DESIGNING AN ACADEMIC READING COURSE FOR FIRST-YEAR MEDICAL STUDENTS DOING BIOCHEMISTRY AT THE UNIVERSITY OF NAMIBIA - CRITERIA, STRATEGIES, EVALUATION AND REFLECTION

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To God be the glory!

Abstract

The need to integrate both content and language instruction in the contexts of English for Academic Purposes (EAP) is widely advocated for. Even though such courses, referred to as Content Based Instruction (CBI), place heavy demands on instructors, they seem to benefit learners in a number of ways. In addition, they have the underlying assumption that the needs of the target audience are considered in all aspects of course development. This would do away with what Hutchinson and Waters (1987, 2009) term ad hoc course development designs. Furthermore, it is generally agreed that reading is a fundamental means of acquiring new information and that there is a strong correlation between reading and academic performance (Grabe and Stoller, 2013). This, as well as the researcher's expertise and interest in academic reading, prompted the development of an English for Specific Academic Purposes (ESAP) reading course, based on principles of CBI instruction, to respond to criticisms against ad hoc course development at the Language Centre (LC) at the University of Namibia (UNAM) in a practical way and not just simply implement theoretical ideologies (Arendale, 2002) or follow the default solution to use remedies that had worked elsewhere, without considering local contexts (Weideman, 2013).

As the LC provides Academic Literacy (AL) support to the entire UNAM student population, a sample of first-year students from the School of Medicine became the target audience for the development of an adjunct reading course. A thorough needs analysis identified the target course as Biochemistry 1 and the target topic as Stereochemistry.

One of the core objectives of this study was to develop a mixed-methods, action research methodological model for the design of academic reading courses for specific subject fields. In doing so, the principles of CBI adjunct course development as suggested by Brinton et al. (1989), as well as suggestions for the development of adjunct courses (Andrade & Makaafi, 2001; Arendale, 2002; Brinton et al., 1989; Evans Commander & Smith, 1995) were considered. In addition, three main prototypes, Hutchinson and Waters (1987; 2009)'s framework for establishing learning needs, Grabe and Stoller's (2011) generic reading framework for conducting action research with the focus on academic reading and

Onwuegbuzie and Dickinson's (2007) 10 step PMARS Process for mixed methods action research were surveyed. By combining relevant elements from these models, but also by addressing certain perceived lacks in the above mentioned prototypes, a generic 17-step model to design academic reading courses for specific fields using mixed methods action research was designed. The model is named Mixed Methods Academic Action Reading Research (MMAARR). Subsequently, a very specific EAP adjunct reading course, comprising of an intensive as well as an extensive component to assist the target audience to cope with the academic reading demands of the target topic, Stereochemistry, was developed, implemented and evaluated. The insights offered here can also be applied to other aspects of academic literacy.

Ten research questions (and sub questions) and one hypothesis were developed to conduct the current research reported on in six phases, namely exploration, needs analysis, setting criteria for developing the new reading course, developing the reading programme, evaluating the reading programme and reflection. By employing pragmatism as a worldview, a more complete understanding of the research problem was aimed for.

Furthermore, the study has contributed to the on-going discussion about the challenges encountered by EAP practitioners that are not content experts. Very little research has been carried out in this regard (Alexander, 2008). To this effect, this study emphasises the need for EAP instructor training, in particular LC instructor in-service training, in order to conduct action research, to design, implement and evaluate EAP courses, in particular academic reading courses. It also underscores the reality that EAP lecturers cannot conduct ESAP courses in isolation and require good collaboration with content lecturers. In addition, no previous study on establishing the reading needs for stereochemistry anywhere in the world could be traced, another reason for the significance of this study. In this process, this study has addressed the mistaken view that science instruction is monolithic.

This research only presents an initial step in finding solutions to LC course development at UNAM, and has been subjected to various limitations. However, the study concludes with several suggestions for further studies, especially in context of the current study.

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CHAPTER 1
INTRODUCTION TO THE STUDY

1.0 Introduction

The main objectives of this chapter are to establish the context, background and importance of the study. In addition, a synopsis of the aims, study objectives and research questions that form the focus of enquiry in this research, as well as data collection methods and procedures, are provided. Thereafter follows a discussion of the limitations of the study, ethical considerations in conducting this research, the definition of important terms and concepts used in this study, as well as an outline of the structure of the dissertation as a whole.

1.1 Background

Academic Literacy (AL), the "academic language and literacy practices required for university courses" (Lea & Street, 2006, p. 370) is an increasingly important area in Applied Linguistics and is taught at tertiary institutions, such as UNAM in English for Academic Purposes (EAP) courses. EAP is a branch of English for Specific Purposes (ESP) (Alexander, Argent & Spencer, 2008; Basturkmen, 2010; Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; 2009). It is a distinctive approach to language teaching that differs from general English Language Teaching (ELT) courses (cf. table 3). While ESP instruction is characteristically practical, it is also "research-based" (Hyland, 2002, p. 386) in nature. Another typical characteristic of ESP teaching is that it is based on the identification of the specific linguistic needs of target groups. Even though it is generally regarded as one of the absolute characteristics of ESP (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000; Strevens, 1988), this aspect also seems to be a much debated topic among ESP/EAP practitioners. For example, concern is raised that EAP practitioners often neglect to address the specific needs of target groups, (Basturkmen, 2006; Basturkmen, 2010; Belcher, 2009; Belcher & Lukkarila, 2011; Dudley-Evans & St John, 1998; 2000; Hutchinson & Waters, 1987; 2009), resulting in "ad hoc" course designs (Hutchinson & Waters, 1987;2009, p. 94).

Another issue that challenges productive ESP instruction at universities (that is, EAP) seems to be the element that this type of instruction tends to move towards general views of academic literacy, emphasising the idea of generic skills and features that are transferable across different disciplines. Lea and Street (2006, p. 368) refer to this as the "study skills model". Consequently, Hyland (2002, p. 391) argues for "putting the S back into ESP" and not to confuse EAP with ELT instruction (cf. table 3). There are proponents of the instruction of broad, universal academic conventions and skills (e.g. Hutchinson & Waters, 1987; 2009) and as such subscribe to the "common core hypothesis" (Bloor & Bloor, 1986, p. 16). However, it would seem reasonable to conclude that, even though there are certain commonalities, specifically regarding reading demands among various academic communities, "scholarly discourse is not uniform and monolithic, differentiated merely by specialist topics and vocabularies" (Hyland, 2002, p. 391). According to Hyland (2002), the abilities to become aware of the purposes of various texts and how these functions are commonly achieved are the fundamentals of becoming literate in one's discipline. Weideman (2013, p.18) regards this awareness as the "typicality" of various academic discourses, for instance, how evidence is presented, as well as stylistic features. This view is shared by that of the New Academic Literacies model (Lea & Street, 2006). More detail regarding this model is provided in section 2.1.1.

Like Hyland (2002), Cheng (2011) argues that broad specialisms, for example, English for Science or English for Business, are too broad to account for individual subject-subgenres, and that each ESP situation is best examined in its own context. These scholars, furthermore, call for more descriptions of the specific disciplinary genres for which students have to read and write. This is especially true in the field of science. Conley (2009) maintains that the field of science has been considered as monolithic, that is to say, the issue that there are various sub-disciplines in each field has been ignored. Weideman (2013, p.17) also shares this belief that academic fields are regarded as having uniform, general AL requirements; however, he raises an essential point by asking, "… how specific do we need to be?" in developing ESP courses. This certainly seems to be an issue of concern to course development at the LC at UNAM (c.f. 1.2). One could address this question from various vantage points, such as obtaining a clear understanding of the options available in developing ESP courses, overcoming challenges

encountered by ESP practitioners and then exploring the concept of AL practices in more detail, with particular reference to academic reading strategy development.

1.1.1 EAP/ESP course development

Perhaps the continuum of ELT course types, as developed by Dudley-Evans and St John (1998; 2000) can be used to put the different ESP courses into perspective. This continuum, as presented in Figure 1, is also useful to illustrate the differences between ELT and ESP courses as it portrays a range of ELT course types, ranging from general (1) to very specific (5).

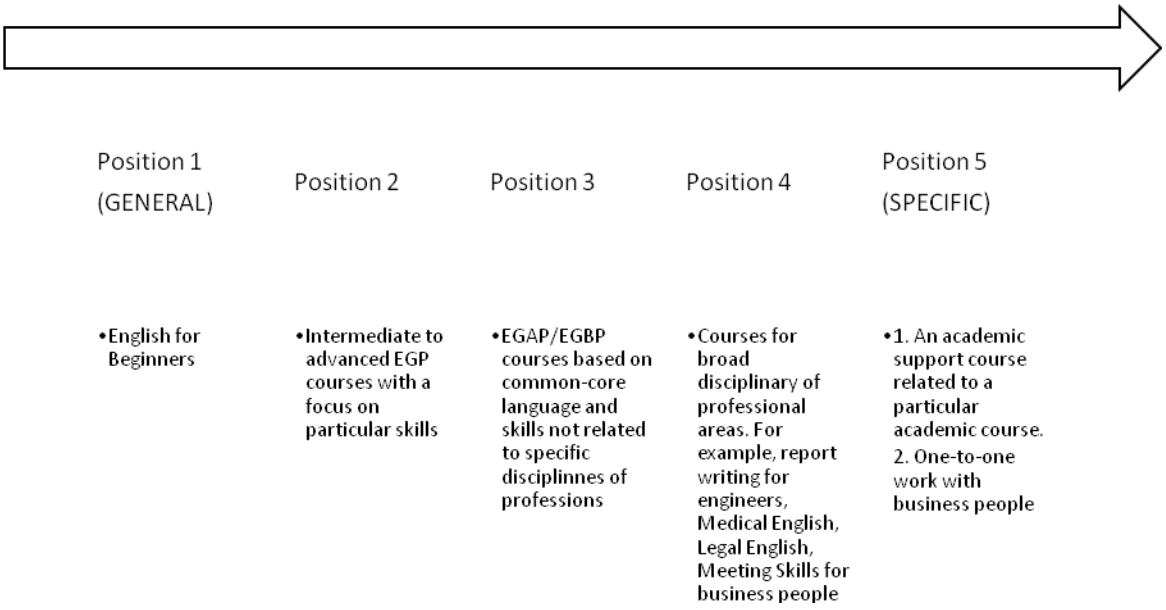

Figure 1: Continuum of ELT course types. Adapted from "Developments for English for Specific Purposes," by Dudley-Evans & St John, 1998; 2000, p. 9.

This continuum, as presented in Figure 1, runs from clearly definable general English to very specific ESP courses. Accordingly, the most specific option is at position 5, where an academic support course is related to a particular academic course. Content Based

Instruction (CBI) seems to be ideal for such purposes. One option to offer CBI instruction at a tertiary institution where the development of AL is crucial, is the adjunct model. As elaborated in sections 2.4 and 2.5, the adjunct model of CBI instruction, also commonly referred to as linked courses, aims at connecting a specially designed language course with a regular academic course (Brinton, Snow & Wesche, 1989; Dudley Evans & St John, 1998; Evans Commander & Smith, 1995). Such courses are taught to students who are simultaneously enrolled in a regular content course, as well as a language course, called the adjunct course (Brinton, Snow & Wesche, 1989; Dudley Evans & St John, 1998; Evans Commander & Smith, 1995). In this way, students are able to apply what they learn in the adjunct course instantaneously to the actual, paired content course (Brinton et al., 1989; Evans Commander & Smith, 1995). Brinton et al. (1989) are of the opinion that such courses seem to be appropriate for adults or young adults with high intermediate to advanced proficiencies levels, and whose overall proficiency is high enough to enable them to handle complex content material. The advantages of attending such courses are well documented, but so are the challenges involved (c.f. 2.5). As such, it is generally concurred that when students are able to perceive the purposes of attending EAP courses, as in the case of adjunct courses, their motivation is increased, which ultimately result in gains in academic literacy practices and content knowledge (Brinton et al., 1989; Dudley Evans & St John, 1998; Evans Commander & Smith, 1995).

1.1.2 Overcoming the challenges experienced by EAP instructors

Alexander et al. (2008) are of the opinion that the documentation of the challenges experienced by EAP practitioners is limited and insufficiently detailed, in general. More details regarding these challenges are elaborated on in section 2.6. One way of overcoming these challenges is to educate EAP instructors in order to fully explore the possibilities EAP instruction can offer (Fadel & Elyas, 2015; Hyland, 2006; Hutchinson & Waters, 1987; 2009), especially for CBI instruction (Snow, 2005). In this way, they would be equipped with a good foundation and knowledge of the theoretical and practical developments in the field and the necessary skills to apply these. This type of education would inevitably imply the exposure of EAP practitioners to various research methods, as well as training. For example, as discussed in section 4.2.2.3, it does not seem as if many EAP/ ESP researchers use mixed methods research that has the advantage of combining

the strengths of qualitative and quantitative research (Creswell, 2014). Rather, qualitative methods are favoured, followed by quantitative methods, as second options (Gollin-Kies, 2014). As it takes skill to employ Mixed Methods Research (MMR), more ESP/ EAP practitioner training in order to facilitate more mixed methods research is recommended (Gollin-Kies, 2014), especially in action research, the design in academic reading research that appears to be dominant (Grabe & Stoller, 2011).

1.1.3 Academic Literacy practices

EAP courses commonly have variables and absolutes (Basturkmen, 2010; Strevens, 1988). One variable characteristic of an EAP course is that it may focus on all four language skills, namely reading, listening, speaking and writing or it may only focus on some or one of these (Strevens, 1988). These four skills are interconnected (Weideman, 2013). In other words, reading and listening skills, also called the receptive skills, contribute to the development of speaking and writing, the productive skills (Grabe & Stoller, 2013; Landi, 2010). A possible writing problem could be a lack of knowledge of all the skills acquired to precede the writing. For example, since writing is a productive skill, students would need to gather academic information, either by listening or reading, the two receptive skills and then make notes and summaries. Afterwards they would need to process the information and analyse it before this new information can be produced, usually in writing, but sometimes also in spoken form. Ignorance of this distinction might lead to a scenario where perceived problems in productive skills may be seen and treated in isolation rather than treating the underlying problems that may stem from incompetence in the receptive skills. As the AL needs of students may vary due to the different academic demands their content subjects make on them, conducting a thorough needs analysis will indicate on which area of AL development EAP courses should focus.

1.1.4 Academic Reading

Jardine (1986) views reading, a receptive skill, as the most important skill required for academic success at university. This view is echoed by various scholars (Aebersold & Field, 1997; Cummins, 2000; Duke, Pearson, Strachan, & Bilman, 2011; Grabe, 2009; Grabe & Stoller, 2011; Krashen, 2003; Landi, 2010; Macalister, 2011; RAND Reading

Study Group, 2002), as information is mainly transmitted in print form via textbooks, the internet, journal articles, study guides and/or notes from lecturers. This knowledge, acquired through the printed word, often mistakenly regarded as a passive process, is then displayed by students in writing when they submit assignments and write examinations or have to do oral presentations. Since academic reading is evidently the vehicle of learning at university, low reading levels may result in low academic performance (Pretorius, 1996; Pretorius & Bohlmann, 2003). Reading instruction should, therefore, be informed by theory regarding all the complexities involved in reading and be deliberate through intensive as well as extensive reading instruction (Eskey, 2005; Macalister, 2011; Nation, 2005; 2007).

More details regarding the complexities involved in reading instruction are discussed in Chapter 3.

1.1.4.1 Research on academic reading

Evidence regarding the importance of developing academic reading strategies among tertiary students is recognised worldwide, and also particularly in the South African context, one of the neighbouring countries with close ties to the Namibian education system (Boakye, 2013; Fouché , 2009; Pretorius, 2012; Pretorius & Bohlmann, 2003; Sebolai, 2014; Venter, 2014), as well as to a limited extent, in the Namibian context (e.g. Murray, 2013; Rickerts, 2000; Willemse, 2006). However, in reviewing the literature on reading research, there seems to be a tendency to focus mainly on improving reading strategies among struggling, at risk readers in order to reduce Matthew effects in reading. The Matthew effect in reading refers to the widening gap between poor and good readers (Stanovich, 1986; 2004). This phenomenon is named after the Bible passage in the New Testament, Matthew 25:29, which states "for unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even which he hath", in other words, the phenomenon that the rich become richer and the poor poorer. As it is established that better readers perform better academically (Pretorius, 2002), it is argued that good readers will continuously outperform their peers who are poor readers. Without assisting the latter to improve their academic reading abilities, the gap between them and their peers, who are better readers, will continue to increase. As a result,

attempts to improve reading ability directly result in increases in vocabulary acquisition, improved grammar, background knowledge, knowledge of texts, genre conventions, reading strategy application by students and indirectly in better academic performance (Pretorius, 2002).

While not disputing the importance of the concept of Matthew effects in reading, Arendale (2002, p. 14) refers to the view that "relies on identification of the high-risk student who is deemed to be deficient or at risk in some way" as being outdated because "attrition cannot be addressed effectively by providing help to only students who show either symptoms or predisposing weaknesses" (Arendale, 2002, p. 14). In other words, the reality is that drop-out of students occurs across various disciplines and not only among those who are classified as poor readers or enrolled for traditionally easier courses. Students who are accepted for traditionally/historically known difficult courses, such as medicine and engineering, require higher admission rates. Arendale (2002) states that such courses could, among others, be identified as requiring students to read vast amounts from difficult sources and to sit for examinations that require the application of high levels of cognition. Other characteristics, according to Arendale (2002), are that student numbers in such courses are large, with little opportunity for student-lecturer or peer interaction, and that class attendance is often optional. As these characteristics are from an American point of view, they should be regarded as mere guidelines in the African, and in particular the Namibian, context.

Linked to the implication that all students require assistance to cope with the linguistic demands of academia is another misconception, namely that learners with higher admission symbols and those enrolled for academically more demanding and challenging programmes, such as medicine, for example, do not need as much assistance to acquire AL as their peers who are enrolled in academically less demanding courses, often as a result of their lower school leaving symbols. Fouché (2009, p. 27) refers to these as the "crème de la crème" who often have adequate financial support, are hardworking and have a strong academic foundation. Similarly, Arendale (2002) reports that these students are often viewed as "different and better than the rest of the institution" (p. 6).

The truth is that all students, not only underprepared students, have AL needs. Students should not be left alone to acquire these skills. The reality is, however, that schools and homes do not adequately prepare learners for AL and higher education (Boughey, 2013). In other words, all university students, even in L1 environments, need assistance to cope with the linguistic demands of academia. This is especially true in the Namibian educational system because many Namibian students are first generation students, coming from academically and economically disadvantaged backgrounds; however, similar to situations elsewhere (e.g. Arendale, 2002), the students at the School of Medicine are generally viewed to be academically better than students in other faculties. One should strongly consider that student AL needs should not be determined by student deficiencies, but rather by the nature and content of the courses they attend. In that way, their practical education needs will be met. These capabilities are especially essential in the case of reading. For example, students arriving at universities may be familiar with the genres of narrative texts through their schooling and everyday experiences. However, many are not equipped to read for their academic courses that require a solid understanding of the structure and demands of expository texts. This implies that attention should not only be given to the development of the cognitive academic language proficiency (CALP) skills (in particular that of the academic reading skill needed by all students), for those students who are perceived to be at risk of failing their courses, but also for those who are enrolled for traditionally difficult courses.

This is especially true for medical students, the participants of this study, for whom "reading is an important component of medical education" (Myerson, Saunders, & Rodeck, 2000). These students have to read extensively, not only to advance through medical school, but also to meet the requirements of the medical profession once they are qualified. An estimated 6 million new medical articles are published each year (Fletcher & Fletcher, 1997). With the advances in research, this number will be increasing annually. If medical students are not skilful and expert readers they will simply not be able to keep up with all the information needed to be successful in their careers. As these students generally do not have much time to read, one should ensure to equip them with the most useful skills in the least amount of time to excel in their studies and to transfer these skills to the essential reading routine that seems to be part of their medical careers. One option that can offer such a possibility is adjunct courses. It would, therefore, make

sense to offer tailor-made EAP courses, (option 5 in Figure 1) that directly address their reading needs. However, as mentioned in section 1.1.2, not all EAP instructors have the training to do so. This issue will again the taken up in sections 2.6 and 3.5.

Linked to the view that all students, irrespective of their admission symbols, require assistance to improve their AL skills, especially in reading, is the difference between the BICS (Basic Interpersonal Communication skills), and CALP, concepts developed to explain the nature of second language acquisition in academic contexts (Cummins, 2000).

1.1.5 Conversational and academic language proficiency

BICS situations are context-embedded and depend on contextual clues that are present in situations where meaning is actively negotiated through feedback and responses, for example, when language is supported by meaningful contextual and interpersonal clues such as eye contact, facial expressions, gestures and intonation in order to construct the meaning of the conversation. Such circumstances are typical of daily oral, informal communication situations inside and outside the classroom that all students encounter. More contextually-reduced situations of communication (CALP) rely on understanding language and linguistic clues to interpret meaning. In other words, context becomes lexicalised and contextual clues decrease or become context-reduced. For example, when reading academic texts, contextual clues decrease while textual clues increase. As such, the individual has to rely on knowledge of the structure of the target language, as well as that of the text, in order to interpret meaning successfully and also within the context presented. It should be noted that in educational contexts, such situations are not limited to reading academic texts, but are also typical of classroom language that can take the form of listening to lectures, having academic discussions, as well as writing academic texts. In oral and written CALP situations, for example, an individual has to rely on his/her understanding of specific words used in academic contexts that are crucial for the exchange to make sense rather than gestures and other interpersonal clues to interpret meaning as in informal situations (Cummins, 2002).

It takes longer for academic language skills (CALP) than for conversational skills (BICS) to develop, and it is important for students to develop the former if they want to succeed

academically. However, there seems to be a common misperception that being able to converse well in a language is an indication that all difficulties in proficiency in such a language have been overcome (Cummins 2000). While it should be noted that increased oral language proficiency could lead to an increase in BICS, but not necessarily an increase in CALP, the reality being that BICS and CALP skills complement each other (Pretorius, 2002). In other words, although CALP is displayed in context-reduced situations, these are developed from the individual's BICS, as support from those experiences make understanding of less cognitively challenging tasks easier (Cummins, 2000). This highlights the importance of activating and applying background knowledge in lessons (cf. 3.2.4). All in all, the BICS/CALP distinction can be used to explain the academic demands made on all university students, (Boughey, 2013), irrespective of their areas of specialisation.

Pretorius (2012) seems to regard academic literacy to be synonymous with CALP development and holds the view that CALP is mainly developed through reading. The conclusion is, therefore, that, besides being proficient in the language of instruction, all university students, even those enrolled in traditionally difficult courses such as medicine, should also have well-developed reading abilities to function at tertiary level. In addition, like Cummins (2000), she maintains that academic literacy continuously needs to be developed because, as learners progress through their schooling, content courses become increasingly more academically challenging and cognitively demanding, requiring more advanced CALP skills development to deal with more abstract and context-reduced language; hence, the need for effective instruction (Cummins, 2000).

1.2 The research context of the current study

Namibia, the setting of the current study, is a multilingual and multicultural country. Even though, as indicated in Table 1, there are thirteen recognised national languages which are used in the educational setting, English is the official language in Namibia and, therefore, the medium of instruction at the University of Namibia (UNAM).

Table 1: Namibian National languages

Namibian languages with official status	**% spoken 1991 census**	**% spoken 2014 census**
Oshikwanyama	50.6	48.9
Oshindonga		
Otjiherero	8.0	8.6
Rukwangali	14.4	13.3
Rugciriku		
Thimbukushu		
Silozi		
Setswana	12.9	11.3
Khoekhoegowab		
Ju/'hoan		
Afrikaans	9.5	10.4
German	0.9	No statistics provided
English	0.8	3.4

(CIA World Factbook, 2015; Maho, 1998)

Since the inception of the Namibian Language Policy after the independence of Namibia in 1992, English was adopted as the official language even though it was, at that stage, the mother tongue of only 0.8% of all Namibians, as depicted in Table 1. As it is further indicated, in 2015, English was the mother tongue of only 3.4% of the Namibian population. Therefore, from the statistics provided in Table 1, it is apt to describe the majority of UNAM students as second language speakers of English. More details about the target group of the current study, first-year medical students at UNAM, is provided in section 4.9.3.

UNAM was established in 1992. At that stage it had a staff component of 313 and on the Main Campus there were 3 639 students. Currently (2015), UNAM employs 2011 staff members at 12 campuses in various regions of Namibia that house 20 975 students in total (UNAM staff reporter, 2016). I have been employed at UNAM since 2001.

Although I have been based at the main campus, I have also lectured at 5 other campuses, inclusive of the campus of the School of Medicine, the setting of the current study.

Following the trend in countries all over the world where English is used to study and teach at universities (Flowerdew & Peacock, 2001), UNAM established the Language Centre (LC) in 1992 "to upgrade University students' competence in English and to provide regular service courses to students in all Faculties" (Chamberlain, 1994, p. 1) with the ultimate purpose, one could argue, to increase student retention at UNAM. Consequently, the LC offers a variety of language courses for non-degree, as well as for certificate, diploma and degree purposes.

One could describe the range of courses offered at the LC as well as what the current study is aiming to do by using the continuum of different ELT course types presented in Figure 1 (Dudley-Evans & St John, 1998; 2000) . As such, the LC non-degree courses could be classified as courses at position 1, while those intended for certificate, diploma and degree purposes, seem to be at positions 2 and 3. Currently no courses at the LC are aimed at positions 4 and 5. The current study is an attempt to develop a course pitched at position 5, following advice offered to develop adjunct courses (as discussed in section 2.5) (Andrade & Makaafi, 2001; Brinton et al., 1989; Evans Commander & Smith, 1995) and also prompted by Weideman's (2013) concern to establish what specific ESP courses should be like. Therefore, the current study explored the processes involved in the development and evaluation of an adjunct reading course for Biochemistry 1 to assist medical students to read stereochemistry, one of the course sections that was identified as the most challenging topic in the course and in which they obtained the lowest score in their 1st semester examination (cf. section Chapter 5). More details regarding this are provided in Chapter 5. A Content Based Instruction (CBI) approach to developing EAP courses was followed. More details regarding the development, implementation and evaluation of this course are provided in Chapters 2 – 8.

The LC does not make use of a placement test and students are allocated to do LC courses for certificate, diploma and degree purposes based on their school-leaving English symbols. The LC offers four courses, CEC (English for Certificate Purposes), ULEG (English for General Purposes), ULCE (English for Communication Skills), as

well as ULEA (English for Academic Purposes), the focus of the current study. The first two are one year courses and meant for students who do certificate and diploma courses respectively, and the last two, one semester each, are intended for those pursuing degrees. A C-symbol in English is the minimum requirement for admission to degree programmes and such students are required to take ULCE in their first-year of studies in semester 1 as a pre-requisite to do ULEA in semester 2. However, students who enter UNAM with A and B symbols in English at the IGCSE level or with a 1, 2 or 3 on the Higher International General Certificate of Secondary Education (HIGCSE) level are exempted from ULCE, and enrol only for the ULEA course. ULEA is a compulsory core course for all students taking degree programmes. The main aim of this course (ULEA) is to offer *general* linguistic support to assist students to cope with the academic literacy demands of their content courses. Consequently, it aims to develop general academic literacy in English for all students, and the course focuses on reading, writing, listening and oral presentation skills for academic purposes.

As will be elaborated on further and in more detail in section 4.9.1, the idea for the current study has taken shape over a number of years, because during my 14 year employment at UNAM, LC course development has always been based on lecturers' intuitions (mine included), and has never been preceded by an in-depth needs analysis, considering the views of various stakeholders. In addition, frequent, albeit vague criticisms, arose from faculties that the LC is not doing its job. Similarly, students, especially those with high school leaving English symbols that exempted them from the ULCE course, often complain that the content of the ULEA course is not very challenging.

My view of the urgency for an "effective, valid, consistent, differentiated, appealing, theoretically defensible, … efficient, accountable" (Weideman, 2013, p. 20) LC course design was further expounded when in 2012, while the current study was already underway, the LC core English modules were assessed and rated, on instruction from our Director at that stage, based on various criteria. Data were qualitatively collected from LC lecturers, students and various faculties and units through interviews; these were presented in the form of summaries for each faculty (Bennet, 2013). The findings for the

various language skills, namely writing, reading, speaking and listening were described in separate sections. The data were not analysed according to specific courses or themes. Only general summaries were provided for each faculty. However, it was pointed out that all faculties reported linguistic lacks among their students in reading, writing, listening and speaking skills. It further transpired that the one area where it was felt that students were lacking was the writing skill, and they seemed to struggle the least with speaking. This seems to be in line with the common perception that being able to converse well in a language is an indication that all difficulties in proficiency in such a language have been overcome through other aspects of language learning (Cummins, 2000) (cf.1.1.6). However, from the summaries it was evident that faculties did not express the same concerns, confirming arguments against generic EAP courses (e.g. Basturkmen, 2010; Hyland, 2002) and evidence that the generic ULEA course might not be appropriate to address the academic literacy needs of all students across the different faculties at UNAM. The latter was explicitly pointed out suggesting that "all faculties identified a need for a special module" (Bennet, 2013, p. 91). Unfortunately, this proposal is yet to be realised.

In 2013, also while the current study was already in progress, as per instruction from the UNAM management, the LC was audited by a panel of 9 academics from 17-19 April 2013 to review the essence of the LC, with particular reference to its "fitness for and of purpose, value for money, customer satisfaction and transformation" (The Centre for Quality Assurance and Management, 2013, p. 3). Self-evaluation reports completed by LC lecturers and interviews with various stakeholders from within the University were used as data collection tools. A total of 22 recommendations were made, but 2 suggestions, specifically related to LC courses and course development were as follows:

Recommendation 3: *There is a need to improve the co-ordination of activities at the Language Centre. For instance there should be a better relationship with faculties where faculty specific language needs can be factored into Language Centre modules and courses…* (The Centre for Quality Assurance and Management, 2013, p. 8)

Recommendation 7: *There is a need to introduce English for Specific Purposes (ESP) to follow English for General Academic Purposes (EGAP). This will address faculty*

specific needs - language of law, language of science, medical English, etc. (The Centre for Quality Assurance and Management, 2013, p. 11)

These recommendations were discussed at a subsequent Language Centre Planning meeting in November 2013, but to date nothing has yet been done to implement these recommendations. Both these recommendations, as well as those from Bennet (2013), underscore the need for urgent attention to consider the specific needs of the stakeholders, as well as the need for some kind of cooperation from the faculties in developing LC courses. One reason for this could be that, in general, it is unclear what the LC courses are supposed to do. The original mandate of the centre, as mentioned earlier (Chamberlain, 1994), appears to be relatively vague as, on the one hand, it does not specifically refer to develop AL skills among students and, on the other hand, it does not specifically indicate what is meant with "service courses". In addition, one could also argue that recommendation 7 from The Centre for Quality Assurance and Management (2013, p. 11) that *There is a need to introduce* ***English for Specific Purposes (ESP)*** *to follow English for General Academic Purposes (EGAP)* suggests a misconception about what exactly ESP courses entail and a lack of understanding that EAP is a branch of ESP, as well as that EAP courses, in turn, can be further divided as either being EGAP or ESAP (English for Specific Academic Purposes) (cf. 2.3.1.1). Another reason for not implementing these suggestions could be as a result of not knowing how to do it.

Even though the Bennet (2012) report suggests that student writing seems to be the most problematic AL skill among UNAM students, Weideman (2013) argues that a writing problem cannot be treated in isolation, as the ability to produce written text depends on proficiency in various other skills, of which the receptive reading strategies is largely responsible for. While a number of academics at the LC are doing academic writing-related research, research into academic reading does not receive the same amount of attention. In the Namibian context academic reading is an under-researched topic. For example, a search in the UNAM library data-base of Masters' and PhD research theses revealed that since 2005, only 8 studies were conducted in the field of reading, 5 exploring some reading-related aspect among primary school Namibian students, none focusing on Namibian secondary school reading and 2 on reading skill exploration among Namibian university students. Of the two Namibian studies that focused on

academic reading, one aimed to assist struggling readers by improving general academic reading abilities among poor readers (Willemse, 2006) and the other aimed to explore reading problems among students in the faculty of Humanities (Murray, 2013). In other words, like other studies explored, the reading needs of students enrolled in traditionally challenging courses (Arendale, 2002), like medicine, in the Namibian context also seem to have been overlooked.

Taking all the above into account, the problem statement, as explained in the following section, was developed.

1.3 Problem statement

Currently a large body of literature exists on academic reading and there are generic reading courses at many universities in southern Africa. Compare for example Basturkmen, (2010); Belcher & Lukkarila, (2011); Boakye, (2013); Boughey, (2013); Carstens, (2009); Carstens, (2013); Fouché, (2009); Jacobs, (2007 (a)); Murray, (2013); Pretorius & Bohlmann, (2003);Rickerts, (2000); Sebolai, (2014); Venter, (2013); Willemse, (2005). However, a perusal and systematic evaluation of existing materials (Belcher, 2009; Hutchinson & Waters, 1987; 2009) showed that relatively little has been written on course design in this field. (This evaluation is presented in detail in section 2.7.3.) Being a staff member of the LC at UNAM, and based on a review of the literature (presented in Chapter 2), I established that there were no suitable examples of reading courses that the LC at UNAM could use.

So far, no attempts have been made at the LC at UNAM to:

- develop and implement EAP courses that are based on a methodological model for course design
- develop and implement EAP courses that take the target and learning needs of students from various faculties into consideration
- develop and implement ESAP courses for specific fields of study

- develop and implement intensive and extensive reading programmes according to the principles and practices of extensive reading
- develop EAP courses in collaboration with other faculties at UNAM.

Two problematic aspects of the courses currently offered by the LC at UNAM are the following:

- the content of all courses, ULEA in particular, has been based on the intuition of LC lecturers
- the content of the present ULCE and ULEA courses are the same for all students from all Faculties.

The lack of serious reflection on the criteria and strategies for developing reading courses for specific purposes lies at the heart of the present research. The rationale and aims of the research are explained next.

1.4 Rationale for the current research

After identifying a gap in the literature (cf. chapters 2 and 3), as well as identifying a real-life concern that is faced (Creswell & Plano Clark, 2011) (as noted in sections 1.1, 1.2 and 1.3 in this chapter), this study was conducted to find specific solutions to respond to criticisms against LC course development in a *practical* way and not just simply implement theoretical ideologies (Arendale, 2002) or follow the default solution to use remedies that had worked elsewhere, without considering local contexts (Weideman, 2013). In my study I explore the processes and challenges involved in developing a tailor-made adjunct reading course for Biochemistry students at UNAM.

1.5 Aims of the current research

The following section details the main aims of the current research.

As applied linguistics is all about the application of theory, the research first of all aimed to explore strategies to develop a methodological model for the design of academic reading courses for specific purposes. In order to reach this aim, a set of research questions and one hypothesis were formulated. The questions unpacked the different

aspects that had to be researched. Research questions 3 to 10 built on the answers to research questions 1 and 2, as indicated in section 1.6. This process emphasises the cyclical nature of action research and the necessity of the various phases that were employed in this research.

The second aim of the study was to use this model for the design of an ESAP reading course.

1.6 Research questions

In this section the different research questions that formed the basis of inquiry for the current study are introduced. It should be noted that a multiphase mixed method design was employed in this action research study (cf. 4.3) that comprised of various cycles. As a result, pragmatism, the inclusion of both qualitative and quantitative data, was the chosen research design (cf. 4.1.1.3) and resulted in the current study having 10 research questions and 1 hypothesis. All research questions could not be determined at the start of the current study, but emerged over time as the different strands were collected concurrently and sequentially. Table 2 (p.31) sums up how the research questions and hypothesis were addressed

Research Question 1

In what subject did first-year students from the School of Medicine at UNAM need more assistance?

Research question 1 dealt with the identification of the target subject, a critical aspect of an adjunct programme. It was especially important to determine the target subject as early as possible as it would form the focus of the adjunct. The identification of the target subject comprised three components, as represented by the three sub-sections, research questions 1a, 1b and 1c (see table 2).

(a) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by informal interviews with students?

(b) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by their questionnaire responses?

(c) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by informal interviews with students concerning their 1st semester examination results?

Research question 2

In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance?

Other than AL interventions for high risk students, a key element to adjunct courses is the identification of high risk course sections (Evans Commander & Smith, 1995); hence, the need for research question 2. For more certainty, the views of the students, as well as those of the content lecturer, had to be obtained. As a result, research question 2 was further subdivided as follows:

(a) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance as revealed by the questionnaire responses of students?

(b) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance as revealed by the content lecturer of the target subject?

Research question 3

Who are my students and what are their literacy backgrounds, reading habits and attitudes towards reading?

Research question 3 was developed to analyse the learning needs of students. In other words, it provided the language learning information about the effective ways of learning the skills and language. It is the process in which various types of information about the learners is gathered.

Research question 4

What are the academic vocabulary levels of first-year students from the School of Medicine at UNAM?

Research question 4 was developed to determine the vocabulary levels of students in order to supplement data to establish the learning needs of the target group.

Research question 5

What are the academic reading needs of students who are enrolled for the target subject?

Research question 5 dealt with determining the academic reading needs of students in the target group, in other words, their needs. In the process, their wants were also established by combining quantitative and qualitative data. This comprised three components, as represented by the three subsections, research questions 5(a), 5(b) and 5 (c).

(a) What are the academic reading needs of students who are enrolled for the target subject, according to their own point of view?

(b) What are the academic reading needs of students who are enrolled for the target subject, according to the view of their content lecturers in 2012 and 2013?

(c) What are the academic reading needs of students who are enrolled for the target subject, according to a reading expert?

Research question 6

To what extent does the content of the generic ULEA course cater for the academic reading needs of first-year students from the School of Medicine at UNAM?

As part of the target needs analysis, namely to determine the lacks of the target group, research question 6 was developed to determine to what extent the content of the generic ULEA course caters for the academic reading needs of students from the School of Medicine at UNAM. First it was important to establish if the reading component of the generic ULEA course caters for the academic reading needs of all their content courses, in general, and then it was necessary to establish if it catered for their academic reading needs for Biochemistry 1, and in particular, stereochemistry. (This subject and topic within the target subject were identified as the answers to research questions 1 and 2 above.) Hence, the development of research questions 6(a) and 6(b) respectively.

(a) To what extent does the content of the generic ULEA course cater for the academic reading needs of 1st year students from the School of Medicine at UNAM, in general?

(b) To what extent does the content of the generic ULEA course cater for the academic reading needs of 1st year students from the School of Medicine at UNAM who are enrolled for the target subject?

Research question 7

What are the possible criteria for the design of academic English reading courses for specific purposes?

Research question 8

What are the criteria against which such a course may be assessed?

Research question 9

How effective was the new reading course?

Course evaluation is an indispensable part in establishing the effectiveness of a course, in other words, determining how much the learners have learnt and how well the course is fulfilling the need the EAP course addressed. Research question 9 was, therefore, subdivided as follows:

(a) To what extent did the intensive reading component of the new reading course meet the expectations of students?

(b) To what extent did the extensive reading component of the new reading course meet the expectations of students?

(c) Did the students in the intervention group outperform those in the control group in the stereochemistry test (the topic that was identified as the answer to research question 2) that was written at the end of the new reading course?

Research question 10

Self-reflection is a critical aspect of research, in particular action research. In order to address one of the aims of the study, research question 12 was developed as follows:

What are the challenges experienced by an EAP course developer who is not a content expert?

Hypothesis

Research question 9 (c) was formulated as the following hypothesis:

Hypothesis 1

H1

After a 10 hour reading intervention programme, there will be a significant difference in the test scores of the intervention group compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Null Hypothesis:

After a 10 hour reading intervention programme, there will not be a significant difference in the test scores of the intervention group compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

1.7 Data collection procedures

The researcher aimed to make a significant contribution to LC course development in her current workplace where a problem was identified. A mixed methods action research approach, namely a multiphase design, was employed and the 6 phases of the research project were conducted over time (Creswell & Plano Clark, 2011). These phases were to determine the criteria against which the course could be developed. It would also determine strategies to be implemented in addressing the problem that was identified (see section 1.3), how such a course could be evaluated and, to finally, reflect on the project. As a result, 16 steps were conducted iteratively (see figure 8). Throughout the various stages qualitative, as well as quantitative, data were collected concurrently as well as sequentially in the different phases of the design, by using a variety of data collection tools Onwuegbuzie & Collins, 2007). Due to the nature of this study, some participants and respondents had identical sample relationships and were involved in both qualitative and quantitative phases of the study. The reason for using a multiphase design was to meet the overall objective of the study through projects that developed over time with many phases; hence, the need for an approach that combined convergent, explanatory as well as exploratory, mixed methods (cf. 4.2.3). It is important to note that this was not intended to be an intervention study and, although some students may have improved their performances in stereochemistry, the topic in biochemistry that was paired in the

adjunct and academic reading, these improvements were not the focus of the study. Several audiences, such as researchers, policy makers, administrators, instructors, providers and others will benefit from the inferences that can be made from this study.

The following tools were employed to collect quantitative data:

- Self-developed, closed questions in 6 questionnaires;
- Student records;
- Nation's standardised vocabulary levels test;
- An adapted stereochemistry test from the biochemistry textbook and biochemistry class notes.

The following tools were employed to collect the qualitative data:

- Self-developed open-ended questions in 6 questionnaires;
- Informal interviews with students and one lecturer;
- Text analysis of the biochemistry text book and lecture notes;
- Observations of biochemistry lessons;
- A research journal kept by the researcher.

Table 2 summarises the different stages and steps involved in the Mixed Action Academic Reading Research Model (MMAARR) and how they were conducted in order to answer the different research questions. It also indicates the data collection tools that were employed to answer each question. More details regarding each of these research questions, the data collected and, the stages and steps employed are presented in the chapters that follow.

Table 2: Summary of data collection procedures of the current study

Research questions (abbreviated)	Data collection tools	Phases	Steps in MMARS
		1.Exploration.	1.Identify issue to investigate.
			2. Obtain ethical clearance.
			3.Form collaboration with key stakeholders.
			4.Review the relevant literature.
			5.Formulate research questions and or hypotheses.
			6.Specify the type(s) of data to collect.
			7.Develop data collection tools.
			8.Pilot data collection tools.
1.Establish target subject.	Interviews; Questionnaire; Student records; Vocabulary levels test; Text analysis; Classroom Observations.	2.Needs analysis.	9.Narrow the focus of enquiry. 10. Analyse and evaluate target and learning situations.
2.Establish target topic.			
3.Establish students' profile.			
4.Establish academic vocabulary levels.			
5.Establish academic reading needs for target subject .			
6.Generic ULEA evaluation.			
7.ESAP reading course design criteria.	Literature Review	3.Setting criteria for developing the new reading course.	
8.Evaluation criteria for new reading course.			
		4. Developing the new reading programme.	11.Design data-driven action. 12. Implement data-driven action.
9.Evaluate new reading course.	Questionnaire; Student records; Stereochemistry test.	5.Evaluating the new reading programme.	13.Evaluate the course and results. 14.Monitor the course and results.
10.EAP instructor challenges.	Research journal	6.Reflection.	15.Reflect on insights. 16.Share insights with colleagues. 17.Share insights with academic community.

1.8 Limitations of the study

One of the limitations of the study is the issue that the empirical portion of the study encompassed a single group of participants which included only students from the School of Medicine. The research site represents only one of the twelve UNAM campuses, and inferences regarding the academic reading needs of the students on this (the medical) campus, cannot be generalised to other students at other campuses. This was, however, beyond the researcher's control as efforts were made to include other students doing Biochemistry 1 from other campuses, but no cooperation was received from the respective lecturers.

Another limitation is that this study only deals with academic reading proficiency and not with writing, listening and speaking that are also important AL skills. As elaborated in section 1.1.3, these skills should not be viewed as separate, but they should be instructed in an integrated way. This limitation, however, was also a necessity, as including the other skills would have resulted in a study too broad for the scope of this research. Perhaps a follow-up study could be done to cater for a study of such a scale and nature.

The fact that the researcher of the current study was also the lecturer of the students who formed the research population could possibly also be a limitation. However, as this was an action research project, it was unavoidable.

A final limitation could also be the fact that non-participating students could only receive copies of the intensive reading booklet and not of the one used for extensive reading. However, as explained in section 7.2.2, this was due to copy right issues.

1.9 Ethical considerations

This study, as suggested by Creswell (2014), was one that comprised a *beneficial* research problem. In other words, it also benefitted individuals being studied and did not have the sole purpose of assisting the researcher with finding answers to the research questions.

In order to ensure that all participants, not only the ones that participated in the adjunct reading course, could benefit from the course (Grabe & Stoller, 2011), the intensive reading course information was e-mailed to the entire research population after the adjunct course was presented. In addition, the lecture venue where the adjunct took place had a balcony, and any student who was not part of the adjunct was free to view the lessons from there.

Participant anonymity and confidentiality were promised and informed consent was obtained at the onset of the study (Dörnyei & Taguchi, 2010; Grabe & Stoller, 2011). As suggested by Leedy and Ormrod (2013), personal information was requested and respondents were informed about the possibility that they may be contacted in a follow-up phase of the study.

Permission to conduct research was also obtained from relevant stakeholders. Because of official requests, the aims, research design, methods of research as well as the importance and relevance of the study to UNAM (Dörnyei & Taguchi, 2010), were outlined. In addition, the purpose of the study was fully disclosed (Creswell, 2014).

Informal interviews were conducted only with participants that signed the consent forms, with the exception of one student. Between 2011 and 2012, prior to the 1st semester of 2013, the researcher regularly had informal discussions with ULEA students from the School of Medicine. One of the aims was to determine qualitatively the subject that they struggled with the most, in other words to answer research question 1 (a). The aims and objectives of the current study were explained to them in detail. As detailed in section 5.2.3.1, while I was conducting the main study, I happened to sit next to a student who was repeating the Biochemistry course (in 2012) and spontaneously asked him about the reasons for having failed the course. Since there was no time for a consent form to be signed, I informally reminded the student of the purpose of my research and also promised complete confidentiality.

Other ethical concerns (see Creswell, 2014) are that during the research, one should respect the research site and disrupt it as little as possible. As a result, much care was taken not to intrude during lesson observations with video camera recordings and, in so doing, interrupt the lecturer. As far as possible all participants in this study were treated

with respect and care was taken not to cause any participants any risk, harm, distress or disadvantage – considerations that are especially relevant in action research, as suggested by Burns (2011).

One more issue regarding good ethical practice when conducting this kind of research should be mentioned here.

As is typically the case in action research, the researcher was part of the research process — she was also the lecturer of the student participants. Although ideally, informed consent should also have been obtained by a disinterested third party in order to protect research participants, this was not required by the committee who granted ethical clearance for the study.
As stated clearly in the letter of informed consent, any participant could withdraw at any stage from the research. That none did so, can be regarded as an indication that no student felt disadvantaged or at risk because of the research.

1.10 List of abbreviations of terms and concepts

AL: Academic Literacy

ESP: English for Specific Purposes

EAP: English for Academic Purposes

EST: English for Science and Technology

EMP: English for Medical Purposes

EGAP: English for General Academic Purposes

ESAP: English for Specific Academic Purposes

UNAM: University of Namibia

LC: Language Centre

CBI: Content Based Instruction

CEC: English for Certificate Purposes

ULEG: English for General Purposes

ULCE: English for Communication Skills

ULEA: English for Academic Purposes

CALP: Cognitive Academic Language Proficiency

BICS: Basic Interpersonal Communication Skills

QUAN: Quantitative

QUAL: Qualitative

MARS: Mixed Action Research Studies

MMARS: Mixed Methods Action Research Studies

MMAAR: Mixed Methods Academic Action Reading Research

SCLT: Sustained-Content Learning

TENOR: Teaching of English for No Obvious Reason

TALL: Test for Academic Literacy Levels

ER: Extensive Reading

SSR: Sustained Silent reading

DEAR: Drop Everything And Read

FVR: Free Voluntary Reading

OOS: Out OF School programmes,

USSR: Uninterrupted Sustained Silent Reading

1.11 Organisation of thesis

Because this study combines two broad fields in applied linguistics, namely ESP and Academic reading, the literature review is also divided into two chapters. Chapter 2 starts with a discussion of academic literacy in general and then links this discussion to ESP and EAP course development. Thereafter, various options for EAP course development are explored and the rationale for selecting an adjunct approach to EAP instruction, as

well as the challenges instructors may experience, is explored. The final part of Chapter 2 extensively explores the literature to provide a comprehensive account of the criteria, stages and strategies involved in developing, implementing and evaluating EAP courses, with particular reference to those that focus on the development of academic reading as a skill.

In Chapter 3 the development of academic reading is explored in more detail. The chapter starts with a possible definition of academic reading and explores theories of reading that highlight the importance of background knowledge in academic reading. Thereafter, the importance of proficient reading strategies among university students, in particular science and those studying biochemistry, are explored. In the last part of Chapter 3 a methodological for the development of EAP reading strategies are discussed in order to examine important aspects to be included in an ESAP reading course. Together, Chapters 2 and 3 deal with informing the development of Stage 3 of the study, namely, setting the criteria to design the course.

Chapter 4 provides the methodology of the current study. It is divided into two main parts. In part A, a review of the literature on research methodology, especially as applied to mixed methods and action research that are applied in the current study, is provided in a contextualised way. In the process, various data collection methods and procedures are considered. In part B, Phase 1 of the current study, namely the investigation and exploration, is described.

Chapter 5 describes Phase 2 of the study, namely the needs analysis stage, as well as the discussion and interpretation of the results that were used to set the criteria for development of the new reading course. This is detailed in Chapter 6, in which Phases 3 and 4, the setting of criteria to develop the new reading course, as well as the development of the new reading programme, are elaborated.

Chapter 7 is divided into two parts. Part one discusses the evaluation of the new reading course that represents Phase 5 of the study, and in part B, my experiences as an EAP course designer who is not a content expert are summarised, representing Phase 6 of the current study.

Chapter 8 represents a synopsis of the mixed-methods action research methodological model for the design of academic reading courses for specific subject fields (MMAARR) that this study developed. It details the development and the subsequently stages involved in the application of such a model.

In Chapter 9, which is the concluding chapter, a general overview of the study and its findings are provided. It also defines the significance and the limitations of the study and concludes with possible suggestions to improve course design practices in general, but at UNAM in particular. Suggestions for further research are also provided.

1.12 Conclusion

The purpose of this chapter was to provide a brief overview of the context for this study. The problem statement, the aims of the research, research questions, research plan, ethical considerations, definition of terms as well as an overview of the structure of the thesis were provided.

CHAPTER 2

ENGLISH FOR ACADEMIC PURPOSES COURSE DESIGN

2.0 Introduction

Since the MMAARR model has the development of specific English academic purposes in mind (cf. chapter 1), Chapter 2 aims to provide a comprehensive account of the literature relating to the considerations in the design, as well as the implementation and evaluation, of English for Academic Purposes (EAP) courses that aim to develop Academic Literacy (AL). In order to contextualise the study, it starts with defining AL, and then also explores the differences between general ELT and EAP courses.

At the UNAM Language Centre (LC) the majority of the UNAM LC lecturers are trained ELT professionals. In practice the differences between ELT and EAP course design, teaching methodologies, as well as evaluation, are often blurred. This situation is further compounded by the fact that the same lecturers often teach all the different courses at the LC, as represented by positions 1-3 in the continuum presented by Dudley-Evans and St John (1998; 2000) (cf. Figure 1. 1.1.1). Next, EAP, a branch of ESP (English for Specific Purposes) will be explored by considering contentious issues, as well as different approaches. Then the adjunct model of instruction, which forms the focus of this study, will be introduced. In the last section of this chapter issues related to EAP course design, as well as the various stages, such as needs analysis, syllabus development, materials development, teaching, methodology, as well as course evaluation, will be explored.

Chapter 3 will focus mainly on reading skill development in the EAP classroom, as the current study combined principles from AL and EAP course design to develop an ESAP reading course for Biochemistry 1 students from the School of Medicine at UNAM. More details about the structure of Chapter 3 will be provided in the introductory section (cf. 3.1).

2.1 Academic literacy

Research on academic literacy has been on-going for more than 20 years (Lillis & Scott, 2007). While language proficiency generally refers to the degree or skill with which a person can read, write, speak or understand a target language (Richards, Platt & Platt, 2002) in a real situation (Sabet & Daneshvar, 2010), a casual definition of academic literacy could be the particular practice of applying these skills in academic contexts (Carstens, 2013; Fouché , 2009; Lea & Street, 2006; Marshall, Conana, Maclons, & Herbert, 2011; Pretorius, 2012; Sebolai, 2014; Weideman, 2013; Willemse, 2008). However, such a definition seems to provide only a superficial account of what true, academic literacy entails, mainly due to the common misperception that the ability to converse well in a language is an indication of absolute proficiency. To exemplify this conception, Cummins (2000) posited a model of language proficiency as a result of conducting research in bilingual education in Canada in the 1970's and 1980's. Consisting of two interconnecting axes, with the horizontal axis describing the amount of contextual support available for making meaning in language use, and the vertical axis signifying the cognitive demand model, it resulted -in the development and distinction of two important concepts, BICS (Basic Interpersonal Communication skills), and CALP (Cognitive Academic Language Proficiency) to explain the nature of language acquisition in academic contexts (cf. 1.1.5).

This BICS/CALP distinction can be used to explain the academic demands made on university students as far as academic literacy is concerned (Boughey, 2013). Besides being proficient in the language of instruction (BICS), university students should also have well-developed cognitive abilities in order to function at tertiary levels, as well as in social contexts (CALP). The implication is that university students need to acquire the skills for CALP. Pretorius (2012) seems to regard academic literacy as synonymous with CALP. However, like Cummins (2000), she maintains that academic literacy continuously needs to be developed because, as learners progress through schooling, the cognitive demands of their courses increase and they are required to use more abstract and less context-embedded language (CALP) in order to construct meaning, an important result of effective teaching (Cummins, 2000).

As mentioned in Chapter 1, UNAM does not employ a test to measure the academic literacy levels of students. However, internationally there seems to be a tendency to do so. In the South African context, most universities require entry-level students to write such tests (Cliff, Ramaboa, & Pearce, 2007; Weideman, 2013). Cliff et al. (2007, p. 33) perceive the essence of being academic literate to, at a minimum, be able to show the abilities of "what it means to read for meaning and argument; to pay attention to the structure and organisation of text; to be active and critical readers, and to formulate written responses to academic tasks that are characterised by logical organisation, coherence and precision of expression". Weideman (2013) provides a similar synopsis of what it means to be academically literate, hence the observation (Pretorius, 2012, p. 77) that "it is the ability to access and understand information from *written* sources rather than oral sources that accounts for success in the formal learning context". Similarly, Grabe (2009) regards reading as crucial to develop Second Language (L2) abilities to a point at which advanced academic curricular goals can be achieved. In other words, reading does not simply play *an important* role in developing academic language skills, it is a fundamental skill to develop CALP and as a result, AL skills, among students. The implication is that explicit attention should be given to foster reading acquisition at the university. This issue will be taken up again in Chapter 3.

2.1.1 Theorising academic literacy

Studies on academic literacy responds to the diverse student populations at universities and consider the complexity of contexts. It "is the extent to which *practice* is privileged over *text"* (Lillis & Scott, 2007, p. 10). In other words, language is no longer seen as merely a linguistic object, but rather as practices. As a result, academic writing, a productive language skill (cf. 1.1.5), that has so far been the focus of most research in academic literacy (Lillis & Scott, 2007; Paré, 2014), is seen as a "social practice" (Lillis & Scott, 2007, p. 11). This implies that language is linked with what individuals do with it in various situations and cultures. Such an approach is "*transformative* rather than *normative"* (p.12) and "*discourse community* replaces *audience*" (Paré, 2014, p. 89). A transformative approach aims to explore how meaning is created in complex, authentic situations that is usually marked with mutliple student-instructor roles, diverse student

populations and various sub-disciplinnes, such as in the current study . A normative approach, on the other hand, assumes a clear role distinction between instructor and students, uniformity among students, fields that remain unchanged and also that there is unidirectional disciplinnes with (Lillis & Scott, 2007). Such studies draw on a number of traditions, such as the New Literacies Studies, critical discourse studies, sociology of knowledge (Lillis & Scott, 2007), Rhetorical Genre Theory (Paré, 2014).

There seems to be three coinciding models of academic literacy within higher education, each model capturing the other and becoming increasingly more intricate. These are the study skills, the academic socialisation, and the academic literacies models (Lea & Street, 2006). The study skills model, like the normative view (Lillis & Scott, 2007) focuses on the superficial qualities of a language, and regards academic literacy as a list of transferable generic skills that all disciplines seem to have in common. As a result, this view assumes that students are able to transfer knowledge from one academic context to the other without any problems. The academic socialisation model relates to the initiation of students into the new customs of academics, into discipline and subject-specific discourses and genres in a superficial, stable and unquestionable way (Marshall et al., 2011), while the academic literacies perspective aims to explore how knowledge is created in any specific academic environment, the role-players involved, as well as the variations that may develop. These last two models seem to be based on the transformative view of academic literacy, as previously outlined (Lillis & Scott, 2007).

According to Marshall et al., (2011), the study skills model perspective seems similar to the common trend in South Africa to teach such skills in English for Academic Purposes and Academic Literacies models. Comparing this to the continuum presented in Figure 1 (cf. 1.1.1), one could conclude that this, too, seems to be true of LC course development at UNAM. Finally, it is important to note that the three models are not mutually exclusive, and all three can be applied to guide curriculum development, instructional practices and research (Lea & Street, 2006).

2.1.2 Influences on development of academic literacy

The reality is that most students "cross boundaries" (Hyland, 2002, p. 389) during their studies. In other words, they are not only introduced to the academic literacy requirements and culture of their major disciplines, but to a multitude of others as they usually take additional courses outside their main field of study. In the process, students are exposed to the various academic literacy practices of all the academic disciplines they encounter. They also typically have discussions with peers and other academics. In other words, they are exposed to various academic or "academic sub-genres" (Jordan, 1997; 2009, p. 249) or "academic discourse communities" (Alexander et al., p. 6, 2008). As each such community is made up of academics who share a particular discourse and ways of representation and thinking, students should be made aware of this and be equipped with skills to realise that literacy is relative to the beliefs and practices of various academic disciplines, as proposed by the academic socialisation model (Lea & Street, 2006).

In addition to considering the influences of various values and ways of knowledge construction in the subject areas and disciplines, one should take cognisance of the roles that literacies acquired at schools and homes play in AL development. Boughey (2013) points out that it is often mistakenly assumed that schooling prepares students for higher education. In addition to exploring this background about students, it is further argued that questions should also be asked about the role of the home in supporting academic literacy development. While the mastery of academic literacies are increased if school- or home-based literacies support and affirm these, optimal mastery of academic literacies is achieved if both school- and home-based literacies support and affirm these (Boughey, 2013).

Four important observations can be drawn from this discussion of academic literacy. Firstly, academic discourse is a new discourse to ALL students, one they need to appropriate if they wish to succeed. Secondly, as AL demands of various academic disciplines do vary, it would make sense that students first need to be introduced to the AL practices of their individual fields of studies. Thereafter they also need to be made

aware of those of the other disciplines they are also exposed to. Thirdly, the academic demands on students increase as they progress through their years of schooling. Therefore, AL, and by implication CALP, should continuously be developed. Fourthly, lecturers should not assume that schools and homes have adequately prepared students to acquire AL. Therefore, contrary to the tendency to neglect students with higher admission symbols and who are enrolled in traditionally difficult courses at university, as observed in section 1.1.6, all students should be assisted to acquire these skills as the role of the AL or EAP practitioner is to assist all students to become part of their different academic discourse communities through the most effective methods (Hyland, 2002; Jordan, 1997; 2009).

At UNAM, academic literacy courses are taught as EAP courses. EAP developed from ESP, which "is centred on the language and activities appropriate to certain disciplines … stressing students' target goals" (Hyland, 2002, p. 386). As such, EAP is that strand of ESP that is specifically concerned with the communicative needs and practices of that social group who is required to use English for study purposes in formal, education settings. Alexander et al. (2008) describe EAP as the teaching of academic discourse in the English language with a key purpose where "every minute of teaching and learning has to count, and the rationale for every activity has to be clear" (Alexander et al., 2008, p. 18). In order to fully grasp this definition, it seems crucial to, firstly, consider the origins of ESP, the differences between general English teaching, and finally all the considerations to take into account to ensure that EAP teaching is truly one that has clear objectives in mind, in other words, teaching with purpose.

2.2 English for Specific Purposes

Being part of the Languages for Specific Purposes (LSP) development (Dudley-Evans & St John, 1998; 2000), ESP draws on a range of interdisciplinary influences, but seems to have its closest connection to Applied Linguistics (Hyland, 2002). The latter is the academic field which connects knowledge about language to decision-making in the real world in a practical way, through finding, as well as attempting to find, local solutions that are often partial and temporary to language-related problems (Davies, 2007; Dudley-Evans & St John, 1998; 2000; Simpson, 2013; Strevens, 1988). ESP is distinguished from

other branches of Applied Linguistics and language teaching mainly due to its practicality and flexibility that reflect the methodology of the disciplines and professions it serves. This is an indication of the authentic exploration and collection of information about the language, discourses, contexts of use, as well as the particular needs of target groups (Belcher, 2009; Johns, Paltridge, & Belcher, 2011b).

The following section will briefly review the various stages in ESP development.

2.2.1 Stages in ESP development

Hutchinson and Waters (1987; 2009) state that the growth of ESP, from its start to where it has become central to English language teaching as it is today, was stirred by three central factors. Firstly, to suit the particular demands and needs of users of English, secondly, due to a transformation of ideas about language and, thirdly, as a result of new ideas about learning. Based on these factors, ESP developed in different stages, at different paces in different countries around the globe. A review of the literature has identified six prominent stages of ESP development, namely register analysis, discourse/rhetorical analysis, targeting situational analysis/needs analysis, skills and strategies analysis and the learning-centred approach, as well as genre analysis. Each of these reflects specific teaching methodologies (Benesh, 2001; Dudley-Evans & St John, 1998; 2000; Flowerdew, 2011; Hutchinson & Waters, 1987; 2009; Jordan, 1997; 2009).

While scholars agree that there were different stages (and methodologies) in the development of this field, not all agree on the number or the different stages. In an attempt to reconcile different viewpoints, Dudley-Evans and St Johns (2000, p. 30) state that "there is now acceptance of many different approaches and a willingness to mix different types of material and methodologies". In the same vein, Johns et al. (2011b) advise that what is important to note is not how many phases there were in ESP development, but that there were distinct phases that dominated the approaches to teaching ESP, and that currently no specific movement dominates. Consequently, pedagogical practices should not directly be influenced by any pre-determined ESP stage or methodology, but by research within a specified context (Johns et al., 2011b). In fact, as Hutchinson and Waters (1987; 2009) and Jordan (1997; 2009) concur, the ESP practitioner should appreciate the different ways in which each of the different stages

shed light on the same phenomena. In other words, it is often necessary to take an eclectic approach, combining elements from various phases of ESP development, in order to determine what works best in a specific ESP classroom.

As a result of the variation among target groups, various ESP courses exist, each denoting the specific communicative needs and practices of an individual and/or social group, for example, English for Occupational Purposes, English for Business Purposes, English for Medical Purposes, English for Academic Purposes and the like. Due to the context of this study, English for Academic Purposes as a branch of ESP, will be elaborated on in the following section.

2.3 EAP as a branch of ESP

Even though the first documented use of the term *English for Academic Purposes* seems to have been in the early 1970's (Jordan, 1997; 2009), the teaching of EAP has dominated the early life of ESP (Dudley-Evans & St John, 1998;2000) which started in the early 1960's (Hyland, 2002). Since then, EAP has developed rapidly on a global scale in a range of settings, resulting in a variety of EAP courses. For example, EAP courses can include all four language skills (reading, writing, listening and speaking) or focus on some or only one, depending on the needs of the target population (Basturkmen, 2010; Dudley- Evans & St John, 1998; Strevens, 1988). Grabe (2009) maintains that the development of ESP (and by extension, EAP), increased the need for students to be able to read effectively in English in order to access information and excel academically as reading proficiency in English assists with the attainment of academic, curricular goals (Grabe, 2009; Swales, 1988). This is probably why, in 1989, it was maintained that ESP and EAP researchers and theorists customarily concentrated on assisting the target group to read English in technical or specific academic fields (Barnett, 1989). More details about the importance of the reading skill will be provided in Chapter 3.

While it is a widely accepted view that EAP is a branch of ESP (Dudley-Evans & St John, 1998;2000; Jordan, 1997;2009; Hutchinson & Waters, 1987; 2009), denoting a "parent to child" relationship (Hamp-Lyons, 2011, p. 89), there is also a view that EAP

and ESP are regarded as "sister fields" (Hamp-Lyons, 2011, p. 89) that developed at the same time, responding to the different needs of their various clients. According to this latter view, ESP seems to have responded to the needs of people from non-English speaking countries to develop basic English language skills for trade purposes, while EAP responded to the needs of the increasing number of international students, focusing on academic contexts and audiences. However, for the purposes of this study, the view that EAP is a branch of ESP and that EAP and ESP share the same characteristics will be taken.

As previously indicated, a range of English courses are taught at the LC at UNAM, ranging from general ELT to EAP courses. However, it seems as if the differences between these types of English courses are not always clear at this LC. As a first step to EAP course development at the LC, the differences between ELT and EAP courses will be explored in more detail next.

2.3.1 General ELT vs. ESP

Regarding the differences between general English Language Teaching (ELT) and EAP, Alexander et al. (2008) are of the opinion that general English teaching is a fallacy as each ELT situation is contextualised, while Hutchinson and Waters, (1987;2009, p. 53) are of the opinion that there is "in theory nothing, in practice a great deal". To this extent, several researchers offer specific differences between ELT and ESP courses, (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000; Hutchinson & Waters, 1987; 2009; Strevens, 1988). Alexander et al. (2008) provide a comprehensive summary, outlining specifics between ELT and EAP in terms of the teaching context, the people involved, as well as the teaching and learning content. These differences are presented in Table 3.

Table 3: Differences between general English teaching (ELT) and EAP

Context	ELT	EAP
What drives the syllabus?	Level driven: the main focus is what a student can or cannot do.	Goal driven: main focus is on goals, often in relation to a specific academic course
Time available	Relatively flexible; student may opt in and out of ELT at various points in adult life with different motivations.	Not flexible; time is strictly limited and an EAP course is probably a 'one-off' endeavour for a student.
What is at stake for the student?	Mostly personal achievement or certification of the language level attained; not necessarily involving high stakes	Mostly the only relevant outcome is entry to or successful completion of university study. Failure is costly in time, money and career prospects.
People		
Student motivation	Varied and general.	Specific.
Instructors	Predominantly graduates from humanities, English, linguistics or European languages.	Attracts a number of graduates in evidence-based academic disciplines too.
Teacher-student roles	Unequal: instructors are seen as language experts and students as language novices.	Instructors and students are more equal; both are learning about the academic community.
Teaching and learning content		
Language content (grammar and vocabulary)	Potentially, the totality of the English language is possible content. Usually, students need to be equipped for a wide range of communicative situations.	Content is limited to academic discourse, e.g. emphasis on academic style, academic vocabulary and associated grammar and discourse structures.
Language skills balance	Speaking and listening are usually given more importance than reading and writing. Exams or students may determine the weighting given.	The main emphasis is on reading and writing. Some EAP students have a specific need, such as academic reading or writing for publication.
Materials	Texts and tasks are often chosen for self-expression and are usually short and quickly covered; personal response and creativity valued.	Texts and tasks are drawn from degree study. They are for communicating, informing and are inherently long and dense. Clarity and objectivity valued in student writing.
Text choice	Texts often from entertaining, easily accessible genres.	Text choice is based on academic genres.
Text exploitation	Variety and pace of activities are important in	Texts require more time for full exploitation. Each text may

	delivery, leading to a tendency to move quickly from text to text to maintain interest, each text having a different topic and learning focus.	have a range of learning focuses. Texts may be linked thematically.
Other skills content	Little emphasis on study skills, mostly on language learning only. Cognitive skills not explicitly included.	Study skills emphasised explicitly, particularly learner independence, cognitive skills and critical thinking.

(Alexander et al., 2008, p. 4)

From Table 3 it is clear that specific differences exist between ELT and EAP courses, to such an extent that the former is sometimes referred to as TENOR (Teaching of English for No Obvious Reason), an acronym that was devised by Abbott in 1981 (Jordan, 1997; 2009). When applying these differences to the current LC courses at UNAM, it seems as if all non-degree purpose courses fall into the ELT bracket. However, those offered for degree, diploma or certificate purposes do not meet all the requirements, as indicated in Table 1 (cf. 1.1.1.), which could possibly explain why these courses do not seem to meet the requirements of the target audiences at UNAM. With special reference to the ULEA course only, the target course of the current study, the areas where there are similarities to the requirements set out in Table 1 are, for example, that the content of the syllabus seems to be goal driven; it relates to academic studies and needs to be covered in a limited time. In addition, student stakes are high as they need to pass the course in order to graduate. As a result, as stated in Table 3, one could describe their levels of motivation to be "specific" (Alexander et al., 2008, p. 4). Furthermore, the content of the course is limited to academic discourse, and reading and writing are emphasised. However, some areas are lacking. For example, being previously trained as high school English (first and additional language) teachers, not all UNAM LC lecturers understand the differences between ELT and EAP courses and approach the latter in similar ways as teaching English in high (secondary) schools. Also, the teacher-student roles are not equal, but rather one where the lecturer is seen as the expert, like in ELT classes. Furthermore, when one regards the language skills balance, it is clear that, even though reading and writing are emphasised, about two to three weeks on average (about 25% of the course duration) are spent on improving speaking skills. Finally, with regards to the materials used in the course, not all texts are drawn from degree studies and are sometimes selected for entertainment and are not so much based on academic genres. Also, a large variety of

texts are used and not much time is devoted to fully exploit each of them. Furthermore, these texts are not linked thematically. All in all, when compared to the requirements as set out in Table 1, the ULEA course, which is the ESP course at the LC at UNAM, seems to comprise partial ELT and partial ESP course development principles.

As mentioned previously, the one absolute characteristic of ESP and, therefore, EAP courses, is that they are designed to meet the specified needs of the learner. In other words, the idea of specificity is central (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000; Hyland, 2002; Strevens, 1988). As a result, various EAP courses exist all over the world, depending on the different target groups that need to be taught in preparation of their academic studies.

Next, the idea of specificity in EAP will be explored in more detail

2.3.1 Specificity in EAP

Specificity in instruction has been one of the key issues of debate in EAP since the early days (Carstens, 2009; Hyland, 2006; 2011), and it is still regarded as one of the important current debates in EAP (Harwood & Petric, 2013). These debates have led to the distinction between English for Specific Academic Purposes (ESAP) and English for General Academic Purposes (EGAP) (Alexander et al., 2008; Benesh, 2001; Hutchinson & Waters, 1987; 2009; Hyland, 2011; Jordan, 1997; 2009). Being aware of these differences is central to a full comprehension of EAP and also of what exactly the LC English course developers at UNAM should consider in EAP course development.

2.3.1.1 EGAP vs. ESAP

In an EGAP approach, instructors attempt to isolate the skills, language forms and study activities thought to be common to all disciplines in one EAP course. In such an approach, certain skills are seen as generic academic practices and thus transferable across a range of disciplines (Basturkmen, 2006; Dudley-Evans & St John, 1998; 2000; Hyland, 2006; Jordan, 1997; 2009). These are also referred to as common-core or wide-angled EAP courses (Dudley-Evans & St John, 1998; Flowerdew & Peacock, 2001;

Hyland, 2002). Even courses such as English for Business Purposes or English for Medical Purposes are regarded to be EGAP, as these are designed for general classes on broad academic skills or registers which encompass many subfields (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000; Hyland, 2002; Weideman, 2013). In such courses, carrier content or the material and activities used to teach the real content or skills identified as specifically required by the target group (Dudley-Evans & St John, 1998; 2000), is either of a *general* academic nature or of a *general* professional nature. With reference to Figure 1 (cf. 1.1.1), the current ULEA course offered at the LC at UNAM that offers generic academic skills to students from all faculties seems to be representative of an EGAP approach to EAP.

Several arguments for EGAP exist. For example, Hutchinson and Waters, (1987; 2009) maintain that there is not enough variation in the grammars, discourse structures or functions of different disciplines to justify the development of costly and time consuming ESAP courses. Even though he is against EGAP, Hyland (2002) mentions several other arguments in favour of EGAP, such as that language instructors lack the expertise to teach discipline conventions and should rather focus on language teaching only, as well as that students need to acquire general AL first before they can study the specific academic literacies for their disciplines. In addition, EGAP courses may appeal where student populations and fields of study are diverse, where EAP instructors have little time and resources to design subject-specific programmes and where there is little cooperation between language and other departments at a university (Hyland, 2002). Harwood and Petric (2013) add that EGAP courses are more economical in the sense that only one class would be required instead of having many different ESAP classes.

On the other hand, in an ESAP approach it is understood that while there are to some extent some generic academic skills across the various disciplines, the differences among these skills and conventions may be greater than the similarities. In addition, it is further argued that it is difficult to isolate these general skills accurately as, in spite of some similarities, the extent to which disciplines conform to these features or what content lecturers expect from their students will vary from context to context (Hyland, 2002). ESAP, therefore, concerns the teaching of skills and language which are related to the

demands of a particular discipline or department at an academic institution (Basturkmen, 2006; Dudley-Evans & St John 1998; 2000; Hyland, 2006; Jordan 1997; 2009). Contrary to belief, ESAP does not simply mean teaching subject-specific vocabulary and using subject-specific reading passages. In fact, ESAP courses use specific material drawn directly from the learners' academic or professional area by using actual subject tasks and courses (carrier content) (Dudley-Evans & St John, 1998) mainly to develop "awareness of the functions of texts and how these functions are conventionally accomplished" (Hyland, 2002, p. 393). In this way, content and language instruction are integrated, implying a close collaboration between subject specialists to gain understanding of students target discourses and courses (Basturkmen, 2006; Brinton et al., 1989; Dudley-Evans & St John 1998; 2000; Jordan 1997; 2009).

Proponents for ESAP argue that EAP courses are essentially meant to be ESAP courses. In other words, if a language course does not teach English that is specific to a particular context, it is not EAP. This is what mainly distinguishes EAP from general English language teaching (e.g. Alexander et al., 2008; Benesh, 2001; Hyland, 2002). These scholars reject the common core, generic, academic literacy skills approach that seems to ignore the issue that generic skills can only have true meaning within the context, interpretation and definition that the different academic fields assign to them. While some (Dudley-Evans & St John, 1998; 2000) suggest that EAP instructors should first help students to obtain core academic skills and then more specific ones, Hyland (2002) contends that students need to be instructed in the academic literacy conventions of their courses as they need them, at any stage of their studies and no irrelevant skills should be taught. Other assertions are that students experience very specific courses, using authentic material as more relevant and intrinsically motivating. In other words, authentic carrier content is used as real content (Alexander et al., 2009; Basturkmen, 2010; Harwood & Petric, 2013). Particularly with reference to academic reading skill development, Pretorius & Bohlmann, (2003)are of the opinion that students are more motivated to do the course if the relevance for their own studies is clear.

Basturkmen (2010) identifies three major disadvantages of an ESAP approach. One is that students doing such courses might not have identical needs. Another concern is that, based on their different needs, the content might be less relevant to some than to others.

A final argument against ESAP courses is that such narrow-angled EAP courses assist learners only to function in very limited circumstances, i.e. the content subject, particular discipline or department at an academic institution that it focuses on. From these arguments against an ESAP approach, one can deduce that homogeneity among students seems to be an important consideration in deciding for or against EGAP or ESAP courses. Wide-angled, EGAP-designed courses seem to be more appropriate for a general heterogeneous group of learners, while narrow-angled ESAP courses seem to be more appropriate for homogeneous groups (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000). At this point it should be noted that homogeneity does not only refer to students taking similar courses, but also to those who have similar language levels (Cheng, 2011; Dudley-Evans & St John, 1998; 2000). This is why such narrow-angled courses are designed for a very specific group of learners and are appropriate where the needs are more or less the same (Dudley-Evans & St John, 1998). However, in arguing for "different strokes for different folks" Hyland (2002, p. 391) acknowledges this dilemma, but as a solution to practising ESAP in heterogeneous classes, suggests that one should rather see this as an opportunity and exploit the specificity of the circumstances by allowing students to contrast their disciplinary experiences and expectations. Dudley-Evans and St John (1998; 2000) remind EAP practitioners that a key feature of such courses is that teaching is flexible and tailored to the needs of individuals as they arise.

No previous studies in conducting EGAP/ESAP research are available to comment on. However, elsewhere several examples show that researchers seem to have various experiences regarding the implementation of ESAP courses, due to various reasons. Three of these studies are reported on next.

Fouché (2009) reports on a 60 hour intervention programme that was developed to raise the academic literacy levels of 21 first-year science students at a South African university. Unlike the current study, Fouché (2009) focused on improving reading as well as writing and listening skills through a face-to-face intervention programme that focused on developing reading, writing and reasoning of participants as these are the areas the researcher considered to be included in the term "academic literacy". This course was subject-specific. The target group was a group of first-year students from the field of science and Technology who were identified to be *at risk* by the results of the TALL and by scrutinising their writing. Authentic material was used, but was not discipline-specific,

as students had different majors, even though they were all science students. As a result, the researcher, therefore, opted for a wide-angled, common-core approach. A mixed-methods study was conducted. A needs analysis was carried out and included the administration of a South African developed test for academic literacy levels (TALL to determine students' academic literacy levels before and after the intervention, as well as the examination of a sample of the assignments students had to do during this said study. The findings showed that the academic literacy intervention did improve the academic literacy performance of participants significantly in some areas, but not enough to elevate students considered at risk of failing. There was a positive correlation between attendance and performance. Other data collection tools were the scrutiny of student records to gather descriptive statistics about the participants and a feedback questionnaire that was administered at the end of the semester. Student feedback indicated a positive attitude towards the entire intervention programme, as well as a distinct preference for collaborative learning and face-to-face interaction, activities that are not always possible in an open and distance learning programme. There are some similarities between this study and the current one, but also some differences. For example, while both studies focussed on first year science students, this study (Fouché, 2009) had a smaller sample and used a wide-angled, common core approach as students had different science majors. As mentioned previously in this section, such a course could be labelled as EGAP as the carrier content used to teach the material was, in spite of being authentic, of a general nature (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000; Hyland, 2002; Weideman, 2013) to accommodate the students from different scientific majors. In the current study it was possible to use a narrow-angled, subject specific course due to the homogeneity of the students as they all did Biochemistry 1 and they were all first-year medical students.

Another similarity between this study and the current one is that both studies used a mixed methods studies approach. It was concluded (Fouché, 2009) that the intervention made a significant impact on students' literacy levels and motivation but not enough, as students were still regarded to be at risk, as indicated by their post-test results of TALL. The current study had a different overall objective, but one of the emerging aims (cf. 1.5) was to establish if the reading program had any impact on the content results of students.

A similar conclusion was made, namely that student motivation to attend the course resulted in improvement in their Stereochemistry scores (cf. 7.1.3).

In another South African study, Carstens (2009) investigated the effectiveness of genre-based approaches in teaching academic writing at a South African university. One of the aims was to compare the overall improvement of students from a subject-specific group (ESAP) with those from a cross-disciplinary group (EGAP) in academic writing. The results indicated that students in both groups gained by participating in the intervention, but that the gains for the former group, as well as their positivity, were superior to those who were in the latter group. She attributed this to their deeper level of engagement with source material and more opportunities to practise content-based writing. The researcher concluded by acknowledging that arguments for both ESAP and EGAP existed and that the decision on whether to have a narrow- or wide-angled approach should, therefore, be made based on a thorough target and learning needs analysis (Carstens, 2009). Even though this study focussed on academic writing and the current one on academic reading, one can draw valuable insight from it. For example, while the current study had a different objective (cf. 1.5), this comparison between EGAP and ESAP courses seem to strengthen support for ESAP courses (cf. 2.3.1.1). In addition, the importance of conducting a through needs analysis, such as was one of the aims of the current study (cf. 1.5) is emphasised.

In order to establish to what extent general EAP courses that are designed for broad groups (such as English for Business, English for Medicine) cater for the needs of all the subgroups within particular fields, Weideman (2013) reports on an evaluation that was done to establish the effectiveness of faculty-specific workbooks that came from overseas and were used to develop AL at a South African university. According to him, the element that faculties at this university selected internationally produced textbooks, reflects the assumptions that not only is faculty- specific workbooks better, but that locally produced textbooks are inferior. It should be noted that, at UNAM, there are no local AL textbooks to select from, a situation that could possibly indicate a gap in the current Namibian produced textbook market. The issue of materials selection and production will be taken up in section 2.7.3. The evaluation by Weideman (2013) was

only done on the topics covered in the workbooks, even though it is acknowledged that subject-specific is more than the themes or topics textbooks cover (cf. 1.1). In examining the textbook used for the natural sciences, one that has 9 subfields, it was determined that not only were the texts pitched at too low levels, but that none of the topics were subject-related or relevant to the course designers' aims for 5 of the 9 groups. Weideman (2013) does not elaborate on what these intentions were, so it is not clear if only carrier but also real content were considered. In addition, Weideman (2013) reported that the content of these faculty-specific workbooks that are used to develop AL was not challenging enough and that no language development was included. Weideman (2013) attributed the incidence that no reading levels of texts were indicated by course designers to the reality that these individuals appeared not to be accountable to justify their designs to anyone.

When examining the two course books dedicated to humanities and social sciences, similar concerns were identified. In other words, topics were of a general nature, but still excluded the majority of students; hence the conclusion that the subject-specific course seemed to have achieved nothing more than a generic course would. Other concerns were that, due to timetabling issues, not all students attended their allocated subject-specific AL time slots. These findings seem to support the idea behind the current study, namely to develop a tailor made ESAP course for one specific group of students (Biochemistry students) as specific as possible by keeping sub-topics in mind (Stereochemistry). Because the authentic texts used in the current study were from the textbooks students used, the reading levels were assumed to be appropriate for their level (first year university students). However, the implied recommendation to establish the reading levels of texts were considered by calculating the reading levels of the texts that were used for the extensive reading programme (cf. table 50).

Finally, like Carstens (2009), Weideman (2013) cautions against the assumption that EGAP is superior to ESAP, and advocates for careful planning, especially considering who will attend the course as a subject specific course will not benefit someone who is from another faculty. Course developers are, furthermore, advised to consider what is "possible and feasible" (Weideman, 2013, p. 18) within each setting, and then to ensure that such course designs are "effective or valid, consistent, differentiated, appealing,

theoretically defensible, yield meaningful results, be accessible, efficient, accountable" (Weideman, 2013, p. 20).

Based on the assumption that EGAP is superior to ESAP and the finding that generic, specialised courses do not meet the needs of all students from different sub disciplines, Weideman (2013, p. 17) asks the valid question: "How specific do we need to be?" One option to consider for developing very specific EAP courses as presented by position 5 in Figure 1 (cf. 1.1.1) (Dudley-Evans & St John, 1998; 2000), is through Content-Based Instruction (CBI). This is a method of delivering EAP instruction that aims at establishing a link between an EAP course and an academic content course. As a result, academic English skills are being taught through the medium of a content course and, in this way, the need to integrate both content and language instruction and, thus elimination of the separation between content and language instruction that is widely advocated for in EAP contexts can be addressed.

The next section will deliberate CBI as well as the options possible in more detail.

2.4 Content-based language instruction (CBI)

CBI, also known as teaching language through the curriculum and Sustained-Content Learning (SCLT) (Nation & Webb, 2011) has the underlying rationale that an "L2 is learnt more effectively when it is used as the medium to convey informational content of interest and relevance to the learner" (Brinton et al., 1989, p. vii). It, therefore, refers to the integration of content learning with language teaching aims, as advocated for in an ESAP approach. Brinton et al., (1989) further assert that, for any programme to be considered as CBI, some degree of integration of language and content teaching is required. It is observed by Arendale (2002, p. 12) that "students often feel frustrated when faced with abstract lectures concerning study skill instruction that is dissociated from college content material" and attentiveness is encouraged when they can apply such skills directly to their content courses.

A CBI curriculum allows for the integration of all language skills, and in the process, considers five important elements. These are the learners' interests and needs, their eventual uses of the target language, their previous learning experiences, a focus on use as well as on usage and, finally, exposing them to meaningful language use (Brinton et al., 1989). In addition, CBI instruction assumes that:

- successful language learning occurs when students are presented with authentic, target language materials in a meaningful, contextualised form with the primary focus on acquiring information;
- students are assisted to process content materials not originally produced for language learning/teaching purposes;
- learners benefit by increasing content as well as language proficiency;
- expository texts are central to teaching;
- leaners are introduced to a new discourse community;
- authentic material can be adapted to suit the needs of learners and
- there is a strong focus on development of academic language proficiency (Brinton et al., 1989; Snow,2005).

All in all, a CBI approach to EAP instruction seems to be ideal to effect all the proponents of ESAP that are hoped to be achieved, and also assist in the development of CALP skills.

Based on these elements, Brinton et al. (1989) classified CBI traditionally into three prototypes, namely: Theme-based, Sheltered and Adjunct models, as will be discussed below. Although Alexander et al., (2008) are of the opinion that the sheltered and the adjunct models of instruction are becoming increasingly important in EAP classrooms, the current trend seems to be, as predicted by Brinton et al. already in 1989, to not apply CBI instruction according to the pure models as traditionally proposed, but rather employ adaptations of the three prototype models to the specialised conditions of particular settings (Grabe & Stoller, 2001; Richardson, Morgan & Fleener, 2012; Snow, 2005).

However, in order to understand the various hybrid CBI options that develop, it is worth considering the features of these prototype CBI approaches in their pure forms.

2.4.1 Different CBI prototypes

2.4.1.1 Theme based model of instruction

In Theme-based CBI courses, the subject teacher also functions as the language teacher. As per CBI requirements, the language class is structured around topics or themes from content courses. The ultimate aim of theme-based CBI courses is concentrated on developing L2 competence for weaker L2 learners within specific topic areas (Brinton et al., 1989).

2.4.1.2 Sheltered model of instruction

Sheltered CBI instruction refers to a situation where a group of L2 learners are kept separate or sheltered from their native-speaking peers with the ultimate aim to help them master authentic content material. A subject-matter course is taught to them by a content area specialist who is also a native speaker of English. In the process, much adjustment to texts and simplifications are made to facilitate the process. This model is appropriate for heterogeneous groups of adult learners at intermediate to high intermediate levels who share some relatively common areas of interest and who are motivated to master the content material (Brinton et al., 1989).

2.4.1.3 Adjunct model of instruction

The Adjunct model of CBI instruction, also commonly referred to as linked courses, aims at connecting a specially designed language course with a regular academic course. Such courses are taught to students who are simultaneously enrolled in a regular content course, as well as a language course, called the adjunct course (Brinton et al., 1989; Evans Commander & Smith, 1995; Dudley Evans & St John, 1998; 2000). Both courses share a common content base, but differ in the focus of instruction. Developing such courses requires close cooperation between the content and the language lecturer, and

equal attention is given to mastery of both language and content provided (Benesh, 2001; Hyland, 2011; Jordan, 1997; 2000; Swales, 1988) even to the extent that the two courses may complement each other in terms of mutually coordinated assignments (Brinton et al., 1989). In such a way, students are able to apply what they learn in the adjunct course instantaneously to the actual paired content course (Brinton et al., 1989; Evans Commander & Smith, 1995). Brinton et al., (1989) are of the opinion that such courses seem to be appropriate for adults or young adults with high intermediate to advanced proficiencies whose overall proficiency is high enough to enable them to handle complex content material, but whose language abilities may be lacking. No prior experience in the content subject is required, but motivation is crucial.

Of these three prototypes available for CBI instruction, the adjunct model was deemed to be the most appropriate to explore in the current study as UNAM LC courses are aimed at adults or young adults, with high and intermediate English proficiencies. Next, adjunct courses will be explored in more detail.

2.5 Adjunct courses

2.5.1 Origins of adjunct courses

Supplementary Instruction (SI), was initially created in 1973 to assist undergraduate dentistry, pharmacy and medical students at the University of Missouri-Kansas City to understand their content subjects better, and consequently solve the high student attrition rate (Arendale, 2002). The adjunct course was introduced as one variation of SI with two important purposes to concentrate on, namely:

- subjects that are traditionally labelled as challenging. Such courses, according to Arendale (2002), usually have a large amount of reading and infrequent examinations that focus on higher cognitive levels.
- assisting students who are often viewed as “different and better than the rest of the institution” (Arendale, 2002, p. 6), as opposed to struggling students.

The course was implemented successfully with students, afterwards showing improvement in both academic abilities and course content areas. The occurrence that these courses started with students traditionally viewed as the academically privileged, like the target population of the current study, brought immense prestige and credibility to the SI program at the University of Missouri-Kansas City in 1973 (Arendale, 2002). This resulted in its spread to colleges and universities around the world. Not only that, it also became one of the one of the few post-secondary programmes to be voted by the U.S. Department of Education as an "Exemplary Educational Program" (Evans Commander & Smith, 1995).

2.5.2 Benefits of adjunct courses

Not only do adjunct models provide an ideal EAP setting (Brinton et al., 1989), it is generally agreed that adjunct courses seem to have several benefits (Andrade & Makaafi, 2001; Arendale, 2002; Brinton et al., 1989; Evans Commander & Smith, 1995; Snow, 2005). Broadly speaking, these relate to student motivation, language, content development and student support.

CBI not only provides help for social and cognitive development during childhood, but also motivates learners and keeps them interested (Yu & Xiao, 2013), successfully leads students to good job placement opportunities and produces advanced levels of language proficiency (Genesee 1998). Andrade and Makaafi (2001) believe that when students perceive the connection between content and language courses when language skill strategies are directly applied to content courses that they are currently taking, they seem to be more motivated and interested in attending those courses. In addition, such an approach promotes the use of language in authentic settings (Snow, 2005) and, therefore, naturally lends itself to project-based learning, the recycling of important skills on a regular basis, the rereading of text resources and realistic tasks for interpreting, integrating and evaluating information from multiple texts. Such activities are vital in promoting EAP reading development and mirror student encounters in academic settings (Grabe & Stoller, 2013). Arendale (2002) states that adjunct courses aid in student retention, particularly among first-generation students and those economically disadvantaged at universities. The adjunct challenges students and promotes participation

opportunities for small group interaction, as well as activities that are central to CBI instruction (Brinton et al., 1989; Evans Commander Smith, 1995; Snow, 2005). In this way, students are introduced to the demands of academic work. Adjunct courses offer a strong support system to students, as well as to their lecturers. It also results in a closer cooperation between language and content practitioners (Andrade & Makaafi, 2001).

In Chapter 3, section 3.4.1.9 several advantages of CBI approaches to reading (hence adjunct courses) are specifically highlighted.

Next, the development of adjunct courses are deliberated on.

2.5.3 Developing adjunct courses

Brinton et al., (1989, p.17) caution that developing and implementing an adjunct course is an "ambitious undertaking", with several important considerations and challenges, a sentiment shared by others (Benesh, 2001; Duenas, 2004; Evans Commander & Smith, 1995). Although various adjunct courses, based on the original prototype, differ in form and content, similar steps and considerations are to be taken to implement them successfully. As a result, several guidelines have been provided by a number of researchers in the field (Andrade & Makaafi, 2001; Dudley-Evans & St John, 1998; 2000; Evans Commander & Smith, 1995). These guidelines mainly relate to four important aspects, namely the securing of university support, identifying the target subject and population, marketing the course and lastly, the necessity to be flexible. With regards to the latter, Evans Commander & Smith (1995) agree with Brinton et al., (1989) that adjunct courses, namely EAP courses, have to take the needs of the particular students and the different social contexts into account.

Evans Commander and Smith (1995) describe how the first ever adjunct course was introduced at Georgia State University, after consultations with a consultant from the University of Missouri-Kansas City SI regarding the adjunct programme (cf. 2.5.1). They developed and adapted an adjunct course that differed from the standard adjunct model in two areas: method of course pairing and the population served. Where SI adjunct courses

originally paired their courses with a particular high risk *section* of a course, they paired theirs with a particular high-risk course after it had been determined that all sections of the History course, the focus of their adjunct, were regarded as high risk. They obtained full cooperation from the History department, and in preparation, the course instructors attended all History classes, took lecture notes and recorded observations of student behaviour. Their experiences in the History class were regarded as vital to their preparation as the lecture could be experienced first-hand and the course could be viewed from the perspective of the student. Furthermore, information about the literacy demands of the American History course, the course requirements, as well as the expectations of students and lecturers, were collected. One challenge was reported to be difficult, namely to recruit students, mainly due to two reasons. Firstly, the number of students enrolled was quite low and, secondly, students had various professors for the same courses and were, therefore, in different classes.

The course content was matched with the reading requirements, as suggested by them, but after piloting the course, changes were made because the results of the pilot did not have much impact on the History scores of students. This was mainly because there was a mismatch between the students' perceived needs and that of their content lecturer, something that was only discovered after students had received low grades on the first test. The changes, which included tasks more in line with the perceived needs of the course outcome, and those obtained from the content lecturer, resulted in an increase of performance of students in the second adjunct which comprised 5 hour courses that took place over 10 weeks.

Based on their experience, they made the following recommendations (Evans Commander & Smith, 1995):

i. Adjunct courses should rather be paired with one *section* of a course and not with multiples.

ii. Adjunct courses should teach learning strategies and skills that relate to the focus of the structure of the discipline and also aim to develop metacognitive awareness. It is important to note that the students'

perceived needs and that of the content instructors did not always match.

iii. Adjunct courses should develop their own tests which can become preliminary reviews for student tests from their professor. Developing their own tests also helped to gain more insight into the study habits of students in the adjunct and allowed the monitoring of students on their own rather than relying on feedback from professors.

iv. Daily goals and assessments motivated students to attend and give structure to the course.

v. If adjunct courses cannot be offered in as many academic disciplines as possible one should offer these for the most difficult courses and also for underprepared students.

vi. Students learn best through modelling, in other words, show students how they can do better in their content courses.

vii. Simplify registration to encourage student attendance.

Adjunct courses cannot be implemented without input from content lecturers. The next section explores this issue in more detail.

2.5.4 Engagement with faculties

The key in EAP classrooms is not only the interaction between the lecturer and students but also engagement between the EAP department and faculties (Swales, 1988). The input from content-area specialists is multifaceted. For example, they can be consulted during needs analysis, can double as continuous sources of support and authentic materials, give recommendations for authentic tasks, act as mentors and provide feedback (Belcher, 2009; Flowerdew & Peacock, 2001; Robinson, 1991; Weideman, 2013). Brinton et al. (1989) caution that one needs to carefully select content instructors who are sensitive to the needs and abilities of L2 learners, as the most knowledgeable specialist may also not be as helpful as the one who has the best understanding and the best sympathy for ESP.

In EAP courses, engagement with faculties can take three main forms: cooperation, collaboration and team teaching (Dudley-Evans & St John, 1998;2000). However, from the literature it seems as if these forms, too, are mere prototypes, as various hybrids to allow for the synchronisation between faculties and EAP instructors have developed over the years. Each of these types of engagement will be briefly elaborated.

2.5.4.1 Cooperation

In order to develop and implement any successful EAP course, it is essential to secure the cooperation of the university as well as that of individual faculties, as one cannot achieve much success without consultation with the faculties that the students belong to. It seems as if, at a minimum, CBI instructors should at least have this type of support. Hutchinson and Waters (1987; 2009) suggest that this should already be achieved during the needs analysis stage as it can inform research procedures. In the process, one should identify willing content instructors, establish cooperation and discuss, within the aims of the adjunct, and advise on texts to use. At this stage one should also reserve seats in content courses and delineate instructors' roles (Evans Commander & Smith, 1995).

2.5.4.2 Collaboration

Collaboration suggests that the EAP practitioner and the content expert or lecturer work together outside the classroom. In true collaboration it mainly occurs in the following three ways:

- The language teacher prepares students for a subsequent content class;
- The language class instructors practise a specific skill or task related to the content subject with material produced by the department;
- The adjunct model. The adjunct class supports the content class, assisting them with difficulties encountered in the content subject (Dudley-Evans & St John, 1998; 2000).

2.5.4.3 Team teaching

Team teaching suggests that the EAP practitioner and the content specialist work together in both classrooms, in various ways to ensure that both content and linguistic aspect are developed. In EAP, both collaboration and team teaching may involve the knowledge and cooperation of a subject specialist (CBI), both occurring with mixed results (Dudley-Evans & St John, 1998; 2000; Flowerdew, 2011). According to Kasper (1994; 1996), it requires commitment and coordination from both language and content area practitioners. It is further recommended for the EAP instructor to have some expertise and interest in the paired content area course to integrate material effectively and to provide extra help to explain ideas. Ideally, both EAP and content area lecturer should attend each other's classes as often as possible. In that way, it is argued, the EAP lecturer can show the content lecturer how to move away from an academic lecturing style of teaching that so often dominates in content classes. On the other hand, the EAP instructor becomes aware of students' problems in class, e.g. how to take notes, how to distinguish important from less important information, how to listen and to understand. In turn, the EAP lecturer can teach these skills to students. All in all, Kasper (1994, p. 383) claims that such a "course is a worthwhile and enjoyable experience for both faculty and students". As mentioned in Chapter 1, the development of such a course and gaining the experience in developing it lies at the heart of this study.

As previously noted, even though no previous research on faculty input in LC course development at UNAM is recorded or known of, different variations of adjunct/pair courses and also various types of cooperation with content faculties have been developed elsewhere, and are reported on in the literature. Some studies will briefly be reviewed here.

Lee (2013) reports an example of team teaching at a university in Sydney, Australia, where the researchers referred to it as a "weak end model of team teaching" (p. 915), as it reflected more characteristics of cooperation rather than of team teaching. At this university, where team teaching is reported to be relatively rare, EAP and subject specialists combined their expertise in an attempt to help students (n=127) to write

assignments for their content subjects. In their case, the content lecturer delivered content during normal teaching hours and the language component (writing) was taught during specific tutorials. Content and EAP lecturers met out of classes to discuss the nature and time frame of assignments, after which the English lecturer (n=1) prepared the lessons to specifically assist students to write the assignments. When these lessons were presented, the content lecturers attended as observers, in order to inform content lecturers (n=4) about ways to incorporate language teaching into their content. In general, the team teaching was perceived as being fruitful to both students and staff, with content lecturers showing more positive attitudes. Both students and content lecturers appreciated the personal expertise on academic language skills displayed by language lecturers. Furthermore, similar to a finding by Brinton et al. (1989) content lecturers reported a better understanding of assignment criteria from a linguistic point of view, subsequently empowering them to develop more effective assignments. Students reported to be more engaged as the team teaching involved their content subjects. On the other hand, certain weaknesses in the team teaching approach were also perceived. For example, the researchers reported that classes were very noisy. In addition, it seemed as if too much knowledge was given to students and that there was too little time for students to contribute. Furthermore, students often became confused because the instructions from the content lecturer and the English lecturer were often contradictory. In conclusion, the researchers stated that the effects of team teaching on student writing were depended on student engagement and motivation and suggested more frequent contact between content and language lecturers (Lee, 2013). Team teaching could certainly be a stepping stone for the LC to make a meaningful input in content development among students. These are all valuable recommendations to deliberate for course development at UNAM, especially to eliminate the current situation where LC lecturers are accused of not doing their jobs (cf. 1.2).

In the South African context, three examples of collaborative teaching are worth noticing. Jacobs (2007a; 2007b) reports on the process of collaboration that occurred between a group of academic literacy practitioners and disciplinary specialists at the Cape Peninsula University of Technology (CPUT) in South Africa. This institution became one of the first tertiary institutions to implement collaborative teaching on an institution-wide scale. As a result of institutional restructuring at this institution, language lecturers were moved

to academic departments across a range of faculties. This compelled them, on the one hand, to embed the teaching of academic literacy courses in the mainstream curricula of the subjects and, on the other hand, to collaborate with subject lecturers in these disciplines instead of just offering generic academic literacy courses beside the subject modules, as it currently is the case at the LC at UNAM. This specific project involved nine language and discipline partnerships that developed due to an institutional call for more research, as well as a growing awareness of the importance of language in education. Data were collected qualitatively. Findings from the study indicate that by asking appropriate questions, academic literacy practitioners have much to offer in terms of assisting content lecturers to explain their tacit knowledge of the subject.

Based on this research, Jacobs (2007a) concludes that the following factors determine a collaborative partnership:

- Subject lecturers' approaches to teaching;
- The views regarding the status of academic literacy discourses that are prevalent in an institution;
- The receptiveness of subject lecturers to integration;
- The understanding of roles played in the process of integration.

These factors accentuate the importance of the role of the content lecturer in the successful implementation of ESAP courses. As mentioned in section 7.3, in the current research, the biggest challenge in developing the MMAAR course for first-year medical students doing Biochemistry was the lack of participation from the content lecturer.

Building on Jacobs's (2007a; 2007b) work, Marshall et al. (2011) report on a similar project that took place approximately 5-7 years after the CPUT intervention at the University of the Western Cape (UWC). This was triggered in an attempt to support underprepared students. Similar to CPUT, partnerships were established between content and academic literacy lecturers. They, particularly, report on the collaboration that took place between an academic literacy lecturer and two physics lecturers from the Physics department. The academic literacy lecturer attended all lectures, tutorials and practicals and was eventually perceived by the students as part of the Physics teaching team. Although the class was led by the Physics lecturer, the AL practitioner was free to

interrupt, ask questions or elaborate on content that was taken for granted by the content lecturer. Similar to the observation by Jacobs (2007a; 2007b), these interruptions were important to discover the tacit content knowledge the content lecturer did not explicitly explain. Weekly meetings between the lecturers were held to plan teaching and learning activities.

Their findings concurred with those of Jacobs (2007a; 2007 b), namely that the role of the AL lecturer was important to indicate to content lecturers those aspects of the course they took for granted and, therefore, did not adequately explain to students. Other roles they added were that the AL practitioner assisted in the initiation of scaffolding in reading and writing activities, and introduced critical reflection in science, a subject that is traditionally seen as neutral and value free. Findings from both Jacobs (2007a; b) and Marshall et al., (2011) confirm that collaborative efforts can be successful if the process is conducted systematically.

Carstens (2013) reports on the implementation of collaborative teaching that has been taking place at the University of Pretoria (UP) since 2009. This came as a result of the growing dissatisfaction expressed by academic staff and students from different faculties regarding the relevancy of the academic literacy courses offered to promote academic development. She reports on two courses, one for Law students and another for science students that were developed; Carstens subsequently developed a very useful continuum to summarise various aspects of integration and collaboration. This continuum would also be suitable to describe LC courses, as faculties become more involved in course development and is presented in Table 4:

Table 4: Curriculum dimensions and their continua of features with regard to collaboration and integration

Dimension	Collaboration and integration		
	Most	**Intermediate**	**Least**
Ownership	Subject-area entity	Joint ownership	Academic literacy entity
Autonomy	Fully integrated with mainstream	Shared responsibility for curriculum	Fully autonomous language module
Collaboration	Regular collaboration between language and subject-lecturers	Some/sporadic collaboration between language and subject-lecturers	No collaboration between language and subject lecturers
Teaching staff	Subject-area lecturers	Team teaching	Language lecturers
Content integration	Fully integrated in content mode	Theme-based access structure; application of AL construct / Language-based access structure: application to disciplinary content	Pure language module
Curriculum for AL activities	Organic – AL curriculum evolves/is adapted in line with content area needs	Predetermined, but with regular input from faculties	Predetermined
Materials	Prescribed texts for content module	Semi-scientific texts on contentious scientific issues / Academic texts related to content and genres of subject-area	Texts found or generated by language lecturer
Assessment	Assessment by subject field lecturer	Joint assessment	Assessment by language lecturer

(Carstens, 2013, p. 119)

The Law course discussed by Carstens comprises four components. Content is presented in the first three, and the language lecturers from the Academic Literacy Unit present the fourth component to ensure that the classroom materials and skills of the language component are aligned with the content and outcomes of the three law components. Difficult reading texts and longer assignments are shared with the law components to allow for scaffolding and mastering of required skills to succeed in the Law programme. A lecturer from the Faculty of Law attended weekly meetings with the "language team" (Carstens, 2013, p. 121), and one from the language team attended the three Law lectures. Based on the continuum presented in Table 4, the course was fully integrated, with the exception of autonomy and assessment that were both in the middle criteria. However, it was evaluated very favourably by students, as well as lecturers of Law. Carstens (2013) adds that although the course-coordinator of the language component was trained as a "linguist", she had been a tutor in the Law Faculty for a number of years, and was, therefore, to some extent familiar with the content. For some (e.g. Belcher, 2009; Dudley-Evans & St John, 1998;2000; Strevens, 1988) who argue that some understanding of the concepts seem essential in ESAP course development, this situation would have been ideal. This study has some resemblance to the current study in the sense that content was used to teach the language skills students needed to master the Law content and also the fact that authentic materials were used. However, the differences seem to be that on the one hand, this study (Carstens, 2013) reports on cooperation between the two faculties and on the other hand, the linguist had previous content knowledge of the subject.

Carstens (2013) also reports on collaboration, this time between the Academic Literacy unit and science departments. This collaboration leans more towards the intermediate and least collaborative extremes of the scale in figure 4. However, it is evaluated favourably, mainly because it used semi-scientific texts and students reported that they could apply what they had learned to other subjects and that it improved their general knowledge of scientific phenomena. This is a positive finding and correlates with data collected from in the current study (cf. 7.1). However, the majority were not convinced that their scientific content knowledge had improved. Perhaps the researcher also should have used qualitative data to triangulate the qualitative data collected to reach more firm conclusions. However, Carstens (2013) contributes this to the element that, similar to

Fouché (2009), the texts were of a broad spectrum to cater for 1 800 BSc students from various science fields.

In the Namibian context, no previous studies of content-EAP lecturer have been reported. This study attempts to fill that gap.

The findings in the above-mentioned studies corroborate earlier observations by Brinton et al. (1989), namely that the effectiveness of a content-language, lecturer-relationship depends on how it is handled by both parties, and that such cooperation should be a two-way process. Also, that as it is usually the EAP teacher who has enlisted the help of the content specialist, it becomes the EAP teacher's main responsibility to ensure that potential problems are anticipated and avoided in order to create a harmonious relationship in such a venture. Furthermore, one of the keys to success is to establish clear guidelines about the EAP teacher and the content specialist's separate and joint roles and responsibilities. In addition, Carstens (2013) concludes that the effectiveness of interventions where content and language are integrated "is not necessarily dependent on team teaching approaches, but on institutionally supported, regular, integrative, mutually consultative planning with all stakeholders involved in an atmosphere informed by study and on-going review" (p. 109).

From these recommendations it is clear that the success of CBI largely depends on the efforts made by the EAP instructor. It is, therefore, stated that being an EAP instructor is not without challenges, even though "research in the challenges that EAP instructors perceive is rare" (Hutchinson & Waters, 1987, p. 19). In the Namibian context, this type of research is not just rare, but non-existent. The next section will explore some of these challenges as reported on in the literature. In Chapter 8, the challenges that were experienced in conducting the current study will be reflected on.

2.6 Challenges encountered by EAP/ CBI instructors

2.6.1 Subject knowledge

One of the challenges encountered by EAP/CBI instructors that has always been a key consideration is the issue of how much subject knowledge the EAP/CBI practitioner needs to have (Alexander et al., 2008; Basturkmen, 2010; Belcher, 2009; Dudley-Evans & St John, 1998; 2000; Flowerdew, 2011; Hutchinson & Waters, 1987; 2009; Johns & Makalela, 2011a). The reality is that AL practitioners often have to deal with content they themselves have little or no prior knowledge of, something that may be the "single most daunting aspect of ESP teaching" (Belcher, 2009, p. 11). This often results in EAP practitioners not being able to fully comprehend the demands of the institutions and the needs of students (Alexander et al., 2008; Johns & Makalela, 2011a) and, as a result, doubt themselves (Hutchinson & Waters, 1987; 2009).

Hutchinson and Waters (1987; 2009) are of the opinion that EAP practitioners do not necessarily need to learn specialist, subject knowledge and should not become instructors of the subject matter but should rather take the roles of interested students of the subject matter. In order to achieve that, and to be able to ask intelligent questions, they require three basic things. One is a positive attitude towards the EAP content, another one is knowledge of the fundamental principles of the subject area and, thirdly, they need to be aware of how much they probably already know about the content.

Others (Belcher, 2009; Dudley-Evans & St John, 1998; 2000; Strevens, 1988) take a different view and argue that while specialist knowledge is not required, some understanding of the concepts seem essential. This is because the lack of subject knowledge can lead to misinterpretations and inaccurate explanations. Also students will have more confidence in and respect for a teacher who has a grasp of the relevant concepts. Belcher (2009) proposes that while much assistance may be required to understand and use the actual texts that students are dealing with in their content subjects, it may also be a rewarding and stimulating experience for the language lecturer to acquire that knowledge.

Various options exist for the EAP practitioner to cope with the highly specialised content of subject material. Such assistance could come in three important ways, namely faculty support, learners and an investigation of target discourse. The first resource, faculty support, has already been dealt with in section 2.5.4. The second resource mentioned, students, is often the easiest accessible source of information about the specialist knowledge required in the EAP classroom (Belcher, 2009). This is because they may bring expertise to their subject disciplines as they often have some background knowledge of the content subject, sometimes even more than the EAP practitioner. This could be exploited to comprehend authentic academic texts more effectively (Watson, 2003). In addition to becoming sources of content knowledge, these students support each other linguistically and emotionally in ways the EAP practitioner may not be able to (Benesh, 2001). EAP practitioners need to understand this and rather assume the role of the English consultant that brings to the classroom linguistic experience and knowledge of teaching methodology, not the holder of all knowledge; he or she should provide advice, suggest alternatives and allow learners to make informed decisions, especially as courses become more specific (Belcher, 2009; Dudley-Evans & St John, 1998; 2000). This common fund of knowledge and interest provides EAP instructors with opportunities to draw on students' knowledge in order to generate genuine, meaningful communication in the EAP classroom. This aspect is particularly important in EAP reading instruction (cf. 3.2.4). This implies inevitably that EAP teachers must be flexible, willing to listen and take an interest in the disciplines and professional activities their students are engaged in (Hutchinson & Waters, 1987; 2009).

However, not all EAP practitioners have students or content specialists to rely on for information or assistance (Dudley-Evans & St John, 1998; 2000). One way to overcome this is through investigating the target discourse. Basturkmen (2010) regards this as the core of EAP course design, but cautions that it is generally time consuming. As mentioned previously, the one aim of this study is to add to the limited existing pool of knowledge about experiences of EAP/CBI practitioners who are not content experts. As no such studies exist in the Namibian context, this report will be the first. More details about this are provided in Chapter 8.

Researchers that did report on such experiences are Wu & Badger (2009) who investigated four different strategies of EAP practitioners in China to cope with the subject-knowledge dilemma, as well as the student responses to each. These strategies were:

- risk taking (by using contextual clues),
- admitting the lack of knowledge,
- avoiding certain topics (when asked about content, the instructor postponed answering) and
- admitting a mistake was made (repairing and correcting himself).

When students were asked about their perceptions of EAP practitioners who did not fully understand the content, it seemed as if most students did not expect them to have a complete knowledge of the subject matter. Admitting ignorance of the subject areas did not contribute to the EAP practitioner losing face. It was concluded that this implied that students were also moving away from the traditional view of seeing the instructors as the only ones having authority and being a source of knowledge. These findings seem positive and encouraging for linguists who have the desire but not sufficient content knowledge to develop ESAP courses, such as the researcher in the current study. As it is reported in section 7.3, a lack of content knowledge was often admitted and asking students to do some research on their own was a common practice. Risk taking and admission when a mistake was made became part and parcel of instructing reading lessons using content I was not very familiar with, but participants in the current study did not seem to have minded.

2.6.2 Other challenges

Besides the limited content subject knowledge, various other challenges faced by EAP practitioners are reported in the literature. For example, the lack of an accepted view to provide clear guidance, a lack of training and a general, unreasonable expectancy of EAP practitioners to conform to the target situation (Hutchinson & Waters, 1987; 2009). In addition, they often have time constraints (Alexander et al., 2008; Johns & Makalela,

2011a), and often work alone without having colleagues to discuss ideas for course and materials design (Basturkmen, 2010). Furthermore, the relatively low levels of language of some students to deal with difficult authentic materials have also been mentioned as an impediment to EAP instruction (Alexander et al., 2008). A further concern is that authentic material is dull in comparison to other popular topics, as well as the reality that they do not always have the freedom to select topics and content (Alexander et al., 2008). Another concern is the low status of EAP courses in some institutions, as well as problems with large classes (Dudley-Evans & St John, 1998; 2000).

In conclusion, there do not seem to be any ready-made answers to the problems and situations EAP practitioners will meet. However, it is concurred that training EAP instructors is the solution to fully explore the possibilities EAP instruction can offer (Fadel & Elyas, 2015; Hyland, 2006; Hutchinson & Waters, 1987; 2009), especially for CBI instruction, a view that has been observed since the late 1980's (Snow, 2005). In that way, they would be equipped with a good foundation and knowledge of the theoretical and practical developments in the field and the necessary skills to make a number of key decisions, as well as to select from all the options available the one that is most appropriate and that will lead to the desired outcomes.

Dudley-Evans and St John (1998; 2000, p.14) refer to EAP instructors as "practitioners" because, as they fittingly maintain, the work involved is varied and requires much more than teaching. Some of the roles that these instructors have to execute, as identified in the literature, are that of being organisers, managers, monitors, participants, advisers, instructors, course designers, materials providers, collaborators, researchers and evaluators (Chang, 2007; Dudley-Evans & St John, 1998; 2000; Hyland, 2006; Swales, 1985).

Of all these roles, a key component is EAP course design. To obtain more knowledge about this, as one of the key aims of the current study, an exploration of the literature on this topic will follow next.

2.7 EAP course design

Course design plays a significant part in the EAP practitioner's workload, something that is usually not the case for a general English teacher (ELT) whose courses are often pre-determined and who often use prescribed textbooks (Alexander et al., 2008; Hutchinson & Waters, 1987; 2009). The key stages in EAP course design are identified to be needs analysis, course and syllabus design, materials selection (and production), teaching and learning and evaluation (Alexander et al., 2008; Dudley-Evans & St John, 1998;2000; Hutchinson & Waters, 1987; 2009; Jordan, 1997; 2009). Figure 2 represents a simplified version of a learner-centred course design framework, as suggested by Hutchinson and Waters (1987; 2009).

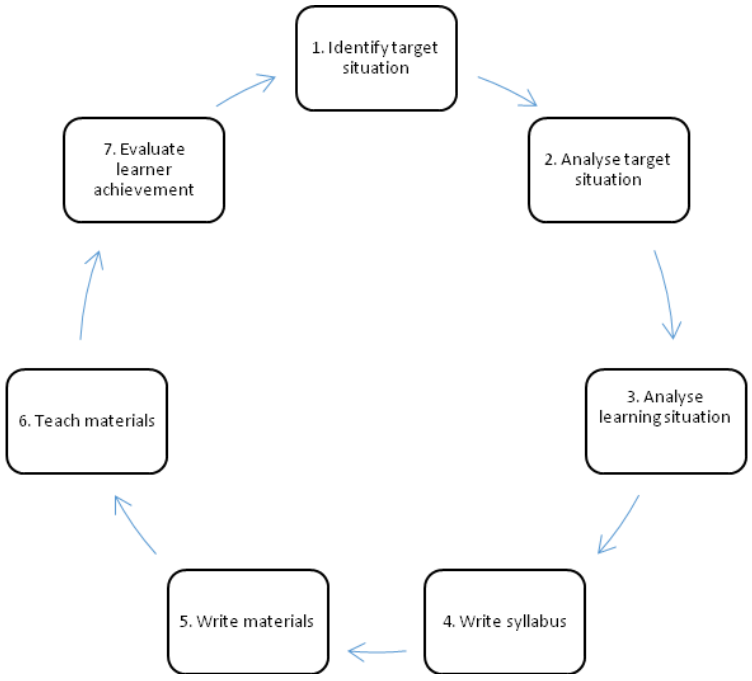

Figure 2: Different stages of a learner-centred course design. Adapted from "English for Specific Purposes," by Hutchinson & Waters, 1987; 2009, p. 65)

Based on the presentation of course design in Figure 2, Hutchinson and Waters (1987; 2009. p. 65) maintain that "[c]ourse design is the process by which the raw data about a learning need is [sic] interpreted in order to produce an integrated series of teaching-learning experiences, whose ultimate aim is to lead the learners to a particular state of knowledge". Each of these stages of EAP course design, as depicted in Figure 5 will

now briefly be elaborated. It is important to note that these stages occur iteratively, but it is generally agreed that needs analysis takes place first (Alexander et al., 2008; Basturkmen, 2006; 2010; Belcher, 2009; Brown, 1995; Dudley-Evans & St John, 1998; Hyland, 2006; Hutchinson & Waters, 1987; Jordan, 1997; Robinson, 1991).

2.7.1 Needs analysis

A needs analysis is recommended in teaching English courses in general, but in ESP and EAP courses in particular. In fact, this is often a key factor in distinguishing among general English courses that are mainly developed based on the instructors' intuitions about learners' needs and EAP courses (Dudley-Evans & St John 1998; 2000; Hutchinson & Waters, 1987; 2009). However, not unique to EAP, the needs analysis is not only a key stage in EAP course design but generally regarded as the cornerstone, the most important step in curriculum design of EAP courses, as all other steps and all other decisions regarding the course design depend on its results (Alexander et al.,2008; Basturkmen, 2006; 2010; Belcher, 2009; Brown, 1995; Dudley-Evans & St John, 1998; Hyland, 2006; Hutchinson & Waters, 1987; Jordan, 1997; Robinson, 1991). As a result, conducting a needs analysis allows for the development of a very specific, coherent EAP course (Alexander et al., 2008; Basturkmen, 2010; Cowling, 2007; Dudley-Evans & St John, 1998). However, taking this a step further, Yu and Xiao, (2013) add that it is not so much the awareness of such a need, but ensuring that the need is implemented throughout the EAP course that is vital. Needs analysis can focus on the language needs of students in several skills or only on a specific skill (Shing & Sim, 2011); this is also the case in the current study that focuses on academic reading only.

Robinson (1991) maintains that one needs to take note of the point that, generally, the process of needs analysis is neither static nor objective. The dynamic, flexible nature of needs analysis is observed in two important ways. One is that the findings from each needs analysis reflect the needs of a specific target situation. To exemplify this element, Johns et al., (2011b, p. 2) note that "to best understand how language is used, we must examine it within its context". By agreeing with this statement, Fadel and Elyas (2015, p.16) note that teaching a language "is no longer just a matter of application that serves all needs through any kind of syllabus and methodology. Rather, it is a regulated application that deals with each situation or given discipline independent of the other". Similarly, Weideman (2013) states that by not conducting needs analysis, local contexts

are ignored, and solutions that worked elsewhere are applied instead, usually not with the desired outcomes. Secondly, even within a specific group, the results from a needs analysis should be regarded as flexible as students' needs may change. It should, therefore, be a continuous process taking place during regular intervals in the process of curriculum development, and conclusions should constantly be evaluated and re-assessed (Basturkmen, 2010; Brown, 1995; Hyland, 2006; Hutchinson & Waters, 1987). Pre-course needs analysis informed the initial course design in the current project while the on-going and after-course needs analysis provided a basis for the revision of the course (Basturkmen, 2010; Belcher, 2009).

Needs analysis should not be seen as an entirely objective procedure for two important reasons. On the one hand, a needs analysis should consider key decisions about teaching content, teaching methodology, as well as course evaluation, with reference to the student. While such a learning-centred approach (Hutchinson & Waters, 1987; 2009) implies that the learners are taken into account on a continuous basis through every stage of the course design process, Nunan (1993) cautions that it takes time for students to be in a position to make informed contributions about the learning content and the learning climate. This might sometimes only be possible well into a course and at times even only at the end of it. As indicated in section 2.5.3, a similar observation was made by Evans Commander and Smith, (1995) during their research. When conflicting versions regarding student needs are observed, it is suggested that each situation should be judged according to the particular circumstances as there are no clear-cut answers (Hutchinson & Waters, 1987; 2009). Similarly, Nunan, (1993) cautions course developers to be aware that learners are different and learn in different ways, and that there may be as many interpretations of what is happening in a class as there are learners in the class. Therefore, the EAP course design should rather be a collaborative effort between instructors and students (Nunan, 1993), after which, as done by Evans Commander and Smith (1995). Brinton et al., (1989) add that the researcher, being the course developer, plays a key role in making certain decisions regarding all aspects, including the needs assessment. The course designer should negotiate and determine a satisfactory compromise as to what to include because there is little point in taking an EAP approach and then ignoring learners' wishes and views (Hutchinson & Waters, 1987; 2009). In addition, the subjectivity of a needs analysis is also observed in the detail that its results depend on the

ideologies of the analyst, the type of questions asked, as well as how the responses are interpreted (Dudley-Evans & St John, 1998; 2000; Hyland, 2006; Robinson, 1991; Sanmugam, 2013).

While researchers have different approaches to conducting needs analysis, many agree that a needs analysis generally reflects the necessities, wants and needs of learners. Carrying out a needs analysis generally means that the course developer (EAP practitioner) first has to ask an array of questions, some to be answered through research, some through intuition and others based on theoretical models. In response to the critical importance of needs analysis in EAP course development, various approaches to needs analysis have been developed over the years (Jordan, 1997; 2009), each requiring a certain amount of time, money, resources and advanced planning to be conducted. One that is still widely applied (Belcher, 2009) is the comprehensive learning-centred needs analysis of Hutchinson and Waters (1987; 2009) that combines target and learning needs to establish what people do with language, as well as how they learn to do what they do with the language (or skill). As further elaborated in Chapter 4, this is also the needs analysis framework (cf. table 5) that was applied in the current study. Needs analysis formed an important part of the current study, as it was indicated in Chapter 1 that to date, no formal needs analysis has been carried out at the LC at UNAM to inform the course development process. In this framework, two important types of needs, target and learner needs, are distinguished. Each will now be elaborated.

2.7.1.1 Target needs

Target needs refer to what knowledge and abilities learners would require in order to perform competently in the target situation. In the process, their necessities, lacks and wants are determined (Hutchinson & Waters, 1987; 2009). Necessities refer to what the learner has to know in order to function efficiently in the target situation. Then, by comparing their necessities with what they already know, their lacks, in other words, what they need instruction in are established. While both necessities and lacks can be established objectively, wants, on the other hand, are the built-in, subjective needs that exist within learners themselves. It should be noted that this need may be interpreted

differently among the various stakeholders (course developer, content lecturer, students) but in order to maintain learner motivation, an important aspect in the learning process, their perceived wants cannot be ignored (Hutchinson & Waters, 1987;2009). In establishing the target needs, one would typically involve both learners and lecturers in establishing their needs. This would sufficiently narrow the focus of the course as views regarding needs may vary according to the views of particular respondents (Basturkmen, 2010).

2.7.1.2 Learning needs

The learning needs analysis provides us with the language learning information and information regarding the effective ways of learning the skills and language. It is the process in which we gather various types of information about the learners, for example, personal factors which may affect the way they learn such as previous learning experiences, cultural information, and reasons for attending the course and expectations of it, as well as their attitudes towards English (Hutchinson & Waters, 1987; 2009). Basturkmen (2010) emphasises the importance of establishing how important students perceive a particular skill to be covered in the ESP course would be for their academic studies. It is argued that, if a skill or aspect of language use is not important, it is unlikely that students would be motivated to invest valuable time in it.

Hutchinson and Waters (1987; 2009) propose the following framework for establishing learning needs:

Table 5: A framework for establishing target and learning needs

Target analysis	
Questions to ask	Why is language (or skill) needed? How will it be used? What will the content areas be? With whom will the learners use the language? Where will the language be used? When will the language be used?
Learner needs	
Why is the course taken?	Optional or compulsory? Apparent need or not? Are status, promotion or money involved? What do learners think the will achieve? What is their attitude towards the course?
How do they learn?	What is their learning background? What is their concept of teaching and learning? What methodology will appeal to them? What sort of techniques are likely to bore/alienate them?
Available resources?	Number and professional competence of instructors; Attitude of instructors to ESP; Instructors' knowledge of and attitude to the subject content; Materials, aids Opportunities for out of class activities
Who are the learners?	Age/sex/nationality What do they know already about English (replace with skill)? What subject knowledge do they have? What are their interests? What is their socio-cultural background? What teaching styles are they used to? What is their attitude to English or to the cultures of the English-speaking world?
Where will the course take place?	Are the surroundings pleasant, dull, noisy or cold?
When will the course take place?	Time of day? Every day/once a week? Full- time/part-time? Concurrent with need or pre-need?

(Hutchinson & Waters, 1987; 2009, p. 59)

This framework has since been used in various EAP needs analysis procedures and adapted according to the desired context (Fouché, 2009; Sanmugam, 2013). This framework needs analysis can be applied to any EAP setting. Brinton et al., (1989) suggest that in developing CBI courses, one should also explore the following issues during the needs analysis stage:

- Are there predetermined curricular objectives that must be adhered to?
- Do the conditions for the selected CBI model exist?
- Is content, language or both the primary aim?
- Is there adequate time to plan and to set up and coordinate the new course?

Alexander et al., (2008, p. 83) agree, but refer to these issues added by Brinton et al., (1989) as "course constraints". While they do not dispute the importance of needs analysis in EAP course design, identifying course constraints is viewed to be the most useful place to start.

It is important to note that while various data collection tools can be used in conducting a needs analysis, the quality of the data depends on using the appropriate data collection techniques. It is normal practice to use more than one way of data collection due to the complexity of needs; however, one also needs to be selective about what type of data to collect (Basturkmen, 2010). Using various research tools, such as in the current study (cf. 5.1.2.1), provides a "thick description" (Starfield, 2011, p. 175) of the complexities of EAP learning environments. One can, therefore, conclude that carrying out a needs analysis is a complex process, but the most characteristic feature of EAP course development. More details regarding the data collection tools to provide a comprehensive needs analysis in the current study are elaborated in Chapter 4.

As suggested in Chapter 1, countless needs analysis studies have been recorded in the fields of EAP/academic literacy worldwide, but none in Namibia, particularly at UNAM. These have been conducted in different areas and in various ways. Many of these studies have been conducted in science-related fields, but to my knowledge, none had been conducted on the academic reading needs of Biochemistry 1 students reading for stereochemistry in particular at UNAM in Namibia or elsewhere in the world.

Next, some of the numerous reports on needs analysis studies will be reviewed for a better contextualisation of the current study.

Unlike the current study that used a mixed methods approach, Fadel and Elyas (2015) report on a quantitative study conducted to explore the language needs of science students in their foundation year in Saudi Arabia, as well as their attitudes towards ESP courses. This study was done after it had been established that a general English course did not serve their language needs and students were unable to grasp the practical use of the course in their areas of specialisation. These researchers seem to have used the acronym ESP to refer to ESAP courses and EGP to EGAP courses. A questionnaire to mainly establish students' perceptions of ESP and its significance to their current and future studies was administered to 85 female participants. No indication of the empirical evaluation of the current general English course was provided to validate the need to develop an ESP course. It was also not stated whether students were informed of the rationale behind an ESP course. However, the findings suggest a moderate interest in taking ESP (40%), and that an overwhelming majority (75%) considers ESP and EGP to be equally important to them. However, almost all students stated their need to study technical terminologies, as well as the need to have topics related to their field of study included in their English course. When asked to rate which of the 4 language skills needed improvement, noticeably, the productive skills, writing (27%) and speaking (56%) were favoured. Regarding their most favoured and, as a result, the teaching method they regarded to be the most effective, the vast majority indicated films, games, projects and presentations (78%), followed by class discussions and role plays (47%). Interestingly, there was not much difference between the latter and the traditional teacher-talk method (46%). Based on the results, it was recommended to design an ESP course to be integrated into the regular EGP course in the form of ESP reading. This reading programme should specifically be designed to cater for the situational and learning needs of students and should focus on technical terminology, with special attention to improve the productive skills of students as a result. Although not specifically stated, these recommendations seem to suggest the authors' reasoning about the inherent integration that exist in the language skills (Weideman, 2013), and that reading seems to be the core skill in developing AL and CALP (cf. 1.1.5). In other words, all students have to read in order to develop their other language skills. Another observation is that the researchers did also not solely rely on the input of the student-participants, but also on their own professional views (cf. 2.7.1) and that the new

proposed course would be placed, according to the continuum developed by Dudley-Evans and St John, (1998; 2000), (cf. Figure 1),) in level 3. In other words, they seem to have catered for all science students, irrespective of their subareas of specialisation. This is a potentially dangerous development, as there are vast differences also within academic subcultures (Hyland, 2002; Weideman, 2013). The researchers also seemed to do a general needs analysis of all four skills and did not specifically focus on one area, for example, reading, as is the case in the current study. Finally the researchers acknowledged that one of the shortcomings of their study was that they only considered the needs of one specific group and that more research needs to be done. An additional shortcoming could be that only quantitative data were collected. Perhaps an added qualitative component could have added to a richer description of the target needs.

In another study, Sebolai (2014) describes an investigation at a SA university which critically reviewed the Academic Literacy Programme (ALP) in order to establish whether it met the students' generic academic literacy needs. This course specifically professed to teach reading and writing in English for General Academic Purposes, using a skills-based approach. It was introduced in 2007 after the results of a standardised test of academic literacy, the Placement Test in English for Educational Purposes (PTEEP), revealed that the academic literacy levels of first-year students (n=408) were too low (39.1%) for academic success at a tertiary institution. A case study approach evaluated the programme based on six areas, namely conceptual design, teaching and learning methodologies, text selection procedures, assessment and managerial structure. The findings revealed that the conceptual design of the AL course failed to sufficiently encapsulate the theory of academic literacy that the PTEEP was based on, as it was skills-based and not skills-neutral (Weideman, 2013). This test was developed based on similar criteria for AL as those that were discussed in section 2.1 (Cliff et al., 2007). The researchers concluded that, similar to the current situation at the UNAM LC, the course was mainly designed on the basis of the intuitions of the course designers and not on the results of the needs analysis tool. Furthermore, the PTEEP was not aligned to the concepts of academic literacy that support the PTEEP. In addition, after an evaluation of the texts that had been selected and included in the course, it was established that they were not consistent with the reading proficiency levels of students. For example, the readability statistics for most of the reading texts in the ALP course book was at a Flesch-

Kincaid Grade Level of 8.3. The researcher concluded that such a score was "probably too low for teaching reading to students hoping to make it at [sic] university study in ESL" (Sebolai, 2014, p. 59). Still on the topic of text evaluation, another similarity with LC course development at UNAM was observed, namely that the selection of texts were random, as well as unrelated in terms of topics, tasks and overall themes. As a result, students would not benefit in terms of scaffolding and re-reading topics to facilitate comprehension and vocabulary improvement. The author also indicated that, as students had various backgrounds, not all would find all topics interesting. Furthermore, when evaluating the teaching and learning methodologies applied in the course, the course was found lacking with regard to practising the pre-, while- and post-reading strategies. While pre-reading was practised throughout, only one type of activity prevailed, namely the exposure of students to new vocabulary prior to reading. However, it was mentioned that instructors did not use a principled approach in selecting vocabulary to focus on, and used the same vocabulary activity in all units. Lessons did not have any while-reading activities and the post-reading activities were established to be based on the intuition of course developers and not by any "principled understanding of what typically goes into this stage of a reading lesson" (Sebolai, 2014, p. 61). More details regarding typical reading lesson development will be elaborated in section 3.3.

Next, in measuring the procedures of assessing the course, (something that the current study did not undertake), Sebolai (2014) established that tests lacked validity and reliability and were also not based on any theory of academic literacy. This assumption was made when students, who performed poorly in the placement tests, seemed to achieve high marks in the ALP achievement tests. Finally, when considering the **structure** and **management** of the ALP course, another aspect that the current study did not explore, a disorderly course "coupled with a lack of sensitivity to the technical and specialised nature of the English language teaching professions especially in the highest echelons of the ALP" (Sebolai, 2014, p. 65) was reported Based on these evaluations, serious shortcomings of the ALP course were revealed, and the researchers proposed its redevelopment, as well as for similar evaluations of literacy programmes at other universities to account for their current content. The researchers did not mention any follow-up courses that were developed and evaluated.

The importance of conducting a needs analysis in EAP course development is illustrated by Sanmugam (2013) who reports on the results of a needs analysis study that was carried out at a Malaysian Polytechnic among fifth-year, engineering students from three different majors. They were selected randomly (n=120) to assist with the improvement of the curriculum of an existing general EAP course. This course was developed and implemented without first carrying out a needs analysis, in other words, based on the intuition of the lecturers as it is also the practice at the UNAM LC, as well as at the SA university reported by Sebolai (2014). Various data collection methods were used to conduct a needs analysis that reflected an adapted version of Hutchinson and Waters' learning-centred needs analysis. In addition, students were asked what skills they expected their English language lecturers to have. Amongst others, the results suggested that, similar to what was reported before (Fadel & Elyas, 2015), these students regarded training in speaking and listening as more important than training in the reading and writing on which their current course focused. The students stated that they needed a course to prepare them for the workplace and that they, therefore, found the current course materials irrelevant to the engineering field. In addition, unlike in the earlier study reported on (Wu & Badger, 2009), 87% felt that their English instructors needed to have a special set of competencies to cater for the needs of the engineering student. Their reading needs were also not reflected in the current course. Their current course focused on textbook reading, but unlike the participants in the current study (cf. 4.9.3), they were already in their third year of studies and required assistance in reading technical articles in journals, technical manuals, texts on the computer, instructions for assignments/projects, instructions for labs and study notes. Based on these results from the needs analysis, it was recommended to revamp the current curriculum to focus more on the listening skills of students, to use materials related to engineering to cater for their areas of specialisation, to train them to read resources more appropriate to their needs and to equip language instructors with specialised skills to meet the needs of engineering students. The researchers did not specify the skills to be focused on to train instructors, but the study does highlight the importance of conducting a thorough needs analysis and to base language support and instruction based on those results.

Johns and Makalela (2011a) report on a project where the main researcher, who is not a South African, was tasked to revamp a general English proficiency course into an EAP

course to respond to the needs of science students at the University of Limpopo, South Africa. The main researcher describes how his own preconceived ideas, the short time in which the work had to be done and because one of the authors of the current general English proficiency course that had to be revamped was one of the staff members, limited the impact of the curriculum that was to be developed. None of these hampering factors were present in the current research, as the researcher was also the English lecturer of the participants and had been a lecturer at the LC for a number of years (cf. 1.2). The researcher in the study reported by Johns and Makalela (2011a) became involved with local and cultural activities, attended campus clubs, departmental meetings, met with students and attended and presented at graduate conferences to gain a better understanding of the target community. Meticulous, detailed notes of all meetings and corridor discussions were kept and used to develop the course. The course was developed and implemented, but was still to be evaluated at the time the article was published. The researchers emphasise that the lesson learnt was that if EAP courses do not consider the needs of target groups, it results in a scenario where the course developer does not fully address the stated and unstated needs of the client. Dudley-Evans and St John (1998; 2000) adds another view to why EAP courses often fail to catering for all the needs of clients, by namely time constraints, such as reported in this study. Time constraints do not seem to have been a limiting factor in the current study as it was possible to cover and use the entire Stereochemistry chapter from the students' textbook as reading material for the intensive reading programme (cf. 6.2.2.1). As it is reported in section 6.2.4, not all students completed the extensive reading programme, but the reasons for that is possible more a lack of motivation and time constraints from their side due to their other demanding content courses than time availed for the implementation of the course.

Once the needs analysis is carried out, the curriculum of the EAP course can be designed, the course objectives can be formulated and the selection of the course content and learning activities are made easier (Shing & Sim, 2011). As previously stated, these suggested stages of EAP course design do not necessarily occur in linear order (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000; Hutchinson & Waters, 1987; 2009). However, for the purpose of the discussion a linear order is assumed. The first 3 stages, as suggested in Figure 2 represent the needs analysis stages which have already been discussed above. Next, the writing of the syllabus, the writing and selection of

materials, the teaching thereof, as well as learner achievement evaluation, will be elaborated on. More details regarding the course development of EAP reading courses, the focus of the current research project, will be provided in Chapter 3.

2.7.2 The Syllabus

A syllabus is crucial in a well-designed EAP course and is generally regarded as a document which indicates the future direction of the course, based on an examination of the needs analysis (Hutchinson & Waters, 1987; 2009). It provides a specification of what should be included in the EAP course. In addition, it involves selecting, grading and the sequencing of the content into manageable material to allow students to progressively reach their learning goals. Researchers such as Basturkmen (2010); Belcher (2009) and Nunan (1993) agree that such a developmental or sequential syllabus will allow for knowledge and skills to be transferred beyond the scope of the course duration, contexts and disciplines. Syllabus design should not be seen as rigid. Alexander et al. (2008) propose a principled, eclectic approach to allow for flexibility as students' needs change. In the same way, Jordan (1997; 2009) maintains that though it is standard practice to design the course once the syllabus has been drawn up, the syllabus, the methodology and the materials actually evolve together, with each informing the other. The ability to do this requires the designer to have a good theoretical understanding of the sentence grammar, vocabulary, rhetorical functions, genres and texts, discourse grammar, content and topics, academic skills and tasks their target group is required to know at university (Alexander et al., 2008; Johns et al., 2011b). Not having these abilities often result in a post-hoc approach to syllabus design (Hutchinson & Waters, 1987; 2009). As indicated in Chapter 1, such a post-hoc approach to syllabus design is regarded as one of the major shortcomings in LC course development at UNAM. In such an approach to course design, course developers first write materials on undefined criteria and then only develop a cosmetic syllabus. This process is illustrated in Figure 3.

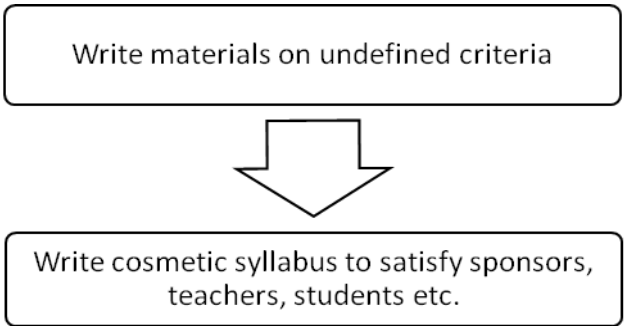

Figure 3: A Post-hoc approach to syllabus design. From "English for Specific Purposes," by Hutchinson & Waters, 1987; 2009, p. 94.

2.7.3 Materials development

A similar argument to that of specificity of EAP is found in the debate on whether authentic material should be used in the EAP classroom or not. Opponents of the use of authentic texts in general EAP instruction, for example Hutchinson and Waters (1987; 2009), offer several reasons for their argument. Firstly, they are of the opinion that any text can be used to teach language skills that are specific to the needs of learners. They also argue that there are no specific grammatical or discourse structures that can be identified within one specific course only. A further argument against the use of authentic material is that once material is removed from the context where it naturally occurs, it may lose its authenticity. Another argument is that instructors might not be able to cope with highly specialised texts, which may result in a scenario where instructors may lose instruction focus and spend more time explaining terminology and concepts (Hutchinson & Waters, 1987; 2009).

This view was heavily criticised by others who argue that "each ESP situation is best examined in its own terms" (Swales, 1985, p. 181) and that EAP teaching is essentially language and context specific (Cheng, 2011). Basturkmen, (2010), Belcher (2009) and Jordan (1997; 2009) support this view, arguing that authentic materials provide a scenario of how language is used in real academic or occupational situations, demonstrating real language use; furthermore, learners seem to be more motivated when materials that relate to their courses are used in ESP classes. Belcher (2009, p. 7) is of the opinion that "it

would make little sense to seek needs assessment data as input for EAP courses if those who develop and teach them were then to choose generic, ready-made commercial materials unresponsive to the specific target needs so successfully identified".

More specifically, with regards to materials to use for course development and use in CBI instruction, Brinton et al., (1989) make several suggestions. Firstly, they argue that authentic materials in CBI can be any material that was not generated specifically for language-teaching purposes. In addition, course developers should use materials to cover a large range of text types and should ensure that materials can be utilised or exploited in terms of language functions and structures. Furthermore, one should consider students, as well as the instructors, in materials selection. In other words, materials should reflect the needs and interests of students and, although content is limited by the specific course content of the textbook in adjunct courses, the instructor should decide if only the textbook or additional materials would be used. This all depends on programme specifics. They argue that if supplementary authentic materials (to the textbook content) are used, these materials should not obscure or weaken the focus of the content course. Finally, these authors do not advocate for lexical or structural simplification in CBI instruction.

Another concern for EAP practitioners is to decide between using materials that already exist and to produce materials for use in their classes. Three basic options seem to exist (Basturkmen, 2010; Dudley-Evans & St John, 1998; 2000; Hutchinson & Waters, 1987; 2009; Swales, 1988; Swales, 2009). Instructors could evaluate materials and select appropriately from what is available from existing material (*materials evaluation*), opt to write their own materials (*materials development*), or they could select to modify and supplement existing materials and activities (*materials adaptation).*

It is generally agreed that, even if it is decided to write one's own materials, the systematic evaluation of existing materials can provide a good source of ideas and techniques (Belcher, 2009; Hutchinson & Waters, 1987; 2009), as well as form the basis for classroom materials (Dudley-Evans & St John, 1998; 2000). While Hutchinson and Waters (1987; 2009) regard the adapting and developing of materials as major undertakings that are very labour intensive, they consequently regard that option as a last resort that should only be followed after it has been established that the target audience's needs are significantly different from those of other groups that the material had already

been developed for. Others (Dudley-Evans & St John, 1988; 2000; Jordan, 1997; 2009) argue in favour of it. It is argued that in this way, instructors will ensure that they have materials that are relevant and interesting, up-to-date, and that have a personal touch.

In the following paragraphs, three workbooks that were developed elsewhere for science students, the target subject of the current study (cf. 5.1) were scrutinised to determine their appropriateness for the new reading course. (This was done after it had been determined that the course would be for biochemistry students and the section of the work it would focus on would be stereochemistry.) These workbooks were obtained through an online search.

Dodgson (2007) developed the *English for Science 1* course book for science students at the University of Mahasarakham in the Northeast region of Thailand. This university offers a variety of degree programmes, not only in science. The course deals with basic reading skills, the writing of summaries, basic grammar for science and also poster presentations. The appendix at the end of this course book contains the reading passages students are required to read as they work through the course. It consists of 19 reading passages, ranging from newspaper articles, short and longer reading passages, as well as 2 journal articles. All the carrier content (reading passages) is science related, but do not seem to be authentic texts that students would need to read during normal science lessons. None of the themes was related to biochemistry at all; however, some seemed to be a good point of reference to see what to include in a typical science course. Some of the reading skills that were focused on, the target content in the lessons are also dealt with in the generic ULEA course at UNAM. They are, for example, skimming, scanning, active reading, detailed reading, critical reading, using dictionaries and glossaries, as well as paraphrasing and summarising. The only text genres that were explained to students are how to read scientific papers and how to develop poster presentations, neither of which is appropriate for my students who read mainly from textbooks (cf. 5.3.3). The reading activities required students to be able to apply these skills. This, together with the topics in the carrier content, gave me the impression that the course was fairly general. However, some activities in the grammar section seemed appropriate to include in the new reading course, for example, the discussion on prefixes that indicate size, location,

number, time and order, as well as the discussion on suffixes forming nouns, verbs, adverbs and adjectives. They also have a section in cause and effect linking words and those used for explaining systems and processes (Dodgson, 2007). Therefore, when I started designing my own reading course, I revisited these sections in this course guide, as guessing the meaning of vocabulary in context and comprehending and applying cohesive devices formed two integral parts of the course (cf. 6.2).

Another course that was discovered through an on-line search is English for Chemists (Velebná, 2009), a course for chemists at the Faculty of Science at the Pavol Jozef Šafárik University in Slovakia. The author states that the main motivation for developing the course was the lack of appropriate materials. The course consists of 10 units in which students are mainly introduced to scientific vocabulary and terminology through authentic texts. The references indicate that the carrier content did not come from one, but rather from a variety of suitable chemistry texts, such as the internet and vocabulary textbooks. True to the aims of the course, the focus of all 10 units is on developing vocabulary and terminology. The themes of the 10 units are: Science, Chemistry, Laboratory, Periodic Table, Matter, Inorganic Chemistry, Organic Chemistry, Environmental Chemistry, Analytical Chemistry and Everyday Chemistry. Browsing through the various units, I took note of how the activities to teach terms and vocabulary were structured, and also revisited this unit for ideas during the development of my own reading course. However, I could not use or adapt any of the units, not even the one dealing with organic chemistry as a theme, as will become clear in Chapter 5. In the above mentioned course, two activities deal with stereochemistry, one asking students to translate and one dealing with word order, neither suitable for the objectives of the new reading course I was developing.

The third study to be discussed was carried out to improve the academic literacy levels of first-year Natural Sciences students by means of an academic literacy intervention at the University of South Africa (UNISA), an Open and Distance Learning institution (Fouché, 2009). As it was reported earlier (cf. 2.7.1.2), the course consisted of 20 x 3 hour sessions. This is a face-to-face intervention programme that focused on developing reading, writing and reasoning skills of science students. The materials developed for the intervention, as contained in the addenda of this particular thesis, were scrutinised for

appropriateness for the new reading course, as it was already suggested much earlier in the development of ESP that an "isolationist attitude can lead to the reduplication of effort and inefficient use of time" (Swales, 1985, p. xiii). Only the lessons dealing with or related to developing reading skills were considered. These assisted students to improve their vocabulary, use scientific words and concepts in context, improve their general reading comprehension in the sciences, apply visual literacy and synthesise information. The researchers employed a common-core approach, using material from general, science-related topics which seemed to be dealt with in isolation and the carrier material, even though all had a science theme collected from various sources and not only from textbooks, as in the current study. Although regarded by the researchers as authentic, to use the same material for the current programme could not be regarded as such, as per requirements for adjunct CBI courses (cf. 2.4). In addition, none of the carrier content had biochemistry, or stereochemistry, for that matter, as a theme. However, when the activities for the new course were developed, this course was revisited.

Even though materials adaptation is not generally advocated in CBI approaches, it is conceded that it is often required (Brinton et al., 1989). These authors are of the opinion that the results from the needs analysis should determine how materials should be adapted and that one should keep an open channel of communication with content lecturers for regular assistance in this regard. Another reason for adaptation could be to map language teaching objectives into the authentic content material or by adding features to render the writing more cohesive, especially when such texts do not conform to the standards of good writing (Brinton et al., 1989).

As previously stated, good materials take time to develop. It is generally agreed that in doing this, developers should pay attention to the general structure and layout, type of texts, activities as well as other pedagogical implications. From personal experience, I know that this too, is an area that is lacking in LC course development at UNAM; hence, the detailed examination of the literature available on this topic. Ideas from Cheng, (2011), Dudley-Evans and St John (1998; 2000) and Hutchinson and Waters (1987; 2009) regarding these qualities of materials development are summarised as follows:

Table 6: Characteristics of good EAP material

Characteristics of good EAP materials	
Structure and layout	Should have clear instructions; Teaching/learning objectives should clearly be stated; Structure should help to organise the teaching-learning process. Unit structure should be coherent, vary in format, type and number of activities, must be systematic but flexible enough to allow creativity and variety; Each unit should reflect and relate to others in the course; Show attention to presentation, having good, consistent rubrics, a planned layout and carefully edited.
General pedagogical implications	Reflect the writer's opinion about language and language learning; Introduce new teaching techniques; Have variety in the micro-skills; Be a source of learning support; Provide models of correct and appropriate language; Materials should be used as a reference; To allow learners to work through materials on their own, materials should be complete, well-laid out and self-explanatory; Feedback explanations, examples, answers, and discussion keys provided; The different learning styles should be taken into account.
Texts	Should be interesting; Learner and teacher should be able to cope with texts; Input should be familiar, but should also offer something new, a reason to communicate and to become involved; Reflect the nature of the learning task; Expose learners to the real language as it is used.
Activities	Should be varied, enjoyable, stimulating, challenging, yet achievable; Creating opportunities for learners to use existing knowledge and skills; Reflect the nature of the learning task; Expose learners to the real language as it is used; Involve learners in thinking and activities should stimulate cognition.

(Cheng, 2011; Dudley-Evans & St John, 1998; 2000; Hutchinson & Waters, 1987; 2009)

A study to compare the effects of authentic teacher-made materials on the reading abilities of Medical Science students in Iran (Sabet & Daneshvar, 2010) revealed that the use of authentic, teacher-made materials proved to be more effective than using existing, international materials. 45 participants were randomly assigned to three groups and were taught Medical English through three different sets of teaching materials. One set

contained internationally produced materials; another was locally produced and the third set was teacher-made materials after it had been established that the instructional materials used did not seem to meet the reading objectives of reading courses for Medical Students as stipulated by the Ministry of Higher Education in Iran. These objectives were to find and discuss the main idea, to paraphrase and summarise a text, to use contextual clues to find new vocabulary and to focus on language. Students were randomly assigned to three groups and taught Medical English from these three types of materials. All participants wrote the same reading post-test. The results indicated that the group that was instructed through the teacher-made material outperformed those who were taught by means of the other material. A significant difference among the three means (1(F=71.745>1) was observed, demonstrating that the different types of materials had different effects on the reading scores of participants in that study. While the study indicated that different types of materials did have different effects on learners, only the quantitative data were provided. More research needs to be done on this issue, for example, by qualitatively exploring reasons why this was the case.

Still part of course development, the next section will discuss considerations to take into account regarding the teaching methodology of a course, an area of EAP that is often overlooked even though it is a fundamental aspect to the successful accomplishment of EAP goals (Alexander et al., 2008; Hutchinson & Waters, 1987; Watson, 2003).

2.7.4 Teaching Methodology

Practitioners need to have an understanding of how the objectives of a syllabus, i.e. the teaching objectives can best be taught and learnt; hence Watson's (2003) argument that one should consider the term TEAP (Teaching EAP) and not only EAP as a reminder of the importance of methodology in EAP instruction.

EAP is best taught through discussion and discovery, using a problem-solving approach, practical, authentic materials and tasks (Hutchinson & Waters, 1987), a focus on inductive learning, the promotion of learner autonomy, the integration of technology in teaching and the use of team teaching (Watson, 2003). However, Hutchinson and Waters

(1987; 2009) remind practitioners that EAP methodology is also determined by the needs analysis of the target and learning needs. In other words, there is not necessarily a best way because all techniques and methods should be a response to a particular situation and text, an observation that is generally concurred by others (e.g. Alexander et al., 2008; Cheng, 2011; Dudley-Evans & St John 1998; 2000; Sailors, 2009; Watson, 2003). As a result, the EAP practitioner must be willing and flexible, and needs to assess situations from various viewpoints and then select and adapt the methodology to match the learners' needs, often resulting in an eclectic approach (Alexander et al., 2008; Hutchinson & Waters, 1987; 2009). For example, in the study by Fouché (2009) earlier referred to, both group and individual activities were incorporated to allow for the different learning styles of students.

Teaching methodology cannot be separated from the activities through which this content is learnt and is usually reflected in these. Watson (2003) refers to activities as teaching techniques and argues that more attention should be paid to develop authentic tasks. To this end, Hutchinson and Waters (1987; 2009) agree and are of the opinion that activities should already have been considered at the start of syllabus design as these directly facilitate learning. When considering these options, one is reminded that in EAP any teaching activity is presented in context and, therefore, should be developed from the texts used; hence, the call for authentic activities inspired by real-life, learning-centred activities (Belcher, 2009; Basturkmen, 2010). Finally, exercises should be developed in a way that makes dense, complicated texts in CBI instruction more accessible (Brinton et al., 1989). More details regarding activity development, with special reference to reading courses, are provided in section 3.4.

A crucial part of an EAP course, especially adjunct courses, is the course evaluation. Next, an overview of some considerations is explored.

2.7.5 Evaluation of the course

Course evaluation is an indispensable part in establishing the effectiveness of a course, in other words, determining how much the learners have learnt and how well the course is fulfilling the need that the EAP course addresses (Basturkmen, 2010; Brinton et al., 1989; Cheng, 2011;Richardson et al., 2012). Dudley-Evans and St John (1998; 2000) are of the opinion that in EAP courses, this is especially important as such courses have specific course objectives. Brinton et al., (1989) share this view, as explicit course objectives are particularly relevant to adjunct courses. In the same vein, Hutchinson and Waters (1987; 2009) consider EAP as accountable teaching where the importance of carrying out a course evaluation is even more realised in the sense that stakeholders want to see results in their various forms of investment in the course, usually time or money.

Evaluations can be carried out informally or formally, and take different forms and methods. However, it should be done systematically, according to clear criteria for evaluation (Dudley-Evans & St John, 1998; 2000). Informal evaluations can assist in the development and improvement of courses, but Brinton et al. (1989) are of the opinion that it is best to gather detailed information in a more formal, systematic way by collecting both qualitative and quantitative data in formative (on-going) or summative (afterwards) forms. While Brinton et al. (1989) regard summative evaluation to be more credible, Grant and Fischer (2010) view formative assessment to be equally important as it could indicate the need for curriculum and teaching reform, should students not perform well on tests/tasks. As a result, they regard formative assessment as assessment *for* learning and not *of* learning. In order to decide what type of assessment to use, Hutchinson and Waters (1987; 2009) suggest that it all depends on the most appropriate model for individual contexts. Grant and Fischer (2010) believe that these should directly be tied to instructional goals.

Two types of assessment are generally involved in EAP course evaluations, learner assessment as well as course evaluation.

2.7.5.1 Learner assessment

Even though a crucial element for an EAP course is how well the learners fare in their target situation (Dudley-Evans & St John, 1998; 2000), EAP Learners are generally assessed for two main purposes. The first purpose is to have feedback to aid learning and the second is to have a comparable measure of competence (Dudley-Evans & St John, 1998; 2000).

Brinton et al. (1989) caution that one needs to be clear what is assessed during any assessment procedure in adjunct courses, and consequently argue that language instructors should also consider content knowledge and not only evaluate L2 capabilities. For example, as it was indicated earlier, Evans Commander and Smith (1995) suggest from their experiences with teaching adjunct language courses, that instructors should develop content post-tests to evaluate the effectiveness of adjunct courses. In the process, care should be taken not to simplify content or questions because texts in both content and language tests should resemble those authentic texts used for native language speakers. One suggestion is that the same test can be used but with different evaluating criteria (Brinton et al., 1989).

Learner assessment can take the form of placement, achievement or proficiency tests (Hutchinson & Waters, 1987; 2009), and can involve quantitative as well as qualitative testing (Richardson et al., 2012), as appropriate. For example, Dudley-Evans and St John (1998; 2000) state that in short, intensive courses, tests may be inappropriate, because real effect is likely to show some time after the course.

Testing is one way of collecting data and providing useful information about performance at one specific point in time. However, it is only one piece of data for evaluation. Tests can be standardised, criterion-referenced or teacher-made. When only one instrument is used to make an educational decision, which process is referred to as "high-stakes testing" (Richardson et al., 2012, p. 356). Relying on the information of one test only is risky and may not be an appropriate measure of academic success. These tests

seem to focus on isolated facts. Also some students may be very familiar with the format of texts, leading to an increase in performance. This concept is referred to as a "wash back effect" (Richardson et al., 2012, p. 361), meaning that constant exposure leads to familiarity, resulting in students becoming adept at test taking. Also, one test may not be appropriate for everyone. One solution to high stakes tests could be excellent instruction and multiple means of assessment that would lead to solid evaluation (Richardson.et al., 2012, p. 363). Therefore, the value of tests depends primarily on how they are used, and results should be seen less as a starting point for genuine interaction between course instructor and learners (Dudley-Evans & St John, 1998; 2000). In addition, tests should be based on what was taught. If students do not perform well on tests, the material may be re-taught, with different instructional strategies. Furthermore, one is reminded of the important detail that instructors and learners first need to have a positive attitude to the tests, otherwise the exercise of testing writing will be futile in EAP course development (Richardson et al., 2012).

2.7.5.2 Course evaluation

EAP course evaluations generally focus on evaluating perceptions of effectiveness and assessing learning, not only at the end of the EAP course, but also in the light of subsequent experiences in the target field. These course evaluations are invaluable for course revisions in EAP courses (Basturkmen, 2010). Such responses provide strong support for instructor convictions about the merits of the model, and important conclusions can be drawn (Brinton et al., 1989). In the process, learners are trained to evaluate themselves, monitor their progress and become sensitive to the learning process (Nunan, 1993).

Evaluations can be carried out by various people, who can be either insiders or outsiders, by using various tools. Outsiders have the advantage of being perceived as more objective, but as they do not know the situation and the environment, they may miss or misinterpret the data. An insider, on the other hand, can become too closely involved (Dudley-Evans & St John, 1998; 2000). Therefore, one can have objective and subjective feedback on evaluations (Hutchinson & Waters, 1987; 2009). Some of the tools that can

be used, for example, are checklists, questionnaires, interviews, observation, analysis of authentic texts, tests, assessment, discussions and record keeping (Dudley-Evans & St John, 1998; 2000). More details regarding the assessment and evaluation tools used in the current study are elaborated in Chapters 4, 5, 6, 7 and 8.

In Taiwan, the importance of using appropriate EAP course materials is given priority, consequently, teaching materials for teaching engineering were developed and evaluated (Hui-Chuan & Yeh-uh, 2012). The material was intended to teach general English skills, vocabulary, grammar, reading and conversation to college engineering majors, and instruction to 67 students who attended two junior engineering classes for two hours per week, over a period of three weeks. It is not clear how the selection of the contents and topics of the material were determined, and no reference to a needs analysis is made. The teaching of the material took place in a familiar environment, the students' home classrooms, to offer the students ease of mind, according to the researchers. Afterwards, data were collected about learner perceptions of the materials, employing a questionnaire that had 12 questions and a focus group interview with 4 male students, all from the same class. The first section of the questionnaire explored to what extent the course improved their general English competence while the last part explored to what extent it improved their EST competence. The results from the questionnaire were generally positive, with students reporting that the course improved their general English vocabulary, grammatical skills and reading strategies; their conversational ability also seemed to have benefited, but to a lesser extent, indicating that that area probably needed more attention. In general, the course also seemed to have improved their abilities in the engineering field and technical vocabulary abilities. A lower score for the effectiveness of the course to enhance the effectiveness of their engineering and general English conversational skills indicated that the materials needed to be enhanced to that effect. The focused interviews corresponded with the information gathered from the questionnaires, with students highlighting the request for more opportunities for discussions, as well as the need for more appealing and interesting material. At the end it was recommended to shorten the reading passages, provide more learner support in the materials and to present the material in a more appealing and authentic way (Hui-Chuan & Yeh-uh, 2012).

Like this study reported here, the research also took place in an environment familiar to the participants. However, this was not pre-planned as it was their campus was the most logical location to use. Another similarity is that, as suggested in section 2.7.3, it was aimed to develop interesting and appealing materials. In addition, the participants evaluated the course afterwards and the fact that a variety of data collection tools were used is another parallel between the two studies. However, unlike this study reported on here, the current research only developed the reading course after a thorough needs analysis was conducted (cf. chapter 5).

With regards to evaluation at the UNAM LC, students are generally assessed through tests and examinations. The only other type of evaluation takes place at the end of each semester when lecturers' performance is evaluated by students, mainly for promotional purposes. Students do not evaluate material or their effectiveness and the effectiveness of the specific AL skills that are taught in the different courses. This is clearly an area that can be improved.

In addition to considering the needs analysis, syllabus development, material selection, teaching methodology and course evaluation, a few more issues need to be considered. These are addressed in the section that follows.

2.8 Other important considerations in course design

Five other issues seem to be important considerations in EAP course design.

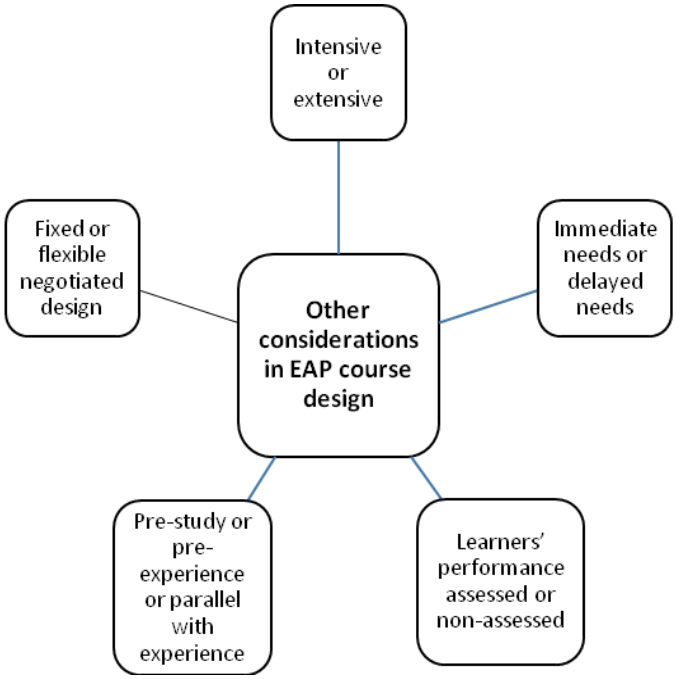

Figure 4: Other important considerations in EAP course design. From "Developments in English for Specific Purposes," by Dudley-Evans & St John, 1998; 2000.

From Figure 4 it is clear that course designers need to consider whether learners' performance in AL courses should be assessed or non-assessed. The advantage of assessed courses is that the status of EAP courses is raised by students and departments (Dudley-Evans & St John, 1998; 2000). Currently at the UNAM LC, courses are credit-bearing, and formal tests and examinations are written. The new course that I have developed, however, did not bear any credits, unlike the extensive reading intervention course conducted by Suk (2015) (cf. 3.4.1.7). Another aspect to consider is whether the course should deal with immediate needs or with delayed needs. The immediate needs are those needs that students have at the time of the course. Delayed needs, on the other hand, are those that will become more significant later. Many EAP courses seem to be a combination of immediate and delayed needs, (Dudley-Evans & St John, 1998; 2000). It seems as if EGAP courses, like the ULEA course at the UNAM LC, deal with general needs. The new adjunct reading course that I have developed deals with the immediate

needs of participants, as identified in the needs analysis. Another aspect to consider is whether the course should be pre-study, pre-experience or run parallel with that study or experience. Pre-experience, EAP courses imply that the learners do not have experience of the target situation at the time of the EAP course. Parallel EAP courses mean the English course runs concurrently with the content course. The advantage of the latter is that students, as well as the EAP practitioner, can draw from the learning content and context to contextualise the EAP instruction (Dudley-Evans & St John, 1998;2000). The aim of the new adjunct that was developed in the current research project, was to run parallel with the stereochemistry lessons of students. Finally, course developers should decide on a fixed-course or flexibly negotiated design. In a fixed EAP course the course design is laid down at the start and is inflexible. A flexible EAP course design, like the one I used, is worked out by the language teacher after consultation with the learners and the institution or it could be subject to a process of negotiation with the learners (Dudley-Evans & St John, 1998; 2000).

2.9 Summary and conclusion of Chapter 2

This chapter has examined relevant literature to explore how AL can be taught in EAP courses. In the process it was highlighted that EAP is a branch of ESP and that an important characteristic of EAP is that it has constant but also variable features. While the constants pertain to the instruction of the academic linguistic needs of target groups, the variables referred to depend on the reasons why the courses are developed, in other words, the target needs of students in particular.

For an EAP practitioner, when developing a new course, there are various options to choose from. While many options are successful, one option to be considered that fosters AL, is the adjunct. Course development and evaluation form the backbone of any successful EAP course. All in all, the EAP instructor, irrespective of what approach is followed, will face challenges. Many of these are not yet accounted for or overcome.

In Chapter 3 reading skill development, the language skill that formed the core of the current study, will be explored, especially as it can and may be instructed in the ESAP classroom.

CHAPTER 3

READING FOR ACADEMIC PURPOSES

3.0 Introduction

The interconnectedness of language skills are highlighted in section 1.3. As it is suggested the reading skill is part and parcel of the development of all the other skills, inclusive of grammar instruction. In order to assist students to pay attention to the specific reading strategies that are required to extract meaning from their reading texts for the various academic departments and even subdivisions they are part of, the EAP instructor should first understand the reading process, as well as issues related to reading instruction. All these elements were instrumental in developing the MMAARR model that this study has developed, implemented and evaluated (cf. chapter 1).

This chapter starts with an attempt to define the process of reading. Thereafter, various theories of reading pertaining to the schema theory, considered to be crucial in the context of the current study, will be elaborated. The third section explores reading for academic purposes, the context of the current study; it then progressively moves to the importance of reading to science students and those doing stereochemistry in biochemistry, in particular. Thereafter a methodological model that was used to develop the reading framework for the current study is introduced and views of various scholars on similar topics are examined. Finally, the importance of action research in the reading classroom is discussed.

3.1 Definition of reading

Traditionally, all AL courses seem to include some reading skill development for students. In Chapter 2 the importance of reading skill development for university students was highlighted. The question can be asked: What exactly does this invisible process (Eskey, 2005) that involves thinking (McWhorter & Sember, 2014) entail? Reading has been described as a process or as “the ability to draw meaning from the printed page and

interpreting this information appropriately" (Grabe & Stoller, 2011, p. 3). It "is what happens when people look at a text and assign meaning to the written symbols in that text … it is the interaction between the text and the reader that constitutes actual reading" (Aebersold & Field, 1997, p. 15). Rueda (2011) regards reading as the use of products and principles of the writing systems to derive at the meaning of a written text. However, these definitions do not reflect the myriad of factors that explain why individuals do not assign the *same* meaning to such written texts. As Cartwright (2009) states, various complexities are involved when readers attempt to coordinate multiple text features in a fluent way to create meaning, especially when reading occurs in the L2, as is the case of participants in the current study. In an attempt to define L2 reading, various aspects seem to be considered. Five pertinent aspects, as summed up in in Figure 5, will be discussed next.

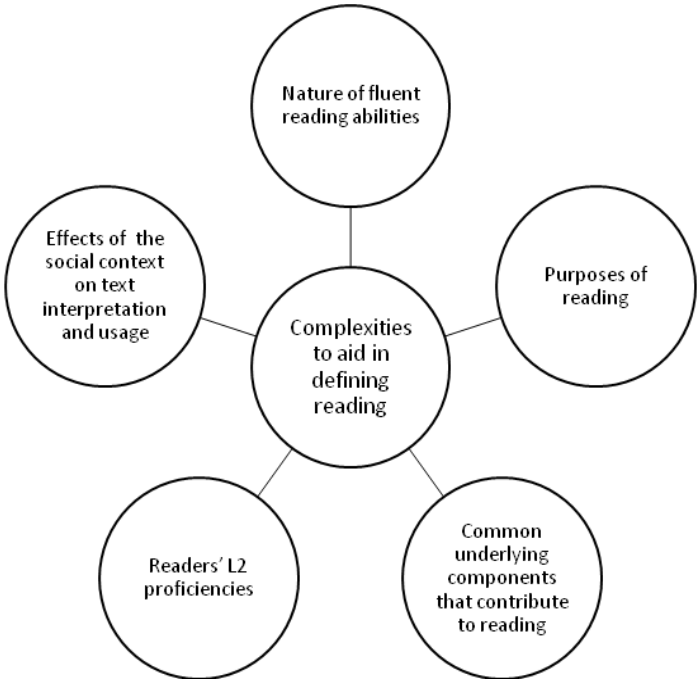

Figure 5: Five pertinent aspects that can assist in defining reading

Each of these aspects are briefly discussed below.

3.1.1 Purposes of reading

It is suggested (Grabe, 2009) that students should deliberately be taught about the purposes of reading and also how to control and alter their reading skills according to the various situations and task requirements. Doing this would ultimately improve their metacognitive awareness (cf. 3.5.1.5) (Grabe, 2009). Grabe and Stoller (2011) identify five main purposes of reading. These are reading to skim and scan, to learn from texts, to integrate information, to write and to integrate texts, and finally, for general comprehension.

3.1.2 The nature of fluent reading comprehension

The nature of fluent reading is linked to the characteristics that good readers display, a topic that has attracted the interest of numerous researchers over the years, internationally (Aebersold & Field, 1997; Alexander et al., 2008; Cartwright, 2009; Duke et al., 2011; Grabe, 1991, 2009; Grabe & Stoller, 2011; 2013; McWhorter & Sember, 2014; Richardson et al., 2012; Shanahan, 2009; Stoller, Anderson, Grabe & Komiyama, 2013; Pressley, 2002), as well as locally (Willemse, 2006). As a result, various definitions for good, competent, skilled or active readers have been proposed. However, for the purposes of this study, the following summary presented by Pressley (2002) will be used to describe these characteristics:

Table 7: Characteristics of Good Readers

Good Readers	
plan and form goals before reading; form predictions before reading; read selectively according to goals; reread as appropriate; monitor their reading continuously; identify important information; try to fill in gaps in the text through inferences and prior knowledge; make guesses about unknown words to keep reading.	use text structure information to guide understanding; attempt to integrate ideas from different parts of the text; build interpretations of the text as they read; build main-idea summaries; evaluate the text and the author, and form feelings about the text; attempt to resolve difficulties; reflect on the information in the text.

(Pressley, 2002, pp. 294-296)

Fluent reading, the key to successful reading, occurs when the reader is able to do all the above "accurately, rapidly with ease and automaticity" (Grabe & Stoller, 2011, p. 11; Grabe, 1991, p. 378). Automaticity, is "the ability to convert most written language into meaningful information so automatically that the reader does not have to think about the language" (Eskey, 2005, p. 568). This, however, takes time to develop and may not be enough to guarantee full comprehension. For example, various other factors may impact the fluency rate of reading, such as the familiarity of the topic that is being read (Grabe, 1991, 1999; Grabe & Stoller, 2011, 2013; RAND Reading Study Group, 2002) and/or the readability of the text (Sebolai, 2014; Rasinksi, Reutzel, Chard & Linan- Thompson, 2011). Both these two aspects are important for the context of this study and will be elaborated in the sections that follow (cf. 3.4.1.7; 3.4.1.9).

3.1.3 Components of reading abilities

In discussing the components of reading abilities, two important processes that are involved in reading are *decoding* and *comprehension.* The former refers to the translation of written signs into language and the latter to the absorption and understanding process where the aims of reading are met by giving meaning and interpretation to the text (Pretorius, 2012). Decoding involves lower-processing reading skills (cf. table 8), and it is important for this to be accurately and automatically executed to enable comprehension (Grabe, 2009). However, someone who can decode well does not necessarily comprehend well and may engage with texts at a superficial level (Pretorius, 1996). These components are discussed in section 3.2.

3.1.4 L2 Proficiency

It is generally accepted that reading success in any language, especially in a L2, is best predicted by proficiency in that language. Reading comprehension is not only linked to reading ability, but also to linguistic knowledge (Benabdallah, 2013; Dudley-Evans & St John, 1998; Eskey, 2005; Grabe & Stoller, 2013; Pressley, 2002; Stoller et al., 2013). Because of their exposure to English prior to being admitted for academic studies, it is assumed that most L2 students who are at academic settings will not have significant problems in this regard and will have reasonable control over word recognition and language knowledge. Consequently, most EAP courses start beyond beginning levels and do not require an extensive grammar component (Afflerbach & Cho, 2009; Grabe & Stoller, 2013). However, while it is conceded that comprehension requires a reasonable knowledge of basic grammar, L2 reading instructors are cautioned not to confuse reading courses with grammar lessons (Grabe & Stoller, 2011; Nation, 2009).

3.1.5 The social context of reading

The social context of reading (cf. 2.1) refers to the issue that all students, even in homogeneous classes, in other words, those enrolled for the same degree, like the students in the current study, are unique or diverse (Richardson et al., 2012). This seems to be especially true about the reading abilities of students in L2 classrooms, due to other reasons than only differences in their cognitive abilities (Grabe & Stoller, 2011). For

example, every student has a prior history that includes a range of sociocultural and educational experiences that play a significant role in accounting for differences in reading abilities. Therefore, reading instructors, like all EAP instructors too, should conduct a needs analysis and enquire about issues like their students' general reading abilities, their exposure to L2 reading, level of motivation and interest, reading experiences, prior educational background, home background and learning goals, in order to enhance instructional practices and support learning (Grabe, 2009; Brandt, 2010). Boughey (2013) argues that one should not assume that schools and homes have provided the necessary skills to support AL development at tertiary institutions, of which the development of academic reading skill is pertinent. Shanahan (2009) concurs that this knowledge (the social context of students) can guide EAP reading instruction.

In order to guide reading instruction in the current study, the social context of reading was taken into account, especially the effects of culture, the home literacy environment, as well as the age of participants. The importance of each directing EAP reading instruction will briefly be elaborated next.

3.1.5.1 Culture

Educators need to consider cultural issues in reading instruction in order to modify instructional methods that would maximise the cultural resources of students. This is because culture reflects the literacy practices that the reader are part of (Eskey, 2005; Grabe, 2009;). Eskey (2005) distinguishes between two important terms: *Enculturation* and *Acculturatio*n. Enculturation refers to the readers' own culture, while acculturation refers to the new culture a reader becomes part of. As a result, it seems obvious that when students become part of the academic culture, educators should be aware of at least two ways in which culture may impede upon students' comprehension abilities. On the one hand, they might be required to engage in a set of social practices that may be in conflict with those they are used to (Eskey, 2005) or, on the other hand, L2 readers may encounter topics that may conflict with their cultural beliefs (Grabe, 2009). For example, some L2 students may come from a culture where it is more acceptable to communicate through speaking rather than through participating in reading or writing (Pretorius, 2002).

In a Namibian study (similar in context to the current study) that examined factors that affect L2 text comprehension of students enrolled for Foundations of English Language Studies at UNAM, Murray (2013) did not find any specific relationship to indicate that the 14 different languages (indicating 14 different cultures) spoken by participants (n=86) played a role in their processing of English texts. Unlike the texts used in the current study which were all from the students' biochemistry textbook, Murray selected 12 texts based on "aspects such as content matter, potential familiarity to participants, complexity of syntax, cohesion and vocabulary" (Murray, 2013, p. 148). She determined that where there was a match between concepts discussed in the text and the cultural background of students, comprehension was facilitated, despite other textual constraints. It should be noted that even though this study is similar in context to the current study in the sense that they were both conducted in Namibia and also at UNAM, these two studies represent participants from different faculties and also indirectly of different academic abilities (cf. 1.1.4.1). The current study also had a different overall objective (cf. 1.4).

3.1.5.2 Exposure to literacy

Children's exposure to print is a strong factor that promotes literacy levels as they benefit from print-rich environments. This issue is evident in a number of ways, such as the number of books at home, the amount of reading to the child, the manner of interaction around the print, the number of rare words used in the home, the number of library visits or even factors like children seeing their parents read (Grabe, 2009; Moje, Stockdill, Kim & Kim, 2011). Students from such print-rich homes are more motivated to read and have higher vocabulary scores than those with less access (Krashen, 2004; 2013; Komiyama, 2013; McQuillan, 2006).

Stanovich and West (1989) developed the Author Recognition Task (ART), and the Magazine Recognition Test (MRT) in which the students who participated were given a list of names of authors and or magazines, half of which were real (and half of which were not), and asked to identify the names they believed to be authentic. When these same tests were used in other studies, it was generally agreed by the researchers that students who recognised more authors and titles had read more and were living in more print-rich environments. They also appeared to have larger vocabularies, spell better and

have more phonological awareness (Bauman, 2009; Krashen, 2013; McQuillan, 2006). Since the development of this ART and MRT tests, (Stanovich & West, 1989) different versions of this test were developed in different contexts, for example, in the current study.

3.1.5.3 Age of readers

The age of readers should also be considered in the reading classroom, especially in text selection, while considering the evidence that most students who do reading for academic purposes are at the time adolescents, and, therefore, they display characteristics very different from primary and secondary school readers. Alexander and Fox (2011) argue that adolescents will become more literate if appropriate reading texts are exploited by course developers; hence the suggestion to take cognisance of the following traits regarding the habits of adolescents, who were also the target group of the current study (cf. 4.9.3)

Adolescents

- have an interest in reading magazines and books about sex/romance and those that disseminate health information;
- are likely to be influenced by cultural norms and social pressures;
- show increased capacities, abilities and efficiencies for:
    - self-regulation,
    - monitoring,
    - working memory functioning,
    - understanding the perspectives of others and responding empathetically,
    - the abstract (moving away from literal to inferential),
    - content knowledge,
    - using text structure and features to support comprehension.
- seem to be able to build comprehension across multiple texts;
- seem to work on their identities and read to learn about their roles and aspects of identity.

- Magazines and other non-literature texts play an important role in the lives of adolescents as they
- establish their roles in societies;
- find that social networks can support or discourage certain types of reading;
- are able to move from smaller classes with much teacher support to larger, more impersonal classes with the focus on content area instruction;
- may show a decrease in their motivation for reading for pleasure and the textbook as an authoritative source of content information;
- seem to solve problems related to their own interests more easily; hence, the importance of content-related reading instruction to stimulate the activation of prior knowledge and engagement, as well as motivation to read (Alexander & Fox, 2011).

Alexander and Fox (2011) further report that the reading interests of adolescents reflect more personal interests in a topic. A similar observation was made by Rucker (1982) who adds that magazines are also important stimulants of reading among adults, and when reading magazines of their choice, their reading levels grow significantly.

Another issue of concern that is indirectly affected by the age of readers is that many students are unable to comprehend texts because texts are far above their comprehension levels and contain difficult vocabulary. Therefore, determining text readability scores allow instructors to match texts with readers (Richardson et al., 2012; Schmitt, Jiang & Grabe, 2011), for example, the Flesch-Kincaid Grade Levels and the Flesch Reading Ease scores (Ward, 2008). This issue is elaborated in section 3.4.1.7.

This section has aimed to illustrate the multi-dimensionality of reading, especially as it relates to L2 readers. It specifically touched on aspects that are relevant to the current study, such as the importance of considering the purposes of reading, the nature of this process, the components involved in reading, the role that L2 proficiency plays in this regard, as well as the social contexts of reading, such as the roles of culture, exposure to

literature and the age of readers. Next, different theories of reading that pertain to the current study are examined.

3.2 Theories of reading

"A theory is an explanation for a phenomenon that is widely held by a group of people" (Tracey & Morrow, 2012, p. 15). However, because reading has so many components, there does not seem to be an umbrella theory of reading. Consequently, various theories of reading have developed, all targeted to explain a manageable part of this complex activity (Perfetti & Stafura, 2014), for example, theories of word reading, learning to read, text comprehension and so forth. These theories, in turn, developed into models that provide ways to explain in more detail how that specific aspect of reading works (Grabe, 2009).

The most common way to discuss models of reading is as being bottom-up, top-down and interactive. Each of these that Grabe (2009) refers to as metaphoric models of comprehension, will next be discussed.

3.2.1 Bottom-up models of reading

Bottom-up models of reading, also referred to as the traditional view of reading, were developed in the 1960s when it was argued that readers automatically process texts from the smallest (bottom) to the largest (top) parts in order to recreate the author's intended meaning (Aebersold & Field 1997; Grabe, 1991; Pretorius, 1996; Paratore, Cassano & Schickedanz, 2011).

This theory assumes that meaning is located in the text, in other words, text-driven; it, furthermore, emphasises the decoding aspects of reading, (cf. 3.1.3), depicting the reading process as a series of discrete stages through which information passes. The processes involved are the oculomotor, perceptual, lexical and various other linguistic processes. Through oculomotor processes, the eye is directed from one print element to

the next; perceptual processes determine the visual patterns of a word; lexical processes bring meaning to the word from previous memory; other linguistic processes consider the semantic and syntactic relationships of successive words, phrases and sentences (Pearson, 2009). This model is criticised as it emphasises reliance on decoding processes; in other words, it regards comprehension as a result of the decoding of printed text, and assumes that readers approach a text with a set of hierarchically ordered sub skills that, once mastered, systematically build up toward comprehending a text (Paris & Hamilton, 2009). Also criticising this model, Pretorius (2002) argues that while the decoding skill is reflected in relatively fluent, oral reading, it is not sufficient for successful comprehension, as many readers who have the abilities to decode texts, still fail to fully comprehend their meaning. In other words it pays little attention to explaining how comprehension occurs. Because of all these criticisms, no current model of reading portrays reading as a pure bottom-up process (Grabe, 2009).

3.2.2 Top-down models of reading

Top-down models of reading are reader-driven and are built on the assumption that the reader is an active participant in the reading process by controlling the comprehension process and determining goals. It argues for the importance of cognition in the reading process and gives attention to the analysis and processing of new information. In the process, readers are assumed to rapidly analyse information from texts (top-down) before moving to the understanding of different words, sounds or letters. As such, it considers the reading process as being more complex than the bottom-up approach (Aebersold & Field 1997; Grabe, 2001; 2009; Pearson, 2009; Tracey & Morrow, 2012).

According to this model, the reader has a set of expectations about the information in the text, and makes and confirms predictions. These predictions are based on his/her prior knowledge about the world (content schemata), and knowledge of text structures (formal schemata), as well as the ability to draw inferences (Carell, 1984). When the upcoming text is consistent with the reader's hypothesis and predictions, the reading process progresses rapidly and smoothly. However, if this does not occur, reading is slowed down and the reader pays more attention to the actual printed text. These top-down

models have since been criticised as being too vague in describing the reading process, since they favour comprehension and ignore decoding in reading. This model also does not clarify what the reader could learn from a text if he/she must anticipate and have expectations about the text (Carell, 1984; Grabe, 2009; Pretorius, 1996; Tracey & Morrow, 2012).

Schema theory, one example of a top-down model of reading, has also been heavily criticised. However, because it attempts to explain the role of background knowledge in reading comprehension, an idea relevant to the current research, this theory will be explained in more detail in section 3.2.4.

3.2.3 Interactive models of reading

Interactive models have been developed as ways to explain the interaction of the bottom-up and top-down processes involved in reading (Grabe, 2009). The central characteristic of an interactive model to reading is that the reader simultaneously uses information that is provided by multiple sources during the reading process (Landi, 2010; Pearson, 2009; Tracey & Morrow, 2012). Grabe (1991) explains that the term *interaction* generally refers to two different concepts. On the one hand, it can refer to the general interaction that takes place between the reader and the text, while reading. In this process, the reader uses information from the text, as well as from background knowledge, to recreate meaning. On the other hand, the term can refer to the interaction of many cognitive skills and processes that interact to produce fluent reading comprehension.

In the interactive approach to reading, recognition is given to the importance of both bottom-up and top-down processes. For appropriate meaning construction, accurate decoding should occur simultaneously while the reader uses his/her experiences and background knowledge to make predictions to actively create meaning (Eskey, 2005; Grabe, 2009). It should be noted that effective top-down processing cannot occur if automaticity, i.e. the rapid decoding and recognition of words to allow for cognitive processing to take place, does not occur (Grabe, 1991) (cf.3.1.2). These processes modify and act on each other for full comprehension to occur, a process that happens simultaneously and rapidly in skilled reading (Pretorius, 2002). Skilled readers employ

automatic, attention-free, bottom-up processes in decoding, allowing them to apply top-down processes, which are contextually dependent, to comprehend texts while they read (Stanovich, 1986; 2004). The importance of these processes taking place simultaneously is explained by the truth that although many readers can decode texts or pronounce words, not all are able to understand what they have read. This is due to ineffective comprehension as a result of readers who are not actively engaging in meaning construction. In other words, for such readers, word recognition occurs without any lexical access (Pretorius, 2002).

Even though Grabe (2009) is of the opinion that describing reading models in this way (bottom-up, top-down and interactive) allows for too many generalisations and simplifications, these models do reflect the primary assumptions about how the comprehension process is carried out. Next, reading models that can specifically be used to explain the importance of background knowledge, one of the key areas of the current study as well as the nature of reading in an academic setting, the focus of the current study, will be discussed. These are the schema theory, Kintsch's Construction-Interaction Model, as well as Grabe's Two-Model Account.

3.2.4 Schema theory

The schema theory, an example of a top-down model of reading comprehension, helps to explain the role of background knowledge in the reading process. Schema theory attempts to explain how knowledge is produced and used by readers (Tracey & Morrow, 2012). There seems to be a traditional and a more current view of schema theory. The more traditional view regards schemas as having stable, fixed structures when activated (Grabe, 2009), assuming that readers have stored, general frameworks in their minds that represent common events, scenarios, objects or locations.

This view has been criticised for several reasons. Firstly, it implies that readers can miscomprehend texts when the text assumes background knowledge they do not possess, when a schema is insufficiently developed, when the text does not have enough cues to activate a schema or even when the reader chooses an inappropriate schema to interpret

the text (Carell, 1984; Pretorius, 1996). Secondly, it also does not account for the event that tertiary students have to acquire knowledge and construct meaning from texts they know very little about, in other words, the understanding of abstract, general and context free information (Grabe, 2009). A third criticism of schema theory is that it does not exactly explain how prior knowledge is retrieved and applied and, fourthly, it simplifies the influence of culture on literacy (McVee, Dunsmore & Gavelek, 2005; Richardson et al., 2012).

All models have gaps, and research into the reading process and comprehension is on-going. So even though the schema theory has been widely criticised, it is generally agreed (Grabe, 2009; McVee et al., 2005; Pearson, 2009; Richardson et al., 2012; Tracey & Morrow, 2012) that its influence on the way the process of reading is viewed is unquestionable. On the one hand, it has paved the way for describing how prior knowledge is integrated into memory, and used in the comprehension process while, on the other hand, it helps researchers understand the role of individuals' prior knowledge in comprehension.

Since the original development of schema theory and consequent criticisms, more recent models have developed to explain the influence of background knowledge on reading comprehension. Grabe (1999), for example, refers to Logan's Instance Theory of Automaticity (1997), Sadoski and Paivio's Dual-Coding Theory (1994), Cognitive Flexibility Theory (1988), Kintsch's Construction-Integration Model of Comprehension (1998) (mid 1970's - early 1980's), as well as Grabe's Two-Model Account of reading comprehension (2009). The last two models will briefly be elaborated next as the latter seems to build on the former in an attempt to account for the complexities involved in academic reading.

3.2.5 Kintsch's Construction-Integration Model of Comprehension (CI)

Kintsch's Construction-Integration Model of Comprehension is described to be perhaps the most popular model of adult reading comprehension processes (Paris & Hamilton, 2009), and is possibly the most complete and fully-developed model created by cognitive

psychologists (Duke et al., 2011). Similar to schema theory, it acknowledges the central role of the reader's background knowledge in comprehension, but does not regard schemas to be fixed, generalised structures but rather variable and unpredictable, activated by cues from the active information in the working memory. As a result, it claims that readers use current information to comprehend new information. In the process, knowledge bases increase, and can then be applied to further comprehension. In other words, as knowledge bases expand, comprehension abilities are enhanced (Duke et al., 2011).

This model developed from the argument that texts can be represented and interpreted in different ways, depending on their purposes and the contexts in which they are presented (Kintsch, 2004). Consequently, it distinguishes between the *text model* of comprehension and the *situation model* of meaning interpretation to further interpret the complexities of reading in a way the metamorphic models of reading, for example, could not. The text model of comprehension involves the accurate reading of the text to consolidate the most important ideas in our working memory, in other words, to determine what the text says explicitly. Readers need knowledge of words, as well as knowledge of the linguistic and grammatical structures of the language, in order to construct this accurate view. It is important for the text base to be an *accurate* account of the text, otherwise a satisfactory situation model cannot be developed (Duke et al., 2011; Pretorius, 2012).

The construction of a text base depends on the reader's ability to decode the literal text, and the construction of the situational model reflects the reader's ability to make inferences, based on background knowledge, vocabulary and the activation of relevant schemata. For constructing the situation model, readers use the information obtained in the accurate representation of the text model, in combination with background knowledge, to create meaning. The new knowledge acquired becomes part of the reader's background knowledge to be used in understanding new situations or new texts. This account emphasises the truth that knowledge construction is a flexible, dynamic, constantly changing phenomenon. In the process, new knowledge structures are developed which will be modified to replace existing knowledge. Without adequate background knowledge, the text will predominate the comprehension process and the reader may be required to connect many disconnected facts and details. Similarly,

without adequate knowledge of the content of the text, the representation would rely more heavily on the reader's prior knowledge and experiences; therefore, it may distort the intended meaning (Paris & Hamilton, 2009).

These terms are not only used exclusively to explain the CI model of reading, but are also used in Grabe's (2009) Two-Model Account of comprehension. As it will be explained next, in this model, the text model and the situational model of interpretation, in combination with lower and higher-order reading skills are key to interpreting the complexities involved in reading.

3.2.6 Grabe's Two-Model Account of comprehension

This model of reading comprehension is based on the premise that reading comprehension occurs through the effective combination of lower-level and higher-level processes (Grabe, 2009), a view that is supported by Landi (2010). Lower level reading skills (also called bottom-up) are those processes that are carried out as part of the working memory. The working memory, key for reading comprehension and actively storing and processing information, has limited storage capacities and usually fades after an activity is carried out, after which the total set of our experiences and efforts to understand our environment is stored in the long term memory. It is also referred to as declarative memory, procedural memory, episodic memory or conditional memory (Grabe & Stoller, 2011). When this happens, we say that new information and knowledge are learnt or acquired. Throughout, there is continuous interaction between the working and long term memory.

Working memory (or short term memory) plays an important role in lower-level processing for reading, and supports higher-level text comprehension. Lower-level processing skills are skills such as word recognition, syntactic parsing (using grammatical information) and semantic proposition encoding (building clause-level meaning from word meanings and grammatical information). The latter is more skills-oriented, and represents the information available at any given moment (Grabe & Stoller,

2013). Landi (2010) states that describing these skills as "lower-level" does not mean that they are simple or undemanding, rather that the intense automaticity of these skills are vital for fluent reading to occur. All these skills are important for fluent reading to occur, but reading should not just be limited to the acquisition of these skills.

Higher-level reading strategies represent comprehension processes that tap mainly into the reader's ability to draw inferences, as well as his/her background knowledge, and comprise three components (Grabe, 2009; Grabe & Stoller, 2011). Firstly, the development of a *text model* of reader comprehension, and secondly, the ability to develop a situation model of reader comprehension. The third component of higher-order reading strategies is the ability to build a set of reading strategies and resources that entail: goal setting, applying reading strategies appropriately, engaging in metacognitive awareness and monitoring, drawing on background knowledge as appropriate and making inferences.

This Two-Model Account of reading can be represented as follows:

Table 8: Working memory processes for reading

Working memory processes for reading	
Lower-level processes	**Higher-level processes**
Lexical access; Syntactic parsing; Semantic proposition formation.	Text model of comprehension; Situation model of reader interpretation; Background knowledge use and drawing inferences; Executive control processes.

(Grabe & Stoller, 2011, p. 14)

The Two-Model Account of reading suggests that, in order to read to learn (as opposed to learn to read), one should first develop an accurate text model of comprehension. Thereafter, an interpretative situation model, relating to existing or revised background knowledge is developed (Grabe & Stoller, 2011). It further implies that readers apply either the text model of comprehension or situation model of interpretation, depending on different levels of reading abilities, different purposes of reading and also different types

of text. The interpretation of science texts, for example, would be more reliant on the text model of comprehension than to interpreting a short story or a poem. However, this does not mean that readers of scientific texts only rely on the text model of comprehension, as many science texts also have ill-constructed concepts, those that can be interpreted in various ways (Spiro, Coulson, Feltovich & Anderson, 1988; 2004). Also, readers who have little background about a topic or who do not have strong attitudes towards a text rely more on the text model of comprehension. They tend to recall mostly information as reflected literally in the text, implying that even if a reader does not have much background knowledge, he/she would still be able to carry out tasks that require the construction of a text-model of comprehension, for example, writing a summary, recalling information, answering multiple choice questions and distinguishing between fact and opinion. In other words, the types of tasks students are required to carry out to show comprehension can lead students to emphasise either a text model of comprehension or a situational model of interpretation (Grabe, 2009).

This model emphasises the importance of understanding the discourse structure of texts in order to support comprehension, and explains the role of background-knowledge during reading. Furthermore, it justifies the importance of the use of inferences, goal setting and evaluation of comprehension, and also offers explanations of learning difficulties, as well as implications for improving comprehension instruction (Grabe, 2009). These are all aspects on which the current study concentrated, as explained in section 3.4.

It is important to assist students to realise that reading is actually an active process, as well as how to activate schemata, as a lack of schema can reduce interest or motivation to read, because if something does not seem relevant, one tends to ignore it (Richardson et al., 2012). Consequently, instructors should plan and structure reading lessons accordingly, because most of the time students actually have some knowledge of most topics. Richardson et al. (2012) suggest three ways in which this can be done: Firstly, additional background might be provided, secondly, learners might be assisted to alter their existing schema as these should be in agreement with the current task and topic

under discussion, and sometimes students have to completely change or restructure prior background knowledge in line with new schema.

So far the discussion was on reading in general. Next, the concept of reading for academic purposes, in other words, the kind of reading that occurs at tertiary institutions and that is taught in academic literacy courses, such as EAP will be addressed.

3.3 The challenges of academic reading

It is generally agreed that reading is a fundamental means of acquiring new information (Alexander et al, 2008; Grabe & Stoller, 2013; McWhorter & Sember, 2014; Pretorius 2002). This is of course also true in EAP contexts (Grabe, 2009).Through reading, students can develop into independent learners, gain the ability to interpret alternative views, and develop critical evaluation skills to transform knowledge to solve problems characteristic to their different fields of study (Alexander et al., 2008). In this way they become acculturated into their various academic courses.

There is a strong relationship between reading performance (cf. 1.1.3), a highly cognitive demanding activity, and the academic performance of students, because it provides a major source of input for further learning of both language and content. In other words, it promotes the development of CALP skills (Cummins, 2000). Grabe and Stoller (2013) concur with this view, and regard the ability to read as possibly the most important L2, academic skill needed by EAP students to succeed. For example, in order for students to produce assignments or any written piece, they need to gain information through reading, in all phases of education. McWhorter and Sember (2014) explain how this happens by stating that while remembering and understanding information are the two primary aims of university students, all students, irrespective of their areas of specialisation, are required to apply basic reading strategies in order to achieve this. In the process, they have to apply new information, analyse and evaluate it to such an extent that they can create something new by putting ideas and information together in new, creative ways. These views seem to encapsulate Weideman's (2013) opinion that the four language

skills are, indeed, integrated; however, he also emphasises that reading is perhaps the most important skill. It is, therefore, no surprise that Pretorius (2002, p.169) is of the opinion that "reading is not simply an additional tool that students need at tertiary level - it constitutes the very process whereby learning occurs".

The next section will address the texts students are required to read when reading for academic purposes.

3.3.1 Academic texts

The type and content of texts students have to read at the university vary, depending on different fields and levels of study (Alexander et al., 2008). However, all academic texts are mostly abstract and conceptually dense, expository texts, which contain many examples, facts, details and graphics (Aebersold & Field, 1997). Students are often unsure how to approach these unfamiliar texts (Alexander et al., 2008), especially when homes and schools did not prepare them for these (Boughey, 2013). Expository, informational or academic texts seem to present more difficulties for learners because these texts are "inconsiderate" (Grabe, 2009, p. 253), a term used to refer to texts that convey abstract, conceptual information, where students rely less on background information and personal experience for comprehension. As the aim of further studies is to learn about new information, these texts are used to introduce new information rather than emphasise familiar content.

One type of text that all students are required to read during their studies is the textbook. (This was also the type of text that seemed to be most important for the target audience of the current research project (cf. 5.3.3).

3.3.1.1 Textbooks

The findings from the needs analysis indicated that the kind of text participants in the current study mainly relied on for information is their textbook (cf. table 41). It is therefore imperative to explore the nature of textbooks, in particular those containing scientific content.

The strength of a textbook is that it can provide, within one source, an overview, covering a range of levels and course specific topics (Richardson et al., 2012; Bezemer & Kress, 2010). In spite of this, textbooks have generally been criticised for various reasons. One reason for this criticism is their inability to stimulate student curiosity or make concepts and content memorable. In addition, they seem to provide overviews of topics, rather than in-depth information. Furthermore, they are condensed, secondary sources, factual, contain challenging vocabulary, are sometimes outdated and objective where the author's original enthusiasm and style are not apparent (Richardson et al., 2012). More specifically, science textbooks are described to be "foreboding … heavy … difficult … boring … and hard to comprehend" (Grant & Fischer, 2010, p. 45).

Just as one should not expect that students can work on their own to acquire the necessary reading strategies to cope with the academic demands of their courses (cf. 2.1), understanding textbook language and organisation also does not come naturally to students. Therefore, the above characterisation of textbooks emphasises the importance of the EAP reading instructor who has to make the information in textbooks more accessible to students, as students generally are required to read these on their own in order to complement lectures and class notes, to write assignments and to prepare for examinations. The reality, however, is that many EAP reading classrooms do not expose students to authentic reading material but use a range of interesting, teacher-selected texts instead. The current situation at the UNAM LC is a clear example of this. An earlier study conducted at UNAM, that of Murray, (2013), also did not use authentic, academic material.

In arguing for authentic, "register-specific", reading instruction (Miller, 2011, p. 32) in order to assist L2 readers at tertiary institutions and to expose them to typical vocabulary, syntax and registers of the written texts they have to deal with, Miller conducted a study to compare the language of texts used in general ESL, reading skill development classes (biographies, newspapers or news magazine articles) and the language used in texts more commonly encountered in undergraduate university classes. At an American university, Miller (2011) selected texts from three university textbooks from the faculties of Humanities, Natural Science and Social Science for comparison purposes. Three specific

features, vocabulary (cf. 3.4.2), nominal modification features and surface features associated with readability (cf. 3.4.1.7), were focused on. (The first and the last features are also pertinent to the current study.)

The results indicated that the excerpts from the university textbooks made significantly more use of words from the Academic Word List (AWL) (cf. 3.4.2) than the texts that were normally used in the ESL reading lessons. In addition, significant differences were also found in the use of nominal modification, but none between the readability scores of the different type of texts. The latter was attributed to the small sample. In addition, it was also established that differences in the use of words from the AWL, nominalisation, as well as readability scores, also existed in the three disciplines (humanities, natural science and social science). These differences were attributed to the issue that these were different types of texts, with entirely different purposes, indicating disciplinary variation as argued by others, (Hyland, 2002; Weideman, 2013). Because only three textbooks were used in the comparison, it was cautiously concluded that the language used in ESL texts was not representative of the language used in university textbooks and that, if instructors wanted to prepare students for the reading demands of their courses, they needed to consider using reading passages that represented the kind of reading students were required to read for their courses. Miller (2011) suggested that educators should take cognisance of these facts in selecting texts in ESL classes, as well as be aware of variations in disciplines. Both these suggestions are important in the context of the current study.

Moje et al. (2011) concur with these conclusions made by Miller (2011) and are of the opinion that in order to prepare students for the workplace, it is critical to pay attention to the demands and challenges of academic texts, the "key ingredients of disciplinary work" (Moje et al., 2011, p. 453). Similarly, others (Alexander et al., 2008; Richardson et al., 2012) argue that instructors are compelled to show students that academic texts, especially textbooks, present information in a specific way that will foster comprehension and, therefore, learning, to the extent that they regard textbooks as being "interesting, informative and engaging" (Richardson et al., 2012, p. 45). Specifically referring to

science students, it seems as if success in reading science textbooks increases students' chances of academic success and later scientific productivity (Grant & Fischer, 2010).

This discussion has implied the importance of exposing students to authentic reading material, in other words, the type of texts they would be required to read for their studies. It has further underscored the importance of specificity in reading instruction, an argument that has always been prevalent in EAP instruction (cf. 3.4). These issues, specifically in the context of EAP reading, will again be taken up in section 3.4. Next the focus will specifically be on the importance of instructing reading strategies for specific purposes, hence an ESAP/CBI/adjunct reading programme.

3.3.2 Reading for specific disciplines

While awareness of general comprehension strategies enhances the readers' general abilities in acquiring AL, reading instruction embedded in the content area will further assist learners to become conversant with a range of topics and terminology required to cope in their respective target environments (Paratore et al., 2011). This call responds to the issue that reading is different in the various disciplines (Miller, 2011), and expert readers in these disciplines read these texts within the frameworks of their discipline, in other words, within a disciplinary frame. Therefore, the introduction of content area reading that will assist students to develop reading strategies which help them to learn and to carry out tasks in the content areas is widely advocated (Benabdallah, 2013; Conley, 2009; Grant & Fischer, 2010; Nation, 2009; Shanahan, 2009). Such an approach ties in with the principles of CBI instruction, as elaborated in section 2.5.

RAND Reading Study Group (2002) mentions several advantages of embedding reading strategy instruction in the in-depth learning of content. One advantage is that, through repetition, the strategies are learned to a high level of competence. In addition, when students perceive the usefulness of reading strategies learnt in the language class to assist the texts in content areas, they apply these purposefully, resulting in highly competent strategic readers. Another advantage is that if cognitive strategies are connected to

students' growing knowledge of a content area, it enables them to become more aware of that content area and continue to deliberately use such cognitive strategies. It seems that, unless the strategy is closely related and linked with knowledge and understanding a content area, students are unlikely to learn the strategies fully, may not perceive the strategies as valuable tools and are less likely to use them in new learning situations with new texts. These advantages seem to assist greatly in facilitating the development of readers reading with a purpose (Grabe, 2009), and are also similar to advantages observed to CBI instruction (cf. 2.4). As a result, it was aimed to implement these strategies as far as possible in the implementation of the MMAARR in the current research (cf. 4.2.3.1).

Next, reading for scientific purposes, the focus of the current study will be elaborated.

3.3.2.1 Reading for Scientific Purposes

EST (English for Science and Technology), is generally viewed as the oldest branch of ESP (Remache, 2013). Alexander et al,. (2008)re of the opinion that, similar to attempts to differentiate between general English teaching and EAP (cf. table 2) various attempts at defining Scientific English have also been made (Holliday & Cain, 2012; Lowe, 2009a; Shanahan, 2009; Remache, 2013; Wignell, 1999). However, these discussions are still on-going, probably due to the broadness of the term *science* (Lowe, 2009 b).

Scientific texts are unique in their text structures, vocabulary and presentation of information (Grant and Fischer, 2010), and the characteristics of scientific discourse is well-documented. For example, according to Remache, (2013) scientific enquiry is typified by observation, measurement and the formulation of hypotheses, experimentations and predictions. Consequently, in the aims to clearly classify, to record consistent truths and reasonable predictions, accuracy is vital. Furthermore, in scientific texts, the most common tenses that occur are the present, simple active and the present, simple passive. Looking specifically at discourses of science, Wignell (1999) concludes that these usually attempt to show procedure (for example, by providing instruction for

experiments), procedural accounts (for example, to record what has already been done in an experiment), scientific report (for example, by organising information by setting up taxonomies, parts or steps or by listing properties), as well as scientific explanation (for example, by explaining why and how phenomena occur). Adding to the characteristics of scientific discourse, Shanahan (2009) explains that it is characterised by nominalisation, objectivity and classification, has a high degree of lexical density and contains a mixture of mathematical expressions, graphical displays and written text. Richardson et al. (2012) add that because science begins with questions, inquiry skills are important. At the most basic level, it requires students to infer (read between the lines), visualise information, and interpret graphs and charts (Grant & Fischer, 2010). Table 9 summarises the characteristics of scientific discourse, based on the literature referred to above.

Table 9: Characteristics of scientific discourse

Characteristics of scientific discourse	Researcher
▪ based on observation, measurement, formulation of hypothesis, experimentations, predictions; ▪ aims to classify clearly, to record consistent truths and to make reasonable predictions; ▪ accuracy is vital; ▪ the most common tenses that occur are the present simple active and the present simple passive.	Remache (2013)
▪ attempts to show procedure, procedural accounts, scientific report or by listing properties, as well as scientific explanation.	Wignell (1999)
▪ nominalisation, objectivity and classification, has a high degree of lexical density and contains a mixture of mathematical expressions, graphical displays and written text.	Shanahan (2009)
▪ begins with questions, inquiry skills are important.	Richardson et al. (2012)
▪ requires students to infer (read between the lines), visualise information and interpret graphs and charts.	Grant & Fischer (2010)

While reading instruction is critical for academic success at all levels, Holliday and Cain, (2012) maintain that it should be at the front and centre of science teaching as reading for comprehension or with engagement does not come naturally to science students. The assertion that without this, students remain outsiders to the scientific discourse community, underscores the importance of developing their reading strategies. Spiegelberg (2013) is concerned about the fact that it seems as if new science students read only at surface levels, while depending on the author's or their lecturer's interpretation of analysis of data and facts (cf. 3.2.2). Similarly, Holliday and Cain, (2012) express alarm that many college, science students also do not read as much as their lecturers expect them to. This is a disparaging situation because the reading of scientific content makes special demands on scientists that are "increasingly less generalisable" (Grant & Fischer, 2010, p. 5) to other disciplines. Grant and Fischer (2010) and Holliday and Cain (2012) concur that the bottom line is that science students are required to read and write like scientists and understand scientific concepts; in other words, they need to be acculturated to the culture of reading like a scientist, read extensively, competently, as well as independently, from a variety of sources to remain informed about their subject.

This requires them to have extensive background and vocabulary knowledge of their subjects, generally regarded as the two main strategies that science students should have to be successful in their studies (Grant & Fischer, 2010). The background knowledge about topics (cf. 3.2.4) plays an important role in content comprehension for scientists. When they know much about the topic, they are able to engage in critique, i.e. they evaluate the source of information, contextualise the reading within a time frame and corroborate across sources. On the other hand, when they do not know much about a topic, they seem to read only to understand and they suspend critique. Instruction in reading in a particular discipline is, therefore, paramount to assist students to read and think deeply about their content courses (Shanahan, 2009). In that way, students first construct mental models of reading and, as their background knowledge of a topic increases, situational models of interpretation are developed (Grabe & Stoller, 2011). It therefore seems as if Grabe's Two-Model account of reading comprehension (cf. table 8) summarises the comprehension process in scientists most appropriately. As mentioned in section 3.2.4, this is one of the new interpretations of the traditional schema theory.

With regards to vocabulary knowledge, concepts in science require specialised words and expressions, and each subcategory in science has its own technical vocabulary. Thus, to ensure successful comprehension of these courses, the learner is expected to have a specialised English vocabulary, as well as general vocabulary, to draw from (Remache, 2013). Not having adequate vocabulary knowledge can lead to superficial engagement with scientific texts (Spiegelberg, 2013). More details regarding the importance of vocabulary knowledge, as well as the different types of vocabulary, are provided in section 3.4.2.

Like others (Hyland, 2002; Weideman, 2013), Moje et al., (2011) state that various disciplines approach and represent information in distinct ways. They further argue that while the importance of equipping learners to read in different content areas is acknowledged, little attention is paid to the reality that even within each discipline, sub disciplines differ, because each has unique traditions, content and genres. Experts in each particular discipline and sub discipline understand this and approach texts in their discipline with familiarity because they are aware of their disciplinary traditions, for example, what is regarded as challenging. Therefore, reading in each discipline requires "disciplinary knowledge" (Shanahan, 2009, p. 241), the knowledge of the traditions that a discipline uses to define and study the range of topics within it, rather than knowledge of the content (domain knowledge). If students are not aware of the disciplinary traditions, in other words, if they are not equipped to read for specific sub disciplines, it is no surprise that they often struggle to learn from content area texts. Shanahan, (2009, p. 241) maintains that "disciplinary knowledge" will allow readers to approach texts with the mind set of say, a scientist or a historian, etc.

Furthermore, the various sub disciplines in science each have their own vocabulary (Remache, 2013). In support, Conley (2009) maintains that the field of science has been considered as monolithic, that is to say, the fact that there are various sub disciplines in each field has been ignored by EAP practitioners. Conley (2009) asserts that fixed, generic approaches to reading comprehension (EGAP) do not meet the specific requirements of students to become conversant with scientific discourse. In addition, these also do not seem to consider the unique challenges and structures in the various sub

disciplines, hence the need for reading courses that consider discipline-specific goals, the current discourse resources of students, as well as the desired scientific discourses, as established by a thorough needs analysis (Conley, 2009).

Typical of EAP courses, researchers also seem to disagree on who should be responsible for the instruction of ESAP scientific reading. On the one hand, as suggested by various EAP practitioners (Belcher, 2009; Dudley-Evans & St John, 1998; 2000; Flowerdew & Peacock 2001; Robinson 1991; Weideman, 2013), Shanahan (2009) argues that science content and literacy specialists should combine efforts. On the other hand, Holliday and Cain (2012) are of the opinion that science-comprehension teaching should rather be undertaken by informed, science instructors during science classes and not by language arts instructors who are unfamiliar with the field of science. More options for collaborative efforts are discussed in detail in section 2.5.

When one considers that reading is different in the various disciplines, and expert readers in these discipline read these texts within the frameworks of their discipline, it can, therefore, be regarded as of paramount importance to examine the unique challenges that readers of biochemistry, in particular when reading stereochemistry, experience. A thorough search of the literature has revealed only two studies that attempted to investigate the reading requirements of biochemistry university students, in general. These will be elaborated next. No previous research that specifically focused on the challenges that students of stereochemistry, the focus of the current study, could be located locally or elsewhere.

3.3.2.2 Reading in biochemistry

Biochemistry is classified as one of the categories of the natural sciences, and is a field that builds on fundamentals taught in all subfields of chemistry and biology. These have two common goals, namely to explain natural phenomena through experimentation and observation and the expectancy of students to apply existing knowledge to discover the unknown (McWhorter & Sember, 2014). Consequently, students are presented with few

new concepts and application is the norm. Application requires high levels of cognitive skills and often includes problem solving. Such skills are not learned through attending lectures, but rather through active application of fundamental principles to explore relationships inherent in biochemistry and by solving unfamiliar problems (Minderhout & Loertscher, 2007).

An investigation among Biochemistry 11 students at the University of Rider in New Jersey (Spiegelberg, 2013) revealed that the students did not read the visuals presented in textbooks and journal articles. Instead they relied on the instructors' explanations or the explanations given by the authors of the texts. Contrary to the target group of the current research project who were chiefly required to read text books for content information, the group described in the Rider university study relied on information from both text books and journal articles, probably because, unlike the current target group, they were already in their second year of study. Spiegelberg (2013) examined the effects of exposing students of Biochemistry 11 at the University of Rider in New Jersey to various research articles about their field of study. Unlike during the regular course, in the study students (n=20) could read articles of their own choice, but the questions were developed by the course instructor. These questions were specifically developed to allow students to provide their own interpretations of visuals presented in the text. Finding their own articles ensured more student engagement, but caused the evaluation aspect of the course to become a time consuming activity. It showed positive results, as presented in the data collected in a post-test and during interviews. No statistics of the raw data were presented, but in the current study the researcher intended to implement such an approach to develop more engaged readers of biochemistry at UNAM. It was, however, done in a slightly different way and also did not result in the expected responses. More details regarding this are provided in sections 6.2.1.2 and sections 6.2.2.2.

In another study, Slimani (2014) investigated the effects of rhetorical functions in enhancing biochemistry students' (n=26) understanding of scientific texts at Ouargla University through a quasi-experiment. Through a review of the literature, 5 rhetorical functions to be taught, namely definition, description, classification, instruction and visual-verbal relationships, were identified. Data were collected from the results of the

students' tests and responses to a questionnaire, and interpreted. The pre-test was administered before planning a lesson which aimed at exploiting rhetorical functions in order to understand scientific texts. This was followed by a post-test which was administered to the participants in order to investigate the effect of rhetorical functions. All in all, it has been confirmed through this study that the instruction of specific rhetorical functions enhanced students' understanding of scientific texts (Slimani, 2014). This study confirms the importance of the instruction of rhetorical functions and as a result, this was one of the elements included in the intensive reading component of the current study (cf. sections 6.1; 6.2.1.1 and 6.2.2.1).

So far the importance of reading skill development to allow students to become members of the academic communities has been emphasised. In the process, the challenges in reading for scientific purposes, especially reading for biochemistry, have been explored in order to gain a better understanding of the challenges the students in the present study might experience. The importance of considering background knowledge in reading lessons, as well as the use of authentic texts, has been underscored. Chapter 2 has explored issues relating to EAP instruction in general. However, since the ultimate aim of the study was to develop a reading course, based on EAP principles, the following section will specifically explore options involved in EAP reading instruction.

3.4 EAP reading instruction

Researchers seem to agree that the best way to develop proficient, comprehending readers and to solve and/or prevent reading problems is through good, solid comprehension instruction (Duke et al., 2011; Grabe, 2009; Grabe & Stoller, 2011; Grabe & Stoller, 2013; Macalister, 2011;RAND Reading Study Group, 2002; Stoller et al., 2013). This, in turn, will encourage learners to become fluent readers who recognise that meaning does not exist in the text, but must be actively constructed, by employing appropriate reading strategies (Grabe, 2009). Additionally, explicit reading instruction can motivate EAP students to practise the skill effectively and extensively on their own, after they have completed their course work (Grabe & Stoller, 2011).

Reading instruction can be explained by differentiating between explicit and implicit learning (Macalister, 2011; Nation, 2007). Understanding this difference allows for the distinction between intensive and extensive reading instruction, two complementary approaches to a well-rounded reading instruction programme (Eskey, 2005; Nation, 2005). Explicit instruction, also referred to as "deliberate learning" (Nation, 2007, p. 5), aims to develop specific reading or writing skills. This type of instruction focuses on raising learners' awareness of giving attention to the specific skills and knowledge required at a particular time, consolidating these in the process. The type of reading instruction that occurs during explicit learning, is referred to as intensive reading. This is when the instruction of meaningful, reading strategies should occur deliberately (Macalister, 2011). Such skills are first stored in the working memory and then in the long term memory of learners as strategies, on condition that the explicitly learnt information is recalled and used frequently (Grabe, 2009; Landi, 2010). In the same vein, Richardson et al. (2012), concurring with Grabe (2009), contend that if students are not informed about the reason why certain reading strategies are taught, they do not apply them and improved reading ability does not occur. The difference between reading strategies and strategies will be further elaborated in section 3.4.1.3.

Implicit learning, on the other hand, refers to the kind of learning that occurs without being aware of the specific information that is learnt (Macalister, 2011; Nation, 2007). It should be noted that it relies on extensive amounts of meaning-focused input that focuses on the acquisition of knowledge through enjoying what is being listened to and/or read (Nation, 2007). This type of learning includes extensive reading (cf. 3.4.1.7). Grabe (2009) cautions that much input is required, otherwise the gains from implicit learning will be low. Richardson et al. (2012) support this view by stating that reading develops through implicit learning that comes with exposure, practice, frequency of repetition and the development of automaticity (cf. 3.1.2).

Understanding the differences between intensive and extensive reading instruction, but also recognising how the two approaches in combination contribute to a meaningful reading curriculum, allow one to embark on developing a curriculum that can contribute to developing good readers (cf. 3.1.2) As a result, based on the characteristics of good

readers and the criteria for fluent reading, a framework for EAP reading instruction has been proposed by Grabe and Stoller in 2001. That one of the conditions for applying this framework (cf. 3.4.1) is that reading strategies and activities should be developed around the main texts being read in students' textbooks, suggests that it is based on CBI principles. Even though other frameworks have also been proposed, for example, by Duke et al.(2011), Eskey (2005) and RAND Reading Study Group (2002), this framework has since featured in many other publications (Grabe, 2009; Grabe & Stoller, 2011; Grabe & Stoller, 2013; Stoller et al., 2013). This framework is not only based on the characteristics of good readers and reading, but also on underlying theoretical assumptions (Grabe, 2009; Stoller et al., 2013). This framework can be used as a guide. Some principles may not be appropriate for certain contexts or some may be added. As the researchers advise, "any effective curriculum interprets the research implications from the perspectives of institutional and teacher goals, strengths and weaknesses of students, student proficiency levels as well as constraints imposed by time, costs, resources and teacher preparedness" (Grabe & Stoller, 2011, p. 131). The implication is that from such a framework, any EGAP or ESAP reading course could be developed.

3.4.1 A generic framework for EAP reading instruction

The framework developed by Grabe and Stoller in 2001 (Grabe, 2009; Grabe & Stoller, 2011) includes the following 9 components:

1) Promote word-recognition skills and build language knowledge;
2) Build a large recognition vocabulary;
3) Teach strategies for reading comprehension;
4) Build awareness of discourse structure;
5) Develop strategic reading;
6) Practise reading fluency;
7) Provide exposure to a volume and range of texts, i.e. promote extensive reading;
8) Develop motivation for reading by providing motivational contexts for reading;
9) Build disciplinary and world knowledge.

These key components are presented in a linear fashion, but a more cyclical representation, as seen in Figure 6 seems to be more appropriate:

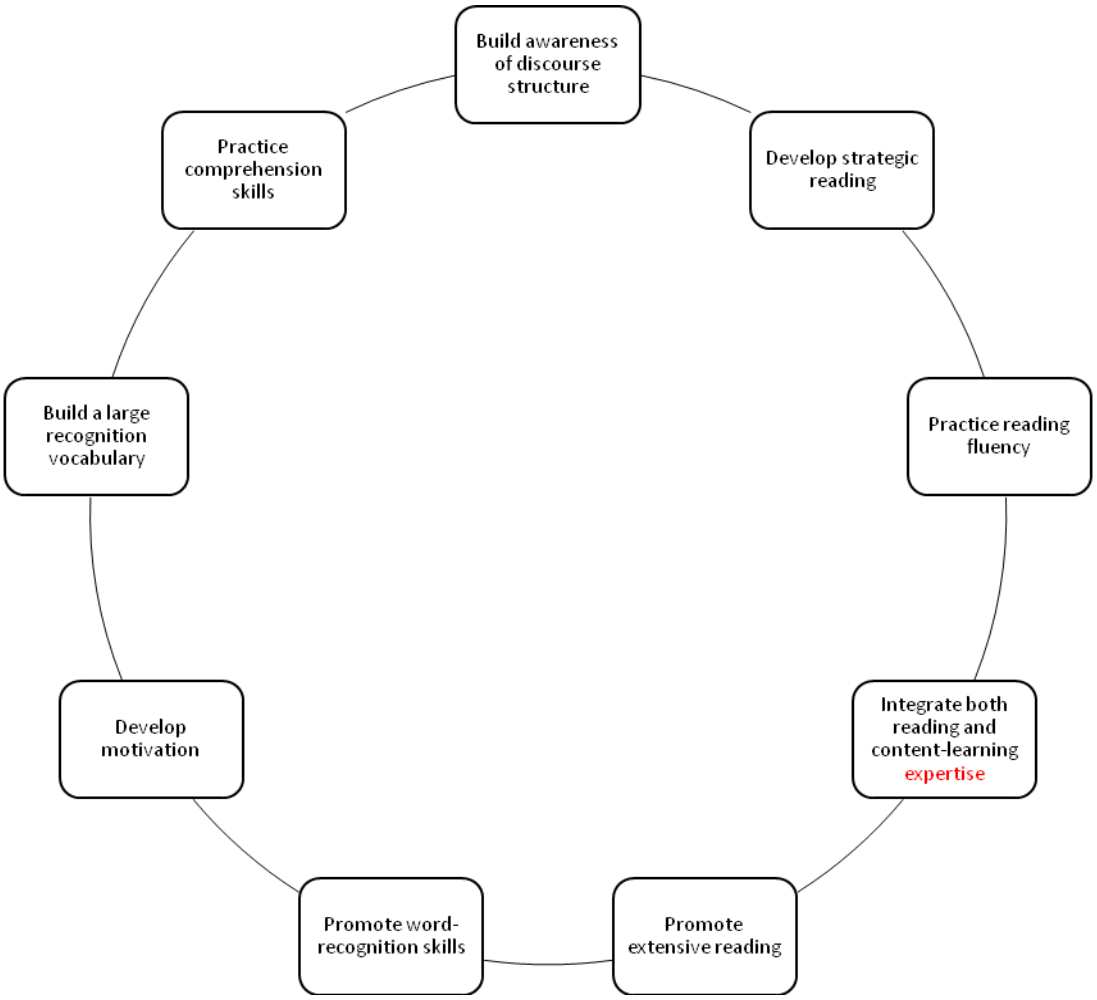

Figure 6: Key components to develop an EAP reading program. Adapted from "Teaching and Researching Reading," Grabe & Stoller, 2011).

According to Grabe and Stoller (2011), this reading framework should ideally be carried out under the following conditions:

Firstly, reading abilities should be developed through consistent practise and extensive exposure to print. In addition, reading materials should be interesting, varied, abundant, visually attractive and easily accessible. Another point to consider is that it is crucial to allow students to have a choice in selecting some of the reading material. This will

encourage student motivation, interest and autonomy, as well as encourage them to use the resources. Furthermore, reading strategies and activities should be developed around the main texts being read in students' textbooks (carrier content). It is important to note that these researchers are of the opinion that if the key skills (real content) cannot be explained in this way, then it might be a case that the textbook does not match the needs of students or that the strategies identified for explicit instruction might not be as important as initially assumed. The last two principles, namely that material should be both interesting and, to some extent, be self-selected, but also from authentic texts they use, do not seem to correspond with the context of intensive reading instruction, since academic texts are notoriously boring. Perhaps a compromise could be reached to allow self-selection and interesting reading passages for the instruction of extensive reading. Other principles around which the reading framework should be built are to pay some attention to the background knowledge of students and also, very importantly, to develop reading lessons around the pre-, while- and post-reading framework. This would prepare them for new readings and oblige them to reflect on texts for a variety of purposes after reading. It is also important to allow students to have successful reading experiences to encourage them to read. In the same vein, the authors stress that students should be required to read in each lesson, a point that is often neglected or overlooked (Grabe & Stoller, 2011).

Each of these components will now be discussed. In the process, the views of various other researchers on these components will be incorporated for a comprehensive overview. Afterwards, in Chapter 4 some elements of this framework will be employed to create the framework for the reading course the current project is reporting on.

3.4.1.1 Promoting word-recognition skills

Reading instructors should assist learners to develop word and phrase recognition abilities, especially those readers at beginning and low-intermediate levels. Because of their exposure to English prior to being admitted to academic studies, most L2 students who are at academic settings will not have significant problems in this regard, and will have reasonable control over word recognition and language knowledge. However, a responsible EAP instructor should still establish the word recognition levels of students

prior to embarking on any EAP reading programme, and should any such problem exist, students should be provided with appropriate training and instruction (Grabe, 2009; Grabe & Stoller 2013). Knowing their word recognition levels will not only assist instructors in diagnosing students but also in establishing curriculum content, as well as monitoring student progress (Grabe, 2009; Nation, 2012a; Nation & Begler, 2007). One aspect that could be diagnosed at this stage is the vocabulary levels of students. As earlier reported, vocabulary knowledge is regarded as one of the main strategies science students should have to be successful in their studies (Grant & Fischer, 2010) , an element that was fundamental in the implementation of the MMAARR currently reported on. However, prior to diagnosing the vocabulary levels of students, instructors, like the researcher of the current study, need to be informed about the different types of vocabulary in order to plan informed reading lessons. This will be deliberated next.

Different types of vocabulary

Researchers are in agreement that vocabulary is commonly divided into different categories, the high-, mid- and low-frequency words (Lowe, 2009a; Nation & Anthony, 2013; Nation & Webb, 2011; RAND Reading Study Group, 2002). This differentiation indicates the level of frequency in which certain words occur in texts; in other words it indicates that some words occur more frequently than others (Nation, 2005). Even though more research to establish the effectiveness of distinguishing among different types of vocabulary levels need to be carried out (RAND Reading Study Group, 2002), such a distinction allows for crucial instructional decisions to be made.

Academic vocabulary includes those words or terms that are commonly found in expository texts, but which are not unique to any specific discipline. Various academic vocabulary lists have been developed, for example, The Academic Word List of Coxhead (AWL), the General Service List (GSL) developed by West (Richardson et al., 2012). These lists take tokens and word families into consideration. A token represents the running words that are used in a word count (Lowe, 2009; Nation, 2012). Currently, it is argued that at least 98% of the tokens in a text are required for adequate comprehension to occur (Nation & Anthony, 2013; Schmitt et al., 2011) and not 95%, as previously suggested. A word family, on the other hand, consists of a headword, its inflected form

and its closely related derived forms, for example, when adding prefixes and suffixes (Lowe, 2009 a; Nation, 2012a).

The first 2 000 word families in English cover about 76% of the total words that occur in a text, the first 3 000 equals about 86% text coverage, the first 4 000 about 95% coverage and about 9 000 word families equal about 98% coverage (Nation, 2006). However, even when readers understand about 98% of the tokens in a text, reading comprehension is not necessarily easy. Schmitt et al. (2011, p.27) regard the 8 000-9 000 word families required for 98% word coverage as "daunting" to students. The 98% word coverage further implies that vocabulary learning should be given more attention and also for longer periods of time. In fact, "everything possible needs to be done to increase the vocabulary levels of learners" (Schmitt et al., 2011, p. 39), because if not enough words are known, text comprehension cannot occur (Eskey, 2005). As previously suggested, this is especially true for science students.

Research indicates that well-educated native speakers of English know about 20 000 word families (Nation, 2006). For advanced reading to occur in L2, it seems that one should have is to have a receptive vocabulary (all the words that one recognises and understands upon hearing or reading them) of more than 10 000 word families as opposed to productive vocabulary (the words one is able to produce within an appropriate context and match to the intended meaning of the speaker, writer) (Grabe & Stoller, 2013). It seems that having minimal receptive knowledge of 10 000 words would allow an L2 reader to understand an academic text at a reasonable rate, though not reading it fluently. Therefore, this minimal level of receptive knowledge assumes that some kind of instruction will help students to learn key vocabulary that relates to the topic of a given text (Schmitt et al., 2011).

The different word categories, based on word families

High-frequently words are of a low level of difficulty, occur frequently in all kinds of texts as they can be used in different contexts and on various topics. They are regarded as "essential, general purposes vocabulary" (Nation & Anthony, 2013, p. 8), for example, *the, it, book, dog, walk.* The number of words categorised as high-frequency has increased from being the first 2 000 word families (Nation, 1990; Nation, 2006; Nation &

Webb, 2011; Lowe, 2009a) to being the first 3 000 word families (Nation & Anthony, 2013). This implies the on-going nature of the research into vocabulary. The reasons for increasing the number to include the first 3 000 word families in the high-frequency levels are, firstly, because knowledge of these words would allow readers to have at least 95% word coverage of most texts and, secondly, because most graded readers include words up to the first 3 000 word families (Nation & Anthony, 2013).

Mid-frequency words include words from the first 4 000-9 000 word families (Nation & Anthony, 2013), a range that includes academic and technical vocabulary, and that has also been recently adjusted from previously including the first 3 000-9 000 word families to currently the first 4000-9 000 word families (Nation, 2006; Schmitt et al., 2011). Knowledge of these words provides readers with sufficient word knowledge to understand about 98% of the tokens (running words) in texts (Nation & Anthony, 2013; Nation, 2006; Schmitt et al., 2011). Academic vocabulary occurs frequently in most kinds of academic texts and contexts that students encounter at tertiary institutions. Examples of such words are: *concur, compare, analyse, evaluate*. Technical/specialised vocabulary occurs in specialised texts, and is closely related to the topic and subject area of the text. Each field has its own technical vocabulary range; for example, in a subject like stereochemistry, terms such as *isomers, functional groups* and *stereocentre* may occur. McWhorter and Sember (2014) are of the opinion that knowing these terms allows learners to become specialists in their fields.

Low-frequency words are of a narrower range and higher level of difficulty. These may include some technical vocabulary that is unique to particular disciplines (Nation & Anthony, 2013), with each word occurring very infrequently. Low frequency words are many, but are generally successfully learnt (Afsaneh, Fatemeh, Alishahi, & Stevenson, 2010). It was also established that while high-frequency words are acquired at a faster pace in diverse contexts, low-frequency words are acquired more effectively in contexts that are familiar, such as those included in an adjunct reading course. Thus the more high-frequency words the learner knows, the easier it becomes to learn low-frequency words (Afsaneh et al., 2010).

It is, therefore, of much help to measure the vocabulary size of readers. Doing this assists in planning reading programmes, diagnosing learner shortcomings with regards to

vocabulary knowledge, and guides research into vocabulary learning and reading (Nation, 2012b; Nation & Begler, 2007). However, Schmitt et al. (2011), as well as Nation (2012a), caution that a lack of vocabulary is not always the reason for poor reading comprehension. Other problems may be a lack of grammar, background knowledge, reading skill, auditory or visual perception or other cognitive issues.

As it was pointed out, reading instructors and also their students have much to gain in determining the level of receptive knowledge of students. One way of establishing this is by using a test that measures the vocabulary size of learners. Such a test can determine whether vocabulary is an issue that hampers comprehension or not.

Vocabulary tests

Various standardised tests that measure vocabulary sizes have been developed, for example, the Vocabulary Levels Test, the Euro Centres Vocabulary Size Test and the Vocabulary Size Test (Nation & Begler, 2007). The Vocabulary Levels Test is used to examine whether learner instruction should focus on high-frequency words, academic words or low-frequency words; consequently, it measures vocabulary levels by looking at the 2nd , 3rd and 5th 1 000 word levels, the Academic Word List and the 10th 1 000. The Euro Centres Vocabulary Size Test is a computerised vocabulary size test that consists of ten 1 000 word levels, using a yes/no format. The Vocabulary Size Test (VST), which was used in the current study, was developed by Nation (2006). By using data from the British National Corpus (BNC), the researcher developed fourteen 1 000 word-family lists in such a way that they represent higher-, as well as lower-frequency words, in that order; in other words, from most frequently occurring to least frequently occurring (Nation, 2012b). Unlike the Vocabulary Levels Test, this test does not have an Academic Word List section because these words can be found in the 1st to the 10th 1 000 words of the test. It is important to note that it is not a diagnostic test like the Vocabulary Levels Test, but is used as a proficiency measure to determine the vocabulary levels – more specifically, the receptive word knowledge of learners – reliably, accurately and comprehensively, based on the most frequent 14 000 word families in English (Nation & Begler, 2007).

Nation (2012b) explains that the test consists of 140 items, ten from each 1 000 word level. The total score out of 140 needs to be multiplied by 100 to interpret the vocabulary size of a test taker. All test words are used in a simple, non-defining context, measuring receptive word knowledge. The test uses a multiple choice format that is easily scored. It is regarded to be more demanding than the Vocabulary Levels Test because all the distractors used in it relate to word form and meaning, compared to the distractors in the Vocabulary Test Levels that do not relate meaning or form to the tested word. Learners, therefore, have to have some, or a moderately developed, idea of the meaning of the word in order to select the correct meaning because this is a test to measure the written, receptive, vocabulary size in English of both first and second language learners, not how well these words could be used in speaking and writing. Nation emphasises that written, receptive knowledge is the vocabulary knowledge required for reading, and it should not be confused with reading skill (Nation, 2012b). Full knowledge of the meaning of the word is not required for reading, although the better the word is known, the easier reading will be (Schmitt et al., 2011; Perfetti & Stafura, 2014). As previously stated, the reading skill, is dependent on various factors of which vocabulary is only one *part*.

A study by Schmitt et al., (2011), aimed to establish the relationship between vocabulary known of a text and reading comprehension of the same text, used participants (n=661) from eight different countries. Participants completed a test to measure their receptive vocabulary knowledge based on words drawn from two texts. Then they had to read the text and finally were asked to complete a reading comprehension for each text. The researchers concluded that there was a linear relationship between vocabulary levels and comprehension; in other words, as vocabulary levels increased, reading comprehension did too. In addition, it was determined that the level of vocabulary required depended on the degree of comprehension required. In other words, if comprehension of all the details in a text was necessary, the learners had to know more words. It was further observed that even with lower vocabulary levels students could still comprehend a considerable amount of information in texts. The researchers further concluded that even though comprehension would be impeded with lower, vocabulary levels, some vocabulary knowledge is better than none, and that more background knowledge (cf.3.4.2) would increase reading comprehension at any particularly vocabulary coverage percentage. In addition, it was resolved that even learners who knew 100% of all the words in a text,

could not understand the text completely; in other words, vocabulary knowledge was not the only factor that determined reading comprehension (Schmitt et al., 2011).

In the Namibian study referred to earlier. Murray (2013), who also explored vocabulary as a possible impeding factor to reading comprehension among UNAM students, confirmed the findings of Schmitt et al. (2011). Murray concluded that there was a statistically significant correlation between participants' vocabulary and reading comprehension scores (r=.464, p=< 0.01, N=81). In addition, it transpired that all students had fairly low levels of vocabulary and that most of the students relied on dictionaries and guessing the meaning of words to deal with unknown vocabulary. The study further highlighted the reality that even when texts had fewer unknown words, comprehension was still impeded by other factors, such as anaphoric reference (cf.3.4.1.4) and complex sentence structures, also confirming the findings of the Schmitt et al. (2011) study. As previously mentioned (cf. 3.1.5.1), the participants from Murray's 2013 study are also UNAM students, but from a different faculty that those reported on in the current research. Even so, these recommendations were also incorporated in developing the MMAARR currently reported on.

The Vocabulary Size Test (VST) is a valuable tool to estimate the learners' reading progress and to design reading courses (Nation & Begler, 2007; Nation, 2012b). For example, students' vocabulary levels can be used to determine the genres they would comfortably be able to read with at least 98% knowledge of the running words in a text, as well as the implications for instruction, as summarised in Table 10. For the current study, knowing this was especially important in order to decide on the type of texts to use for the extensive reading course (cf. 5.4).

Table 10: Word levels and implications for instruction

Level	1 000 word families	Implications for instruction
High-frequency	1 000-3 000 95% text coverage	Reading graded readers; Learners will benefit from deliberate teaching and learning
Mid-frequency	4 000-9 000 98% text coverage	Reading mid-frequency readers; Learners will benefit from deliberate learning
Low-frequency	10 000 onwards about 100% text coverage	Wide reading; Learners will benefit from specialized studies of a subject area.

(Nation, 2012b, p. 6)

According to the information in Table 10, learners who know the first 3 000 word families, would be able to read graded readers and will benefit from deliberate teaching and learning. On the other hand, those who know between 4 000-9 000 words, should read mid-frequency, graded readers and would also benefit from deliberate learning, while those who know 10 000 words and more could be exposed to wide reading, and would benefit from specialised studies in a subject area, probably like CBI, adjunct approaches.

Finally, it is useful to note that researchers (Nation, 2012b; Nation & Anthony, 2013) have also established that the number of word families non-native undergraduates and non-native PhD students at English speaking universities need to successfully cope, are 5 000-6 000 and 9 000 word families, respectively. These findings emphasise the importance of assisting students to build large vocabularies, an aspect that will be considered next.

3.4.1.2 Building a large recognition vocabulary

Researchers agree that skilful, automatic and fluent reading requires a large recognition vocabulary (Duke et al., 2011; Eskey, 2005; Grabe, 2009; Nation & Anthony, 2013; RAND Reading Study Group, 2002; Richardson et al., 2012; Schmitt et al., 2011; Stoller et al., 2013). This is especially true for science students who require knowledge of a large, recognition vocabulary in order to comprehend scientific texts that have a high degree of lexical density (McWhorter & Sember, 2014). It is estimated that each year science students learn about 3 000 new words on average, in comparison to the 1 500 that language students do (Grant & Fischer, 2010). This is quite a challenge, because, in the process, they are required to actively add subject-specific words, symbolisation, formulas, abbreviations that are used to represent objects and concepts in abbreviated form to their background knowledge, as their level of studies progresses. In addition, they should be able to comprehend deeply the science behind scientific concepts, what each mean in different contexts, apply formulas, not merely memorising them, as well as be able to spell and pronounce scientific terms correctly (McWhorter & Sember, 2014). It is, therefore, crucial to ensure that learners have the necessary vocabulary to read with comprehension (Schmitt et al., 2011),an element that was a key focus in the development of the current reading programme.

The question of what are the best practices for vocabulary instruction is still being researched (Duke et al., 2011). However, we do know that learning the words seems to be a multifaceted, time consuming process that requires multiple encounters in multiple contexts (Grabe 2009; Richardson et al., 2012). As indicated in section 3.4, Macalister (2011) argues that instructors can assist students through explicit, as well as implicit instruction, in other words, through direct vocabulary instruction, as well as providing opportunities for learning words incidentally. Each of these concepts will now be explored individually.

Explicit vocabulary instruction

Direct, explicit vocabulary instruction and vocabulary learning strategies can provide students with opportunities to practise using words and have multiple encounters with the same words in order for repetition to take place (Bauman, 2009; Grabe, 2009; Duke et al.,

2011; Nation, 2005; RAND Reading Study Group, 2002; Richardson et al., 2012; Stoller et al., 2013). It is part of the intensive reading instruction and usually involves the exposure of learners to texts that contain a great deal of new vocabulary, and requiring them to deliberately pay attention to new words. These new words should be recycled in lessons, in order for key words to be "overlearned" (Grabe, 2009, p. 283) as can be accomplished in adjunct reading courses. In addition, direct vocabulary instruction aids automatic, effortless, word recognition which is a prerequisite for free, cognitive, processing resources to deal with other details in the text, such as discourse makers and main ideas (Grabe & Stoller, 2013). Even native speakers can benefit from explicit vocabulary instruction on condition that they are motivated, interested and attentive (Nation & Webb, 2011) but more attention should be given to teaching vocabulary to L2 speakers, as the difference between a native speaker's vocabulary and an L2 learner's vocabulary can be up to several thousand words (Nation, 2012b).

Numerous suggestions for direct vocabulary instruction that should be emphasised until learners can apply words confidently and fluently, are provided (Duke et al., 2011; Grabe, 2009; Grabe & Stoller, 2013; Nation, 2005). However, with particular reference to science students, researchers (Grant & Fischer, 2010; McWhorter & Sember, 2014; Richardson et al., 2012) agree that the two vocabulary instruction strategies, that could especially be beneficial to them, are to teach them word parts, as well as how to guess the meanings of words in contexts. Grant and Fischer (2010) caution that while it is a good idea to make use of different types of dictionaries, it is not very practical to be over-reliant on them, especially when reading science texts. This would result in reading being extremely time consuming and tedious, resulting in giving up.

Learning word parts

Word parts refer to prefixes, roots and suffixes. Prefixes appear at the beginning of words, have meaning and alter the meaning of the root to which they are connected. Roots, on the other hand, are the basic or core meanings of words, while suffixes appear at word-endings; they usually change the part of speech of a word. Often, a variety of words can be formed by adding different suffixes and even prefixes. As a result, knowing these affixes can increase word knowledge (Richardson et al., 2012), referred to as the "multiplier effect" (McWhorter & Sember, 2014, p. 69). Teaching students to analyse

new words and then identify prefixes, roots and suffixes, also referred to as structural or morphemic analysis (Richardson et al., 2012), is essential to foster improved vocabulary skills.

Different academic disciplines, especially science, usually use a core of common prefixes, roots and suffixes (McWhorter & Sember, 2014). For example, in Physics the prefixes that each indicate a number or the units of measure are crucial to know. Another example for scientists is the understanding and application of nominalisation (Shanahan & Shanahan, 2008). Nominalisation, a characteristic of academic language, refers to the transformation of a verb to a noun, by adding a suffix. In science texts, nominalisation is used to create technical vocabulary. Also, many terms in science have Greek or Latin roots, and students can benefit from being introduced to these (Richardson et al., 2012; Carnine & Carnine, 2004). It was, therefore, a crucial aspect to determine the most common word parts students need to learn in order to read their stereochemistry passages with better comprehension.

While it is generally consented that instructors should provide students with explicit instruction to promote the independent use of word-part analysis and ultimately increase their vocabulary levels, the short comings of the word-part analysis are also recognised (Grant & Fischer, 2010; Richardson et al., 2012; McWhorter & Sember, 2014). Even though it is a very useful strategy, deciphering word parts can also be misleading, as the context in which the word is used also needs to be analysed (Grant & Fischer, 2010). This strategy of explicit vocabulary instruction seems to be more successful when used in combination with contextual analysis (Richardson et al., 2012); consequently, students should be made aware that this strategy alone does not always work (McWhorter & Sember, 2014).

Guessing the meaning of words in context

Learners should be taught how to guess the meanings of words (Nation, 2005). This is especially true for science students who need to know that word meaning depends on context (Grant & Fischer, 2010). One way of guessing the meaning of words in context is to decipher words by breaking them up into affixes, as explained in the section above. Often these do not provide the exact meaning of the word, but may be adequate to

understand some of it in the immediate context in which it is encountered (Grant & Fischer, 2010). Another way is to make students aware that educational texts sometimes offer word meanings in the form of contextual clues, such as definitions, synonyms, contrast and inference (Grant & Fischer, 2010; McWhorter & Sember, 2014; Richardson et al., 2012).

However, even though guessing the meaning of words in context is an approach that is widely advocated, it appears to be a vocabulary and reading strategy that is overvalued for three important reasons. Firstly, it often leads to misinterpretations (Eskey, 2005). Guessing the meaning of words in context only provides a limited understanding which may be accurate or not. One of the reasons for this is because, contrary to some, other texts offer no or limited assistance in the form of contextual clues, such as definitions, synonyms, contrast and inference, and draw heavily on the readers' background knowledge of the topic under discussions (Grabe, 2009; McWhorter & Sember, 2014; RAND Reading Study Group, 2002; Richardson et al., 2012). Secondly, guessing the meaning of words actually becomes more difficult if more words in the text are not known (Eskey, 2005; Grabe, 2009) and the third and final misconception seems to be that it is commonly perceived to be a strategy employed by good readers. Eskey (2005) and Grabe (2009) argue that it is actually a reading strategy employed by weaker readers. They argue that this group of readers seem to be more reliant on guessing the meaning of words in order to cope with difficult texts, as opposed to good readers who do not do this because they know more words (Eskey, 2005; Grabe, 2009). In other words, the more words students know, the less reliant they are on this reading strategy.

The implications of this discussion are that, because words have different meanings depending on different contexts, the more familiar students are with the content of the reading material, the more accurately they will be able to guess the meaning of specific words (Grabe, 2009; Grabe & Stoller, 2013). Using the guessing strategy to learn specific meanings of new words may therefore not be very effective for weaker readers or those readers not very familiar with the background knowledge of the text. Based on their vocabulary levels, it was inferred that participants in the current study were above average readers (cf. 5.2.2.1). This as well as the fact that the intensive reading programme was designed to improve their background knowledge (cf.6.2.1.1 and 6.2.2.1), encouraged the inclusion of guessing the meaning of words in context as a

reading strategy in the MMAARR currently reported on. Nation (2005) is of the opinion that the strategy of guessing the meaning of words can only be employed effectively as a reading strategy if certain conditions prevail: Learners must read a great deal; they must have developed some reading strategies and they should be familiar with at least 98% of the running words in a text.

Due to the size and complexities of vocabulary learning, explicit vocabulary instruction will never be sufficient to teach all the words needed for full comprehension of certain texts (Grabe & Stoller, 2013; Krashen, 2013; Nation, 1990). The next section will explore the advice provided in the literature in order to determine what vocabulary to focus on to explicitly teach students. This advice was drawn upon during the development and instruction of the reading programme currently reported on.
reading strategies

Selection of words for explicit instruction

Instructors will need to decide which words to emphasise and pay more attention to while still trying to attend to the others to some extent. Nagy and Hiebert (2011) observe that even though the principles of word selection for an informational text will not be the same as for an academic text, educators will benefit from having a standard criterion for selecting the words to be targeted. In order to decide which words to select for direct instruction, various suggestions are made in the literature, as summarised in Table 11.

Table 11: Suggestions for vocabulary selection for direct instruction

Suggestions for vocabulary selection for direct instruction	Researcher
Establish the role of the word in the language, lexicon, students' existing knowledge, the lesson.	Nagy & Hiebert, 2011
Focus on four to five key words that may be used numerous times and in multiple ways, not on a large number of words. Identify words which are likely to be unfamiliar to most students in assigned reading. Further divide those into those that are deserving direct attention and those not worthy of instructional time.	Grabe & Stoller, 2013
Select words based on prior knowledge of students, the purpose of the lesson unit, the need for students to understand the words in order to comprehend the lesson, words indicated in boldface, coloured print, vocabulary lists, etc.	Richardson et al., 2012

Grabe and Stoller (2013) do not provide much information to explain how instructors should decide which words would deserve direct attention and those not worthy of instructional time, but being aware of the different types of vocabulary might provide more insight into making such a selection.

For the current study, it is worth noting that Nation and Webb (2011) provide the following suggestions on how to promote vocabulary learning specifically in CBI instruction. Similar to Evans Commander and Smith (1995), they support the idea of limiting the content matter of the lessons to one particular subject area, as it was done in the current study, for a number of reasons. Firstly, the number of new vocabulary words to focus on becomes more manageable. Having a wide variety of topics in a course results in a heavy vocabulary load. Secondly, this increases the repetitions of the vocabulary, both high-frequency, academic and technical vocabulary. In addition, this allows learners to build up knowledge of the subject area. The study of that subject will become easier because the content will become increasingly familiar. This makes it easier to guess the meaning of words in context, and then develop and establish new concepts.

They claim that, even though vocabulary learning is only one of the many goals that are involved in CBI instruction, vocabulary knowledge plays a very important role in content lessons.

Implicit vocabulary instruction

According to Nation (2005), the only other way of learning the vocabulary to comprehend academic texts will occur implicitly, through extensive reading (Nation, 2005). Duke et al. (2011) and Grabe, (2009) concur that this is indeed possible and that at least 5 - 15% of new words can be learnt on first encounter, at least to become part of the reader's receptive knowledge. Extensive reading is, therefore, a way of learning new vocabulary and improving and advancing fluency with the vocabulary already known to the reader. Finally, instructors are reminded that for learners to understand about 98% of all running words in a text, it "would require a lot of deliberate and incidental learning of vocabulary" (Schmitt et al., 2011, p. 5). More details regarding extensive reading are provided in section 3.4.1.7.

In conclusion, vocabulary learning should take the form of explicit, as well as implicit, instruction. The former seems to heighten student awareness of new words, while the latter reading motivates learners to use new words and increase their knowledge of words (Grant & Fischer, 2010).

This completes the discussion on the importance of building a large recognition vocabulary of students in EAP reading instruction, as suggested by Grabe and Stoller in 2001. Next, the importance of teaching strategies for reading instruction will be deliberated.

3.4.1.3 Teaching strategies for reading comprehension

While it is widely argued (Pressley, 2002; RAND Reading Study Group, 2002; Stoller et al., 2013) that a reading course should include the explicit teaching of strategies that students would require for reading comprehension, as such instruction will provide students with a repertoire of strategies that skilled readers apply to effectively foster and monitor reading comprehension, Wilkinson and Hye Son, (2011) and Duke et al. (2011)

are of the opinion that more research needs to be carried out to determine why this is the case.

However, prior to elaborating this important aspect of a successful reading course, one first needs to distinguish the difference between a reading *skill* and a reading *strategy*. According to Grabe (2009, p. 221), "strategies are cognitive processes that are open to conscious reflection but that may be on their way to becoming skills". In other words, reading strategies are reading strategies that become automatic over time through deliberate teaching until fluency of strategy use is accomplished and the reader becomes less aware of using them, in other words, they are used automatically (Afflerbach & Cho, 2009). Strategies, therefore, appear to be processes that readers apply deliberately and consciously to solve reading problems while skills are applied automatically and unconsciously. Strategy instruction promotes self-reflection by students about their own reading abilities (Goodman & Goodman, 2009). Skilled/good readers seem to know how to apply comprehension strategies selectively, successfully, effectively and strategically, depending on their reading goals and abilities to aid comprehension. Struggling readers, on the other hand, experience difficulties with comprehension because they know little about comprehension strategies and how to use them (Afflerbach & Cho, 2009; Conley, 2009; Grabe, 2009).

While Grabe and Stoller (2011) regard main-idea comprehension to be the core of reading instruction, various other effective reading strategies to teach deliberately in reading courses have been proposed (Duke et al., 2011; Eskey, 2005; Grabe, 2009; Holliday & Cain, 2012 ; Pressley, 2002; RAND Reading Study Group, 2002; Stoller et al., 2013). Grabe (2009) distinguishes between reading strategies that have been proven empirically to *effectively* increase comprehension and those that have been proven empirically to *indirectly* increase comprehension when used in multiple-strategy instruction. These are presented in the table that follows:

Table 12: Reading strategies to increase comprehension

Reading comprehension strategies to effectively increase comprehension	**Reading comprehension strategies to indirectly increase comprehension when used in multiple-strategy instruction**
Summarising Forming questions Answering questions and elaborative interrogation Making associations Activating prior knowledge Previewing Monitoring comprehension Using text structure awareness Constructing mental images Using visual graphics and graphic organizers	Clarifying Establishing goals for reading Mental translation Paraphrasing Predicting Rereading Reading aloud (for modelling and fluency) Synthesising information Taking notes Drawing inferences

(Grabe, 2009: 218-219)

Considering the many reading strategies that are components of reading skill development (cf. table 12), and that successful strategy instruction is time consuming and requires teacher effort, Holliday and Cain, (2012) and Wilkinson and Hye Son (2011) concur that instruction is often neglected. Grabe (2009) advises that not every reading strategy can receive an equal amount of attention in each reading course (Grabe, 2009). It is, therefore, suggested that instructors instruct only strategies that seem applicable to the particular group of students (Holliday & Cain, 2012; Grabe, 2009) and strategically focus on those that are the most efficient and effective to suit the target situation (Richardson et al., 2012), implying the importance of needs analysis (cf. 2.7.1). Doing this allows strategies to be taught extensively and deliberately until they become skills (Afflerbach, Pearson & Paris, 2008; Grabe, 2009). This relates to the Time-on Task principle (Nation, 2007), suggesting that the more time you spend on doing something, the better you become. The RAND Reading Study Group (2002) reminds instructors that the explicitness with which instructors teach comprehension strategies makes a difference in learner outcomes, especially for low-achieving students. In the same vein, Wilkinson and Hye Son (2011) add that strategy instruction promotes students' active engagement with text.

The guidelines described above have been developed for strategy instruction in general EAP courses. However, one is reminded that different content areas may require the application of different reading strategies (Shanahan & Shanahan, 2008). The following reading strategies, in addition to learning new vocabulary, symbols and abbreviations, are mentioned as of particular importance to science students: in general, previewing, asking questions (adopting a scientific mind set); studying and drawing diagrams (McWhorter & Sember, 2014). All these reading strategies also appear in the list provided by Grabe (2009) in Table 12. As previously discussed, subdivisions within content areas also have their own, unique discourses, making different demands on readers. However, as observed by Grabe (2009), not all reading strategies could be paid attention to, mainly due to time constraints. Therefore, only the reading strategies that pertain to the current research, as indicated by the needs analysis (cf. 5.3.3), will briefly be elaborated.

Reading strategies specific to biochemistry students in comprehending stereochemistry

After the needs analysis in the current research were conducted (cf. chapter 5), the following reading strategies have been determined to be of most value to students of stereochemistry:

- ✓ Drawing inferences;
- ✓ Note taking;
- ✓ Selecting and Synthesising;
- ✓ Visual literacy;
- ✓ Forming questions;
- ✓ Activating background knowledge;
- ✓ Answering questions (and elaborative interrogation);
- ✓ Using text structure awareness;
- ✓ Previewing ;
- ✓ Constructing mental images;
- ✓ Establishing goals for reading.

Drawing inferences

An inference is a reasoned guess about the unknown, based on existing knowledge. It is not limited to reading, but readers of scientific texts often have to infer because often information is left out as writers assume readers to know enough to fill the missing gaps (McWhorter & Sember, 2014). Through drawing inferences, readers of science texts can integrate new information with prior knowledge, interpret decontextualized information, synthesise information from multiple cues and sources, evaluate information in terms of their own goals and attitudes and understand information that may be theoretically different from prior experiences and expectations. Drawing inferences also assists readers of science texts to infer the difference between fact and opinion, as reading facts is one of the fundamentals of science texts (Richardson et al., 2012).

Drawing inferences is one of the effective reading comprehension strategies that have been proven to indirectly increase comprehension skills, when taught explicitly and practised in combination with other strategies (See Table 15) (Grabe, 2009; Schmitt et al., 2011). In short, through drawing inferences, readers develop situational models for interpreting texts (Grabe, 2009), but only if the correct literal meaning or mental models are created (McWhorter & Sember, 2014).

Note taking

Note taking is another reading strategy that can indirectly improve reading comprehension if taught in combination with other strategies (Grabe, 2009). At a university, note taking is an activity that typically takes place while students listen to their lecturers, to record the contents of the lesson but also when they read and summarise the most important information from their text books or course materials. Note-taking is an effective reading strategy for various reasons. Firstly, it assists readers in organising information. While doing so, they are able to see correlations between ideas. In addition, through note taking, students are able to select and synthesise information from numerous sources such as lecture notes, information from text books,

journals and other reading material (McWhorter & Sember, 2014. Furthermore, the ability to take notes facilitates the recollection of information and, finally, it enables students to assess their own reading comprehension abilities (Boye, 2012; McWhorter & Sember, 2014).

Note-taking remains an integral part of the learning process, even on today's high-tech campuses, where many university students, like the sample in the current study, have access to lecture notes outside the classroom. Consequently, not many students see the need of taking notes. Unfortunately, not all students are good note takers and their notes are often incomplete (Boye, 2012). Research shows that students recall more lecture material if they record it in their notes and, ultimately, perform better on tests of recall and synthesise than students who do not take notes (Boye, 2012).

Raver and Maydosz (2010) examined the impact of providing instructor notes before lessons (as it is the practice for the students in the current study, cf. 5.3.3.), providing instructor notes immediately after the lessons and not providing any instructor notes to students (n=154). The conclusion was that students who did not receive instructor-provided notes received statistically lower post-test scores than those who received instructor-provided lecture notes before or after lectures.

This, however, does not suggest that instructors should simply supply learners with full transcriptions of lessons. Boye (2012) argues that although instructor notes are better and more complete than learner notes, a compromise could perhaps be to provide learners with partial or guided notes in an attempt to fine-tune these skills in order to generate more successful learners. Such notes could provide an outline that students could follow; it may be graphic organisers like charts or matrices or printable PowerPoint hand-outs in which portions of slides are left blank for students to fill in during lessons. This would require their attention and attendance. This could also allow students to prepare and review materials to identify concepts that require further explanation (Boye, 2012).

Selecting and synthesising information

Selecting and synthesising information (Afflerbach & Cho, 2009), also referred to as intertextuality (Wilkinson & Hye Son, 2011), are important intellectual resources for making meaning, and are reading strategies that can be taught in combination with drawing inferences and note taking, strategies that are described in the previous sections. Being able to do these is important for academic studies because often students read multiple texts and are required to process information from various sources for a comprehensive overview. For example, students, like the sample in the current study, may have to integrate information from lecturer notes, text books and maybe additional reading material in order to assemble everything there is to know about a topic. A global understanding is achieved by applying and linking various activities such as comparing, contrasting and differentiating information from each text appropriately to assemble ideas coherently (Afflerbach & Cho, 2009; McWhorter & Sember, 2014).

Visual literacy

Visual literacy includes the ability to construct mental images and to use visual graphics and graphic organisers (Grabe, 2009; McWhorter & Sember, 2014; Richardson et al., 2012). The main purpose of visual information is to condense written information, which, in turn, enhances reading comprehension and reinforces learning (Richardson et al., 2012; McWhorter & Sember, 2014). Examples of visual information in science texts, specifically, contain numerous diagrams and drawings of structures and processes, tables, graphs, graphic organisers, cartoons, photos, and the like, each relating to the content under discussion with the specific aim to simplify it.

Graphic organisers, especially, seem to be quite prominent in science classrooms. In fact, “they have become a staple of many science classrooms” (Grant & Fischer, 2010, p. 85), mainly because they are effective to provide students with a logical way of interpreting how scientific ideas connect and relate to each other, based on what they have read. These clarify, organise and consolidate information, and also emphasise a particular thought pattern. As a result, learning, reading and the consolidation of information are improved, scientific processes are made more real and manageable, more practical and

less theoretical. While it is important to instruct students in interpreting these, ultimately they should be encouraged to be creative and to create their own patterns to present information diagrammatically in order to represent their comprehension in any, individual way (Grant & Fischer, 2010; McWhorter & Sember, 2014).

However, students often seem to ignore information that is presented visually (Spiegelberg, 2013). McWhorter and Sember (2014) and Richardson et al, (2012) agree that this may happen because they seem to be intimidated by visual information mainly because they are not adequately prepared. Students, therefore, need to be taught that there are different types of graphics and also how to read graphics. The following guidelines are suggested.

Table 13: How to read graphics

How to read graphics
▪ Read the title and caption ▪ Determine how the graphic is organised ▪ Note any symbols and abbreviations used ▪ Determine the scale or unit of measurement ▪ Identify the trends, patterns and relationships the graph is intended to show ▪ Read any footnotes ▪ Check your source

(McWhorter & Sember, 2014. p. 220-221)

Forming and answering questions

The importance of forming and answering questions is highlighted by the reality that it is generally agreed to use pre-, while- and post-reading questions in conducting comprehension lessons (Aebersold & Field, 1997; Duke et al., 2011; Grabe, 2009; Grabe & Stoller, 2011). In fact, as indicated in section 3.4, this was one of the conditions for implementing the reading framework that is currently used to guide this discussion.

There are a number of reasons why this is such a vital aspect of comprehension instruction. One of the main reasons is because classroom questioning can help students to remember lesson content, improve their information finding abilities, and it can lead to more in-depth text processing. In addition, questions are excellent probes, help create

meaning for readers, stimulate higher level thinking, and they can be indicators of students' understanding of texts. Furthermore, student-generated questions encourage higher level thinking and better text comprehension, especially of more demanding material (Grabe, 2009; Richardson et al., 2012)

However, Richardson et al. (2012) indicate that using questions as a teaching strategy in class seems to be less effective at times. This is especially obvious when they are not well-considered and focus more on establishing literal comprehension, when questions do not match student abilities and when alternative answers to questions (which students often provide) are not considered. It also seems to be less effective when the importance of the technique has not been explained to students and also when student-generated questions are not promoted.

Activating background knowledge

McWhorter and Sember (2014) explain that activating background knowledge (cf. 2.4; 3.2.4) assists text comprehension in three ways. Firstly, it promotes active reading because students start to think about the topic. Secondly, it assists text comprehension because the reader connects new information with prior knowledge. Thirdly, increased interest in topics is sparked if readers realise that they already know something about a topic. It is interesting to note that in the Namibian study referred to earlier, Murray (2013) came to the conclusion that familiarity with the topic might have caused readers in her sample to lose interest in reading certain texts.

Also deliberating the advantages of activating background knowledge, Richardson et al. (2012) argue that readers with rich prior knowledge of a subject apply reading strategies more effectively when compared to those with less subject knowledge. In addition, they seem to be able to focus on what is important in a task and distinguish between main and supporting ideas. In contrast, those with inadequate background knowledge often search and read unproductively, are also unable to construct goals for reading and seem to have trouble to articulate and ask questions. Background knowledge of a content area fosters reading comprehension and allows students to make accurate predictions and inferences

(Grant & Fischer, 2010; Schmitt et al., 2011). The more background knowledge readers have about a topic, the easier it is to comprehend. However, at university level, especially in science, students are often required to learn about new concepts. Some will have some knowledge of these, others very little or nothing. Educators should, therefore, facilitate learning, especially in instances where students have little prior knowledge about a subject. Some of the ways of doing it is using trade books (Grant & Fischer, 2010) (cf. 3.4.1.7), making use of visuals, practising the pronunciation of words (Richardson et al., 2012) or including a number of pre- and while-reading activities (Eskey, 2005; Grabe 2009). Although important, background knowledge alone does not imply being a competent reader. It needs to be examined in relation to other factors responsible for reading comprehension, such as linguistic competence and vocabulary.

After determining which reading strategies the target group would benefit from the most, reading instructors should consider a few vital considerations. Firstly, they need to plan thoroughly and practise before teaching each strategy to ensure that learners fully grasp concepts (Holliday & Cain, 2012). In addition, practitioners should explain, model, practise and recycle each selected reading strategy to reflect the purposefulness of reading (Holliday & Cain, 2012; McWhorter & Sember, 2014; Stoller et al., 2013). Another point to consider is that reading strategy instruction should be combined with students having extensive practice and exposure to much reading, for example, by building expectations among students that reading occurs in every lesson (cf. 3.4) (Grabe, 2009; Stoller et al., 2013). Another suggestion that has also been mentioned in section 3.4.1.3 is that strategies should be taught by developing lessons around pre-, during- and post-reading tasks to allow for consistent practise within the context of reading (Aebersold & Field, 1997; Eskey, 2005; Grabe, 2009). Finally, one is reminded that students should be motivated to learn new reading strategies (Duke et al., 2011; Holliday & Cain, 2012; Stoller et al., 2013).

Next follows a brief overview of some considerations to take into account in reading strategy instruction.

Activities to consider in reading strategy instruction

The importance of activities to reflect the teaching methodology in EAP courses was already highlighted in section 2.7.1.4. It was then emphasised that even though they consume effort, time and skill, tasks and activities should be well designed in such a way that the reading abilities of the target group improve and that they should not be based on intuition.

Various guidelines for activity development, especially in the context of reading, have been proposed, for example, MINUS (Macalister, 2011, p. 162) and FLOW, an idea from Csikszentmihalyi (1990) in Grant and Fischer (2010). The letters in the mnemonic MINUS represent the following ideas:

Table 14: Interpretation of the mnemonic MINUS

M- there is focus on meaning
I- the texts and the tasks interest the learners
N- there is new learning
U- the input is understandable, activities help understanding
S- tasks are designed to reduce stress for the learners

(Macalister, 2011, p. 162)

The mnemonic MINUS summarises a framework for the development of activities that is based on the understanding that tasks should be meaningful, originating from texts and be tasks that interest learners. Furthermore, activities should stimulate the creation of new meaning and assist comprehension under conditions where the input is understandable. Activities should, therefore, be designed to reduce stress for learners, and as a result, increase their motivation to learn.

FLOW is mostly associated with reading, but can also be applied to non-pedagogical activities, such as rock climbing. The ultimate aim of FLOW, the state that people seem to reach when they are deeply, but effortlessly involved in an activity, is to improve.

FLOW requires concentration and complete absorption in the task at hand, which would result in feelings of satisfaction, motivation and interest. By applying these principles to reading instruction, Grant and Fischer (2010) are of the opinion that activities that produce FLOW clearly set goals, provide students with the required resources to allow total absorption in the task at hand, result in undivided attention to completing the task successfully, as well as provide instant and incremental feedback. They emphasise that for students to have the required feedback to carry out tasks, they do not only require physical resources, but also the skills and background knowledge to carry out the task. Krashen (2003) links this idea of FLOW to his pleasure hypothesis. According to this hypothesis, pedagogical activities that stimulate language acquisition are enjoyable and those who do not achieve such a purpose are simply not pleasurable. Both MINUS and FLOW aspects have been considered in the development of activities in the current study (cf. 6.2).

The following section will explore the notion of building awareness of discourse structure as one of the pillars of the generic EAP reading instruction framework proposed by Grabe and Stoller (2011) in more detail.

3.4.1.4 Building awareness of discourse structure

Discourse analysis is typical in ESP/ EAP course development (cf. 2.2; 4.4.6) and discourse-structure awareness has been proven to be fundamental to reading success, hence its importance in reading instruction and curriculum planning (Duke et al., 2011; Eskey, 2005; Grabe, 2009; Goodman & Goodman, 2009; RAND Reading Study Group, 2002; Grabe & Stoller, 2011). Discourse structures are the frameworks that writers employ to convey information in an organised and coherent manner. Additionally, this reflects the writers' goals and expectations as determined by the specific information that is presented (Jiang, 2012). Discourse structures are presented as clues that reveal how the author attempted to relate ideas to one another or any sort of systematic attempt to impose structure on a text (Grabe, 2009). Consequently, Jiang (2012) argues that students should be made aware that discourse structure is not arbitrary and recurs regularly and purposefully across texts and in various combinations.

Evidence exists that students who are explicitly taught the structure of texts use this knowledge to improve their comprehension (Duke et al., 2011; Richardson et al., 2012). For example, the study carried out by Slimani (2014) suggests that readers who understand the way the discourse of the text is structured will find it easier to comprehend such a text. However, Grabe and Stoller (2011) point out that, in spite of this evidence that reading comprehension depends on readers' awareness of text structure, few EAP reading curricula focus on discourse structure awareness.

Texts signal discourse in two distinct ways. On the one hand, through lexical and structuring signals and, on the other hand, by using specific patterns and systems of text organisation (Grabe,
2009). Each strategy was used in the current study and will briefly be expounded.

a. Lexical and structuring signals

Cohesion "occurs when the interpretation of some element in the discourse is dependent on that of another" (Halliday & Hasan, 1976, p. 4). It is also defined as the lexical and structuring signal words that may indicate lexical relationships between the different parts of a sentence or between the different sentences in a text (Grabe 2009; Richards et al., 2002). For example, anaphoric referencing (anaphora) involves the linking back to information provided or mentioned earlier in a text, while cataphoric referencing (cataphora) involves the opposite, namely, indicating information that is still to be mentioned (Halliday & Hasan, 1976). Writers often use pronouns, demonstratives, repeated nouns, synonyms, paraphrases, ellipsis, substitution and the like to signal anaphora and cataphora in texts. Making such connections by using prior references is crucial for reading comprehension and to create text and situation models of reading comprehension, aspects that poor readers seem to struggle with (Grabe, 2009).

Coherence is influenced by signals from the text and refers to the semantic relationships linking the sentences in a particular text (or utterances in a discourse) or, in a longer text, to content being organised in a way that enables a reader to make sense of it (Richards et

al., 2002). This is reflected in the specific patterns, systems or structures in which texts are organised, and indicates the goals of writers and the purposes of specific texts regarded as rhetorical genre analysis (Hatch, 1992) or thought patterns (McWhorter & Sember, 2014). Writers often provide clues that signal the thought pattern that is introduced. Knowing about these structures and how they convey intended information enhances comprehension because these structures have functional purposes that guide readers to make predictions as to how texts can be interpreted. They are recognised by good readers and writers while poor readers can be overwhelmed by all of this (Grabe, 2009). Certain transition words, structures or thought patterns are unique to certain disciplines (Richardson et al., 2012; McWhorter & Sember, 2014), and within each discipline various subcultures (Moje et al., 2011) exist. It is, therefore, up to readers and instructors as facilitators to determine the standard of coherence that is necessary for task success (Grabe, 2009). For the rest of the discussion, the term "thought patterns", as used by McWhorter and Sember (2014) will refer to structures in which texts are organised to indicate the goals of writers and the purposes of specific texts.

Science, the umbrella discipline of biochemistry, the focus of the current study, is concerned with the *how* and *why* in academic settings. In reviewing the literature, the thought patterns provided by McWhorter and Sember (2014) that seem to be particularly important to comprehend life and physical sciences (*definition, process, cause-effect, classification, problem-solution*) and those provided by Slimani (2014) to be typical of biochemistry (*definition, description, classification, instruction and visual-verbal relationships*) were compared for similarities and differences. Thereafter, from reviewing the typical thought patterns students in the current study would have to apply to comprehend the chapter on stereochemistry in the students' textbook (*definition, classification, order or sequence, cause and effect, comparing and contrasting, listing/enumeration)* another comparison showed that the thought patterns of these students were only partially similar to those of the life and physical science students (McWhorter & Sember, 2014) or the biochemistry students in Slimani's 2104 study. This finding seems to confirm the support for needs analysis and the development of ESAP courses for specific needs of students. On the other hand, it also provides evidence that various subsections of courses make different demands on students.

Table 15: Comparison of thought patterns in three subgenres of science

Life and Physical Science	Slimani (2014). Biochemistry	Stereochemistry
Definition	◊	◊
Process	x	◊
cause-effect	x	◊
Classification	◊	◊
problem-solution	x	x
x	description	x
x	instruction,	x
x	visual-verbal	x
x	x	*comparing and contrasting,*
x	x	*listing/ enumeration*

McWhorter and Sember (2014)

Each of these thought patterns that seem to be important to read stereochemistry with improved comprehension will be elaborated briefly as these thought patterns were emphasised on during the development and instruction of the intensive reading programme (cf. 6.2.1.1 and 6.2.2.1).

Definition

Definition patterns are typical of introductory textbooks that introduce students to new, specialised vocabulary in a short time (McWhorter & Sember, 2014), for example, when the writer needs to define the technical terms when a reader is unfamiliar with the subject. These patterns can help the reader to become interested, but mainly it helps to overcome ambiguity in a text (Slimani, 2014). For example: Stereochemistry *is …;*
Stereochemistry *can be defined as …;*
Stereochemistry *means …;*
Stereochemistry *refers to …;*

Another term for Stereochemistry is …*;*

Stereochemistry *also means*… .

Classification

Classification, a pattern that is widely used in academic subjects like science, indicates the division of a broad topic into major categories according to a shared feature (McWhorter & Sember, 2014; Slimani, 2014). For example:

Isomers are *composed of …;*

Isomers *comprise …;*

There are *several kinds* of isomers;

Another type of isomer is ....

Order or sequence

This pattern indicates when or in what order things happen (Duke et al., 2011). It can be subdivided into patterns of chronology, patterns of process, order of importance, as well as spatial order (McWhorter & Sember, 2014).

Chronology and process

Chronology refers to the sequence in which events occur in time while *process* refers to steps or stages by which actions are accomplished. Transitional words or phrases that indicate chronology and process are *then, before, during, by the time, first, last, while, afterward, after, meanwhile, thereafter, at that point.*

Order of importance

Sometimes ideas are listed in order of priority, either from least to most important or from most to least important. Transitions indicating this are, for example, *less, more, primary, first, next, last, most important, primarily, secondarily.*

Spatial order

Spatial order refers to the organisation of information according to its physical location, position or order in space. Instructors often refer to a visual aid or diagram when providing spatial descriptions because often a diagram accompanies text material. Transitions for spatial order are as follows: *The left side of the…; beneath the surface; the lower portion; next to, beside, to the left, through, in the centre, externally, between, leading to …, the outer covering….*

Cause-effect pattern

This pattern indicates the relationship between two or more activities that are somehow linked in time, often the one causing the other to take place. Information can explain both causes and effects or only causes or only effects of a particular action (Duke et al., 2011). Sometimes multiple causes and effects are described, prompted by the questions 'how' and why' that are prominent in the sciences (McWhorter & Sember, 2014). For example:
Causes: *because, due to, one cause is … another is…, since, for, first, second.*
Effect: *consequently, as a result, thus, resulted in, one result is, another is, therefore.*

Comparison and contrast

The comparison thought pattern is used to highlight similarities between ideas while the contrast pattern emphasises the differences. Sometimes both comparison and contrast patterns are used for a balanced view (Duke et al., 2011; McWhorter & Sember, 2014).
For example:
Transitions for contrast: *Unlike, less, contrasted, differs, in contrast, however, on the other hand, as opposed to, whereas.*
Transitions for comparison: *Similarities, as….as, like, both….resembles, in a like manner, similarly, likewise, correspondingly, in the same way….*

Listing/Enumeration

Listing/enumeration is the listing of ideas, a pattern commonly used in most textbooks for most academic disciplines (McWhorter & Sember, 2014). Examples of transition words are as follows:

Table 16: Transitions showing listing/enumeration

Thought pattern	Explanation	Examples
Statement and clarification	These patterns show that information that will explain an idea or concept will follow.	in fact, in other words, clearly, evidently, obviously
Summary	These words indicate that a shortened review of an idea or piece of information will be provided.	in summary, in conclusion, in brief, to summarise, to sum up, in short, on the whole
Generalisation and example	These words provide examples to clarify broad, general statements.	for example, for instance, that is, to illustrate, thus
Addition	These words indicate that additional information will follow.	Furthermore, additionally, also, besides, further, in addition, moreover, again

Additional patterns and transitions that are useful to assist with text comprehension are as follows: (McWhorter & Sember, 2014; Stoller et al., 2013).

Table 17: Additional thought patterns and transitions

Thought pattern	Explanation	Examples
Statement and clarification	These patterns show that information that will explain an idea or concept will follow.	in fact, in other words, clearly, evidently, obviously
Summary	These words indicate that a shortened review of an idea or piece of information will be provided.	in summary, in conclusion, in brief, to summarise, to sum up, in short, on the whole
Generalisation and example	These words provide examples to clarify broad, general statements.	for example, for instance, that is, to illustrate, thus
Addition	These words indicate that additional information will follow.	furthermore, additionally, also, besides, further, in addition, moreover, again

b. Specific patterns and systems of text organisation

Specific patterns and systems of text organisation that reflect the goals of the writer and the purposes of specific texts are features that skilled readers learn to recognise (Grabe, 2009; Hyland, 2006; Swales, 1988). Genres can be described in terms of real-world uses of texts, such as the CV, business memo and letter to the press; they can also be described in terms of institutional genres, like the textbook chapter, the novel, the report, summary, etc. The genre that was of importance to the current study is the textbook chapter.

Explicit instruction on discourse structure of texts that university students commonly encounter make students more aware of how texts, for example, textbooks, are structured and how discourse structure is signalled (Alexander et al., 2008). As texts become more difficult, readers rely increasingly on discourse structure (Grabe, 2009); therefore,

familiarity with various text structures provides expectations for the organisation and grammar of a text and for the types of information they will encounter. Consequently, readers who are unaware of discourse structure do not approach a text with a particular plan of action and fail to comprehend, and remember, information (RAND Reading Study Group, 2002). One could therefore conclude that familiarity with various text structures aids comprehension and recall of texts and that students should especially be introduced to the discourse structure of textbooks. More details regarding textbooks as sources of required reading for students, especially undergraduates, are provided in section 3.3.1.1.

How discourse structure can be taught

Instruction about the structures found in the different genres benefit students. As there are so many to choose from, the lecturer should decide appropriateness based on levels of maturity and language proficiency (Grabe 2009). In addition, the type of instruction must be consistent and continually take place at the pre-reading stage, as well as during the while- and post-reading stages, in order to reach the ultimate goal for students to do this independently over time (Stoller et al., 2013). For example, graphic organisers serve as effective tools for raising students' discourse structure awareness and can be used during lessons, as well as during assessment, in science classrooms (Grabe, 2009; Grabe & Stoller, 2011; Grant & Fischer, 2010; Jiang, 2012; Richardson et al., 2012). Jiang (2012) found that graphic organisers that reflect patterns of discourse organisation in specific texts, i.e. that of the text that is being analysed, seem to be more powerful in consolidating information than in teaching generic patterns of discourse organisation.

Venter (2014) describes empirical research conducted among first-year university students (n=150) at a South African university. Similar to the current study, the study focused on the improvement of students' academic reading strategies; however, it centred on the improvement of conjunctions only. It established that "the cloze test is a good method to teach comprehension of conjunction markers" (Venter, 2014, p. iii). Unlike in the current study, only quantitative data were collected through an experimental design comprising pre- and post-tests to establish whether the 9 week intervention, using cloze tests, concentrating on the improvement of conjunction markers, would improve the

academic reading proficiency of participants. A test of academic literacy that is commonly used in South African settings (TAG) was used as pre- and post-tests. The sets of data were compared and it was determined that overall, the intervention had had significant effects on the overall post-test results, as well as on the section in the test that specifically deals with conjunction markers. In addition, the effects it had on the former were described as "big" and that on the latter as "medium" (Venter, 2014, p. 112).

In the recent Namibian study mentioned previously, Murray (2013) determined that Namibian students (n=86) from the Faculties of Humanities and Social Sciences at the University of Namibia achieved lower scores in reading comprehension tests that had more incidences of anaphoric references, and also performed poorly in tasks that required them to identify these. In another Namibian study, Willemse (2006) designed a reading intervention programme for first-year UNAM students (n=27) who were from various faculties, after a pre-test had indicated that they were reading at frustration levels (55.5%), borderline levels (41%) and instructional levels (4%). The reading intervention had an intensive, as well as an extensive, component and, among other reading strategies, it focused on anaphora and cataphora. The improvement rates in the individual reading strategies were not measured, but after a 10 week intervention, the overall post-reading scores indicated that the participants did show a significant improvement in their reading scores as a result of attending the intervention ($p< 0,025$), compared to students in the control group. On a less positive note, although participants in the intervention group did show a significant improvement in their results, most of them were still very weak readers. For example, after writing a self-developed reading test, the student with the lowest pre-reading score in the intervention group improved with 25% (from a pre-reading score of 18% to a post-reading score of 43%), but she was still reading at the frustration level and needed more intensive instruction in reading to improve her reading levels. Similarly, prior to the intervention, 55.5% of all participants in the intervention group read at frustration levels, 41% at borderline levels and only 4% at instructional level. After the intervention 26% still read at frustration levels, 70% were borderline readers and 4% at instructional level.

All in all, making students aware of the structure and lexical signalling of text is vital for comprehension to occur, but also promotes academic writing abilities. As mentioned in

section 1.1.3 the former is a receptive skill, while the latter a productive one. The next section will discuss the importance of developing strategic reading.

3.4.1.5 Developing strategic reading

The development of strategic readers seems to go hand in hand with the idea of explicitly teaching students reading strategies (see 3.4.1.3). In other words, even though readers are taught vocabulary learning techniques and receive explicit reading strategy instruction and awareness raising of discourse structures, they still need to be encouraged to become strategic readers. This means that they need to be taught why, how and when to apply certain reading strategies that are used by skilled readers (Duke et al., 2011). Strategic readers generally display the characteristics of good readers that are presented in Table 7. One aspect of special importance is the issue that they monitor their comprehension continuously. This ability indicates heightened levels of metacognition (Eskey, 2005; Grabe, 2009; Pearson, 2009).

The term "metacognition" was first researched during the late 1970's (Pearson, 2009), and refers to the knowledge and control that we have over our cognitive processes. In reading, one can show two categories of metacognition. On the one hand, readers display metacognitive awareness, and on the other hand, they display metacognitive regulation. The former refers to being aware of what the reader knows, while the latter refers to the knowledge of when, where and how to use strategies. In other words, simply teaching students a list of cognitive reading strategies alone does not foster comprehension. They also need to be assisted to think about when and why they use these. In other words, they need to think about how they think (Eskey, 2005; Grabe, 2009).

Duke et al. (2011, p. 367) suggest "dialogic" approaches to strategy instruction. A dialogic perspective to reading instruction does not perceive it to be abstract, content free and isolated from the goal of acquiring knowledge. Rather, it is regarded as embedded in meaningful discussion that emerges as a result of interaction and that is often due to conflicting views embedded in those authentic contexts which represent specific content domains that students are exposed to outside the reading classroom. Student discussions are encouraged, and thus, students are able to closely link reading strategy instruction to

what happens in the content classrooms, enhancing both their reading comprehension, as well as content knowledge. This is what happens in adjunct CBI courses. This dialogic approach to reading instruction seems to be an attempt to address a concern raised by Grabe and Stoller (2013), namely that EAP courses often introduce strategies but rarely in purposeful combinations or to achieve meaningful reading goals.

Various ways for strategic instruction in reading classes are suggested, although it seems as if these vary from one researcher to another (Duke et al., 2011; Grabe, 2009; Macalister, 2011; Pressley, 2002). One way of doing this is to make readers aware that people read for different purposes (cf. 3.1.1), each making different cognitive demands on the reader (Anderson, 2000; Grabe, 2009). Another suggestion is to implement multiple strategy instruction, a practice that appears to increase comprehension of texts in various contexts significantly (Duke et al., 2011; Pressley, 2002) (cf. 3.4.1.3). In order for this to occur, guided practice, as well as periodic review, is required until these eventually become automatic, a pre-requisite for fluent reading to occur, as indicated in section 3.1.2 (Duke et al., 2011; Grabe, 2009).

Finally, to become strategic readers, students need 'both skill and will' (Miller & Faircloth, 2009, p. 308). In this view, 'will' represents the motivation to become engaged with reading, to continue reading to reach goals and to persist through difficulties (cf. 3.4.1.8).

3.4.1.6 Practising reading fluency

Good readers are able to read fluently, as was indicated in section 3.1.2. In that section it was explained that Grabe (2009) perceives fluent readers to be readers who read texts and terminology with relative ease, accuracy and automaticity at a rapid pace. Two key terms in this definition of fluency are *accuracy* and *automaticity*. According to Eskey (2005), accuracy is the ultimate aim of automatic, rapid reading and depends on knowledge of the real world, vocabulary, text structure and grammar. In the same vein, Rasinksi et al. (2011) are of the opinion that if the message is not understood correctly, in other words, accurately, the purpose of reading is defeated, even if the reading process was automatic and rapid. While Rasinksi et al. (2011) regard automaticity as a defining feature of

reading fluency, Eskey (2005, p. 568) adds that it allows readers to decode many words accurately and rapidly, i.e. have a "swift reading rate". Other factors that can impact the fluency rate of reading are the familiarity of the topic (cf. 3.4.1.) and the readability of the text (cf. 3.4.1.7). In other words, a student who is familiar with a topic is more likely to understand concepts and the vocabulary associated with those concepts, as well as read with good comprehension (Rasinksi et al., 2011). Familiarity of a topic was already addressed in section 2.7.4 while the readability of texts is elaborated in section 3.4.1.7. Both these concepts are important in the current study.

Stoller et al. (2013) list two practical ways for improving reading fluency. One is to ensure that students read a great deal. The indisputable principle is that students become better readers if they read more. Another way is to allow students to re-read texts that are also used in other contexts. This not only increases reading fluency, but also reading speed. Increased reading speed is of paramount importance to allow students to read the required reading that increases in amount and complexity as they advance in their studies. Both these aspects were indirect aims of the study.

In summary, it seems as if the ultimate aim of a good reader is to read fluently. Such a reader would have adequate knowledge of vocabulary learning strategies, pay attention to discourse structure, read strategically with accuracy and automaticity at a rapid pace. Fluency is a frequently neglected, but critical component, of effective and successful reading instruction that takes time to develop (Grabe, 2009; RAND Reading Study Group, 2002; Stoller et al., 2013). Instruction that is designed to enhance reading fluency leads to fairly significant gains in word recognition and fluency and moderate gains in comprehension (Rasinksi et al., 2011).

The following section deals with an exploration of important issues regarding reading that instructors need to take into account when developing extensive reading courses. This was one of the core aspects of the current study; therefore, a detailed discussion will follow as one of the main aims of conducting this study was to explore strategies to employ in the development of ESAP reading courses. The focus will particularly be on the development of extensive reading courses for specific groups of students as, so far, all

attempts at introducing extensive reading programmes at the UNAM LC were in the first place developed on principles of "ad hoc" course design (Hutchinson & Waters, 1987; 2009, p.94), and secondly for large groups of students who were not homogeneous in terms of field of study.

3.4.1.7 Providing exposure to a volume and range of texts

Extensive reading (ER), the reading of large quantities of printed text that are interesting and accessible, is widely seen as *supplementary* reading to intensive reading as readers willingly engage with various types of texts (Day & Bamford, 1998; 2002). However, Krashen (2004; 2013) is of the opinion that extensive reading *alone* should be sufficient to improve reading comprehension and that university students who struggle with academic English vocabulary, should be exposed to more comprehensible input, not to be taught explicitly.

Researchers (Day & Bamford 1998; 2002; Eskey, 2005; Grabe, 2009; Krashen, 2003; 2004; 2013; Maley, 2010; Nation & Anthony, 2013; Richards et al., 2002) generally agree that there are various educational reasons for introducing extensive reading in a reading classroom. For example, if practised over a longer time, it is responsible for increases in students' comprehension abilities, vocabulary growth, motivation to read, as well as reception to reading instruction, spelling and writing, language and literacy skills in the target language, world knowledge, conceptual learning and reasoning skills. In addition, ER develops learner autonomy and provides comprehensible input. It is, therefore, no surprise that Eskey (2005) argues that every individual should develop a reading habit in order to experience reading and academic success.

Various names for ER exist, such as SSR (Sustained Silent reading), DEAR (Drop Everything And Read), FVR (Free Voluntary Reading), Out OF School (OOS) programmes, USSR (Uninterrupted Sustained Silent Reading); free-reading time, reading lab or library time. All these terms reflect the variations of extensive reading programmes that have developed as a "major pedagogical response" (Eskey, 2005, p. 575) to the problem of finding appropriate texts for particular groups of readers and to encourage them to read such texts in large quantities. Some differences exist among these

programmes in terms of learner autonomy in text selection, as well as expectations from participants. Regarding the former, in some programmes students may select their own reading materials; in others they are allowed to select from prescribed reading lists, while in a number of such programmes, students are assigned specific readings. Furthermore, in terms of the latter, while a few programmes require students to do nothing more than read, some expect them to make summaries and write reports, and others even expect students to write examinations or assignments based on the readings (Grabe, 2009; Eskey, 2005). However, in spite of some differences, the one common goal that all ER programmes share is to demand that students read considerable quantities of text in the target language.

The following principles for teaching extensive reading were suggested by Day and Bamford in 1988 and later revised (Day & Bamford, 2002) as "a tool for professional development" (p. 2).

These relate to the nature of extensive reading, the conditions, as well as the methodology required, for successful implementation, all factors that were important in the development of the extensive reading programme of the current study.

Table 18: Principles for extensive reading

Principles for Extensive Reading
Reading material is easy.
A variety of materials on a wide range of topics is available.
Learners choose what they want to read.
Learners read as much as possible.
The purpose of reading is usually related to pleasure, information and general understanding.
Reading is its own reward.
Reading speed is usually faster rather than slower.
Reading is individual and silent.
Teachers orient and guide their students.
The teacher is a role model of a reader.

(Day & Bamford, 2002)

The authors emphasise that these principles were developed to encourage and guide others to reflect on how to best assist their own students. Consequently, not all extensive reading programmes strictly follow these guidelines. As observed by Maley (2010, p. 135), "the actual practice is often at odds with these principles".

Each of these recommendations will now be briefly discussed. In the process, the input of other researchers regarding each will be provided in order to contextualise the current study.

i. The reading material is easy

Day and Bamford (1998; 2002) regard *easy* reading materials as those that can be comprehended and that are within the linguistic competence of the students in terms if

vocabulary and grammar. This would seem to limit the use of dictionaries, a practice they discourage because the constant stopping to look up words makes fluent reading difficult.

According to Krashen's input hypothesis (Krashen, 2004), learners progress in their knowledge of the language if they are exposed to language that is slightly beyond their current levels, this is called 'i+1' where 'i' is the language input and '+1' is the next stage of language acquisition. However, Day and Bamford (1998) are of the opinion that that ER materials should rather be pitched at levels of 'i-1'. In that way, they argue, most of the texts would be easy to comprehend and rapid, fluent reading would occur. Taking both views into consideration, Maley (2010), on the other hand, by using Krashen's (2002) term in arguing for specificity in ESP, argues for "different strokes for different folks" in extensive reading. He furthermore proposes that the 'i-1' input should be applied to lower level readers and 'i+1' for more advanced readers. These readers, it is argued, require more challenging reading material. Duke et al. (2011) seem to agree with this claim and also promote the idea of exposing students to texts that challenge them. They argue that such challenging texts might, in fact, not be frustrating to students and may have other important attributes such as promoting high engagement. Also, it is further contended that, if these texts relate to their content areas, their understanding may be enhanced, an additional advantage of challenging texts. This is an aspect the current study aimed to explore.

One way of establishing text difficulty is through calculating its readability.

What is readability?

Text difficulty, known as readability, emerged as an important research area in the first half of the 20th century (Pearson, 2009). The motive in developing readability formulas was to screen texts so that they could match students' interests and developmental capacities rather than to confuse them with abridged versions of text. In other words, these formulas are used to establish text difficulty and to interpret how easily written materials can be read and understood. Readability depends on the average length of

sentences in a passage, the number of words a passage contains, as well as the grammatical complexity of the language used (Chen, 2012; Pearson, 2009; Richardson et al., 2012).

Various formulas to establish readability exist currently. Popular measures of readability are, for example, the Flesh-Kincaid Grade Level, Fry Readability Formula, The Coleman Formula, The Bormuth Mean Cloze Formula, The Listening Formula, McLaughlin's SMOG Formula, the Forcast Formula, the New Dale-Chall Readability Formula. These formulas identify a certain grade level of difficulty and express the readability of texts in terms of reading-level scores (Chen, 2012; Miller, 2011; Richardson et al., 2012).

The Flesch Reading Scores are expressed as the Flesch-Kincaid Grade Level and Flesch Reading Ease measures, and are available on word processing programmes, such as Microsoft Word. These are provided, based on the average number of syllabus per word and the average number of words per sentence (Richardson et al., 2012). Tables 22 and 23 provide summaries of how these scores can be interpreted. From these summaries it can be deduced that university students, such as the target group in the current study, should be able to read texts with Flesch Reading Ease scores of above 50 and at Flesch-Kincaid Grade Levels of 11 and above.

Table 19: Interpretation of Flesch Reading Ease scores

Flesch Reading Ease Score	**Readability level**	**Education Level**
0-29	Very Difficult	College Graduates
30-49	Difficult	College
50-59	Fairly Difficult	Senior High School
60-69	Plain English	13-15 year olds
70-79	Fairly Easy	12 year olds
80-89	Easy	11 year olds
90-100	Very Easy	10 year olds

(Ward, 2008)

Table 20: Interpretation of the Flesch-Kincaid Grade Level

Flesch-Kincaid Grade level	USA Grade	Approximate age
	Kindergarten	6
1	1	7
2	2	8
3	3	9
4	4	10
5	5	11
6	6	12
7	7	13
8	8	14
9	9	15
10	10	16
11	11	17
12	12	18
13-14	13-14	19
15	15	20
16	16	21

(Ward, 2008)

Many students are unable to comprehend texts because those texts are far above their comprehension levels and contain difficult vocabulary. Therefore, determining text readability scores allow instructors to match texts with readers (Richardson et al., 2012; Schmitt et al., 2011). Weideman (2013) also used such formulas to determine if texts are challenging enough for particular groups of students (cf. 2.3.1.1) by examining the textbook dedicated to the natural sciences, one that has 9 subfields or disciplinary groups. It was determined that the texts were pitched at too low levels for university students, the target group. Similarly, the study by Sebolai (2014) (cf. 2.7.1.1.) who reviewed the Academic Literacy Programme (ALP) at a SA university to establish whether it met first-year students' generic, academic literacy needs (like in the current study), determined that readability statistics of most of the reading texts in the ALP course book were at a Flesch-Kincaid Grade Level of 8.3. The researcher concluded that such scores were

"probably too low for teaching reading to students hoping to make it at university study in ESL" (Sebolai, 2014, p. 59).

However, readability formulas have certain limitations (Richardson et al., 2012). Firstly, educators should know that they are not precise, but are merely predictive of how difficult material may be for students. In addition, grade levels can be ambiguous because sentence length is not a comprehensive measure for readability, and measures of words and sentences are also not always accurate measures. Finally, readability scores of texts seem to depend on how much of the text is measured. Therefore, even though readability formulas are extremely useful to match texts with readers, instructors should be aware of their shortcomings and rely on professional judgement when using these. Ward (2008) adds that the original texts should be clear and cohesive, otherwise readability scores will be of little use. In the Namibian study, Murray (2013) also used readability levels to determine the readability scores of texts in her study in order to predict potential levels of difficulty students might encounter with 10 different texts. Her findings indicated that in cases where students were familiar with the topics (had background knowledge) readability scores were not a determining factor of the levels of difficulty. This emphasises the evidence that educators should regard these indicators as merely predictive.

While Day and Bamford (1998; 2002), Krashen (2004) and Duke et al. (2011) restrict their definition to the type of reading materials to use in ER classrooms, Grabe (2009) and Maley (2010) list a number of requirements that readers should possess to be able to read extended texts for long periods of time. These are as follows.

Table 21: Reader requirements in order to read extended texts

Reader requirements in order to read extended texts	Researcher
○ Have some level of fluency and efficiency in processing words and sentences; ○ Have some awareness of how texts are structured; ○ Apply common strategies that are carried out as routine; ○ Be efficient in drawing inferences, monitoring and evaluation skills; ○ Be motivated to persist, and have prior knowledge of extended reading.	Grabe, 2009
Know 98-99% of the words in a text	Maley, 2010

ii. A variety of materials on a wide range of topics is available

Day and Bamford (1998, 2002) regard the ability to encourage students to read as a prominent factor in determining the success of an extensive reading program. It is generally agreed that readers are more likely to engage in extensive reading if three conditions prevail. Firstly, they should have access to various texts; secondly, these texts should reflect their interests, as well as their different purposes for reading. Thirdly, these texts should be available in abundance for learners to use beyond class time to ensure that they remain involved (Day & Bamford, 1998; 2002; Duke et al., 2011; Eskey, 2005; Grabe, 2009). Eskey (2005) cautions that there is a need for sensitivity regarding the needs of students. For example, for some students just making the texts available is enough, while others might require more guidance (Eskey, 2005). All these aspects were important considerations in the current study (cf. 6.2).

These relate to the nature of extensive reading, the conditions, as well as the methodology required, for successful implementation, all factors that were important in the development of the extensive reading programme of the current study.

In a more recent study, this time in the Korean context, Suk (2015) investigated the longitudinal effect of a 15 week, extensive reading programme on EFL university students' reading comprehension, reading rate, vocabulary acquisition and motivation to read. The study also explored students' perceptions of extensive reading for the duration of their study. A quasi-experimental research design was employed, using two comparison (n=88) and two experimental (n=83) classes, of which all four were intact. The former group had intensive reading instruction for 100 minutes per week while the latter group had 70 minutes of equivalent intensive reading instruction and 30 minutes of extensive reading instruction per week. Both groups used the same textbook for the intensive reading. For extensive reading, graded readers, ranging between 800-3 500 headwords with Flesch-Kincaid Grade Levels ranging from 5.7-7.3, and comprising both narrative, as well as expository, texts were used. The researcher decided on these based on her knowledge of the students and decided to include easier reading materials to limit the use of dictionaries, i.e. 'i-1'. Through funding 350 titles were made available. Activities were developed for each and students had to do a compulsory assignment that counted for a promotional mark afterwards. Data were collected through a mixed-methods research design, like in the current study, comprising a reading comprehension test, vocabulary tests, questionnaire, as well as a semi-structured questionnaire. The results indicated that the experimental classes significantly outperformed the intensive reading classes on three variables, namely reading comprehension, reading rate and vocabulary acquisition. Students were largely motivated to read extensively due to extrinsic motivation, i.e. the motivation to do well in the compulsory extensive reading assignment, and not due to internal motivation. Follow-up interviews indicated they would not have read the required maximum number of stories if it was not compulsory as many indicated that they did not have much time for reading as they were working. Finally, students also seemed to have had positive extensive reading experiences over the 15 week period. This study indicates the value of extensive reading, in particular when students were internally as well as externally motivated to do so. In the current research, extensive reading formed part of the programme. However, as elaborated in section 7.2.2, students' involvement were only based on internal motivation. This could be the reason for the low return rate of the reading booklets.

iii. Learners choose what they want to read

According to this suggestion, students should not only select what they want to read, they should also have the freedom to stop reading material that fails to interest them or texts they find too difficult (Day & Bamford, 1998, 2002). This view is supported by others too. For example, Krashen, (2004) agrees that the more exposure students have to self-selected reading, the greater the reading development, including vocabulary acquisition. Similarly, Grabe (2009) maintains that this practice encourages them to become independent and responsible for their own learning, and the RAND Reading Study Group (2002) concludes that students who are given choices seem more motivated to read and comprehend text.

iv. Learners read as much as possible

The issue that students should read as much as possible, perhaps in, and definitely outside, the classroom, is regarded as the "extensive" component of extensive reading (Day & Bamford, 2002, p. 3). They argue that the reason why students do not read may be because they are not provided with opportunities for reading. One way to ensure that students read much is to make extensive reading a regular component of the reading curriculum (Nation, 2009), as it is evident that students who read frequently become adequate readers and acquire language skills unconsciously, and thus increase their reading abilities and vocabulary levels (Krashen, 2013). This may be why scientists report that students who read a great deal tend to be higher achievers and more often the recipients of professional awards (Grant & Fischer, 2010).

v. The purpose of reading is usually related to pleasure, information and general understanding

The goals or purposes of reading for academic purposes (intensive reading) and reading for pleasure (extensive reading) differ. While the aim of the former is always to achieve

maximum comprehension or to gain knowledge, that of the latter is to focus only on achieving sufficient understanding to fulfil a particular purpose, such as enjoying the story or passing time. This, in turn determines the nature of the material, as well as the level of interest of the student (Day & Bamford, 2002).

While it is generally believed that extensive reading texts, that reflect content matter and that are more theoretical, are not appropriate for extensive reading purposes, a review of studies that examined the literacy practices that youth from a combination of the arts, science, social studies and mathematics fields engaged in after school came to several interesting conclusions (Moje et al., 2011). In the first instance it is reported that out of school texts (extensive reading) among them were not limited to the printed text and encompassed modes and forms that could be linear, multimodal or interactive, such as television, hypertext, books, etc. In addition, when student preferences for out-of-class reading matched their content in classes, students showed more engagement and competence in content lessons. The researchers concluded that while this provided support for the positive effects of pairing out-of-school texts with content from the content classes, more research was needed on the nature, complexities and overlapping aspects between texts read out of school and what students **we**re required to read at school. It was further concluded that research of this nature was more prevalent among students from the Arts faculties and that "few studies, to our knowledge examine what youth learn (from OOS) about social, scientific, mathematical and other concepts relevant to their disciplines" (Moje et al., 2011, p. 479). These findings draw attention to a debate that exists among ER course developers, namely the use of authentic material versus adapted and graded readers in such courses.

With regards to extensive reading especially, some (e.g. Maley, 2010) argue that students should, ideally, be exposed to authentic texts as early as possible. However, others, such as Grabe (2009) and Hutchinson and Waters (1987; 2009) are of the opinion that authenticity should not be regarded as an issue in extensive reading. They posit that there is no evidence that authentic texts would lead to more improvement compared to graded readers and also that students should rather be exposed to interesting, attractive, enjoyable texts, rather than impose authentic texts on them (Grabe, 2009).

Graded readers marked the establishment of ER (Maley, 2010), and are developed around carefully designed vocabulary lists, allowing for the gradual introduction of the different types of words. Some are simplified or adapted versions of original texts while some are original stories.

Most graded reading schemes aim to increase the vocabulary size of readers to a size of about 3 000 word families, in other words, expose them to the low-frequency words. Another group of readers, the mid-frequency readers, have recently been developed to enable learners to increase their vocabularies up to the 9 000 word-family level more easily (see table 10). These graded readers have been profiled, using computer programming, simplified and designed to be interesting and comprehensible to readers (Nation & Anthony, 2013). Doing this, allows readers who need to increase their vocabulary levels to read in the mid-frequency vocabulary range to "read texts that would otherwise be too difficult" (Nation & Anthony, 2013, p. 10).

However, the use of graded readers has also been criticised (Nation, 2005; Maley, 2010). Some of these criticisms are that they are not authentic and that they contain structured or modified text. In spite of criticisms, Nation (2005) and Grabe (2009) maintain that the graded readers should be seen as valuable as they represent conditions that allow readers from different levels to read texts with ease and a sense of enjoyment, with a reasonable degree of comprehension and that the readers are not overwhelmed with very demanding vocabulary levels.

In spite of the support for graded readers, more alternative types of material to the use of graded readers are emerging, for example, student- or teacher-generated texts, e-publications, online reading materials, reading laboratories (Maley, 2010), the use of case studies (Daly, 2002; Watson, 2003; Yadav, Lundenberg, DeSchrywer, Dirkin, Schiller, Maier & Herreid, 2007), as well as trade books (Crawson & Hopper, 2009; Grant & Fischer, 2010). Another option is also "narrow reading", i.e. reading of texts by the same author, with similar content or texts from a single genre (Krashen, 2004).

In support of the use of content-related texts as opposed to graded readers or narratives for extensive reading purposes, Pressley (2002) is of the opinion that one way to increase

a reader's knowledge, such as knowledge in the content areas, is through encouraging extensive reading of high quality, information-rich texts. Similarly, Kasper (1996; 2000) argues that these types of texts require more effort to comprehend than literature texts, so students have to apply more advanced levels of processing. In the process they also become more aware of how to construct meaning from information stored in memory, how to extract relevant information from the text and how to filter out redundant information. In addition, students are encouraged to construct schemata, apply increased metacognition and, therefore, apply more efficient use of comprehension strategies. Two such examples that are discipline-based are case studies and trade books. Examples of content-related, case studies were used in the current study, but it is also worth reviewing the purposes of trade books for future extensive reading course development at the UNAM LC.

Case studies

Case studies are generally used by content lecturers, especially in science, to increase students' knowledge of subject content successfully (Yadav et al., 2007), but Daly (2002) believes that language instructors who have advanced L2 students, like those in the current study, can just as successfully use case studies in language classes. Watson (2003) concurs that the methodology of using case studies can be used in EAP courses to improve authenticity, hence the use of case studies as material for extensive reading in the current study.

In a study to collect information about the use of case studies in science classes, Yadav et al., (2007) report a positive impact on the performance of students. For example, faculty members believed students' critical thinking abilities increased and their understanding of the content and concepts deepened. In addition, they were able to make connections across multiple content areas. Students were also able to view concepts from multiple perspectives; they retained more information, had a better grasp of practical applications. Increased student participation was observed, as well. The only drawback was that students found the format of case studies challenging. A similar observation was made by participants in the current study (cf. 7.2.2).

Similarly, Daly (2002) describes how case studies were used successfully in a Business English classroom to teach all language skills. It is reported that the use of case studies had a number of advantages in the language classroom. For example, similar to the findings by Yadav et al. (2007), the critical thinking of students improved. In addition, case studies seemed to increase the reflective learning of students and their abilities to organise the dense information that case studies contain. They also improved their verbal, as well as non-verbal, communication skills and encouraged collaborative learning and team working skills among the participants. In addition, students used case studies to imitate authentic situations. It was overall a positive experience, but Daly (2002) is of the opinion that, similar to concerns raised by CBI instructors, the one main reason why language instructors do not use case studies in the classroom seems to be the content specificity of the case studies. This often implies that students inevitably know more than their instructors, a condition that indirectly calls for a reversal of roles - from traditional teacher to facilitator, and something not many instructors are comfortable with. In addition, they may feel overwhelmed by the content and afraid of losing face in front of their students. Another reason why they may feel uncomfortable in using case studies is that they may feel that real teaching is not happening. However, Daly (2002) maintains that case studies can be used successfully in language teaching, provided that they are well prepared in advance and that student roles are clearly explained. Daly (2002) explains that case studies can even be used successfully in intensive reading lessons, provided that instructors read them through with learners, make sure they are understood, explain to students how to analyse them, pre-teach any language required to discuss them and, finally, make provision for group discussions and presentations.

The study by Spiegelberg (2013) referred to earlier where students (n=14) at the University of Rider could select their own reading material, confirmed that they enjoyed learning about scientific principles more directly from scientists themselves in less formal ways, for example, through reading primary literature such as journal papers and other accounts, as opposed to the traditional textbook. Although not explicitly mentioned, it is assumed that case studies can form part of what the authors refer to as “other accounts”.

All three studies mentioned in this section seem to support the notion that case studies can be used successfully in intensive reading lessons (Daly, 2002) as well as extensive components (DLY, 2002; Spiegelberg, 2013; Yadav et al., 2007).

Trade books

Trade books are informational texts that include that content which is included in content subjects. They offer another option to use in extensive reading courses that aim to promote the reading of content-related material. They are not limited to certain fields and they can be used to increase resources in science classes (Crawson & Hopper, 2009). These are not textbooks, nor reference material. They are interesting, authentic resources and include a combination of factual and narrative components and topics that are covered in textbooks written in journalistic or narrative style. Trade books can also be used to increase learners' background knowledge about certain topics. This will allow students to apply the knowledge to their own lives, and as a result, improve motivation for reading and learning (Crawson & Hopper, 2009; Grant & Fischer, 2010).

Guo (2012) investigated the effects of extensive reading on students' English proficiency, particularly with regard to vocabulary and grammar, by using authentic materials. 50 English major students at a college in Taiwan were randomly assigned to a control and experimental group. Both groups received the same English classroom instruction, but the experimental group was given supplementary materials related to course topics for extensive reading outside the class. This material took the form of online reading materials that were selected by instructors. Post-test results indicated that the experimental group had a much higher gain in vocabulary development. They also outperformed those in the control group in course exams, and became more involved in class discussions. These increases were attributed to the reality that the authentic, extensive reading materials provided students with extended exposure to topics similar to those in their course materials, underscoring the importance of continuous exposure to a large quantity of texts to retain vocabulary and to ensure improved reading comprehension and fluency, such as in adjunct CBI courses. In addition, positive attitudes regarding the extensive reading programme were reported as students found the

readings more relevant. The researcher suggested that instructors could make more use of relatively inexpensive, online resources, but that instructors needed to include students' opinions in material selection. Also, care should be taken to select material that is at the right comprehension level (Guo, 2012).

Another 6 week study to measure the effects on student performance of discipline-based texts versus fictional literature as extensive reading materials was carried out in two phases. In the first phase Kasper (1996) compared the reading scores of two groups of students in an English reading class. Both groups used content-related, reading material (psychology) in the English reading class, while the one group was paired with the content class (32), the other one not (32). At the end of 6 weeks, no significant differences on their reading scores were found between the two groups. However, when the results of these 2 groups were compared to other groups on the same campus that used literature in their courses and not content-related reading material, it indicated that the two paired groups and the two non-paired groups had made significant gains compared to those who read normal literature. The paired group scored 100% on average in their reading test and the non-paired group 94%, while the overall average of the other groups that read literature, was 54%. The researcher, therefore, concluded that the discipline-based nature of the reading material used in the paired course was the determining factor in enhancing the reading performance of students, even without content pairing. Other conclusions were that teaching students reading strategies did not make a difference. It was actually the texts they read that caused the difference in reading performance (Kasper, 1996).

It was further concluded that content-related texts required readers to develop more elaborative schemata compared to literary texts. The latter required fewer opportunities to add to existing knowledge structures. In using content-related material for the extensive reading component of the MMAARR currently reported on, it was hoped that participants would perceive and experience similar benefits as described by Kasper (1996).

In conclusion, Maley (2010) is of the opinion that, in spite of the conflict regarding what type of text to use, ER can be experienced with any kind of written text (Maley, 2010). Grabe (2009) further adds that the most important consideration should be that students are allowed to read material they want to engage with and to encourage them to continue reading on their own. Day and Bamford (2002) argue that the determining factor in text selection should not be whether the text is authentic, but whether it reflects the students' abilities and whether it is enjoyable. This, in their view, will motivate students to read and study more and increase their reading skill and ability.

vi. Reading is its own reward

Day and Bamford (1998) state that reading is its own reward and that there should be few or no follow-up exercises after reading, just as it happens in real life. In their later version, Day and Bamford, (2002) concede that instructors may ask students to complete follow-up activities for various reasons. Some of these are to establish student comprehension and experiences from reading texts, monitor their attitudes towards reading, establish how much and what they have read, make reading a shared experience and even link reading with other aspects of the curriculum.

A survey of ER material revealed that most provide a variety of additional activities. However, Maley (2010) is of the opinion that no compelling evidence exists to indicate that adding questions improve reading abilities. It was, therefore, concluded that activities for extensive reading are included mainly due to institutional demands, to measure progress, as well as due to the view of some instructors that they need to teach ER. Richardson et al. (2012), on the other hand, believe that adding student activities to ER programmes could promote student reflexivity. If students are provided with opportunities to reflect on what they have read, in other words, monitor their comprehension, they gradually become autonomous learners (self-regulated) who process ideas and make sense of what they have read. Poor readers seem to lose track of what they read and have no particular strategies to repair miscomprehension. As previously indicated, these are general guidelines, and the ER instructor has to decide what is appropriate in the particular context.

vii. Reading speed is usually faster rather than slower

As stated previously, Day and Bamford (2002) believe that, when readers read material for personal purposes that are well within their linguistic ability, they have incentives to promote fluent reading. This in turn will encourage them to read more, faster, better and be less reliant on dictionaries. Extensive reading also stimulates reading for general meaning, as well as guessing the meaning of unknown words and encouraging readers to be comfortable with a certain level of vagueness in the meaning of ideas and words (Day & Bamford, 2002).

It should be noted that practising reading fluency (cf. 3.4.1.6) is not the same as the ability to read texts for extended periods. Grabe (2009) explains that fluency is more concerned with the ability to recognise words in shorter texts efficiently, automatically and accurately, and it is hoped that this would eventually lead to the ability to read longer texts silently. However, the best way to promote extensive reading is through practising extensive reading (Krashen, 2004). In other words, constant and regular exposure to print enables reading processes to become automatised and, hence, more effective.

viii. Reading is individual and silent

Silent reading is in direct contrast with the direct instruction of reading strategies that takes place in reading classrooms (Day & Bamford, 1998; 2002). However, this is a practice that many reading instructors and administrators do not seem to be comfortable with, resulting in not including extensive reading programmes in curricula (Grabe, 2009). Silent reading seems to have various benefits. On the one hand, individual, quiet, uninterrupted reading promotes personal interactions with texts, allowing students to realise that they, and not their instructors, are responsible for creating meaning. On the other hand, they also realise that they can read at their own pace, as well as when and where they choose to read (Day & Bamford, 1998; 2002).

ix. Instructors orient and guide their students

Guidance suggests the sharing of the reading encounter. In the process, instructors should orient students to the goals of the programme, explain the methodology, keep track of what each student reads, and guide students in getting the most out of the programme. It is important that they need to be carefully introduced to extensive reading because it is very different from usual classroom practice (Day & Bamford, 2002). Grabe (2009) concurs and adds that successful, extensive reading programmes require a significant effort.

This significant effort is exemplified in the guidelines proposed by Maley (2010) to enhance comprehension of ER material. Some of these suggestions that were considered in the development of ER material for the current study are as follows.

Table 22: Suggestions to enhance comprehension of ER material

Suggestions to enhance comprehension of ER material	
▪ Pay attention to layout, font size and illustrations. ▪ Text that is too dense or too small is difficult to read. ▪ Allow plenty of white space. ▪ Where possible, include illustrations to enhance understanding of the text. ▪ Provide background information. ▪ Include a blurb or summarize information or about the author etc. to help student to establish how much/little they already know about the topic. ▪ Do not include too many glosses or translations.	Maley (2010)

(Maley, 2010)

x. The teacher is a role model of a reader

Extensive reading instructors are readers themselves, showing by example, the attitudes and behaviours of a good reader. In addition, they realise that there is a need to be

informed about what students read in order to share reading experiences and to make recommendations, etc. (Day & Bamford, 2002). Eskey (2005) supports this view, adding that the reading instructor has the responsibility to make the extensive reading experience as rewarding as possible for the learners and to motivate them. Also, students should be aware of the goals and benefits of extensive reading and be encouraged to read at every opportunity. This, in turn, will motivate them to read more (Grabe, 2009). In the same vein, Komiyama (2013) is of the opinion that a frustrating reading experience can demotivate students.

Maley (2010) and Grabe (2009) both ask the following, valid question: If ER is so effective, why do most programmes of instruction make little or no room for it? Maley (2010) lists the following reasons, as revealed by a survey conducted. Firstly, instructors seem to have insufficient time as the ER is often not linked to the syllabus and examination. In addition, such programmes seem to be too costly, especially when reading materials are not available. Another reason seems to be a lack of understanding regarding ER and its benefits, evident in apprehension on the part of instructors, who find it impossible to stop teaching and to allow learning to take place. Grabe (2009) agrees with this last reason and adds that another reason for this lack of attention to ER is because there seems to be a general perception that good comprehenders will, eventually, on their own develop the ability to read longer texts.

Finally, Krashen (2013) provides four reasons why extensive reading is better than direct (explicit) instruction, and maintains that if sustained, silent reading is implemented properly, increased opportunities to read lead to greater literacy development than traditional skill building approaches. These reasons are summarised in Table 23.

Table 23: Explicit reading instruction vs. extensive reading

Explicit reading instruction	Extensive reading
Focuses on restricted words/ vocabulary; Might only have a short term effect; Require much planning and detail; Often met with little enthusiasm.	Provides a much richer supply of vocabulary, grammar as well as cultural information; Long lasting effects; Require little preparation; Pleasant experiences that are undertaken willingly, and enthusiastically.

(Krashen, 2013)

Finally, the ability to read extensively is a gradual process, so constant and regular exposure to print enables reading processes to become automatised (Nation & Anthony, 2013).

The study referred to earlier (Willemse, 2006) also included an extensive reading programme. The students in her research group were regarded as coming from "print-impoverished backgrounds" (Willemse, 2006, p. 154). Extensive reading was not only encouraged but participants were also provided with literature to read. Written responses to articles and books were regularly expected and monitored by the researcher. Although the effect of extensive reading alone on the performances of the reading scores of the intervention group compared to the reading scores of the control group was not established, one could conclude that extensive reading was one of the factors responsible for a significant improvement in the reading scores of the intervention group compared to the reading scores of the control group. Through interviews with participants, as well as observations, their enjoyment of this aspect of the reading intervention was evident.

This section has elaborated on the importance of providing learners with opportunities for exposure to reading material, based on recommendations (Day & Bamford, 1998; 2002) that were considered in implementing the extensive reading component of the current study. The following section will explore another aspect proposed in the generic EAP

model of reading, namely the importance of developing motivation for reading among learners.

3.4.1.8 Developing motivation for reading

Motivation is directly correlated with learning in general, and reading comprehension, in particular (Duke et al., 2011). In general, positive motivation for learning is often reflected in factors such as curiosity, enjoyment of activities, social involvement and academic achievement. More specifically, in the reading classroom, positive motivation seems to be measured by the amount and frequency that students freely engage in reading tasks. Supporting this statement, Eskey (2005) notes that in order to convince students to willingly participate in a demanding activity, such as reading, readers must be highly motivated. Others (Grabe, 2009; Guthrie, Wigfield, Metsala & Cox, 1999; Guthrie, 2004; Krashen, 2004; 2013) agree that only then (when readers are motivated), can the reading amount, reading comprehension, the frequency and time spent on reading topics for various purposes, also be increased to produce skilled readers, the ultimate outcome of frequent reading.

When readers have goals, they seem to be more motivated (Guthrie et al., 1999). Two important types of goals, performance goals and mastery orientation goals, are identified. The former refers to goals that focus on demonstrating that one is capable and can outperform others, while the latter refers to those that imply an attempt to improve one's capabilities and focus on the task at hand. Based on these two types of goals, two types of motivation, external (extrinsic) and internal (or intrinsic) motivation, are distinguished. Performance goals determine extrinsic motivation while mastery orientation goals determine intrinsic motivation.

High levels of intrinsic motivation are associated with a sense of competence because the emphasis is on curiosity and an interest in the activity one is doing, as well as a desire to master tasks. Extrinsic motivation, on the other hand, is linked to learning and reading with the ultimate aim of external recognition, awards, such as outperforming peers, gaining credit, the ability to complete assignments, etc. Evidence suggests that mastery orientation goals or intrinsic motivation leads to more motivational and academic outcomes (Grant & Fischer, 2010; Guthrie et al., 1999; Komiyama, 2013; Macalister,

2011; Richardson et al., 2012; Yu & Xiao, 2013). However, Eskey (2005) cautions that what motivates one group, may not have the same success with another, implying the importance of conducting a thorough needs analysis.

In order to shed more light on how learners are motivated to read, an important aspect, namely affect, will be elaborated next.

Affective constructs in reading

Affective constructs refer to feelings, emotions, attitudes, self-concepts, values, etc., and has an effect on motivation to read and could, as a result, directly impact reading proficiency (Richardson et al., 2012). Of these affective constructs mentioned, attitude seems to be the most critical variable that influences reading success, and seems to be the main reason why readers read or do not read. Consequently, reading instructors have the responsibility to gather information of students' attitudes towards reading, in general, at the start of a reading programme (Grabe & Stoller, 2013), as part of a needs analysis assessment (cf. 2.7.1), as it was done in the current study. Attitude towards reading seems to be already cemented during early schooling years, but can be altered, depending on the instructors' input, for example, by increasing motivation to read (Richardson et al., 2012).

Student motivation to read and to comprehend text in EAP reading classrooms seems to be fostered when instructors capitalise on four main aspects, namely types of texts, activities, specific strategy instruction and CBI. Firstly, matching readers with texts has proven to be one solution to motivate people to read more. In that way reading success, due to background knowledge, can also optimally relied on (Grabe, 2009; Duke et al., 2011; Eskey, 2005; Holliday & Cain, 2012). In addition, texts should be linguistically appropriate and relevant to their particular needs. Guthrie (2004) concurs that if students are provided with age and level appropriate texts, they will experience comprehension success and task completion, important factors to promote intrinsic motivation for reading. Secondly, activities that are challenging will keep students engaged and motivated. Being a tool, reflecting the instructor's teaching methodology (cf. 2.7.4), it is generally concurred that motivation for reading is increased when instructors keep students engaged, for example, through appropriate activities that represent real-world

interactions (Genesee, 1998; Duke et al., 2011; Grabe, 2009; RAND Reading Study Group, 2002; Yu & Xiao, 2013).

Furthermore, even though reading skill is, to a large extent, not depended on which specific reading strategy is taught, but on the amount of reading done, motivation does seem to be increased through specific strategy instruction, followed by evaluation and feedback that support learning. When students perceive the purpose in applying reading strategies, they appear to be more motivated (RAND Reading Study Group, 2002; Wilkinson & Hye Son, 2011). More details regarding strategy instruction have been provided in section 3.5.1. Fourthly, (cf. 2.4) students appear to be more motivated when reading skill development is combined with content-based reading instruction (Duke et al., 2011; Grabe, 2009; Duke et al., 2011; RAND Reading Study Group, 2002; Wilkinson & Hye Son, 2011). This aspect of CBI has already been introduced in Chapter 2 (cf. 2.3.1.1) and will be taken up again in the following section.

Komiyama (2013) is of the opinion that the role of motivation in developing EAP reading strategies is inadequately understood and viewed as a minor issue; hence, the small body of research related to motivation in developing ER reading strategies, compared to research on motivation in L1 reading research. However, two research studies that investigated the role of motivation in reading comprehension will now briefly be discussed.

Prayan (2007) investigated the effectiveness and usefulness of involving learners in the selection of course material in the design of an EAP English for Biotechnology course for 200 undergraduate engineering students at an Indian university. This was in an attempt to revamp the existing EAP course and to increase student motivation in doing the course. The low levels of student motivation were reflected in poor class attendance and non-participation in class activities. The main reasons stated for students' low levels of motivation seemed to be that the existing topics covered in the course were not specific to students of Biotechnology and also did not reflect their needs and interests. Students also perceived the course to be challenging, while content lecturers also expressed dissatisfaction with the results of the course.

After a thorough needs analysis, a new reading course was developed. Each lesson consisted of reading texts and reading strategy instruction suitable to engineering students doing biotechnology at undergraduate level. Student involvement was limited to suggesting which texts to include, pending the approval of the course developer. Unlike the current project, this one focused on reading, writing, listening and speaking skills. Course evaluation took the form of only an end-of-course, student questionnaire. Due to time constraints, an achievement test at the end of the programme was not administered. Positive responses with regards to the course design process, course delivery, their participation and overall impact the course had had on students were reported, especially regarding their involvement in course design and reading texts that reflected their interests. Student motivation to attend classes seemed to have increased. They were more cooperative and most submitted assignments on time. The researchers further reported that, even though it was challenging to collaborate with students to design the course, learners showed enthusiasm and motivation.

Another study investigated the effectiveness of learning-centred EAP instruction among Iranian undergraduate students from the Faculty of Engineering (Kashef, Pandian, & Khameneh, 2014). It combined elements to foster students' motivation. For example, the goals of lessons were explained, the importance of new reading strategies and strategies were explained and they were explicitly taught, then modelled. In addition, an experimental group's (n=40) needs, interests, as well as existing and required learning skills, were considered in teaching them specific reading instructions. Furthermore, in a deliberate attempt to maintain the interest of students, as in the current study, they were kept engaged in doing pair and group work, giving them enough time to think about answers and responses, emphasising the process rather than the product, and respecting attitudes and abilities. As mentioned previously, teaching methodologies are directly reflected in the type of activities developed for each lesson. The results indicated that those in the experimental group who received learning-centred EAP instruction in reading (n=40) showed an improvement in their attitudes towards reading, in contrast to their peers in the control group who received conventional reading instruction (n=40). This intervention did not establish reading comprehension effects, only change in attitudes (Kashef et al., 2014).

The next section will explore the final aspect that should be considered in developing EAP reading courses, namely the importance of building disciplinary and word knowledge among learners.

3.4.1.9 Building disciplinary and world knowledge

It is generally believed that prior knowledge, which has so far been a general thread throughout these two literature review chapters, is a major cognitive predictor of text comprehension; in other words, the more a reader knows about a specific topic, the greater the comprehension of the text read. In other words, the amount of related-domain or world knowledge that a reader brings to a text significantly affects that reader's comprehension of that text (Duke et al., 2011). This principle directly follows from the account of the reading comprehension process in Schema Theory, Kintch's (1998; 2004) CI Model and Grabe's (2009) Two-Model Account of comprehension that were reviewed in section 3.2

As discussed in Chapter 2 (cf. 2.4), one approach which includes disciplinary and world knowledge within the context of subject matter learning in EAP courses, and reading instruction specifically, is a CBI approach (Grabe & Stoller, 2011; Kasper, 1994; 1996; RAND Reading Study Group, 2002). The use of discipline-related texts in reading courses seems to have several advantages, both *academically* and for *reading improvement*.

General academic advantages are that students seem to be less overwhelmed by and anxious of the amount of academic content to be learnt when the same content is presented in the more secure, comfortable, supportive conditions of language classes. In addition, reviewing the same content material in the language class allows for multiple exposures to, as well as repetition of, language and content due to more time spent with the material. In the process, content is reinforced and consolidated which maximises retention. Furthermore, academic content becomes more familiar through multiple exposures, and this makes it easier for students to become more integrated into the customs and traditions of their academic disciplines and this, in turn, is conducive to

more efficient learning and class participation. Finally, content lecturers become more sensitive towards the needs of ESL students (Andrade & Makaafi, 2001; Brinton et al., 1989; Kasper, 1994; 1996).

Kasper (1996) mentions several advantages of CBI approaches to reading specifically. For example, multiple exposures to sophisticated reading material facilitates vocabulary acquisition and allows students to reinforce the practising of reading strategies, thereby reinforcing deeper levels of comprehension, as well as content subject learning. This, in turn, fosters students who become less dependent on the context, and allows for greater application of higher-order reading strategies, i.e. developing mental, as well as situational models of reading, as discussed in section 3.2. Furthermore, discipline-based texts require more effort to comprehend than literature texts, so students have to apply more advanced levels of processing. In the process they also become more aware of how to construct meaning from information stored in memory, how to extract relevant information from the text and how to filter out redundant information. Not only that, it also teaches those reading strategies and practices that can be extended to other courses, helping students to succeed in their academic studies. Furthermore, such an approach to reading naturally leads to opportunities for extended reading, motivational learning experiences, strategic responses to increasingly complex tasks, greater choices in reading materials, and growing challenges to match growing skills (Kasper, 1996).

Kasper (1994) reports on a 6 week course at the Kingsborough Community College that was conducted to establish the effects of using discipline-based texts in an academic course pairing (adjunct) on students' reading performance and their academic performance. In the experimental group (n=16), an analytical reading course was paired with a mainstream introductory psychology course, compared to those in the control group (n=19) who did the same reading course in a non-paired situation. Students in both classes did extensive reading, but the experimental group obtained significantly higher reading scores compared to those in the control group. Student responses indicated that the paired course was a good idea that helped them to improve their psychology, made it easier to handle the workload and understand the material; they also would recommend the course to others. One student did mention that the programme was exhausting.

According to the students, not only did it improve their reading abilities, but also their performance in psychology. Researchers attributed these improvements to the evidence that, since students in the paired-reading class already had background knowledge of the content, they had pre-existing schema which enabled them to construct text models for the articles they read in the language class. This facilitated comprehension and enhanced reading performance. In addition, students were encouraged to: construct schemata as each time they read such texts, they learned something new about language, as well as the content. They applied increased metacognition and, therefore, made more efficient use of comprehension strategies until they eventually became independent readers (Kasper, 1994).

CBI options specifically geared towards instructing reading are labelled as CBRI (Content Based Reading Instruction) (Grabe, 2009), for example, Transactional Strategies Instruction (TSI), Collaborative Strategic Reader (CSR), Concept-Oriented Reading Instruction (CORI) (Guthrie, ,Barbosa, Perencevich, Taboada, Davis, Scafiddi & Tonks, 2004) and the Six-T's Approach to CBRI.

Two of these options, Concept-Oriented Reading Instruction (CORI) and the Six-T's Approach to CBRI will now be elaborated.

Content-based reading instruction (CBRI)

The CBRI approach to teaching reading that combines instruction of reading and content skills was developed by Guthrie, Wigfield and colleagues (Grabe, 2009). It has demonstrated remarkable success in many studies with L1 elementary grade students in building student motivation for reading, promoting reading engagement, producing greater amounts of reading activity and significantly improving reading comprehension abilities. Instructors provide scaffolded support for student activities and students have many opportunities for conversations around text information and strategy practice that will support comprehension. They grow in content competence, exercise some degree of

autonomy in reading choices and activities and build collaboration and communication skills as they synthesise and report their findings. Time is also available to support vocabulary instruction, metalinguistic awareness and fluency practices. Finally, the development of motivation for reading is woven throughout all phases of instruction (Duke et al., 2011; Grabe, 2009; Miller & Faircloth, 2009).

While CBRI is mainly used to develop elementary and middle school children's reading comprehension, motivation and engagement in reading in L1 conditions, in a recent study, this model was adapted to consider the multilingual and multicultural tertiary, academic L2 context at a South African University, calling it CRITE (Critical Reading Instruction Through Engagement) (Boakye, 2013). It is based on the CBRI engagement model but aims at improving tertiary-level students' critical reading comprehension (including comprehension, strategy use, academic vocabulary and critical analysis). The target group was, like those in the current study, first-year students who had enrolled for the Academic Literacy module. Prior to the intervention, ANOVA results showed a robust relationship between socio-affective factors and students' academic reading abilities. In other words, the poorer a students' reading background, the lower were his/her affective levels and also his/her reading proficiency. It was also determined that factors that strongly predicted the sampled students' reading ability were self-efficacy and motivation, with the former the best predictor. Based on these findings, a reading intervention programme to enrich the current Academic Literacy programme was designed and implemented. Afterwards, evaluation results showed that the intervention classes had improved significantly in affective reading levels on most categories, compared to the control group that showed minimal improvement or decreased affective levels. Even though this study had different aims than the current study, it still underscores the importance of self-efficacy and motivation in reading strategy development among students.

The Six-T's approach to CBRI

The Six-T's approach to CBRI was developed by Grabe and Stoller in 1997 as a response to the random approaches to CBI instruction (Snow, 2005). By comparing the different approaches to CBI instruction (Stoller & Grabe, 1997), Grabe and Stoller (2001) deduce that there are many similarities among them and that the most prominent commonality is the issue that all CBI is fundamentally theme-based. Although it can be applied to the integration of all language skills, it is particularly appropriate for the development of a reading curriculum (Grabe, 2009), and has also been used in the current study. One of the strengths of this circular model is its flexibility that allows for the integration of reading and writing skills, the creation of a coherent reading curriculum that makes provision for the reading of multiple text sources while reading strategies are introduced and reading strategies practised recurrently. In addition, this approach is systematic (Snow, 2005), and promotes the instruction of all crucial reading strategies, as well as encourage positive motivation for reading and learning for additional information (Grabe, 2009).

The 6 T's that this approach is built on are Themes; Topics; Texts; Threads; Transitions; Tasks. *Themes* identify overarching content areas, and *Topics* are subordinate content units that are closely linked and that build a coherent set of information for students to learn and work with. Furthermore, *Texts* are key to CBRI and they must be top priority at the outset. Text material that provides the core input for themes and topics need to be interesting, attractive, extended in length, sufficiently complex, serious in content presentation, coherent and instructionally usable. *Threads*, on the other hand, represent additional conceptual issues and ideas that can be used to link content across themes and topics, adding to the coherence of the curriculum. *Transitions* represent explicit linkages from one text to the next and one topic to the next. They signal to students that instructional activities are coherently linked and that each new activity builds on previous activities. *Tasks* are at the heart of day-to day lessons and learning activities. Tasks are how we teach reading strategies, main idea-comprehension, reading strategies, metalinguistic awareness and advanced EAP reading strategies of summarising, synthesis and critical evaluation of text information (Grabe 2009; Snow, 2005).

Because the approach is based on the one similarity among all CBI approaches, namely that it is theme based, it seems to be compatible with any CBI model or prototype, including the adjunct which is the prototype that was deemed to be the most appropriate for the current study. However, reading instructors are cautioned that before using the Six-T's approach in any CBI model, they should consider several aspects, for example, the needs of students, the expectations of the institution, the objectives for instruction, the availability of resources and, finally, instructors should be thoroughly prepared (Grabe, 2009; Stoller & Grabe, 1997).

3.5. Conclusion to Chapter 3

Stoller et al. (2013) are of the opinion that an effective EAP reading curriculum should interpret all the qualities of good readers and equip students to search for information, comprehend texts, gain new knowledge (information) and integrate (synthesise), as well as assess (evaluate) information. When one considers the nine components of reading skill development discussed in this section, it seems that these have such aims as proposed. Grabe (2009) reminds reading instructors that one should consider an approach that would combine all these in a coherent and effective way, such as content-based instruction (CBI), but also to remember that not every component can receive the equal amount of attention in an EAP curriculum for a specific target group. Each unique EAP reading curriculum seems to be a reflection of students' abilities and proficiency levels, as well as constraints imposed by time, costs, resources and teacher preparedness (Grabe & Stoller 2013). Reading instructors have the common desire to guide their students to become more "skilled, motivated and strategic readers" (Grabe & Stoller, 2011, p. 163). In order to achieve this, one should consider that reading contexts are different, as determined by the learning goals and student proficiencies. No two classes are alike and the reading instructor cannot assume to know in advance what aspects of reading students would require more assistance with (Eskey, 2005). It needs dedication from the teacher and motivated students to create an effective, reading course (Eskey, 2005). One way of doing this could be to consider action research. In that way, one could become more

effective, one could respond to the call that "L2 reading instruction should be sensitive to the students' needs and goals and to the larger institutional context" (Grabe, 2009, p. 19).

3.6 Summary of Chapter 3

Chapter 3 has explored the concept of reading, as well as the issues important to consider in developing a reading programme in an EAP context. In the process, the development of intensive, as well as extensive reading courses, was considered, drawing on theory, as well as on research conducted in the Namibian context and elsewhere. Throughout, the importance of developing academic reading courses for specific target groups was emphasised. In such courses relevant reading strategies will be acquired that will allow readers to improve linguistically, as well as in content classes. Finally it was suggested that one way to ensure the development of such focused reading courses would be for instructors to conduct action research. In that way, reading curricula at universities would progress beyond instructors' superficial, out-of-date and loose interpretations of theories of reading, intuitions, own experiences of learning to read and certain instructional procedures proposed by popular textbook series and curriculum guidelines to those that cater for the needs of individual students.

As this research was also conducted to explore various issues regarding EAP course development, in particular academic reading, Chapters 2 and 3 together presented a review of the literature that was consulted to shape the research. The next chapter will explore the research methodology. The Mixed Methods Action Research design that was used, will be explained in detail.

CHAPTER 4

METHODOLOGY

4.0 Introduction

This chapter describes and discusses the methodology used to conduct the current study in two sections. It presents a "topic-based" (Boote & Beile, 2005, p. 10) review of the literature relating to (i) the researcher's philosophical foundations, (ii) the available research designs to employ and (iii) the selection of specific methods used to collect, analyse and interpret the data, as suggested by Creswell's (2014) in section A. As such, the research approaches and procedures that were followed are contextualised by elaborating on these three important aspects. As indicated in table 2, this research study was conducted in six iterative phases. Section B of this chapter elaborates Phase 1 of the study, as the personal experiences of the researcher, as well as that of the target audience of the current study, are also vital considerations in the research methodology. These aspects that are ingrained in the explorative, first phase of the study that shaped the other phases, are discussed in section B of this chapter. These are the phases that formed the backbone of the development of MMAARR (cf. figure 8).

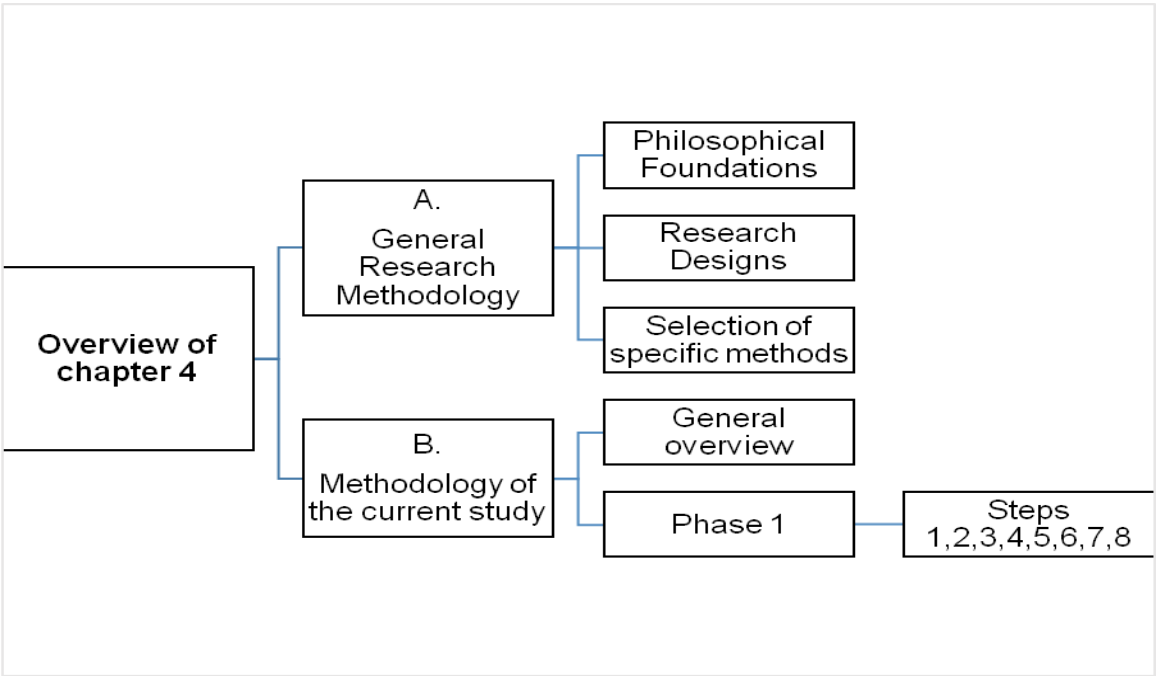

Figure 7: Overview of Chapter 4

SECTION A

4.1 General research methodology

This section aims to provide background in order to explain the methodological decisions that were made in the planning of, as well as the approaches taken to, data collection and analysis in the different phases of the study (cf. table 2). Three main aspects, namely philosophical foundations, research designs and specific research methods will be elaborated.

4.1.1 Philosophical foundations

Creswell and Plano Clark (2011) assert that all research methods reflect certain philosophical foundations. These provide the fundamentals for doing research, and determine a number of assumptions to be made about the process of gaining knowledge during research. As a result, these views or foundations may influence the research itself, as well as the research methods a researcher employs. A variety of labels for the term, philosophical foundations, are suggested in the literature. Some of these are philosophical worldviews (Creswell, 2014), theoretical frameworks (Mertens, 2010), philosophical foundations, paradigms or worldviews (Creswell & Plano Clark, 2011; Creswell, 2014). In this study, the term philosophical *worldviews* will be used throughout to refer to this concept.

A philosophical worldview is generally understood to refer to the set of beliefs a researcher has about the nature of reality and how it is constructed. In this set of beliefs, a distinction is made between *ontology* and *epistemology*. *Ontology* refers to one's view of the nature of reality and existence. In other words, does the researcher think that reality is objective or is it created by one's own consciousness? *Epistemology*, on the other hand, is concerned with knowledge and how it can be acquired or constructed (Alexander, Thomas, Cronin, Fielding, & Moran-Ellis, 2009; Brynman, 2004; Gilbert, 2009; Mertens, 2012; Morgan, 2014; Poni, 2014).

Furthermore, philosophical worldviews influence the way that issues are explored and examined. In other words, these frame the research design of a study and will, to a large extent, determine whether the research design will employ a qualitative, quantitative or mixed methods approach (Alexander et al., 2009; Creswell & Plano Clark, 2011; Creswell, 2014; Gilbert, 2009; McNiff & Whitehead, 2008; Mertens, 2012; Poni, 2014). More details regarding these approaches to research are provided in section 4.2.

From the literature it is apparent that various scholars offer different worldview possibilities (Creswell & Plano Clark, 2011). Although it might seem that some are replacing others, it is believed that, due to their overlapping and repetitive nature, variations in worldview alternatives indicate progression rather than differences (McNiff & Whitehead, 2008; Mertens, 2010). Based on the literature, three philosophical viewpoints generally seem to be of importance to action researchers who employ mixed methods research designs, as is the case in the current study. These are post-positivism, constructivism and pragmatism. Each of these will now, in turn, be elaborated in order to contextualise the current study.

4.1.1.1 Post-positivism

As has been argued by various scholars (Creswell, 2014; Creswell & Plano Clark, 2011; Mertens, 2010), this study regards post-positivism as the worldview associated with quantitative approaches to research. However, because others (Alexander et al., 2009; Brynman, 2004; Morgan, 2014) seem to view positivism, rather than post-positivism, as the appropriate research approach, this section will commence with a short overview of positivism as a worldview before exploring post-positivism as a worldview in more detail.

The epistemology of positivists is that current knowledge about the world can be subject to error and can be replaced by future knowledge. In addition, they propose that researchers and the participants in a study are assumed to be independent, therefore, not influencing each other (Mertens, 2010; Morgan, 2014). The ontological position of positivists is, therefore, that only one, value-free reality exists. In other words, this single reality exists apart from human perceptions and interpretations of that reality (Morgan,

2014). Consequently, positivists employ research methods, such as pure experiments, to validate events and to test or revise theories in response to the evidence.

Post-positivism is generally regarded as the successor of positivism. According to Creswell (2014, p.7), "it represents the thinking after positivism". In addition, it focuses on the collection of empirical and objective data, and it assumes that the social world can be studied in the same way as the natural world (Creswell, 2014; Mertens, 2010). The ontological view of post-positivism is generally to accept the existence of one reality (like in positivism), but claims that it can only be known partially due to the researcher's human limitations. The epistemological view is that while the researcher should take a neutral, objective stance, the theories, hypotheses and background knowledge held by the researcher can strongly influence what is observed (Mertens, 2010). In this approach, researchers follow the scientific method which begins with a theory, collect data that either support or refute the theory and then they carry out more tests if required and make the required revisions to the theory. According to this worldview, it is argued that while there is much about the human experience that is not observable, it is still important (Creswell, 2014). However, post-positivists realise it is difficult or impossible to conduct strict experiments with people. Therefore, quasi-experiments (cf. 4.4.3) were developed. In addition, this method acknowledges the reality that it is not always possible to assign people randomly to experiments (Mertens, 2010).

To summarise, positivists believe that the world out there is to be measured. A realistic, objective stance towards data is taken as something that exists out there, and factual information is required (Alexander et al., 2009). Post-positivism, on the other hand, rejects the narrow view of positivists (Mertens, 2010), thereby challenging the notion of absolute truth of knowledge and recognising the human influence on research (Creswell, 2014).

4.1.1.2 Constructivism

Constructivism as a worldview is often combined with interpretivism and qualitative research designs. This worldview claims that the intent of the researcher is to interpret the meanings that others have of the world with the aim to generate or develop a theory or

pattern of meaning (Creswell, 2014). Additionally, constructivism supports the view that there exist many socially constructed realities that are unfolded as the researcher engages with participants, each seeking to understand the other's point of view. Consequently, the ontological position of constructivists is that multiple realities exist that are socially constructed, each reflecting the different experiences and beliefs of different individuals (Mertens, 2010; Morgan, 2014). Their epistemological stance is that of a more personal, interactive mode of data collection, where objectivity is replaced by subjectivity. However, data are not figmental or imaginative, as outcomes are rooted in a context, can be traced back to sources and are also interpreted in specific contexts (Mertens, 2010).

4.1.1.3 Pragmatism

Scholars that follow either post-positivist or constructivist worldviews argue that these philosophical foundations are inherently incompatible, resulting in claims that methods cannot be mixed across these two paradigms (Alexander et al., 2009; Onwuegbuzie & Dickinson, 2007; Teddlie & Tashakkori, 2009). These claims are regarded as conservative and are also referred to as the "incompatibility thesis" (Teddlie & Tashakkori, 2010, p. 6). As a result, such scholars are often labelled as purists (Alexander et al., 2009; Creswell & Plano Clark, 2011).

One worldview in the social sciences that rejects the distinction between post-positivism and constructivism is pragmatism. This worldview argues for the abandonment of the dichotomy between post-positivism and constructivism (Creswell & Plano Clark, 2011; Morgan, 2014; Spiro & DeSchryver, 2009). For pragmatists, there is indeed such a thing as reality, but it is ever-changing. This is a worldview that arises out of actions, situations and consequences rather than predetermined conditions. The ultimate goal for pragmatists is to focus on the research problem and then to use all possible approaches to understand it (Creswell, 2014). As a result, pragmatists argue that worldviews may shift during a project, depending on the research questions. In other words, the research questions assume primary importance and are more important than the method or the philosophical worldview that underlies the method (Morgan, 2014; Creswell & Plano Clark, 2011).

The ontological position of pragmatists is that reality can be single or it can be that all individuals have their own unique interpretations (Mertens, 2010). In addition, they are of the opinion that any reality is socially constructed and can only be encountered through human experience. The epistemological stance of pragmatists is that researchers are not passive observers, and can study phenomena of interest in various ways that are appropriate, based on the context. In addition, results are used in various ways to bring positive consequences (Mertens, 2010). Furthermore, while each individual's knowledge is unique and based on individual experience, it is also socially shared because it originates from socially-shared experiences (Morgan, 2014). American philosophers, such as Peirce and Dewey, were important in the early development of pragmatism (Punch, 2009).

In summary, pragmatism as a worldview does not restrict researchers to one particular stance. In other words, they are free to use methods, techniques and procedures that best meet their needs and purposes. In this view, research methods are guided by research questions (Creswell, 2014; Creswell & Plano Clark, 2011; Koshy, Koshy & Waterman,2011; Morgan, 2014; Mertens, 2010; Mills, 2014).

This section has reviewed three worldviews that are central to the current study, namely post-positivism, constructivism, as well as pragmatism. As previously indicated, worldviews influence the way that issues are explored and examined and, in turn, frame the methodology or research design of a study. This discussion has also pointed out that post-positivist and constructivist viewpoints are generally equated with the differences between quantitative and qualitative research. However, researchers (Alexander et al., 2009; Mertens, 2012; Morgan, 2014) concur that one should be cautious to directly translate these differences to the post-positivism and constructivism division. In other words, the word qualitative is not automatically a synonym for constructivism while the word quantitative is also not automatically a synonym for positivism or post-positivism. Mertens (2012) asserts that these terminologies (qualitative and quantitative) simply imply different types of information or data, and not the epistemological and ontological assumptions that are associated with the different philosophical foundations of research. In that way, researchers can use multiple methods to investigate the topics that they study. In other words, they can select the most appropriate techniques from the countless options available from qualitative and quantitative data collection methods, and then

combine these to investigate a phenomenon of interest thoroughly, as was done in the current study. This research approach is referred to by Teddlie and Tashakkori (2010, p. 5) as "methodological eclecticism".

The following section will deliberate on three main research approaches to social and behavioural sciences, namely qualitative, quantitative and mixed methods research.

4.2. Research approaches

Research designs are types of inquiry that are available to the researcher that also determine the type of study selected (Creswell, 2014; Gilbert, 2009). Three main methodological approaches that represent the different research designs in social and behavioural sciences are qualitative, quantitative and mixed methods research. Teddlie and Tashakkori (2009) refer to mixed methods as the third methodological movement, following the developments of qualitative and quantitative research (Creswell & Plano Clark, 2011; Johnson, Onwuegbuzie & Turner, 2007; Punch, 2009). As will be highlighted in the sections that follow, different research designs involve more than the format in which the data are presented or which methods researchers use. In other words, research methods involving experiments and numbers should not instinctively be classified as being quantitative. Likewise, those involving narratives, words or survey interviews should not automatically be labelled as being qualitative. As Morgan (2014, p. 47), succinctly puts it, "the real distinction is in the way that these methods are used".

The reason for comparing qualitative and quantitative research approaches in the sections that follow is because understanding their separate strengths is crucial to understanding the use of a mixed methods research design (Creswell & Plano Clark, 2011; Creswell, 2014; Gilbert, 2009; Johnson et al., 2007; Morgan, 2014; Punch, 2009).

4.2.1 Quantitative research

Quantitative researchers believe that reality is objective and can be measured, in other words, it can be quantified (Brynman, 2004; Leedy & Ormrod, 2013; Morgan, 2014). The essential characteristics of quantitative research are that it is deductive, objective and

general (Morgan, 2014). Its deductive nature is seen in the reality that it typically starts with theories or hypotheses that are tested through observations and pre-determined goals. Typically, researchers are actively controlling external factors and seeking for cause and effect. On the other hand, the objectivity of quantitative research is reflected in the detached nature of the researcher who relies on standardised protocols to emphasise measurement. Furthermore, research procedures are generally predetermined and only severe problems would justify the alteration of data collection. In the process, quantitative researchers aim to use numbers, counts, numerical description and coding in conducting research. Typically, quantitative research aims to make generalisations. In other words, it attempts to understand a large number of people in order to apply results to a wider range of settings (Brynman, 2004; Creswell & Plano Clark, 2011; Golofshani, 2003; Leedy & Ormrod, 2013; Morgan, 2014; Poni, 2014)

Using quantitative methods has various advantages, but also disadvantages that researchers need to be aware of. Some of the strengths of quantitative research is that it involves a lack of ambiguity and allows for summarisation and analysis of results, often using statistical tools. As a result, it is appropriate for representative studies (Gilbert, 2009). Morgan (2014) asserts that one of the main strengths in quantitative research is that the application of research methods produces data through deduction, objectivity and generality. Some of the disadvantages of quantitative research methods are that it is weak in contextualising settings, the voices of participants are not directly heard and, as such, researchers are distant from participants (Creswell & Plano Clark, 2011). Finally, it should be noted that even though it is generally agreed that quantitative researchers most often work within the worldviews of positivism and post-positivism, these are also appropriate for qualitative research methods (Creswell & Plano Clark, 2011; Mertens, 2010; Morgan, 2014; Wolcott, 1992).

The next section will discuss the qualitative research approach.

4.2.2 Qualitative research

Qualitative researchers look at how qualities or characteristics of the phenomenon they research construct knowledge. They seek illumination, understanding, and aim to draw

conclusions to be applied to other, similar situations (Brynman, 2004; Creswell & Plano Clark, 2011; Leedy & Ormrod, 2013; Morgan, 2014; Poni, 2014). Morgan (2014) contends that the major characteristics of qualitative research are that data are produced by highlighting induction, subjectivity and context. The inductive nature of this type of research is reflected in the following characterisation: it typically starts with observations, and then theories and/or general hypotheses are created. In other words, theories are not verified, but they emerge. Consequently, this approach calls for a flexible, emergent approach to data collection and analysis (Morgan, 2014). The subjective nature of this type of research is reflected in the emphasis on meanings and interpretations in order to understand others' perspectives in natural settings. In addition, it requires close contact between the researcher and other role players, with the researcher playing an interpretive role. The emphasis on context in this type of research is reflected in the event that the researcher takes, and purposefully examines, a few, selected cases with the minimum instruction in natural settings. Nunan and Choi, (2011) explain that in qualitative research, the author tells a story and is a central, visible presence in the research procedures. Therefore, the qualitative researcher is required to be involved in, and actually become, the research instrument. Brynman (2004) refers to qualitative research as a research strategy that usually emphasises words, rejects the practices of positivists and emphasises the ways in which individuals interpret the world. It also embodies the view of social reality as a constantly emerging property of individuals' creations.

Like the quantitative research approach, the qualitative approach to research also has strengths and limitations. The strengths of this type of research is that it is context-specific and allows specific situations or sets of people to be studied holistically and in detail, from as many angles as possible (Creswell & Plano Clark, 2011). As a result, procedures are emergent, because decisions about the next stage in such a study is often dependent on earlier observations and/or interviews (Morgan, 2014). On the other hand, the disadvantages of qualitative research are that it may be biased because of the personal interpretations made by the researchers. The values of the researcher influence the observations of reality; hence, results are limited to the time and the context of the study (Creswell & Plano Clark, 2011). This, as well as smaller sample sizes, limits generalisability. Subjectivity is further reflected when the beliefs and experiences of the

researcher influences the data collection procedures, as well as observations (what are seen and heard) (Creswell & Plano Clark, 2011).

In conclusion, while constructivism or interpretivism as worldviews are typical for qualitative approaches to research, quantitative research methods can also be used within these worldviews (Creswell & Plano Clark, 2011; Mertens, 2010; Morgan, 2014; Wolcott, 1994).

So far it has been observed that qualitative and quantitative research approaches each have different strengths and that neither of them is without limitations. When researchers utilise quantitative and qualitative data within the same framework to inform their decisions, they are using what researchers refer to as a *mixed methods* technique.

The next section will deliberate on mixed methods research in more detail.

4.2.3 Mixed Methods Research (MMR)

MMR is an iterative, cyclical approach to research which applies to the use of both inductive and deductive designs in the same study (Teddlie & Tashakkori, 2010). Mixed methods researchers capitalise on the different strengths that qualitative and quantitative research approaches bring to a study. In fact, the essential motivation for MMR is that more can be learnt about a research topic than would be possible when using either method in isolation while, at the same time, the weaknesses of each are compensated for by the other method. As a result, the interaction and strength that exist between these two research approaches allow for enhanced research goals, and the generation of knowledge from diverse perspectives, and consequently for a better understanding of social phenomena (Creswell & Plano Clark, 2011; Morgan, 2014; Poni, 2014; Punch, 2009; Onwuegbuzie & Dickinson, 2007). Poni (2014) states that by accepting the merits and diversity of each, mixed methods researchers actually achieve a higher degree of consensus. Furthermore, mixed methods researchers reject the “incompatibility thesis” (Teddlie & Tashakkori, 2010, p. 6) and follow a pragmatic worldview.

According to Creswell (2014), the advantages of using MMR can be observed at three levels, namely general, practical and procedural. At a general level, a mixed methods approach can be chosen because of its strength of drawing on both quantitative and qualitative research and minimising the limitations of both approaches. At a practical level, MMR seems to provide a refined, multifaceted approach to research that appeals to those on the forefront of new research procedures, especially if both quantitative and qualitative data need to be combined. At a procedural level, it is a useful strategy to have a more complete understanding of the research problems.

MMR is a relatively new field, stemming from the late 1980's even though its origins go back as far as 1959 in various fields, such as evaluation, education, management, sociology and the health sciences in general (Creswell, 2014; Morse, 2010). However, some areas still seem to be debated. This is evident in efforts to find a uniform term, as well as criteria for what exactly a MMR entails. Firstly, some of the terms that have been used to refer to this approach are *integrated* or *combined research, qualitative and quantitative research, hybrid research, methodological triangulation, mixed methodology, combined research* or *combining qualitative and quantitative methods* or *integrating multiple methods*. However, scholars concur that the term 'mixed methods' is dominant (Creswell, 2014; Creswell & Plano Clark, 2011; Morgan, 2014); therefore, this is the term that will be used to describe the overall approach to the research project that is reported on here. Secondly, in addition to having various other terms for mixed methods, there also seems to be a debate regarding what exactly a mixed methods approach entails. On the one hand, Creswell and Plano Clark (2011) are of the opinion that the term, 'mixed methods', should be reserved for projects that combine the strengths of qualitative and quantitative research methods and data only. This is a view that is shared by many others (Ivankova, 2015; Leedy & Ormrod, 2013; Mills, 2014; Mouton, 2013; Poni, 2014; Onwuegbuzie & Dickinson, 2007). On the other hand, there are those who view this interpretation as too restricted (Alexander et al., 2009; Morse, 2010). As a result, such researchers also include projects that combine two types of qualitative and two types of quantitative methods as mixed methods projects, in other words, not only cross-worldview studies are included.

In the African context, the use of MMR also seems to be on this rise, but there are still some researchers that seem doubtful about this type of research approach. In a recent

study, Ukwuoma (2015) explored the perceptions of postgraduate students (n=147) regarding the use of MMR in research and positive (77%) as well as negative (33%) perceptions were recorded. The lack of support in the form of local expertise and guidance as well as the fact that literature on the topic does not contextualise developing countries were cited as the main reasons for negative perceptions regarding the use of MMR in this article.

To contextualise the current study, it is worth establishing to what extent mixed methods research is used in EAP reading research, in particular those following an action research design, as is the case in the current study. In a recent study, Gollin-Kies (2014) surveyed 352 empirical research articles published in two peer-reviewed journals over a ten year period between 2003 and 2013to discover which of qualitative, quantitative or mixed methods research were mostly represented. Data were collected from the English for Specific Purposes Journal (n= 179) and English for Academic Purposes Journal (n=173), two journals the researcher regarded to have the highest readership among ESP practitioners. It was concluded that the use of qualitative methods were favoured (57%), followed by quantitative approaches (25.3%) and that even though the use of mixed methods research was on the rise, especially towards the end of the decade that this research was conducted, the use of this specific research approach among ESP practitioners is still lagging behind (17.6%). Recognising the skill it takes to employ MMR, the researcher, therefore, recommends more ESP practitioner training in order to facilitate "more deliberate mixed methods research planning" (Gollin-Kies, 2014, p. 34).

Also, because it has been observed that there is "a growing use of both quantitative and qualitative data in action research projects" (Ivankova, 2015, p. 50), the results of another study are worth considering in order to contextualise the current study. Wiśniewska (2011) explored the research designs of ELT research articles (n=12) to establish to what extent action research studies employed MMR. By looking specifically at the combination of qualitative and quantitative approaches to research, it was concluded that only some action research studies employed such combinations. No empirical data could be found that attempted to determine the dominance of MMR in reading, especially EAP reading, research. However, according to Grabe and Stoller (2011), it seems to be the dominant approach to academic reading research. Finally, Brown (2011), in an overview of research methods in Second Language Studies regard those who perceive the

advantages of combining quantitative and qualitative research approaches, in other words, mixed methods research, as the "stronger researchers" (Brown, 2011, p. 199).

It is generally agreed that pragmatism seems to be the most appropriate worldview for mixed methods research (Alexander et al., 2009; Creswell & Plano Clark, 2011; Creswell, 2014; Morgan, 2014; Punch, 2009; Teddlie & Tashakkori, 2010). This is mainly because it allows for the adoption of a pluralistic stance in gathering different types of data to best answer research questions. In addition, pragmatism allows for both qualitative and quantitative research methods to be used in a single study, and regards the research question to be of primary importance (more important than the method or the philosophical worldview that underlies the method); it, furthermore, argues for the abandonment of the dichotomy between post-positivism and constructivism or the "incompatibility thesis" that has been referred to earlier (Creswell & Plano Clark, 2011; Mertens, 2010; Punch, 2009). Accordingly, in mixed methods research, worldviews can change during a study, and specific worldviews can be tied to certain phases of a project. It is also possible to use qualitative and quantitative data collection methods in the same phase of a project (Creswell & Plano Clark, 2011). For example, some studies may start with a survey covering specific variables and empirical measures (a quantitative study), within a post-positivistic worldview. If the researcher then moves to collect data more qualitatively, the worldview will shift to a more constructivist perspective. This is typical of action research projects that employ mixed methods research (Ivankova, 2015; Wiśniewska, 2011).

The challenges regarding undertaking MMR is widely documented. These challenges are represented in the effective design and implementation of this type of research because a mixed methods approach is more than simply combining different types of data. To that effect, Morse (2010, p. 348) cautions that "mixed methods are not data soup". Leedy and Ormrod (2013) concur by regarding MMR as the most challenging study that can be undertaken. In addition, others (Brynman, 2004; Creswell & Plano Clark, 2011; Morgan, 2014) caution that combining qualitative and quantitative data is a challenging undertaking that requires about twice as much effort, planning resources and time than one method alone would require. Because of the nature of MMR, it is generally agreed that doing MMR requires a thorough understanding of both qualitative and quantitative research for it to be competently designed and conducted (Creswell & Plano Clark, 2011;

Mills, 2014; Morgan, 2014). No wonder Teddlie and Tashakkori (2010, p.8) are of the opinion that a researcher who employs MMR should in actual fact be a "connoisseur of methods", or one who skilfully and often instinctively selects and combines the best approaches to answer research questions, as questions arise during research. In that way, Teddlie and Tashakkori (2010, p. 5) argue that qualitative and quantitative research can be combined to cancel out the weaknesses of each other, one of the guiding principles of mixed methods research, hence, the term "methodological eclecticism".

It is of interest to note that this same term ("methodological eclecticism") seems to be used to describe both a desired and also an unwanted characteristic of mixed methods researchers. As indicated above, Teddlie and Tashakkori (2010) use this term to describe the ability required of a researcher to skilfully combine qualitative and quantitative research approaches. However, also in the context of MMR, Morgan (2014, p. 4) refers to "methodological eclecticism" (p. 4) as an approach that is characterised by researchers who *carelessly* integrate the two methods, and not necessarily who incorporate the different strengths each method offers. As a result, they caution researchers against it. However, in spite of these different interpretations of this term, mixed methods researchers would seem to benefit by considering the advice offered by Morse (2010) who states that, in order to conduct mixed methods research with minimal error and confusion, the researcher should remain in control. In addition, it is suggested that one should consider and reflect on all options in as much detail as possible.

A mixed methods approach (especially in an action research design) expands research options radically, allows researchers to answer existing questions in new ways and permits for new questions to be asked. However, Morgan (2014) is of the opinion that using a mixed methods approach is not automatically preferable to using only one method. This view that a mixed methods approach is not necessarily the best is echoed by others (Brynman, 2004; Creswell, 2014; Creswell & Plano Clark, 2011; Mertens, 2012; Teddlie & Tashakkori, 2010). In other words, it is argued that the approach used must be appropriate to the research questions. As a result, sometimes a single qualitative or quantitative research approach would be more suitable. For example, according to Gollin-Kies (2014), the dominance of a qualitative research approach to empirical ESP research is unsurprising "as ESP is so context-dependent" (p.33).

In order to make informed decisions regarding the appropriateness of the research approach to use in a certain context, certain guidelines are suggested. While Leedy and Ormrod (2013) merely state that research problems that "practically scream for both qualitative and quantitative data" (p. 258) require mixed-methods research, Creswell and Plano Clark (2011) provide more specific criteria for choosing this approach. These criteria are summarised in Table 24.

Table 24: Criteria for mixed methods research projects

A need exists because one data source may be insufficient;
Results need to be explained;
Exploratory findings need to be generalised;
A second method is needed to enhance a primary method;
A theoretical stance needs to be employed;
An overall research objective can be best addressed with multiple phases or projects.

(Creswell & Plano Clark, 2011, p. 8)

Merterns (2010) reminds that mixed methods is not a new way of doing research, even though the trend in using MMR in ESP only seems to have been gaining momentum in recent years (Gollin-Kies, 2014). Teddlie and Tashakkori (2010) predict that the various techniques and interpretations of mixed methods research will continue to evolve and emerge as new topics and new lines of inquiry are included. This view is echoed by Leedy and Ormrod (2013, p. 259) who state that "the way to combine qualitative and quantitative research methods seem to be limitless and are restricted only by the researcher's imagination and creativity and, of course, by the nature of the research problem". Finally, Morse (2010, p. 340) is of the opinion that the interest in mixed methods research is increasing because MMR provides researchers with a way to work efficiently with the nuances of present day research and to encapsulate quantitative variables with phenomena that cannot easily be quantified in the same project. Furthermore, it is considered to be efficient because it can incorporate both meaning and quantity in the same project; it is a method that acknowledges the progression of research as it moves inductively toward solving a puzzle or increases the scope of deductive

inquiry, as well as enables questions that normally would emerge at the end of a project to be addressed before closure.

It is for all the reasons outlined above that a mixed methods approach was decided upon in the current research. In other words, qualitative as well as quantitative data were combined to answer the various research questions in order to ultimately develop a reading course that is tailor made for first-year medical students doing Biochemistry at UNAM (cf.1.6).

There are various ways to combine qualitative and quantitative research methods. While Teddlie and Tashakkori (2010) are of the opinion that it emerged partially out of the triangulation of data sources to look for convergence (cf. 4.2.3), Creswell (2014) mentions the following three specific reasons for this occurrence. Firstly, qualitative and quantitative data could be integrated to confirm the accuracy and validity of each other. Secondly, one data base could be used to explain the other data base, as one data base could explore different types of questions that the other cannot. Thirdly, one data base could build on the other, and one could alternate with the other back and forth during a longitudinal study. As a result, a number of mixed methods designs are proposed. These will be elaborated next.

a. Different types of mixed methods design options

A number of mixed methods designs are proposed based on four different ways that the qualitative and quantitative components or strands in a study relate to each other. These are the level of interaction between the strands, the relative priority of the strands, the timing or sequencing of each, as well as the procedures for mixing the strands (Creswell & Plano Clark, 2011; Morgan, 2014). The level of interaction refers to the extent or level to which the two strands interact or are kept independent. The relative priority, on the other hand, relates to which of the qualitative or quantitative strands has a greater emphasis or whether both have equal importance. The timing of the strands refers to the pacing or implementation or the order in which the researcher uses the results from the different data sets in the study. In other words, whether the quantitative and the qualitative phases of the research study occur at approximately the same point in time (i.e. concurrent) or whether these two components occur one after the other, such that one

phase informs the next phase (i.e. sequential). Finally, the procedures for mixing the strands refer to the stages in the study when the two strands are integrated. For example, this could occur during the research design process, the data collection phase, the data analysis or the data interpretation stage (Creswell & Plano Clark, 2011; Morgan, 2014). Considering these aspects regarding the level of interaction between the strands in a MMR, Creswell and Plano Clark (2011) recommend six major mixed methods designs to serve as prototypes for other mixed methods researchers. These are the convergent parallel, the explanatory sequential, the exploratory sequential, the embedded, the multiphase design, as well as the transformative design. Of these, the first four are regarded as the basic ones and the last two as more complex, as they combine a number of components. Three basic designs, namely the convergent parallel design, the explanatory sequential design and the exploratory sequential design, are all applicable to the current study. Therefore, in order to contextualise the current research, the design of each of these basic prototypes and then the design of a multiphase design, the template of the current research, will be elaborated. The reason for using a multiphase design was to meet the overall objective of the study through projects that developed over time with many phases; hence, the need for an approach that combined convergent, explanatory as well as exploratory, mixed methods.

Convergent parallel mixed methods research design

The convergent parallel, mixed methods design is a form of mixed methods where the researcher converges or merges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem. In the process, data are collected more or less at the same time and integrated in the interpretation level. This design, where each study is separate with neither taking priority over the other, is carried out for two main purposes, convergence and divergence. Convergence, also referred to as concordance (Creswell & Plano Clark, 2011) refers to the process to triangulate methods by directly comparing and contrasting statistical, quantitative results with qualitative findings to show greater certainty in results. As a result, triangulation is now commonly associated with the convergence of results (Leedy & Ormrod, 2013). The goal is simply to detect similar results by using methods with distinctive strengths to gain similar conclusions about the phenomenon under investigation (Creswell, 2014; Creswell & Plano Clark, 2011; Leedy & Ormrod, 2013; Morgan, 2014). This seems to be the most familiar, most

basic, advanced, mixed methods strategy. Creswell (2014) is of the opinion that this is probably the reason why new researchers to the field of mixed methods think that combining quantitative and qualitative data is the only way of conducting a mixed methods study. The other, distinct characteristic of this design is that of the explanation and exploration of divergence, also referred to as contradictions or discordance (Creswell & Plano Clark, 2011). Divergence, rather than convergence, is also an important aim of MMR and should not be stated as a limitation in the study without further follow-up (Creswell, 2014; Creswell & Plano Clark, 2011; Leedy & Ormrod, 2013; Morgan, 2014). Creswell (2014) regards this as a weak solution, and argues that in a case of divergence, one should rather return to the data base and collect additional information. In the same vein, Teddlie and Tashakkori (2010) argue that discordance often produces greater insight into a phenomenon than concordance. As it will be elaborated in Chapters 5, 6 and 7, the current study did make use of this mixed methods design and encountered both concordance and divergence. It will also be discussed how and why this prototype, as suggested by Creswell and Plano (2011), was adjusted.

The following two sections will discuss two different types of sequential methods. However, it may be useful to provide some background to the rationale behind sequential mixed methods designs.

The idea behind sequential designs is that one method of data collection enhances the effectiveness of the other and they are, therefore, not triangulated as with convergent designs. In other words, what is learnt from one method, determines how the next one will be applied. Therefore, connecting the two methods is essential so that the one set of results can increase the effectiveness of the other set. The two methods are integrated where the results from the first study help to inform the design and procedures of the second study (Creswell, 2014; Creswell & Plano Clark, 2011; Leedy & Ormrod, 2013; Morgan, 2014). In essence, using both methods in sequence produces more and better results than using only one. This is the broad reason for using mixed methods studies. In doing so, a number of different sequential research designs are proposed. The explanatory sequential MMR and the exploratory sequential MMR, as proposed by Creswell and Plano Clark (2011), will now be elaborated.

Explanatory, sequential, mixed methods design

The explanatory sequential MMR model takes place in two, straightforward phases. In Phase One, the researcher collects quantitative data, analyses them and then, in Phase Two, collects qualitative data to follow up on particular, preliminary quantitative results in more depth. As such, the qualitative strand depends on the data obtained from the quantitative strand, reflecting the emergent nature of MMR (Creswell, 2014; Creswell & Plano Clark, 2011; Leedy & Ormrod, 2013; Morgan, 2014; Morse, 2010; Onwuegbuzie & Dickinson, 2007). The label, *explanatory sequential*, comes from the evidence that it is considered as *explanatory* because the initial quantitative data are further explained by the qualitative data. On the other hand, it is considered as *sequential* because the quantitative phase is followed by the qualitative phase. Creswell (2014) mentions two specific challenges concerning the use of this model. One is that it is often taxing to identify the quantitative results to further explore them qualitatively. Another is the unequal sample sizes for each phase of the study, in other words, the often smaller samples in the qualitative phase compared to frequently the larger numbers in the quantitative phase. In Chapters 5, 6 and 7, it will be discussed how and when the current study used the explanatory, sequential, mixed methods model. At the same time it will be described how the prototype, as suggested by Creswell and Plano (2011), was adjusted.

Exploratory, sequential, mixed methods design

The exploratory, sequential, MMR model occurs in the reverse sequence from the explanatory sequential design. In other words, the researcher first begins with a qualitative phase, usually to explore the views of participants, to obtain a general sense of the characteristics, phenomena and other issues related to the topic. The qualitative data are analysed and the information used to develop a second, quantitative phase. In addition, the qualitative phase might be useful to build an instrument that best fits the sample under study, to identify appropriate instruments to use in the follow-up quantitative phase or to specify variables that need to be explored in a follow-up quantitative study (Creswell, 2014; Creswell & Plano Clark, 2011; Leedy & Ormrod, 2013; Morgan, 2014; Morse, 2010; Onwuegbuzie & Dickinson, 2007). Creswell (2014) mentions two specific challenges concerning the use of this model. Similar to the explanatory, sequential design, one is the occurrence that it is often taxing to decide on

the appropriate qualitative findings to use in the quantitative study. The other challenge is reflected in the sample selection for both phases of the research. In Chapters 5, 6 and 7, it will be elaborated how and when the current study used this mixed methods model. At the same time, it will be described how the prototype, as suggested by Creswell and Plano (2011), was adjusted.

As indicated previously, these basic models can be used in more advanced mixed methods strategies, such as a multiphase mixed methods design.

Multiphase, mixed methods design

A multiphase mixed methods design provides an overall methodological framework to a long-term project that calls for multiple phases to be conducted in researching a topic, programme evaluations and programme interventions, such as the current study. In the process, an iteration of connected, quantitative and qualitative studies (strands) that are sequentially, as well as concurrently, aligned are conducted, each new approach building on what was learned previously to address a central programme objective or a set of research questions (Creswell, 2014; Creswell & Plano Clark, 2011; Morgan, 2014). In other words, concurrent or sequential strategies are used in tandem over time to understand a long-term programme goal best. A notation or symbol system can be used to provide a short overview of any mixed methods research, in other words, how the different strands are combined. The next section will elaborate this in more detail.

A notation system for mixed methods designs

It is generally agreed that the mixed methods notation system was introduced in 1991 by Morse (Creswell & Plano Clark, 2011; Dörnyei, 2007; Morgan, 2014), and has since been expanded. Consequently, various typologies have been developed, based on the following principles:

- A strand or method can play a supplementary role or become a core method.
- Core methods are those that can stand on their own and are prioritised in the design (Creswell & Plano Clark, 2011; Morgan, 2014).

- Supplementary methods are those that make notable contributions, but may not be able to do so in a separate study. Consequently, they have lesser priorities in the design (Creswell & Plano Clark, 2011; Morgan, 2014; Morse, 2010).

The following summary of notations used to describe mixed methods designs, as provided by Creswell and Plano Clark (2011) are used in the current study:

Table 25: Summary of notations used to describe mixed methods designs

Notation	What the notation indicates
QUAL	Qualitative strand Capital letters denote priority or increased weight
Qual	Qualitative strand Lower case denotes lower weight or priority
QUAN	Quantitative strand Capital letters denote priority or increased weight
Quan	Quantitative research Lower case denotes lower weight or priority
+	Plus sign represents strands that occur concurrently Example: QUAN + QUAL means that quantitative and qualitative methods are both prioritised and occur concurrently
→	Arrow shows methods that occur in a sequence Example: QUAN→ qual means that the quantitative strand is prioritised and that the methods occur in a sequence of quantitative strand followed by a qualitative strand that has a lesser priority in the design.
=	Equal sign explains the purpose for mixing methods Example: QUAN→qual =
→←	Double arrow indicates methods that were implemented in a recursive fashion. Example: (QUAL→QUAN→ QUAL→QUAN, etc.)
[ ]	Brackets are used to distinguish mixed methods projects in a series of studies Example: QUAL→QUAN→QUAL→[QUAN→qual]

(Creswell & Plano Clark, 2011, p. 109)

The current study is an action research project that employed a mixed methods research approach. Because the discussion so far only elaborated mixed methods research, the section that follows will explore action research as a research design in order to contextualise the current study.

4.3 Action research

The term, action research, denotes the importance of both action and research simultaneously in order to bridge the gap between theory and practice. In other words, this type of research is a practical, participative and interpretive process that aims to understand the underlying causes of problems in order to improve conditions in a desirable way. Throughout the process the researcher, as well as people in real-world situations, are closely involved in aiming to effect lasting and useful changes. Because of these characteristics of action research, Onwuegbuzie and Dickinson (2007) regard this type of research to be particularly well-suited for designing courses and curricula, and Grabe and Stoller (2011) regard it as appropriate for designing EAP reading courses, as was the aim of the current study.

Various strands or broad movements of action research exist. Consequently, the literature appears to distinguish between two main groups, namely the critical and the pragmatic orientation of action research (Burns, 2011; Christ, 2010; Coghlan & Brannick, 2012; Gay, Mills & Airasian, 2014; Johansson & Lindhult, 2008; Kumar, 2011). Each seems to be appropriate for different research contexts. In support of this statement, McNiff and Whitehead (2008, p. 7) assert that "the action research family is wide and diverse" and that it is not only limited to education, the focus of the current study.

The critical orientation of action research appears to be grounded in the critical theory paradigm that is associated with the thinking of Paulo Freire, namely to encourage critical change (Johansson & Lindhult, 2008; McNiff & Whitehead, 2008). In addition, this strand of action research aims at the systematic collection of data about unattended or unexplained issues in a community that stem from unequal and invisible, power relations. This collected research evidence is then disclosed in order to justify the introduction of social change or transformation. In short, in this process, the action research process is guided by the ultimate aim of producing change (Kumar, 2011). It is argued that this strand reflects the indirect relation of action research to an emancipatory worldview, one that calls for change (Christ, 2010; Johansson & Lindhult, 2008). Please note that because the current study does not employ this worldview, it was excluded from the discussion on various worldviews (cf. 4.1). Finally, various terms for this type of action

research seem to exist. For example, Gay et al. (2014) refer to this as *critical action* research, while Kumar (2011) regards it as *The American tradition of action research*.

The pragmatic orientation or strand of action research, also regarded as representative of the roots or the original intent of action research, aims to improve instruction and classroom practices. Johansson and Lindhult, (2008) are of the opinion that, in general, L2 action research projects seem to form part of this strand of action research. In addition, the work of the social psychologist, Kurt Lewin in 1946, is cited as key to its inception and development (Burns, 2011; Christ, 2010; Johansson & Lindhult, 2008). Furthermore, it is argued that this term reflects the indirect relation of action research to pragmatism as a worldview (Christ, 2010; Johansson & Lindhult, 2008), the worldview that rejects the stance that qualitative and quantitative approaches are incompatible. While some action researchers simply use the term "action research" to refer to this strand that specifically focuses on classroom problem solving, other terms also seem to exist. For example, Christ (2010) and Gay et al. (2014) refer to this strand as *practical action research* while Kumar (2011) regards it as the *British tradition of action research*. The current study was undertaken with the purpose of improving and understanding classroom practices at the LC of UNAM. It, therefore, is an example of this strand of action research. Henceforth, the term, 'action research', will be used to imply the pragmatic orientation or strand.

One key characteristic of action research is that practitioners *themselves* conduct the inquiry or investigation and in classroom action research, such as the current study, use teaching space as the central location for inquiry (Gay et al., 2014; Dörnyei, 2007; Onwuegbuzie & Dickinson, 2007). This is vital to facilitate self-improvement among classroom practitioners, obtain an enhanced understanding of their practice and to assemble suitable and available data in order to produce meaningful change in the teaching-learning environment, the ultimate aim of classroom action research. In the process, instructors can take reflective stances towards their daily routines, and both student learning and teacher effectiveness can be improved (Mills, 2014). Burns (2011) notes that the latter can only occur after a gap between the actual and the ideal has been identified, indicating the importance of carrying out a thorough needs analysis (cf. 2.7.1). Gay et al. (2014) believe that such a needs analysis empowers instructors to make informed decisions about what to change and what not to change; in other words,

informing the researcher's future direction and action. Grabe and Stoller (2011) also note the advantages of the central role that instructors play in action research studies, especially in the context of improving conditions and outcomes in EAP reading settings. They are of the opinion that this type of investigation gives the researcher the flexibility and authority to reconsider guiding questions, data-collection techniques and methods of analysis. In the same vein, they argue that the instructor is in a position to make the action research project in reading classrooms as meaningful and manageable as possible, provided that the research question guides the project procedures.

Action research is often criticised, but much support for it exists as well. Some of the critique against action research is firstly a misguided opinion that action research studies involve "mono-method" approaches (Onwuegbuzie & Dickinson, 2007, p. 2), in other words, only qualitative or only quantitative techniques. Another criticism stems from the contextualised nature and often small numbers of samples that cause action research findings not to be generalizable to other contexts (Koshky, 2005). However, much support for the use of action research exists. For example, Burns, (2009) contends that "despite the criticisms and doubts that have dogged the process of action research in the language teaching field, it appears as if action research is here to stay" (p. 248). In the same vein, Dörnyei (2007, p. 191) asserts that "there is one big problem with action research: there is too little of it". Onwuegbuzie and Dickinson (2007) assert that this type of research, that is conducted by classroom instructors, is often the most relevant for the teaching profession. They list 27 positive outcomes associated with conducting action research. Reading instruction, in particular, also seems to benefit much from the practice of action research. For example, Grabe and Stoller (2011) argue that through classroom action research, various options for reading instruction can be practically examined and created. This, in turn, will result in improved reading instruction and more skilled student readers.

The next section will specifically visit action research studies that used mixed methods methodologies.

4.3.1 Mixed methods action research studies

Contrary to some perceptions, regarded by Onwuegbuzie and Dickinson (2007) as mistaken, action researchers can, depending on the research context and problem, employ both qualitative and quantitative research methodologies and data collection methods, in other words MMR (Burns, 2011; Grabe & Stoller, 2011; Mills, 2014; Onwuegbuzie & Dickinson, 2007). Researchers now seem to have specific terms for action research projects that do so. Three prominent action researchers are Onwuegbuzie and Dickinson (2007), Christ (2010) and Ivankova (2015).

Onwuegbuzie and Dickinson (2007) define Mixed Methods Action Research Studies (MMARS) as research that takes place when action research studies are conducted, using mixed methods research approaches. They extend this definition to those MARS studies that actively seek engagement with all stakeholders, and label such studies as Participatory Mixed Method Action Research Studies (PMARS). In addition, Christ (2010) labels such an approach as *action-oriented mixed methods research;* Ivankova (2015) refers to such an approach as *Mixed Methods Action Research (MMAR).*

The value and rationale for using a mixed methods research approach in any study has been elaborated in detail in section 4.2. Christ (2010), Onwuegbuzie and Dickinson (2007) and Ivankova (2015) specifically describe the significance of combining *action research* with MMR. The following table provides a summary of their ideas.

Table 26: Significance of combining action research with mixed methods research

Employing MMR in action research can	Researcher
provide a rigorous methodological foundation, assessment, development, evaluation and monitoring to an action plan in order to promote a significant change.	Ivankova, 2015
provide a structure for collecting, analysing and combining quantitative and qualitative data. This will enhance the reliability and trustworthiness of conclusions about the phenomena being investigated.	
efficiently reveal vital aspects that could benefit from intervention, and how these could be improved.	
allow decision making to be substantiated on statistics, i.e., more firm positions for the support of change.	
allow for more rigorous and methodological research methods that may allow for more research questions and issues to arise.	
ensure better generalisability of the action research study results to other settings and populations in different contexts.	
allow for a thorough research plan, combining qualitative and quantitative studies which will increase the quality of research.	Onwuegbuzie & Dickinson, 2007
allow issues to be explored in greater depth.	
promote constant reflection and action; allows improvement to take place.	Christ, 2010

The next section will focus on exploring the qualities of action research studies, specifically in the reading classroom, by using a mixed methods approach.

4.3.2 A model to conduct action research in the reading classroom

Although different terminologies for the steps in the action research cycle seem to abound, scholars generally concur that the classic representation of the Four Phase Model of action research was developed by Stephen Kemmis: Plan →Act →Observe →Reflect (Burns, 2011; Coghlan & Brannick, 2012; Mills, 2014). The last stage, namely reflection, leads to the next stage of planning where the same four, simple steps are repeated. This suggests the cyclical, iterative, flexible approach of action research. At this stage, it should be noted that these characteristics appear to be similar to those of the multiphase mixed methods design.

This classical model of action research has since been criticised for not taking the complexity of the actual research process involved in action research into account, and various models have since been proposed. These dynamic, cyclical models have specifically been developed to allow for feedback, modification and re-trial (Burns, 2011; Onwuegbuzie & Dickinson, 2007; Tsui, 2011). However, the four basic steps of the classic representation of the Four Phase Model of action research are still present and observable in each. Koshy et al. (2011) caution that, although the options and possibilities for action research are almost infinite, no model is superior as many have similarities. It is, therefore, recommended that an action researcher should rather adopt or adapt models as appropriate rather than strictly follow one model too rigidly. Grabe and Stoller (2011) concur, and are of the opinion that keeping too closely to one model may limit the researcher in exploring the evolving, flexible and versatile nature of action research projects. Consequently, they suggest that such projects should rather be defined and structured according to different educational and instructional contexts. Two examples that allowed the researcher to consider the current study from various vantage points are Onwuegbuzie and Dickinson's 10 step PMARS Process (2007) and Grabe and Stoller's 12 Step Model (2011) to conduct action research in the reading classroom. Each will now briefly be described and in section 4.8.2 it will be explained how these were used to design the current study.

The 10 step PMARS Process as proposed by Onwuegbuzie and Dickinson (2007) comprises the following 10 steps:

- Step 1: Identifying an issue or problem to investigate;
- Step 2: Forming collaboration with key stakeholders;
- Step 3: Understanding the contexts, system and relevant literature;
- Step 4: Formulating research questions and/or hypotheses;
- Step 5: Developing a collaborative research plan of action;
- Step 6: Collecting the data;
- Step 7: Analysing the data;
- Step 8: Interpreting the findings;
- Step 9: Designing data-driven action/intervention;
- Step 10: Evaluating the action/intervention

(Onwuegbuzie & Dickinson, 2007, pp. 11-12).

The 12 step model to conduct action research in the reading classroom is referred to as a "multiple-technique, mixed-model approach" (Grabe & Stoller, 2011, p. 174). These steps are as follows:

- Step 1: Establish a purpose and decide on a topic;
- Step 2: Pose a specific question (narrowing the focus of enquiry);
- Step 3: Anticipate outcomes;
- Step 4: Specify the type(s) of data to collect (HOW, WHERE AND FROM WHOM?);
- Step 5: Determine ways to collect data in an ethical manner;
- Step 6: Consider issues related to time;
- Step 7: Collect data systematically;
- Step 8: Examine and analyse data;
- Step 9: Reflect on results;
- Step 10: Generate practical solutions;

- Step 11: Experiment with and monitor solutions;
- Step 12: Share insights with colleagues.

Grabe and Stoller (2011) advise that the different steps are interrelated, with considerable overlap between them, and that they can be adapted as required. In addition, they highlight two important aspects regarding Step 12 (share insights with colleagues). Firstly, they are of the opinion that this should not necessarily be regarded as the final stage. Secondly, they argue that sharing (Step 12) has a "multiplier effect" (Grabe & Stoller, 2011, p. 190), This means that, in addition to action researchers reaching the main goals of the project as elaborated namely for self-improvement and to make meaningful changes, the sharing of experiences implies that increasing numbers of students become beneficiaries of the research. In other words, the potential for the multiplier-effect extends the impact of a single action research project, as well as enhance teaching and learning in multiple classrooms and in multiple, instructional contexts. Perhaps not in the context of action research projects per se, but others also concur with this view. For example, Creswell (2014) is of the opinion that data should be shared with others. In the same vein, Dörnyei and Taguchi (2010) recommend providing research participants with feedback on results. Doing this, they argue, will also prepare the ground for future surveys.

4.3.3 The reading instructor as action researcher

Grabe and Stoller (2011, p. 164-165) advocate for action research in especially the L2 reading classroom, and lists several advantages of action research for reading instructors. Action research in the reading classroom:

- allows for a systematic reflection on aspects of our own reading instruction;
- allows for a systematic reflection on our students' learning;
- develops a keener understanding of reading;
- improves our instructional techniques that help students develop reading strategies;
- builds teacher-student roles that support effective learning;
- allows non-threatening means for reflecting on reading from a variety of perspectives and for a variety of purposes;

- allows investigation of almost any aspect of reading instruction and reading assessment that we want to improve or understand better.

At this stage, it is interesting to note that Christ (2010) seems to have a different idea of the definition of true action research projects. According to this view, an intervention is only regarded as true action research if modifications are made at least three times. If conducted for fewer than 3 reiterations, it should be classified as an *arrested* action research project. The current study, however, does not subscribe to this view. In other words, it assumes that any action research project follows the tradition action research cycle of Plan →Act →Observe →Reflect, and is defined and structured differently, according to unique educational and instructional contexts, irrespective of the number of modifications made.

In this section of Chapter 4, action research as a research approach has been elaborated. Two different views regarding action research were presented, and the current study was situated within the pragmatic approach of action research. It was, furthermore, illustrated that while all action research projects have certain similarities, each should differ according to its unique context. Two action research models that are of particular importance to the current study were discussed. The next section will introduce specific methods that are available to collect data. Only those that relate to the current study are highlighted and discussed.

4.4 Data collection methods

Various data collection methods and data collection instruments are available to quantitative and qualitative researchers, particularly those engaged in EAP research. Those of particular importance to the current research are survey research (interviews and questionnaires), participant observation, archival documents, textbook analysis, as well as journals/diary entries. It also deals with issues such as piloting and ethical considerations. Each of these tools will now briefly be elaborated. In the process, the distinct advantages, as well as disadvantages, of each will be discussed, as well as how each can be used in qualitative and/or quantitative research. The latter is important, as the current study has used a multiphase, mixed methods design where both qualitative and quantitative data were collected concurrently and sequentially in the various stages of the action research project (cf.4.2). In each phase, the data collection method(s) used were regarded to be

appropriate. The next section will deliberate on data collection tools, in particular those applicable to the current study.

4.4.1 Surveys

According to Leedy and Ormrod (2013), the term, survey research, does not just refer to any form of descriptive, quantitative research, but it specifically "involves acquiring information about one or more groups of people … by asking them questions and tabulating their answers" (Leedy & Ormrod, 2013, p. 189). When one follows this definition, questionnaires, as well as interviews, data collection tools that were used in the current research, seem to be classified as survey instruments. The next section will discuss each of them in more detail; it will also be highlighted how they share various similarities.

4.4.1.1 Questionnaires

Often no appropriate, ready-made or standardised questionnaire exists, and researchers frequently have to design their own (Brynman, 2004). As a result researchers need to consider carefully the advantages and disadvantages, as well as certain guidelines to follow in the design of questionnaires.

Questionnaires have several advantages. For example, they are efficient in terms of researcher time, effort, financial resources, as well as versatility (Dörnyei & Taguchi, 2010; Leedy & Ormrod, 2013). These were also the reasons why questionnaires were used in the current study. However, there are certain drawbacks or limitations to the use of questionnaires that researchers, such as myself, have to be aware of. Leedy and Ormrod (2013) caution that survey results can change as these are self-reported data and that participants may distort facts. Kruger and Dunning (1999) mention the tendency of people to exaggerate their intellectual and social abilities as another observed disadvantage of using questionnaires. This is referred to as the Dunning-Kruger effect. In the same vein Dörnyei and Taguchi (2010, pp. 7-8) present nine of the most common disadvantages of questionnaires.

Table 27: Common disadvantages of questionnaires

Disadvantages of questionnaires	Commonly named as
Simple and superficially answered as respondents are often reluctant to spend too much time on answering questions;	
Unreliable and unmotivated respondents are prone to omit responses accidentally or purposely;	
Respondents may have literacy problems and may misunderstand questions and instructions;	
Little or no opportunity to correct mistakes of respondents;	
Untrue answers provided; Answers are what they think researcher wants to hear/what the desirable answer is;	Social desirability/prestige bias
Responses not intentionally deviated from the truth, rather because they deceive themselves and the researcher;	Self-deception
Tendency to agree with sentences when they are unsure or undecided or unwillingness to look at the negative side of an issue or to provide strong negative issues;	Acquiescence bias
Humans tend to overgeneralise or might not want to say anything negative about a person or an object. Similarly, when someone is disliked, the person will only be regarded in a negative light;	Halo effect
Lengthy, monotonous questionnaires may cause inaccurate responses due to tiredness or boredom. Most likely those toward the end of a questionnaire.	Fatigue effects.

Dörnyei & Taguchi (2010, pp. 7-8)

In general, questionnaires are particularly suited for quantitative research, but can also be employed in collecting qualitative data (Brynman, 2004). The former are collected in the form of closed-questions where the respondents are provided with ready-made responses to choose from. In order to quantify responses, researchers can use rating scales and/or checklists (Dörnyei & Taguchi, 2010; Leedy & Ormrod, 2013). These responses are commonly devised by using rating scales (Likert, semantic differential and/or numerical rating scales, true/false items), rank order items, numeric items, as well as checklists. The literature mentions at least five advantages of closed-questions. For example, the answers are easy to process, the comparability of answers is increased, the questionnaire is easy to complete and variability among answers is negated (Brynman, 2004). In addition, the coding and tabulation of answers are straightforward and objective (Dörnyei & Taguchi, 2010). Brynman (2004) mentions a loss in spontaneity in the answers of respondents as the major disadvantage.

Qualitative data in a questionnaire are collected when the actual question is not followed by closed-response options for the respondents to choose from, but by a blank space for

the respondent to fill (Dörnyei & Taguchi, 2010; Leedy & Ormrod, 2013). Such information may not be as rich and descriptive and exploratory as one would hope for, but open-ended questions in questionnaires do have certain merits. Dörnyei and Taguchi (2010) state five important advantages. One is that responses to these questions can enrich quantitative data. Another advantage is that information from open-ended questions can provide researchers with illustrative quotes. In addition, such information can identify issues not previously anticipated. A further advantage is that open-ended questions can take different forms and can, therefore, collect different types of information. For example, specific, open questions require specific pieces of information to be answered, clarification questions require respondents to clarify a closed answer, sentence-completion questions ask respondents to complete sentences and short-answer questions require respondents to provide short answers. A final advantage is that open-ended questions are sometimes included because researchers cannot predetermine the range of possible answers and cannot offer any pre-prepared response categories. Some of the major disadvantages of open-ended questions are that they take much time to answer and also that it is difficult to decode responses in a reliable manner (Dörnyei & Taguchi, 2010).

Dörnyei and Taguchi (2010) classify the data that questionnaires can yield generally about respondents into three groups. These are questions that generate factual, behavioural and attitudinal information. The first group, factual questions, are those that provide background information about respondents for example, their demographic data, literacy backgrounds, etc. Such data can be valuable in interpreting findings in a survey. The second group, behavioural questions, assist researchers to establish the current and past life style habits of respondents, personal histories and/or language learning strategies. The third group, attitudinal questions, mainly assist researchers to establish what people think. Consequently, these questions concern the attitudes, opinions, beliefs, interests and values of respondents, and can be closed or open-ended (Dörnyei & Taguchi, 2010).

Suggestions to eliminate an “ad hoc” questionnaire design (Dörnyei & Taguchi, 2010, p. 22) are, for example, the use of multi-scales or different questions that are measuring the same element that may provide more reliable, complete or accurate views than when single items or one question only is used to elicit answers in a specific context. This will

increase the psychometric reliability, but might not appeal to respondents who may experience questionnaire fatigue and/or feel their integrity and honesty are doubted (Dörnyei & Taguchi, 2010). Another suggestion is to put factual or personal, as well as open-ended questions, at the end of the questionnaire. In this way, students do not spend too much time answering them at the start of the questionnaire which might not allow them enough time to complete the entire questionnaire (Dörnyei & Taguchi, 2010).

Questionnaires are either self-completed or administered in groups. The disadvantage of the former is that it may have low return rates and that there would be no one to offer clarification on certain questions. Leedy and Ormrod (2013) concur with Dörnyei and Taguchi (2010), and suggest that researchers should choose an appropriate time to request for questionnaires to be completed, motivate potential respondents, make a good first impression, offer results of the study and be gently persistent. The latter, group administration of questionnaires, is popular in L2 research as administering them is easy to arrange and often referred to as "captive groups" (Dörnyei & Taguchi, 2010, p. 82). Even though these have the advantage of having a response rate of nearly 100%, researchers should still give respondents enough advance notice and communicate the significance and purpose of the survey, emphasise confidentiality, read out questionnaire instructions, pay attention to the layout of the questionnaire and promise feedback on the results. Dörnyei and Taguchi (2010) are of the opinion that this will create a positive climate for administration and raise the professional feel of the survey, as well as promote positive participant attitudes.

Online questionnaire administration is becoming increasingly popular, because it saves time as well as costs, and populations that would otherwise be very difficult to reach become accessible (Dörnyei & Taguchi, 2010).

All the factors discussed in this section were taken into account in deciding to make extensive use of questionnaires in the current research to collect qualitative as well as quantitative data (cf. table 2).

4.4.1.2. Interviews

In many ways self-completed questionnaires and structured interviews are similar methods of carrying out social research. Brynman (2004) is of the opinion that the fundamental differences are that the former does not require an interviewer to ask the questions and are shorter, hence, it reduces the risk of respondent fatigue and generally have designs that are easy to follow. Therefore, it is argued that the same disadvantages researchers have to be aware of when using questionnaires in their research also apply when using structured interviews as a research tool (Brynman, 2004). There are, however, a number of advantages for researchers to take note of when using the self-completed questionnaire rather than the structured interview. Firstly, self-completed questionnaires are cheaper and quicker to administer. In addition, since during face-to-face interviews, characteristics such as ethnicity, gender and social background of interviewers may contribute to bias towards the answers of respondents, the use of self-completed questionnaires minimises the effects that interviewers may have on respondents. Another advantage is that no interviewer variability will occur and, finally, completing self-completed questionnaires seems to be more convenient for respondents (Brynman, 2004).

A distinction is made between quantitative and qualitative interviews. More structured, face-to-face interviews are examples of the former, while open-ended interviews are examples of the latter. Leedy and Ormrod (2013) assert that while researchers ask a standard set of questions and nothing more during structured interviews, qualitative interviewing is much less structured, even to the extent that some are semi-structured and others are completely unstructured. The latter is flexible, like a conversation, and is likely to yield information the researcher did not ask for. Brynman (2004) believes that the advantages of this type of interviews are that the knowledge of and understanding about certain issues can be tapped into, new ideas can be explored and can be used to develop closed-end or fixed-format questions/answers. The disadvantages, on the other hand, are that such data are time consuming to collect and to decode and usually require greater effort from both respondents and researchers or interviewers (Brynman, 2004). Finally, while it is custom to record and transcribe interviews, the former does not always occur

as recordings might disturb some participants (Brynman, 2004). Hence, not all interviews are transcribed.

As seen in the discussion above, questionnaires and interviews share various similarities. For example, Teddlie and Tashakkori (2009) state that both seek to determine the attitudes, feelings and beliefs of respondents towards the topic of interest; both involve self-reports, both can be used in qualitative, quantitative and mixed method research, and both use a variety of somewhat overlapping formats. Therefore, if used together, they generate a complex mix of data, a factor that contributed in using such a combination in the current research.

In the current research, unstructured, qualitative interviews were used (cf. table 2).

4.4.2 Experiments and quasi-experiments

True experiments involve selecting members of the research population to be included (sample) on a random basis to experimental and control groups in order to eliminate any subjectivity that may affect the outcome of a study (Dörnyei & Taguchi, 2010). In quasi-experiments, subjects are not randomly assigned to experimental and control groups (Leedy & Ormrod, 2013). In other words, these are studies that have certain characteristics of experimental testing, but do not fulfil all the internal validity criteria to the extent that its design and data allow a researcher to draw legitimate conclusions about cause-effect relationships testings (Brynman, 2004). Leedy and Ormrod (2013) suggest that one way to ensure internal validity is to keep some things constant (i.e., one researcher) and to include a control group, as it was done in the current study.

As it is summarised in table 2, the current study conducted a quasi-experiment due to the nature of the research. This was done even though the aim of the study was not to result in reading score improvement (cf.1.4).

4.4.3 Tests

Tests can be standardised, criterion-referenced or teacher-made. In addition, testing is a way of collecting data, and they provide useful information about performance at one

specific point in time. (Richardson et al., 2012). However, in the context of EAP instruction, the context of the current study, Dudley-Evans and St John (1998; 2000) maintain that because it is only one piece of data for evaluation, test results should rather be seen as a starting point for genuine interaction between course instructor and learners. They further argue that the value of any test depends primarily on how it is used (cf. 2.7.5).

When and how the tests that were used in the current study were employed are summarised in table 2.

4.4.4 Observation

Observation, where the phenomenon that is studied is observed in its natural setting, is of great value for many research purposes. During observation, the researcher can be a participant or a non-participant observer (Leedy & Ormrod, 2013). It is generally agreed that its biggest strength is that it provides researchers with *direct information* other than self-report accounts (Dörnyei & Taguchi, 2010; Leedy & Ormrod, 2013; Morgan, 2014). Morgan (2014) argues that in the process, the researcher is provided with rich observations to create a more holistic understanding of why things happen in a certain way. Similarly, Dörnyei (2007) concedes that it is a valuable tool to provide descriptive, contextual information about the setting of the targeted phenomenon.

Observations seem to be useful for subjective (Morgan, 2014), as well as objective (Dörnyei & Taguchi, 2010), purposes. The subjectivity is reflected in the evidence that it allows for the interpretation of perspectives of others. In the process, researchers become immersed in the world of others' lives in an attempt to understand what that world means to them. In addition, the closeness experienced with participants allows for probing and engagement and causes interpretations to be developed in a subjective way, as generally happens during participant observation in action research (Morgan, 2014). On the other hand, Dörnyei and Taguchi (2010) believe that observations provide objective accounts to back up the subjective, self-reports from participants. To this end, Leedy and Ormrod (2013) advise researchers to be objective when taking field notes and not to confuse actual observations (objective accounts) with interpretations (subjective accounts).

Finally, it should be noted that a possible challenge could be that this method continually requires the researcher to encounter and to make sense of unfamiliar events (Morgan, 2014). This could especially be relevant to EAP conditions where the EAP instructor is not a content expert as was the case in the current study (cf. 2.5).

Class room observations can take different forms. For example, they can be structured or unstructured. The former refers to a process where one collects quantitative data and the latter to when one collects qualitative data (Dörnyei, 2007). It should be noted that observations in qualitative studies are *intentionally* unstructured and free-flowing to allow for flexibility. In other words, the researcher can take advantage of any unforeseen data sources as they surface. Morgan (2014) notes two important aspects to consider during classroom observations. Firstly, one should remember that this type of research always involves a choice whether to pay more attention to some and/or less attention to other things. Secondly, nothing is context-free and everything that is observed is connected to something else.

Observations can be done either with audio or video recordings or by writing everything down. The first two methods have the drawback that background noise can slip in, that it may be defective or that it may make participants uncomfortable. Dörnyei (2007) believes that video-recordings are the most useful, but indicates three problems with these. One is that a fixed camera can only see what it is pointing at, secondly, such recordings are costly, and thirdly, these often cause distraction. Written notes, on the other hand, may not capture the richness of the situation and require objectivity.

As class observations were also employed as data collection tools in the current study (cf. table 2), all the factors elaborated on in this section were considered.

4.4.5 Content analysis

Content analysis of documents, like archives, minutes, textbooks, etc., is "a detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes or biases" (Leedy & Ormrod, 2013, p. 148). It requires a great amount of planning, are not necessarily stand-alone projects and might be used to

flesh out complex, multidimensional aspects of a study. Brynman (2004) adds that this is not limited to qualitative studies and that qualitative researchers may apply quantification methods to analyse documents.

Leedy and Ormrod, (2013) provide the following guidelines to follow during content analysis.

Table 28: Guidelines to follow during content analysis

Guidelines to follow during content analysis
Be systematic, and as objective as possible; Identify a specific body of material to be studied. If it is big, select a sample, if small, study it in its' entirety; Define which characteristic or qualities to examine as precisely and concretely as possible. Provide examples; Divide lengthy, complex items into small, manageable segments to analyse separately; Scrutinise material for instances of each characteristic or quality observed as identified in step 3; Tabulate the frequency of each characteristic found.

(Leedy & Ormrod, 2013, p. 149)

Content analysis was crucial in the collection of data in the current study (cf. table 2). This was done, keeping the above guidelines (cf. table 28) in mind.

4.4.6 Journals

Journals, also referred to as diary entries or memos, are notes that researchers jot down about their initial interpretations of what they see and hear. These notes are either structured or free text entries. The advantages of using journals in research are well documented (Brynman, 2004; Leedy & Ormrod, 2013; Nunan & Choi, 2011; Tsui, 2011).

For example, this commonly allows researchers opportunity for critical self-reflexivity (Nunan & Choi, 2011; Tsui, 2011) one of the key features of action research (Koshy et al., 2011). In addition, such notes are useful to be read by other practitioners and sharing such reflective writings allows for engagement in collaborative reflections (Tsui, 2011). Finally, journal entries can serve as a means of data collection, as a document or as a log of the researcher's activities (Brynman, 2004). It is for these reasons that journals were also used as data collection tools in the current research (cf. table 2).

The ultimate goal of data collection would be to describe, display, interpret and explain data collected afterwards. This section has looked at various data collection tools, specifically those that were used in the current study. The next section will elaborate the process of data analysis. As various options are available, only those that are relevant to the current research will be discussed.

4.5 Data analysis

Data analysis typically takes place after data have been collected in order to make sense of the data. As hinted at in section 2.3, one of the challenges of conducting MMR is that the researcher needs to acquire skills to conduct both qualitative and quantitative research. However, data analysis could potentially present the biggest challenge in MMR. This is possibly because various options for processing qualitative, as well as quantitative, data exist. For example, depending on the type and size of the data set, researchers can decide between manual processing methods or various computer programmes.

The following sections will briefly elaborate some aspects to consider when analysing quantitative and qualitative data, in particular those that are significant for the current study.

4.5.1 Analysis of quantitative data

Dörnyei and Taguchi (2010) describe three distinct stages contained in analysing quantitative data. These involve coding, data cleaning and then data manipulation. Firstly, coding refers to the process of giving each data collection tool (such as

questionnaires) a unique identification code in sequential order. In the process, answers to questions should also be coded by using a numerical score. Secondly, data cleaning refers to the process of correcting as many human errors and inaccuracies that occurred during the data entering phase as possible. During the third phase, data manipulation, researchers make changes to the data set prior to the analysis (like dealing with missing data), to make the analysis more appropriate for certain statistical procedures.

The standard procedure to analyse quantitative data is by means of submitting them to various statistical procedures. By doing so, one can distinguish between descriptive and inferential statistics. Descriptive statistics are used to summarise sets of numerical data with the aim to describe the population being studied. Such descriptions do not allow for any general conclusions that would go beyond the sample (Christ, 2010; Dörnyei & Taguchi, 2010; Larson-Hall, 2010). The following are all examples of descriptive statistics: frequency distributions; measures of central tendency, such as the mean and range (minimum and maximum values) of a variable; mode and median; the standard deviation of results (an index of the average disparity among the scores), as well as graphs like pie and bar charts that describe the data. In other words, with descriptive research a situation is described as it is (Leedy & Ormrod, 2013).

While descriptive statistics describe a sample, inferential statistics infer predictions about a larger population that the sample represents. Inferential, statistical procedures can be used to test hypotheses, make estimations by using sample data, and generalise findings. For example, statistical significance denotes whether a particular result is powerful enough to indicate a more generalizable phenomenon. To address this issue of generalisation, tests of significance, such as chi-square or t-tests, for example, can indicate the probability whether the results of the analysis could have occurred by chance or not. Important factors in statistical significance are the size of the sample investigated and the magnitude of the result. In other words, if a result is significant, we actually say that the observed phenomenon is real and not just by chance (Dörnyei & Taguchi, 2010; Larson-Hall, 2010). Other examples of inferential statistics are t-tests, ANOVA, correlation analysis, Levene's test of homogeneity, to name a few. A t-tests is a parametric test that is used when you have one independent variable with only two levels and one dependent variable. It is performed to determine if two groups are different from each other. Levene's test for equal variances is done to establish if the variances between

the two groups were equal (Larson-Hall, 2010). The Statistical Package for the Social Sciences (SPSS) is a powerful statistical package specifically designed to analyse data from the social sciences but it is now used by a variety of fields and individuals. It is regarded as the market leaders in processing quantitative data (Dörnyei & Taguchi, 2010; Leedy & Ormrod, 2013).

Since action research studies are rarely designed to make broad generalisations, the researcher investigates a sample with the sole purpose of wanting to know more about the particular people under investigation only, as it was the case in the current study. As a result, generalisation is not a key factor and the use of inferential statistics not so important. To this end, Koshky (2005) emphasises that big claims of generalisation can only be made with big samples. Consequently, descriptive statistics that do not allow for any general conclusions that would go beyond the sample are appropriate for action research projects (Christ, 2010; Dörnyei & Taguchi, 2010; Larson-Hall, 2010).

4.5.2 Analysis of qualitative data

Dörnyei and Taguchi (2010) also discuss the analysis of qualitative data where researchers do not have pre-coded response options. In order to limit subjectivity, it is suggested that each response should be carefully considered and any distinctive content elements, essential statements or key points, should be marked. Next, based on these elements, broader categories or themes are formed to describe the contents of the response in a way that allows for comparisons with other replies. It should be noted that if required, qualitative data can be quantified and analysed through SPSS. In order to do this, responses are coded and used to represent responses numerically. Qualitative data can then be entered into an SPSS data file as quantitative data and analysed as appropriate.

The following section will elaborate the data interpretation stage that typically takes place after the data have been collected.

4.6 Data interpretation

In action research studies, it is often difficult to separate the data interpretation stage from the data collection stage, revealing the truly, cyclical nature of this type of research. With reference to their action research cycle in conducting research in L2 reading, Grabe and Stoller (2011) suggest that one should often revisit steps to generate conclusions to implement.

They also suggest ten specific questions to consider during the data interpretation stage. These are as follows.

Table 29: Questions to consider during data interpretation

Questions to consider during the data interpretation stage of reading action research studies
1. What do students mean? 2. What have I learnt myself, about students, reading, reading instruction, and reading curriculum? 3. How can these insights be used to improve teaching and learning in my classes? 4. Which aspects of classroom teaching should remain the same and which should be modified, how might I modify instruction to create a more effective learning environment? 5. What were the weaknesses of my action research? 6. What limitation should I take into account when reflecting on results? 7. Would I take this research one step further to learn even more about the topic? 8. What new questions do I have now? 9. Could these new questions be used as a springboard for future action research projects? 10. How might I structure future action research projects based on this experience?

(Grabe & Stoller, 2011)

Answers to the above questions should be considered in order to allow instructors not only to arrive at a better understanding, but also to take practical steps to improve classroom instruction, find practical solutions, implement and monitor these (Grabe & Stoller, 2011). Similarly, Onwuegbuzie and Dickinson (2007) contend that the PMARS researcher plays an important role in not only designing new or modifying existing programmes, but also in evaluating them.

This section has dealt with data analysis and the interpretation thereof. The next three sections will deal with important aspects of conducting any empirical study, namely sampling, piloting and ethical considerations.

4.7 Considerations in data collection

4.7.1 Sampling

It is usually not possible to do research on the entire research population. Therefore, the sample, whom the researchers actually examine, should be representative of the target population. In other words, a good sample is regarded as one that is very similar to the target population in its most general characteristics (Dörnyei & Taguchi, 2010

Convenience sampling is the selection of a sample when an important criterion is convenience or accessibility for the researcher (Dörnyei & Taguchi, 2010). The sample for the current study was also selected due to convenience, but more specifically, it was purposive sampling. The latter seems to be the most common sample type in L2 research (Brynman, 2004; Dörnyei & Taguchi, 2010) and also of those action research studies that employ MMR (Onwuegbuzie & Dickinson, 2007). Purposive sampling refers to the selection of a sample according to the purpose of the study and whether the sample meet certain practical criteria, such as geographical proximity, availability at a certain time or easy accessibility. Furthermore, purposive sampling means that besides their relative ease of accessibility, participants also have to possess certain characteristics that are related to the key characteristics and the purpose of the investigation. In other words, researchers select individuals and objects that address specific purposes related to the research questions and that would yield the most information about the research questions and the type of research being conducted (Brynman, 2004; Dörnyei & Taguchi, 2010; Leedy & Ormrod, 2013; Teddlie & Tashakkori, 2009).

Within the context of MMR, Creswell and Plano Clark (2011) and Teddlie and Tashakkori, (2009) remind researchers that MMR sample sizes typically include combining two different types of sample sizes: larger quantitative samples and smaller qualitative research samples. Consequently, MMR researchers are advised to plan ahead

and to ensure that the sampling size is consistent with the research goal(s), objective(s) and question(s), data collection tools/instruments. However, one probably needs to take a more flexible approach when combining MMR with action research, a type of research that is emergent. Often researchers would have to gather additional data and they cannot always determine all samples beforehand. Taking this into account, Grabe and Stoller (2011) believe that in spite of the often unpredictable nature of action research, what should remain constant in action research is the careful, regular and systematic collection of data. Therefore, it would appear as if researchers who undertake mixed methods action research projects should combine the advice provided by Creswell and Plano Clark (2011), Teddlie and Tashakkori (2009), as well as Grabe and Stoller (2011). In other words, they need to plan ahead as much as possible, but they also need to be flexible enough to make adjustments as required. Finally, it is worth observing that Brynman (2004) is of the opinion that in terms of generalisability, irrespective of the sampling techniques applied and sampling sizes, any findings can only be generalised to the population from which the sample was taken.

4.7.2 Piloting

Brynman (2004) asserts it is not only advantageous to conduct a pilot study, but it is an integral aspect of research in general. By way of concurring with this statement, Teddlie and Tashakkori (2009) add that in a pilot study, procedures are tested, possible problems in data collection are identified and, also, that it sets the stage for the actual study.

Questionnaires, specifically, should be piloted, ideally on a sample of people who are similar to the target sample the instrument is designed for. Dörnyei and Taguchi (2010) believe that these trial runs would allow the researcher to collect feedback regarding how well the instrument works and whether it measures what it was intended to measure. For example, ambiguous or too difficult questions may be highlighted. Piloting can also indicate pitfalls or problems in the administration of the questionnaire, the scoring and processing of the answers, the overall appearance of the questionnaire, the appropriateness of the cover letter, editing, as well as the length of time it takes to complete.

4.7.3 Ethical considerations

Whenever we use humans they should be treated fairly and with respect, as well as responsibly. This essentially means that projects should not cause participants any risk, harm, distress or disadvantage. Burns (2011) is of the opinion that these factors are especially important in action research projects, as participants need more understanding of the complex ethical issues that may not be as prevalent in traditional qualitative and quantitative methods.

Dörnyei and Taguchi (2010) identify two key factors to consider, namely confidentiality and consent of participants. 'Confidentiality" refers to the following: when research findings are disseminated, participants should be protected by not revealing their identities and maintaining confidentiality (Dörnyei & Taguchi, 2010; Grabe & Stoller, 2011). Burns (2011) is of the opinion that confidentiality becomes of particular importance in localised situations, such as action research projects, where participant identity may easily be uncovered. The researcher should, therefore, provide true information about the extent to which responses will be held confidential, as well as how and for what purposes the data will be used and shared with other researchers in the academic community. All in all, it is imperative that no harm should come to respondents as a result of their participation in the research, and it is the researcher's moral and professional obligation to maintain the level of confidentiality that was promised to respondents at the onset.

Even though complete anonymity should be granted in the dissemination of findings, this concept might not be advisable during participation as one might want to link data collected from one source to data from other sources (Dörnyei & Taguchi, 2010) or use contact details to contact respondents in a follow-up phase (Leedy & Ormrod, 2013). As a possible solution to this dilemma, Leedy and Ormrod (2013) advise to request personal information and then inform respondents about the possibility that they may be contacted in a follow-up phase of the study. Also, another consideration is that, especially in action research studies, the identity of certain participants could easily be inferred, especially when the sample is small.

Soliciting informed consent, in general, refers to informing participants about the study and asking for their volunteer participation (Dörnyei & Taguchi, 2010). In other words, the purpose of the study should be fully disclosed (Creswell, 2014). Furthermore, while Creswell (2014) cautions that the norms and characters of indigenous cultures should be respected and participants should not be coerced into signing consent forms, Burns (2011) is of the opinion that students might feel obliged to participate. In the case of minors, Dörnyei and Taguchi (2010) advise that permission to conduct the survey should be obtained from someone who has authority. Finally, permission to conduct research should also be obtained from relevant stakeholders. Official requests should outline the aims, research design, methods of research, as well as the importance and relevance of the survey to education (Dörnyei & Taguchi, 2010).

Various other ethical issues to be considered are also mentioned in the literature. For example, Creswell (2014) is of the opinion that researchers should identify a *beneficial* research problem, in other words, one that will benefit individuals being studied and not only assist the researcher to solve the research question. Grabe and Stoller (2011) concur with this view and caution researchers to make sure that all participants receive the benefits and to avoid deceiving, exploiting and collecting harmful information from participants. Another concern raised by Creswell (2014) is that during the research, one should respect the research site and disrupt it as little as possible. It is, furthermore, recommended to report only positive results afterwards, not to falsify authorship, evidence, data, findings or conclusions and not to plagiarise information.

This completes the first part of Chapter 4. As outlined in the introduction of this chapter (cf. 4.1), this part of Chapter 4 dealt with research methodology in general. In the process, various research paradigms, research designs and specific data collection tools that are relevant to the current study were elaborated. This second part moves on to describe in greater detail how this information was applied in the planning of, as well as the approaches taken to, data collection and analysis in the different phases of the study. In other words, it explains the specific research design and methodological norms, such as participants, instruments and research procedures, that were employed in this specific study, the phenomenon being studied, personal experiences of the researcher, as well as the target audience (Gilbert, 2009).

SECTION B

4.8 Methodology of the current research

4.8. Introduction

Designing the reading course for specific purposes that this document is reporting on involved several considerations, stages and participants. This section presents the methodology of the study that was used to collect the data to answer the research questions and to prove or disprove the research hypothesis. Firstly, the research questions and hypothesis will be presented. Then the research design and research methodology will be described, after which the participants will be discussed. Thereafter, the measurement tools, the data collection procedure and the tools to analyse the data will be presented. Then, a description of how the data were analysed will be presented, before a detailed description of Phase 1 of the research project will commence.

As already mentioned in Chapter 1, (cf. 1.4), the following research questions and one hypothesis informed the research design:

The study posed the following research questions and one hypothesis:

1. In what subject did first-year students from the School of Medicine at UNAM need more assistance?

(a) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by informal interviews with students?

(b) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by questionnaire responses of students?

(c) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by the 1st semester examination results?

2. In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance?

(a) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance as revealed by the questionnaire responses of students?

(b) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance as revealed by the content lecturer of the target subject?

3. Who are my students and what are their literacy backgrounds, reading habits and attitudes towards reading?

4. What are the academic vocabulary levels of 1st year students from the School of Medicine at UNAM?

5. What are the academic reading needs of students who are enrolled for the target subject?

(a) What are the academic reading needs of students who are enrolled for the target subject according to their own point of view?

(b) What are the academic reading needs of students who are enrolled for the target subject according to the view of their content lecturers in 2012 and 2013?

(c) What are the academic reading needs of students who are enrolled for the target subject according to a reading expert?

6. To what extent does the content of the generic ULEA course cater for the academic reading needs of first-year students from the School of Medicine at UNAM?

7. What are the possible criteria for the design of academic English reading courses for specific purposes?

8. What are the criteria against which such a course may be assessed?

9. How effective was the new reading course?

(a) To what extent did the intensive reading component of the new reading course meet the expectations of students?

(b) To what extent did the extensive reading component of new reading course meet the expectations of students?

(c) Did the students in the intervention group outperform those in the control group in the stereochemistry test that was written at the end of the new reading course?

10. What are the challenges experienced by an EAP course developer who is not a content expert?

Hypothesis 1

From research question 9 (c), the following hypothesis was developed.

Hypothesis 1

H1

After a 10 hour reading intervention programme, there will be a significant difference in the test scores of the intervention group when compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Null Hypothesis:

After a 10 hour reading intervention programme, there will not be a significant difference in the test scores of the intervention group when compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

4.8.1 Research design

The research design chosen for this study was an action research design, regarded to be the most appropriate to combine Content Based Instruction (CBI) with academic reading (Grabe & Stoller, 2013). Mixed-methods research was employed. The relevant, practical, participative and interpretive characteristics of action research seemed ideal to allow me to become closely involved in deliberately improving what seems to be ad hoc EAP course design conditions (Hutchinson & Waters, 1987; 2009) at the UNAM LC, as these concern me personally. In the process, the aim was to effect lasting and useful changes to improve reading instruction conditions at the institution, and in particular, in a desirable way but also to enhance my classroom teaching.

As suggested previously (cf. 4.3), it is best to adjust prototypes to contexts as required. Hence, three models, in particular, were instrumental in developing the action research model that shaped the current study. These are:

- Hutchinson and Waters's (1987) needs analysis framework (cf. table 5)

- Onwuegbuzie and Dickinson's (2007) framework for mixed methods action research combined with active participation from stakeholders (PARS) (cf.4.3.2)
- Grabe and Stoller's (2011) framework for conducting action research with the focus on academic reading (cf. 4.3.2).

These three models have all been elaborated previously and are all relevant to the current study for different reasons. For example, Hutchinson and Waters's (1987) model is designed for the development of EAP courses in particular, such as the case of the current study, while Onwuegbuzie and Dickinson's (2007) PARS model emphasises the importance of involving stakeholders in the action research process. Finally, Grabe and Stoller's (2011) model describes the combination of the core elements of the current study, namely action research, mixed methods, as well as EAP reading practices. The following table includes a summary of all the steps suggested by combining these three models. Several similarities, but also differences were observed.

Table 30: Summary of steps for mixed methods action research in academic reading

Step	Researcher
Identify an issue or problem to investigate;	Grabe & Stoller, 2011. Hutchinson & Waters,1987. Onwuegbuzie & Dickinson, 2007.
Form collaboration with key stakeholders;	Onwuegbuzie & Dickinson, 2007.
Understand context, and review the relevant literature;	Onwuegbuzie & Dickinson, 2007.
Narrow the focus of enquiry;	Grabe & Stoller, 2011.
Formulate research questions and/or hypothesis;	Onwuegbuzie & Dickinson, 2007.
Develop a collaborative research plan of action;	Onwuegbuzie & Dickinson, 2007.
Anticipate time and outcomes;	Grabe & Stoller, 2011.

Step	Researcher
Specify the type(s) of data to collect in an ethical manner;	Grabe & Stoller, 2011.
Collect data systematically; Collect the data;	Onwuegbuzie & Dickinson, 2007.
Examine and analyse data;	Onwuegbuzie & Dickinson, 2007. Grabe & Stoller, 2011.
Analyse the target situation; Analyse the learning situation;	Hutchinson & Waters, 1987.
Reflect on results;	Grabe & Stoller, 2011.
Interpret the findings;	Onwuegbuzie & Dickinson, 2007.
Design data-driven action/intervention;	Onwuegbuzie & Dickinson, 2007.
Generate practical solutions;	Grabe & Stoller, 2011.
Write syllabus; Write materials; Teach materials;	Hutchinson & Waters, 1987.
Evaluate the action/ intervention;	Onwuegbuzie & Dickinson, 2007.
Experiment with and monitor solutions;	Grabe & Stoller, 2011.
Evaluate learner achievement;	Hutchinson & Waters, 1987.
Share insights with colleagues.	Grabe & Stoller, 2011.

From these steps, a model to conduct the current study was developed by combining relevant elements from each of these three models, but also by adding some perceived lacks, such as the development and piloting of data collection tools. It resulted in the development of a 17-step model to design a mixed methods action research project to develop the EAP reading for specific purposes course for the current study (cf. table 33). This model is labelled a MMAARR (Mixed Methods Academic Action Reading Research).

Table 31: MMAARR (Mixed Methods Academic Action Reading Research)

A Mixed Methods Action Research Plan for designing a reading course for Specific Purposes
1. Identify issue to investigate; 2. Obtain ethical clearance; 3. Form collaboration with key stakeholders; 4. Review the relevant literature; 5. Formulate research questions and or hypotheses; 6. Specify the type(s) of data to collect; 7. Develop data collection tools; 8. Pilot data collection tools; 9. Analyse and evaluate target and learning situations; 10. Narrow the focus of enquiry; 11. Design strategies for data-driven action based on criteria identified; 12. Implement data-driven action; 13. Evaluate the course; 14. Monitor the course; 15. Reflect on insights; 16. Share insights with colleagues

Figure 8 summarises this model. The diamond shape at the centre of the model makes use of the recent idea of crystallisation that seems to illuminate contexts more than triangulation does. This idea is based on the argument that the concept of triangulation suggests a rigid, two-dimensional object and it is too restrictive to describe the aims of mixed methods research. It is, therefore, argued that "we do not triangulate, we crystallize" (Ellingson, 2008, p. 3), since using a crystal as the central image allows researchers to view situations from multiple perspectives or facets and with the continuous knowledge that there is always more to explore. Gerard and Begley (2004, p. 389) are of the opinion that the assumption that triangulation is restricted to exposing three sides is a misconception, and researchers should not be in haste to abandon "the well-examined approach of triangulation".

My use of the diamond shape in the centre of the model does not imply the abandonment of the idea of triangulation. Neither does it imply 'crystallization' and 'triangulation' are regarded as the same phenomenon or as synonyms for the same concept. imply different approaches to research. This being said, the multifaceted nature of the crystal image does imply a less rigid approach and I use the image for this reason.

It should be noted that an "emergent design" (Leedy & Ormrod, 2013, p. 260) and not a fixed one was followed, as most of the steps in the action research cycle were carried out in a recursive fashion (Creswell & Plano Clark, 2011). This is represented by the arrows that point both ways, as well as by the multiple-pointed diamond shape in the middle of the following diagram.

MMAARR

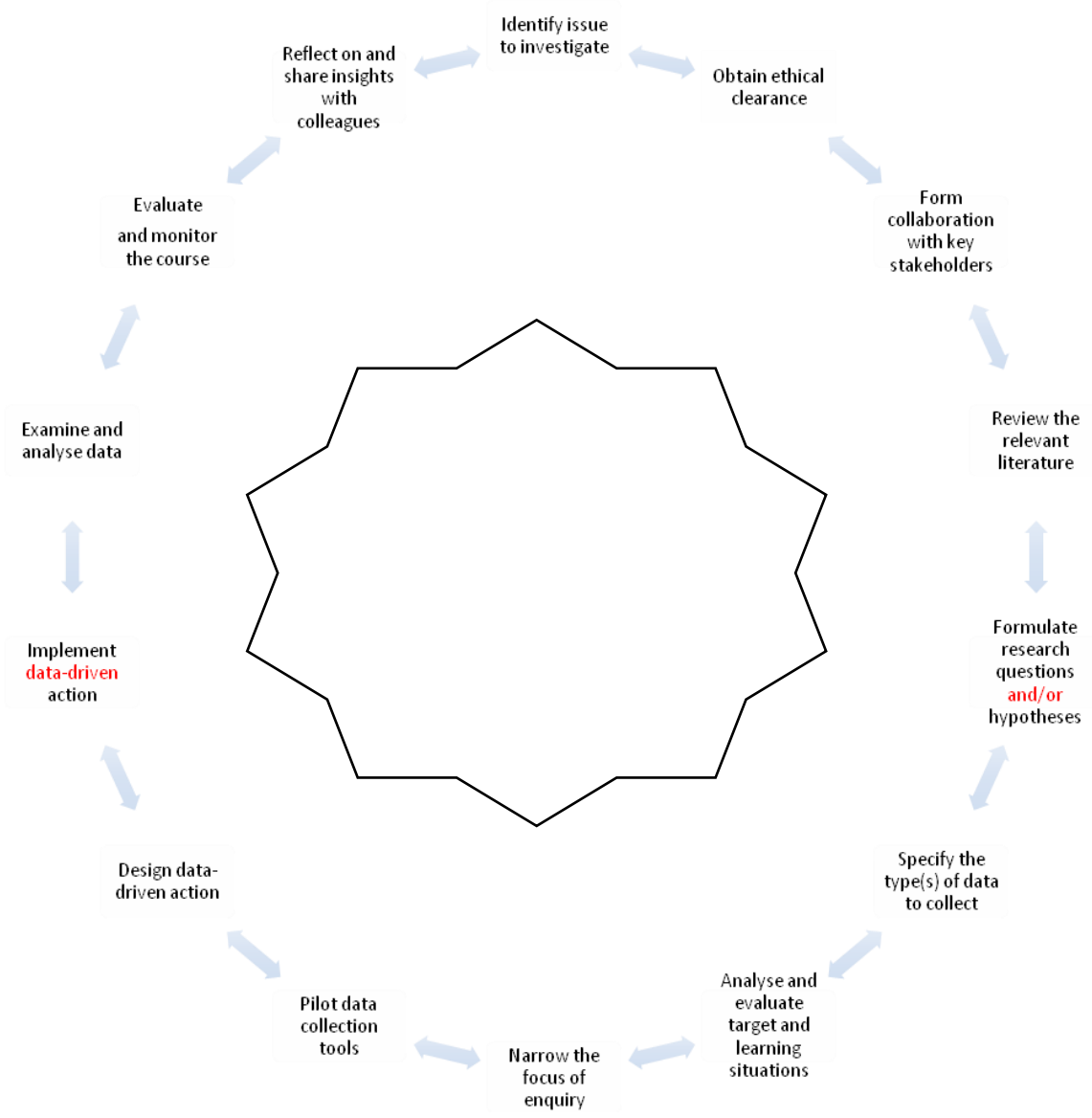

Figure 8: Illustration of the iterative, cyclical nature of the action research process (MMAAR)

4.8.2 Phases of data collection

Based on the 17 steps suggested in the model, the research was conducted in six phases, namely exploration, needs analysis, setting criteria for developing the new reading course, developing the reading programme, evaluating the reading programme and reflection. These six phases, as well as how they correspond with the different steps in the MMRR model, are outlined in the following table.

Table 32: Different phases of current study and corresponding steps in MMAARR

Different phases of current study	Corresponding step(s) in MMAARR
PHASE 1: Exploration	1. Identify issue to investigate;
	2. Obtain ethical clearance;
	3. Form collaboration with key stakeholders;
	4. Review the relevant literature;
	5. Formulate research questions and/or hypotheses;
	6. Specify the type(s) of data to collect;
	7. Develop data collection tools;
	8. Pilot data collection tools.
PHASE 2: Needs analysis	9. Narrow the focus of enquiry
	Analyse and evaluate target and learning situations.
PHASE 3: Setting criteria for developing the new reading course	Design data-driven action.
PHASE 4: Developing the new reading programme	Implement data- driven action.
PHASE 5: Evaluating the new reading programme	Evaluate the course. Monitor the course.
PHASE 6: Reflection	Reflect on insights. Share insights with colleagues. Share insights with wider academic community

More detail about each of these phases will be provided in the following sections and chapters. But first, a general summary of the participants, as well as the data collection tools that were used to conduct this study, will be provided. Thereafter, Phase 1 will be discussed in more detail.

4.8.3 Participants of the study

Through purposive sampling, different participants were located to participate in the various phases of the project. All participants in the current research project were affiliated to UNAM. The different groups were:

- 1st year UNAM students from the School of Medicine (2011-2013);
- Three UNAM lecturers from the School of Medicine (2012-2013);
- 1st year UNAM students from the Language Centre at the Main Campus (2012);
- One UNAM lecturer from the Language Centre, namely the researcher.

Sample sizes varied due to the issue that different participants were involved in the different phases of the research project, and also because in mixed methods research, sample sizes typically comprise larger quantitative samples and smaller qualitative samples (Teddlie & Tashakkori, 2009).

This section only provided a brief overview of the different participants in the study. Detailed information about each sample group will be provided when each of the phases are described in more detail.

4.8.4 Measurement tools

As indicated previously (cf. 1.5) various measurement tools were employed to collect the quantitative, as well as qualitative, data in the study. As each phase of the study will be explained, more details regarding the specific data collection tools used in each will be provided.

4.8.5 Piloting of data collection tools

With the exception of the tests to collect data used in this study (Nation's Vocabulary Levels Test and the biochemistry test) and the student records, all other data collection tools were self-made. Therefore, wherever possible, the piloting of all questionnaires occurred with participants that closely resembled the target audience, as suggested by Dörnyei and Taguchi (2010).

Questionnaires 1 and 2 were piloted in 2012. Afterwards, they were combined to become questionnaire 4 that was used in the main study in 2013. Questionnaire 3, the formal interview/questionnaire with the content lecturer in 2012 was edited for grammatical correctness, as were questionnaires 5 and 6. These two questionnaires evaluated the intensive and extensive reading components of the course and could not be piloted on students from the School of Medicine in the same year that the main study took place, because there is no second semester intake for ULEA on that campus. It should also be noted that all data collection tools were scrutinised by my supervisor for input.

4.8.6 Data analysis

The Statistical Package for the Social Sciences (SPSS) was used to analyse the quantitative, as well as the qualitative, data generated in this study by means of descriptive and inferential measures, where appropriate (cf. 4.5). It should be reiterated that because of the small sample size, as well as the action research nature of the study, the aim was not to make big claims of generalisation (Koshky, 2005). As a result, descriptive data were mainly analysed by using frequency counts, as well as other fitting methods of presenting the data, such as different types of graphs and tables. However, in order to test hypothesis 1, inferential statistics, such as the independent samples t-test, Levene's test for homogeneity between the two means and correlation tests were carried out. The t-test for unrelated samples was applied in order to compare the scores of the two similar groups in the post-test. Levene's test for equal variances was done to establish if the variances between the two groups were equal.

As it was suggested earlier (cf. 2.2.2.3), doing MMR requires the researcher to have advanced knowledge of qualitative, as well as quantitative, research methods, and often assistance is called for from elsewhere in order to conduct the research accurately. Therefore, prior to the data collection phase of this study, I attended an introductory SPSS course to become familiar with the basics of the programme. However, during the data analysis stage, I did obtain help from a qualified statistician from the Department of Statistics at UNAM who monitored my work to ensure that I followed the correct

procedures in analysing the data. As each phase of the study will be elaborated, more details regarding methods of data analysis applied in each will be provided.

In the rest of this chapter, Phase 1 will be reported on because much of the planning of the research methodology of the current study took place during this phase.

4. 9 PHASE 1: Exploration

As indicated in Figure 9 this phase of the study comprised eight steps and is representative of an exploratory, sequential (qual→QUAN+QUAL) mixed methods study. Each will now be discussed in more detail.

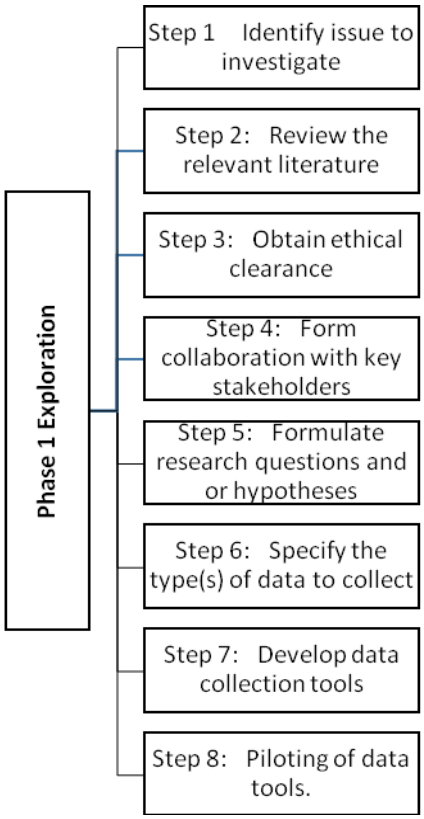

Figure 9: Phase 1

4.9.1 Steps in Phase 1

Step 1 Identifying the issue to investigate

Having been a lecturer at the LC at UNAM since 2001, I formed the general idea for this research project over the course of a number of years preceding the formal study. However, more structured planning for the doctoral research took place over a period of 3 years (2011-2013) during which time I was responsible each year for lecturing ULEA to the first-year intake from the School of Medicine. Therefore, the focus and discussion of this study are the students from the UNAM School of Medicine who were enrolled for the ULEA course during 2011 and 2013.

I have always sensed a general reluctance among UNAM students who obtained high symbols for English in their final school leaving examinations to do the courses at the LC. This reluctance seemed to be amplified among the students at the School of Medicine. As per UNAM requirements, medical students are also required to do ULEA, even though they have obtained top, high school, exit grades in various subjects, including English. I qualitatively observed this reluctance at the start, as well as during each semester. For example, at the *beginning* of each semester, requests for exemptions from doing the ULEA course were usually overwhelming. However, according to UNAM and LC criteria, exemptions are only granted if a student has done a similar course at another university. In addition, I observed their reluctance to do the course was further evident *during* the course when students, generally:

- only attended the required minimum number of classes, which are 80% per LC rules;
- did not participate in group discussions;
- pretended to type notes on their laptops but were actually browsing the internet or doing work for other courses;
- did not bring the ULEA study guides to class;
- did not do ULEA homework activities;
- were openly daydreaming and/or sleeping;

- explicitly asked about the purpose(s) for doing the course and
- did very well in their ULEA tests and examinations, with the minimum effort, compared to their peers at the Main Campus.

These observations depressed and concerned me, but also increased my intrinsic motivation to improve my practice. For example, I wanted to make my teaching methods, as well as the generic course, more challenging, as well as more interesting. I also wanted students to perceive the purpose for doing the course. I was hoping that if students could perceive the benefits of doing an EAP course, as discussed in Chapter 2, they might be more motivated to do it. However, I realised that adjusting my teaching methods would be easy to do, but that amending the current course content would not be possible due to three main reasons. Firstly, since this is a generic course that all first-year students do, they all write the same examination. As a result, adjusting their ULEA course content would imply a mismatch between content and assessment which could have disadvantages for the students. Secondly, the bulky content of the generic course did not allow for much time for extra, challenging and interesting activities to be added to the existing course. Thirdly, I was discouraged from doing the latter because students seemed to want to do the bare minimum to pass the generic ULEA course.

However, the idea to develop an ESAP course for students from the School of Medicine at UNAM slowly began to take shape, especially as I started to explore the literature. One important example is that my initial idea of developing a course called English for Medical Purposes, changed when I realised that at first-year level all their courses were only basic introduction to medicine-related courses and issues that would follow in coming years. It is important to note that even though the literature review is listed as Step 2 in this phase, it was actually an on-going process and not restricted to one phase of the study. Even though I had limited knowledge of their content courses, the literature review further prompted me to explore the possibility of developing an adjunct ESAP course, linked to one specific course, such as CBI adjunct courses advocated for in order to develop an EAP course that would be more meaningful to them. The two reports referred to in Chapter 1 (cf. 1.2) that highlighted the importance to revise LC courses to respond to needs from faculties (Bennet, 2013; The Centre for Quality Assurance and Management, 2013) and further provided evidence for the pressing need to revamp LC

course development. As was elaborated on in Chapter 2, EAP courses may include all four skills, but can also only focus on one. In the same vein, Burns (2009) recommends that action researchers should focus on one aspect that the researcher is interested in and motivated by to explore. Because of my passion for, and having obtained my Master's Degree in academic reading, academic reading became the focus of the new ESAP course.

I regularly had informal discussions with students in class regarding their reading habits, the various challenges regarding academic reading they experienced as students, the various courses they did, the reading requirements of each course, as well as who the responsible lecturers for each course were. In order to narrow down the focus of the adjunct, I was also keen to find out what subject they struggled with the most. These activities are typical of the strengths of exploring by collecting qualitative data at the start of a research cycle. Besides exploring many of the issues and areas that I was unfamiliar with, I especially became aware of my lack of content knowledge of their content subjects.

During this qualitative, exploratory phase, I made several observations. Firstly, it transpired that many students from the School of Medicine generally liked reading, although the majority indicated that they could not read as much as they wanted to, due to their heavy workloads. In addition, I discovered that these students received much more assistance from the government of Namibia to excel in their studies, compared to students at the main campus. For example, besides automatically receiving full bursaries to cover their tuition fees, all their textbooks were provided, and they were instructed in new, modernised classrooms. Please note that this is not so for UNAM students at the main campus. Only some are granted bursaries after application. Furthermore, students have to buy their own textbooks as only a few copies of each are kept in the library. In addition, classrooms at the LC classrooms at the main campus (where all the other UNAM students receive their ULEA instruction) are cramped, hot, with limited electronic equipment to use in lessons. The reason for this discrepancy is probably because the School of Medicine, having only been established in 2010, is one of the newest UNAM campuses. Also, the intake of students is, on average, not more than 100 first-year students annually, compared to thousands at the much older main campus. Another important observation was that the ULEA class at the School of Medicine

comprised students from the School of Medicine and the School of Pharmacy. The curricula of these two groups of students are more or less the same in their first-year. Therefore, it was decided by UNAM management to combine these two groups to attend overlapping courses, such as all UNAM core courses (Computer Literacy, Contemporary Social Issues, and ULEA) and three content courses, namely Physiology 1, Anatomy 1 and Biochemistry 1. Consequently, for the purposes of the research, the term '*students from the School of Medicine'* will refer to students from both the Medicine and Pharmacy Faculties.

A last observation was that during this qualitative, exploratory phase, it seemed as if the majority of students complained about the subject Anatomy 1.

The identification of the issue to investigate became clear: the development of an ESAP course for students from the School of Medicine at UNAM. Having had such informal, qualitative, exploratory input at the start of the programme assisted me to obtain a general sense of the characteristics of the students, as well as other issues related to the study, such as which subject could possibly become the adjunct, their reading abilities and habits, workloads and compulsory core subjects, who the different lecturers were, the course requirements, etc. In addition, it guided the research process, informed the development of data collection instruments and assisted in developing a programme to suit the participants. Very importantly, during this phase, I started to develop a relationship with the students who would form the main research group of the study. Furthermore, as I became aware of my limited knowledge of anatomy, I started to read up about this course, obtained a copy of the students' recommended textbook, bought an anatomy dictionary, collected interesting anatomy-related reading material to be used for the extensive reading programme (which seemed to be available in abundance) and established contact with the content lecturer. As was elaborated on in section 2.5.4, benefits such as these are well documented (Creswell & Plano Clark, 2011; Leedy & Ormrod, 2013; Morgan, 2014).

Step 2: Reviewing the relevant literature

Reflective of the iterative nature of MMR and action research studies, reviewing the relevant literature was an on-going process. However, at this stage of the study, it provided me with the required theoretical knowledge base to create and develop English for Specific Academic Purposes (with a focus on reading) and adjunct CBI courses, as well as mixed methods action research. The literature review further shaped the development of the research questions and hypothesis, the data collection, as well as data analysis and interpretation procedures.

Step 3: Obtaining ethical clearance

Once the research project was decided on, ethical clearance was obtained from the relevant stakeholders, such as the PVC of UNAM, the Director of the Language Centre, the Director of the Examination department, the Dean of the School of Medicine, the content lecturers, as well as the students (cf. Appendix B).

Step 4: Forming collaboration with key stakeholders

Collaboration with the stakeholders seemed to occur more or less at the same time as obtaining ethical clearance. However, because the direct and on-going involvement of the students, as well as the content lecturer, was vital, student collaboration was initiated during Step 1, and maintained until the end of the study. In addition, I contacted the anatomy lecturer, introduced myself in 2011, as well as the possible aims of my research, in order to establish a working relationship with her. This collaboration proved to be extremely useful, but two other content lecturers were also involved at a later stage, after the needs analysis had revealed that the target subject should be Biochemistry 1 and not Anatomy 1 as anticipated. The third group of important stakeholders was represented by my colleagues at the LC. It was important to provide them with regular updates, especially my Head of Department and Director, as they frequently had to give permission for leave to attend to studies or for supervisory visits.

Step 5: Formulating the research questions and/or hypotheses

The research questions that are listed in sections 1.4 and 4.8 informed the research design. These research questions dealt with the following 12 themes:

1. Identification of the target subject;
2. Identification of topics in the target subject;
3. Identification of student characteristics;
4. Establishment of vocabulary levels of students;
5. Establishment of the academic reading needs of students;
6. Evaluation of the effectiveness of the general ULEA course;
7. Establishment of the possible criteria for the design of academic English reading courses for specific purposes;
8. Establishment of characteristics of academic reading and approaches to the teaching and learning of academic reading;
9. Determining the teaching methods to be employed in the new reading course;
10. Determining the criteria against which such a course may be assessed;
11. Determining the effectiveness of the new reading course;
12. Reflecting on the challenges experienced by an EAP course developer who is not a content expert.

Step 6: Specifying the type(s) of data to collect

Developed from the thesis title, the research questions guided me in deciding what type of data to collect. As is typical of action research, the study was conducted in natural contexts, and involved close contact with the students. It was decided to combine the strengths of qualitative and quantitative data collection tools, hence, a mixed methods study, to answer the research questions. Various measurement tools were employed to

collect the quantitative, as well as the qualitative, data in the study (cf.1.5; table 2). These will be elaborated as the discussion on the various phases of the study progresses.

Step 7: Developing data collection tools

With the exception of the tests used in this study to collect data (Nation's Vocabulary Levels Test and the biochemistry test) and the student records, all other data collection tools were self-made. As each phase of the study will be elaborated, more details regarding the specific data collection tools used in each will be provided.

Step 8: Piloting of data collection tools

Due to the nature of the study, not all data collection tools could be piloted. This section will discuss those that could be piloted, namely questionnaires 1 (cf. Appendix C) and 2 (cf. Appendix D) as well as the extensive reading booklet (see CD included).

Questionnaires

Due to the various stages involved, only questionnaires 1 and 2 could be piloted, after which they were combined to become questionnaire 4 (Appendix F). Questionnaire 3 [cf. Appendix E (which was originally intended to be an interview)] could only be edited and not piloted for content since there was only one content lecturer and because the course was only offered in the first semester each year. Furthermore, questionnaires 5 (cf. Appendix G) and 6 (cf. Appendix H) were post-evaluation questionnaires. These could not be piloted on participants that closely resembled the target audience. It should also be noted that only the 2012 cohort participated in the piloting of the instruments that were subsequently used in the main study in 2013.

Questionnaire 1

Questionnaire 1 was based on the needs analysis framework developed by Hutchinson and Waters (1987; 2009), and informed by the qualitative, explorative nature of Step 1, Phase 1. It had 23 questions and comprised four sections, A, B, C and D. In order to

prevent questionnaire fatigue (cf. 4.4.2.1), the section about the personal details of the respondents was put last and became Section D.

Also to prevent questionnaire fatigue, Questionnaire 1 did not have specific questions about the literacy backgrounds and reading attitudes of students. It was decided to collect this information from students that would participate in the main study only as it was assumed that, due to similar fields of study and acceptance criteria, these characteristics would closely resemble those of students that would eventually participate in the main study. These assumptions were confirmed in 2013 (cf. table 36). However, this questionnaire tapped into the students' general reading habits and their view of the generic ULEA course as it was administered after the reading section of this course was taught. Data were collected concurrently from quantitative, closed-ended and qualitative, open-ended questions (QUAN+QUAL). Each of the four sections of questionnaire 1will now be discussed.

Section A

Section A tapped into the students' views regarding the usefulness of the reading component of the generic ULEA course. It comprised six questions, a combination of closed and open-ended questions. All the closed, quantitative questions in Section A were followed by spaces where students could substantiate their answers qualitatively, should they wished to. Establishing the perceived shortcomings of the generic ULEA course was vital to the study, hence, the importance to formulate these questions accurately in the questionnaire.

Section B

Section B comprised six closed questions, and tapped into the reading habits of UNAM students at the School of Medicine, in general. The aim was to confirm quantitatively those answers to data that were already collected qualitatively during the collection of exploratory data in this phase.

Section C

Section C only had one question (question 19), and aimed to tap into the daily activities of students and to see how much spare time medical students at UNAM actually have, for activities such as reading for pleasure and other leisure activities.

Section D

As mentioned already, this section dealt with the general information of students, such as their ages, sex, where they completed their secondary school education and when they enrolled at UNAM for the first time. The latter aspect was deemed important at this stage because it was observed that some students enrolled as BSc students at UNAM before transferring to the School of Medicine. They would then technically be 1st year medical students, but registered as second or third-year students academically.

Sample for piloting of questionnaire

After purposive sampling, a total of 41 students from the 2012 cohort completed the questionnaire. Two main criteria were used. Firstly, all students had to be enrolled for the ULEA course in the one (or only) class at the School of Medicine that I was responsible for. Secondly, they had to do Physiology 1, Biochemistry 1, as well as Anatomy 1, during the same semester. These are the three content courses that all students from both the School of Medicine and the School of Pharmacy were required to do. In spite of purposive sampling, these students were still asked to volunteer to participate. In other words, only volunteers from those that met the criteria participated.

If this phase was solely conducted for the piloting of the survey tools, a smaller sample size would have been sufficient. However, as it will be explained in Chapter 5, some of the data obtained from this sample already formed part of the formal needs analysis, i.e., Stage 2 of the main study.

Administration of questionnaire 1

Prior to the questionnaire administration, I informed students in my ULEA class about the study, asked for their voluntary participation, and guaranteed the confidentiality of

their responses, as suggested in the literature (Creswell, 2014; Dörnyei & Taguchi, 2010). Being "captive groups" (Dörnyei & Taguchi, 2010, p. 82), all students who volunteered completed the questionnaire in the ULEA lecture venue, during one of the ULEA lessons, after completing the reading section of the generic ULEA course. I administered and collected the questionnaires afterwards.

Changes made to the questions in questionnaire 1

The following changes were made after the piloting of this questionnaire:

Most of the open-ended questions (questions 2, 4, 6, 8, 10) were removed from the questionnaire of the main study for two reasons. Firstly, in response to question 2, the open-ended question to question 1 stating: *In general, how would you rate the reading component of the ULEA course* only 5 students responded, stating that *the reading material in the course was not medically related*, evidence that was generally known. Secondly, nobody responded to questions 4, 6, 8, and 10. The only open-ended question that remained in the main study was question 12. This was the only open-ended question that yielded some response (18 responses) that would be particularly useful in developing the new reading course. It required students to make suggestions to improve the current reading component of the ULEA course. As some misunderstanding seemed to have occurred due to ambiguous wording, questions 5, 7 and 9 were rephrased to clarify them and make them more specific to solicit the appropriate information.

In addition, it was decided to omit the question that tapped into the daily activities of students to see how much spare time medical students at UNAM actually have for activities such as reading for pleasure and other leisure activities. It did not seem to elicit any unique information. In other words, it is generally established that medical students do not have much leisure time. Also, the issue that it required them to calculate how much time they spent on various activities per week seemed too cumbersome for respondents to reply to. Omitting this question would also shorten the questionnaire, preventing questionnaire fatigue.

While some spelling mistakes were corrected, the timing for the questionnaire completion seemed adequate. All students managed to complete the questionnaire within the 45 minutes allotted time during the ULEA lesson. Hence the need to arrange for extra time and consequently disrupt the timetables of students or to impose on another lecturer's lecturing time, one of the ethical considerations (cf. 4.7), was unnecessary.

At this stage, as alluded to earlier, all questions in questionnaire 1 were piloted, with the exception of questions 17 and 18. Due to the nature of the project, it was imperative to establish which of the three content subjects (Anatomy 1, Physiology 1 and Biochemistry 1) the students (2012 group) regarded to be the easiest and also which one they perceived to be the most challenging as early as possible, as the preparation for the adjunct already had to commence during the second semester of 2012 to be implemented during the first semester of 2013. Due to the perceived similarities of the groups, it was assumed that the 2013 cohort would provide similar responses. Also, as the same question was asked qualitatively during the preliminary, qualitative phase reported on previously, the aim of including these questions in the questionnaire was really to converge or diverge data. An additional source for convergence or divergence to their answers would come from scrutinising their examination results three months after this questionnaire was completed (cf. Stage 2). Doing this seemed to support the view of Morgan (2014) who is of the opinion that in research it does not matter when data are collected, but *how* they are used. In other words, Phase 2 of the study, the needs analysis, already partially commenced during Phase 1, reflecting the iterative nature of mixed methods action research studies.

Questionnaire 2

This questionnaire comprised three sections, A, B and C, and had a total of 12 questions, including the section on personal data. It had a combination of closed and open-ended questions, and mostly tapped into the students' experience with Biochemistry 1 as a subject, as well as their general reading habits. Please note that this questionnaire was developed after Biochemistry 1, and not Anatomy 1, as initially expected, was determined to be the lowest-scoring subject. More details regarding this process will be given in Chapter 5.

This questionnaire had the following three sections:

Section A

Section A (questions 1-5) tapped into students' experiences when doing the prescribed reading for Biochemistry 1, as well as established any topics in biochemistry they perceived to be especially interesting or challenging. This was in order to answer research question 2 (a).

Section B

This section of the second questionnaire that was administered to the 2012 group tapped into their general reading habits and formed questions 6-8. It aimed to explore what students did before, while and after reading.

Section C

This section included personal details (questions 9-12). As in questionnaire 1, this question was put last to prevent questionnaire fatigue.

Sample for piloting of questionnaire 2

The same sampling methods for piloting questionnaire 1 were applied to pilot questionnaire 2. In other words, through purposive sampling, of which the same two main criteria were used, namely, all students had to be enrolled for the ULEA course in the one (or only) class at the School of Medicine that I was responsible for. Secondly, they had to do Physiology 1, Biochemistry 1, as well as Anatomy 1, during the same semester. This time 53 students from the 2012 cohort voluntarily completed it.

Data collection procedure

After scrutinising the first semester examination results of all students who met the criteria for purposive sampling, it transpired that, of the three content subjects that were

considered, Biochemistry 1 was in fact the lowest scoring subject. Having taught the ULEA course in semester 1, I no longer had easy access to the students. Because of the generally low return rates of online-questionnaires (cf. 4.4.2.1), I asked the Anatomy 1 lecturer at the School of Medicine with whom I had already established some collaboration, to administer the questionnaire to students, who had attended my ULEA class, at the beginning of semester 2 as she still had access to those students in her classes. She did this, even though, contrary to earlier assumptions, Anatomy 1 was not the lowest scoring subject. She collected the questionnaires afterwards and returned them to me, another example of "captive groups" (Dörnyei & Taguchi, 2010, p. 82). Prior to this, I informed students about this via e-mail and once again asked for their voluntarily participation. The issue that even more students participated then (53) compared to when questionnaire 1 was administered (41) in my ULEA class, could be interpreted in two ways. On the one hand, it might indicate their positive attitudes towards the development of an EAP course that would cater for their specific academic needs. On the other hand, the higher attendance rate in Anatomy 1 classes, compared to that of the earlier ULEA lessons, could confirm my exploratory observations of poor student attendance in the ULEA class, as reported earlier on in Step 1. On a more positive note, the evidence that the content lecturer, as well as the students, was willing to assist me seems to reflect the good relationship that was established among us during this stage of the study. This also underscores the evidence that EAP lecturers cannot conduct ESAP courses in isolation and would require good collaboration with content lecturers and that, contrary to some belief, not all content lecturers are reluctant to assist EAP lecturers to become more effective (cf. 2.5.4).

Finally, another important observation is the issue that data from scrutinising the examination results of student were needed in order for questionnaire 2 to be developed and administered. This reflects the emergent and sequential nature of action research.

Changes to questions in questionnaire 2

While it was decided that all questions in Section A would remain the same, the instructions to question 2 were clarified to elicit appropriate responses. In addition, the option 'none of the above' as a response to question 3 was removed as it seemed that

students were reluctant to think about the other options and selected this one as an easy way out.

All the questions in section B were removed as they seemed to yield redundant information. At this stage, I realised that questions regarding pre-, while- and after-reading strategies should ideally be asked prior to attending the ULEA reading course, as the course actually covers these aspects. As this questionnaire would be completed after the reading section of the generic ULEA course was taught, it was expected that, like the 2012 cohort, the 2013 group would already be familiar with the reading strategies that good readers employ (cf. table 7).

One shortcoming of the questionnaire was the omission of a section that tapped into the literacy backgrounds of students and their reading attitudes, hence, this inclusion in the final questionnaire (4) to be administered in the main study.

It should be noted that due to the nature of this study, questions 4 and 5 could, strictly speaking, also not be piloted here as these responses already formed part of the needs analysis, Phase (2). Here students were asked to mention topics they found particularly interesting and topics they found particularly challenging in the Biochemistry 1 course. These were open-ended questions and students could list as many topics as they wanted to. Determining a specific topic in Biochemistry 1 that the adjunct would focus on at this stage already was important in order to commence with preparations for the reading course during the second semester of 2012, to be implemented in the 1st semester in 2013. I also needed this information from students to compare their answers to that of their content lecturer for convergence or divergence (research question 2(b)). More information regarding this is provided in Stage 2 of the study.

After the pilot study, questionnaires 1 and 2 were combined into questionnaire 4 to be used in the main study in 2013.

Piloting of Extensive reading booklet

The aim was to develop an extensive reading course that would reflect the content of the intensive reading course (cf. 3.4.1.7). As a result, only at the end of semester 1 in 2012, after the target subject and the specific topic were determined, the extensive reading booklet could be developed. This, again, reflects the sequential, emerging nature of action research and multiple mixed methods studies. Because the ULEA course was taught in the first semester, I no longer had regular contact with students from the School of Medicine in semester 2. Taking their busy schedules into account, I opted to ask students at the main campus to read through the booklet. Five students who were science majors and who attended my ULEA classes at the main campus volunteered to read through it, mainly to pick up spelling errors, to state whether they enjoyed and understood the case studies or not and to point out any other shortcomings.

The general responses were positive and students seemed to enjoy the stories. They only suggested minor spelling errors to be corrected. However, when the extensive reading booklets were returned after the main study in 2013, I realised that none of the booklets had any space for students to provide any form of identification. This proved to be a major shortcoming because I wanted to contact these students for interviews to explore some of their responses to the evaluation questionnaire that was at the end of the booklet. This questionnaire was the only self-completed or self-administered questionnaire used in this study, which could be the reason for the poor response rate (10/21), as suggested by Dörnyei and Taguchi (2010).

This concludes the discussion on Phase 1.

4.9.2 Summary of Phase 1

Phase 1 took place over two years and it marked the formal beginning of the research. The pilot study was an important part of this phase. It was, furthermore, vital for two more issues pertaining to this study. One was that the pilot study served as an exploratory phase for the development of the survey tools employed and the other was that, due to the nature of this research, data were collected during this stage to explore and inform issues

relevant to Phases 2 and 3. An exploratory, sequential (qual→QUAN+QUAL) mixed methods model was used during this phase.

A summary of the main activities carried out during this phase is as follows:

- Exploratory phase for development of survey tools
- Piloting Questionnaire 1 to become part of Questionnaire 4 [cf. Phase 2 (2012)]
- Piloting of Questionnaire 2 to become part of questionnaire 4 [cf. Phase 2 (2012)]
- Data collection for research question 1 (b): In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by questionnaire responses of students? [Phase 2 (2012), cf. Chapter 6]
- Data collection for research question 2 (a) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance as revealed by the questionnaire responses of students? [Phase 2 (2013)]

4.10 Conclusion to Chapter 4

Chapter 4 has dealt with a discussion of the literature reviewed that informed the research plans of the current study in section A. In the process it was explained why a mixed methods action research design, based on pragmatism as a philosophical foundation, was selected to be appropriate to develop an adjunct reading course, such as in the current study. This section also deliberated on considerations to take into account when the various data collection methods and tools used in the current study would be appropriate, as well as the specific data analysis and interpretation methods used in the current study.

Additional important factors to consider in data collection, such sample selection, piloting of data collection tools, as well as ethical considerations, concluded Section A of Chapter 4. The next section explained how these concepts deliberated on in Section A were applied in the methodology of the current study, and concluded with a discussion of the first of the six phases of the study. This phase included 8 distinct phases, and each was reported on in detail. The next chapter will report on Phase 2 of the current study, namely the needs analysis that comprised two steps, steps 9 and 10 of the current study.

CHAPTER 5

CONDUCTING THE NEEDS ANALYSIS

5.0 Introduction

The needs analysis represents Phase 2 of the current study. During this stage, steps 9 and 10 (cf. Figure 10) were conducted. In other words, the focus of the enquiry was narrowed down (Step 9), and the target and learning needs were determined to set criteria for developing the reading adjunct (Step 10).

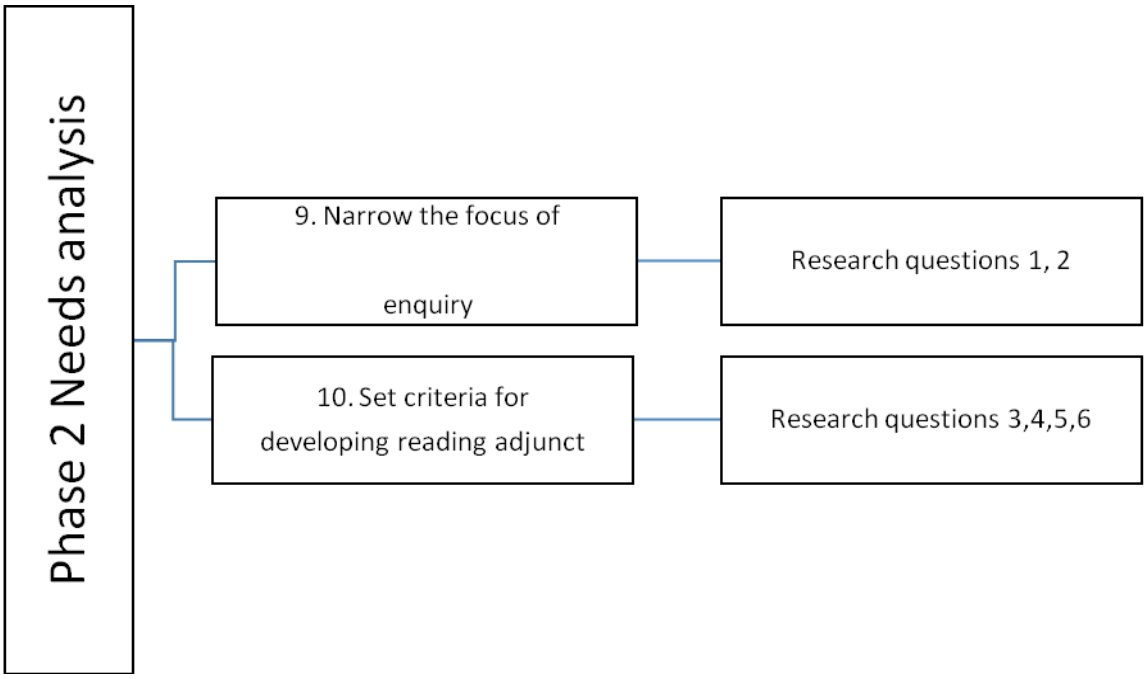

Figure 10: Summary of Chapter 5

The needs analysis phase of the study, therefore, addressed research questions 1, 2, 3, 4, 5, and 6 as represented in table 33 that follows:

Table 33: A summary of research questions addressed in Phase 2 of the study

Steps In phase 2	Research question
9. Narrow the focus of Enquiry	(a) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by informal interviews with students? (b) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by questionnaire responses of students? (a) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by informal interviews with students as revealed in the 1st semester examination results?
	2 (a) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by the questionnaire responses of students? (b) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by the content lecturer of the target subject?

Steps in Phase 2	Research question
10. Analyse and evaluate target and learning situations	3 Who are my students and what are their literacy backgrounds, reading habits and attitudes towards reading?
	4 What are the academic vocabulary levels of 1st year students from the School of Medicine at UNAM?
	5 (a) What are the academic reading needs of students who are enrolled for the target subject, according to their own point of view? (b) What are the academic reading needs of students who are enrolled for the target subject, according to the view of their content lecturers in 2012 and 2013? (c) What are the academic reading needs of students who are enrolled for the target subject, according to a reading expert?

Steps in Phase 2	Research question
	6 (a)To what extent does the content of the generic ULEA course cater for the academic reading needs of 1st year students from the School of Medicine at UNAM, in general? (b)To what extent does the content of the generic ULEA course cater for the academic reading needs of 1st year students from the School of Medicine at UNAM who are enrolled for the target subject?

Step 9 will now be elaborated on. In the process, the methods, procedures, data collection and data analysis procedures will be dealt in order to answer the research questions that were posed to narrow down the focus of enquiry.

5.1 Step 9: Narrowing down the focus of enquiry

This step was addressed by the formulation of research questions 1 and 2. In short, these two research questions were developed to determine the lowest scoring subject and then the most challenging topic in that subject.

5.1.1 Research question 1

Research question 1 dealt with the identification of the target subject. It was especially important to determine the target subject as early as possible as it would form the focus of the two reading courses. The identification of the target subject comprised three components, as represented by the three subsections, research questions 1a, 1b and 1c (cf. table 33). It was initially thought that only the first two elements or strands (one qualitative and one quantitative) would be adequate to determine this subject, but after these results indicated divergence (cf. 5.1.1.2) instead of convergence, a third, quantitative strand was introduced (QUAL+QUAN+QUAN).

5.1.1.1 Data collection instruments

Three research instruments were used to collect data to determine the target subject, namely:

(a) Informal, unstructured interviews;

(b) Questionnaire 1 (Questions 17 and 18) in;

(c) Examination records.

Each research instrument, the sample used, as well as the procedure for data collection and method of data analysis, will be described next.

Informal, unstructured interviews

Between 2011 and 2012, prior to the 1st semester of 2013, I regularly had informal discussions with ULEA students from the School of Medicine. One of the aims was to determine qualitatively the subject that they struggled with the most, in other words to answer research question 1 (a). No actual number of responses was recorded, as these were generally group discussions with any students who were present on a particular day and who were willing to contribute. I made mental observations and recorded the data afterwards in my research journal. Since this was preliminary to the formal research that is currently reported on, these participants were not asked to complete formal consent forms. However, the aims of the research were clearly outlined as well as the fact that their contributions would be voluntarily and anonymous.

From informal student responses, Anatomy 1 seemed to be the subject the 2011 and 2012 cohort struggled with the most. In response to what exactly they struggled with, students generally complained about the number of new and challenging words they had to learn and use each day. They also complained about the amount or reading they had to do for this course. As indicated previously, (c.f. 4.9.1) at this, exploratory stage of the research,

I started to read up about this course, enquired about it and obtained a copy of the students' recommended textbook from the library, as well as bought an anatomy dictionary in anticipation of overcoming my limited knowledge of this subject. Additionally, in preparation for the extensive reading component of the new reading course, I started collecting interesting, anatomy-related, reading material to be used. This type of material seemed to be available in abundance. I also established contact with the content lecturer and tentatively explained my research aims to her. This was received with great enthusiasm by her.

Questionnaire 1

Before the June 2012 examination, questionnaire 1 was administered mainly for piloting purposes. However, as previously indicated (c.f. 4.9.1), due to the nature of the study, responses to Questions 17 and 18 already formed part of Phase 2, the needs analysis. As these questions were both closed, they were included in questionnaire 1 to quantitatively establish which content subject students struggled with the most, in other words, to answer research question 1 (b). Students from the 2012 cohort were asked to indicate which of the three content subjects that were considered in this research (Anatomy 1, Physiology 1 and Biochemistry 1) they considered to be the most **difficult** (question 17) and also which one they perceived to be the **easiest** (question 18) in order to compare their responses for possible inconsistencies. Through purposive selection, the questionnaire was administered to the 2012 cohort (n=41) in captive groups, after their official consent to participate in the research was obtained. The procedure for administration this questionnaire was elaborated on in Chapter 4 (c.f. 4.9.1). The sample characteristics are elaborated on in Table 36.

For each question, only one of the three target subjects could be selected. Thereafter, each option was numbered for easy data entry on a SPSS spread sheet and results were descriptively analysed by using frequencies. Averages and percentages were calculated to interpret the data.

These responses are summarised in the following Table:

Table 34: Easiest and most difficult subject

Subject	%	
	Most difficult subject (n=38)	Easiest subject (n=40)
Anatomy	18.4	37.5
Physiology	39.5	25.0
Biochemistry	42.1	35.0

Not all students (41) who answered questionnaire 1 responded to questions 17 (3) and 18 (1) respectively. However, based on the valid percentages, the results of question 17 indicated that the sample of students perceived Biochemistry 1 as the most difficult (42.1%), followed by Physiology 1 (39.5%) and then Anatomy 1 (18.5%). The evidence that they seemed to regard Anatomy 1 as the easiest subject was also reflected in their responses to question 18. Following Anatomy 1 as the easiest (37.5%) was Biochemistry 1 (35.9 %) and then Physiology 1 (25.6 %).

Examination results of students June 2012

Because the data from the first, qualitative and the second, quantitative strand showed divergence and no clear target subject emerged, it was decided to introduce a third strand to conclude the answer to research question 1. Ideally, according to the procedures for MMR as suggested by Creswell and Plano Clark (2011), one should follow up a qualitative strand with a quantitative strand, but in this case, it was deemed more appropriate to introduce the examination results, a quantitative strand, to assist in determining the target subject.

Permission to use the examination results was already obtained in Phase 1 of the study (Appendix A), and students were also informed about this. As soon as the semester 1 (2012) examination results were released, they were used to determine the lowest scoring subject, an important consideration in preparing questionnaire 2 which had to be administered at the beginning of semester 2 (2012). In other words, I first had to determine the lowest scoring subject because questionnaire 2 dealt with students' reading

experiences when reading for that subject, and was also administered to determine the topic in the target subject that students struggled with the most.

Besides the student numbers, no further personal data were collected about these respondents. However, if needed, the student numbers would have been adequate to contact them. The examination scores of three different subjects of first-year Medical students (81 Anatomy 1, 92 Biochemistry 1, and 79 Physiology 1) were obtained, after which the averages achieved in each group were calculated and compared. Please note that not all students did all three courses due to exemptions, and also some did not write all the examinations, hence the differences in student numbers for the different courses.

Data analysis and presentation

The results were computed on Microsoft Excel (2010) and the average score for each subject was determined. Figure 11 summarises these results.

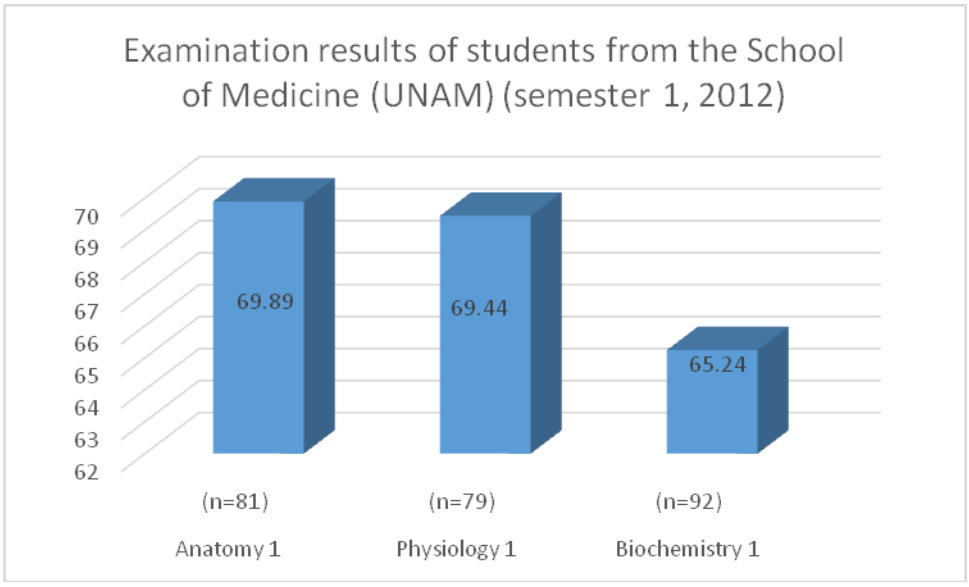

Figure 11: Examination results of students

Based on the examination results of June 2012, the conclusion is that Biochemistry 1 was the lowest scoring subject (65.24%). It is probable that the 2013 cohort who would take part in the main study would achieve similar results.

So far, the data collected to determine the target subject of the adjunct, i.e. the lowest scoring subject, were presented. In the process it was explained why and how the qualitative and quantitative data was obtained. The discussion and interpretation of the data that were triangulated in a convergent parallel mixed methods design (QUAL+QUAN+QUAN) follows.

5.1.1.2 Discussion and interpretation of results

The qualitative data gathered during informal discussions with students suggested that the subject most students complained about was Anatomy 1. However, the quantitative questionnaire responses suggested otherwise. In fact, according to the latter, the majority of respondents (42.1%) viewed Biochemistry 1 as the most difficult subject, an element that was corroborated by the examination results that revealed it to be the lowest scoring subject. This contradiction was further expounded by the incidence that from the questionnaire responses, Anatomy 1 was regarded to be the easiest subject (37.5%) and also the highest scoring one (69.89%).

Instead of convergence, this divergence between the qualitative and quantitative data results of the first two strands to establish the target subject resulted in the addition of a third, quantitative strand, indicating the explorative nature of multi-method, mixed methods research, as well as action research (Creswell & Plano Clark, 2011; Morgan, 2014). It resulted in additional information to be collected, because simply stating divergence as a limitation in the study without further follow-up would have been a weak solution (Creswell, 2014). Similarly, Morse (2010) is of the opinion that even though it introduces more work, one should add supplementary strands until the research is certain to be completed; hence the decision to scrutinise the student records after the 1st semester examination was written. Adding a quantitative strand after one that is similar, may be considered as a weak option for mixed methods research as some are of the opinion that two similar strands should not follow each other (cf. 4.2.3). It was initially planned to have only one qualitative strand followed by one quantitative strand; however, due to the unexpected divergence, this method was more appropriate. This reflects the continuous and seemingly limitless nature of the development of mixed methods (Leedy & Ormrod, 2013) that were elaborated on in Chapter 4 (cf. 4.2.3).

Because of the preliminary data collected during the informal, qualitative interviews, I did not anticipate this divergence. This could have been because, knowing some students who have failed Anatomy 1 previously, I might have been subjective during these informal class discussions and only heard what I wanted to hear. Alternatively, students who did not struggle with Anatomy 1 might have been either absent or did not participate in class discussions or were not verbal enough. More structured focus group discussions or individual interviews probably would have been more appropriate. However, the data collected during the last two strands presented a challenge and were a setback in time. Since the collection of data for the first strand, I had already started with preliminary preparations for developing the new reading course with Anatomy 1 as an adjunct (cf. 4.9.1). Not only that, but by the time the questionnaires were administered in June 2012, I had already established a bond with the Anatomy 1 lecturer, something that would be to a great advantage in developing a CBI reading course that focuses on a content subject the language lecturer does not know much about, as agreed upon by many (Alexander et al., 2008; Basturkmen, 2010; Belcher, 2009; Dudley-Evans & St John, 1998;2000; Flowerdew, 2011; Hutchinson & Waters, 1987;2009; Johns & Makalela, 2011a). The issue that so much time had lapsed between the accumulation of data for the first and second strands could be perceived as a possible shortcoming in this study. Even though Morgan (2014) is of the opinion that it is not when the data are collected, but how they are used, it would seem to be more beneficial to the development of research plans if data to use for triangulation to determine possible convergence or divergence are collected simultaneously or more or less at the same time, as suggested by Creswell and Plano Clark (2011) (cf. 4.2.3). All in all, this illustrates the importance of using more than one data source to make confident conclusions about research communities.

In addition, the above average Biochemistry 1 scores of the 2012 cohort (65.24%) compelled me not to describe the target subject as the 'high risk' subject, as it seems to be a term commonly applied in adjunct courses (Evans Commander & Smith, 1995). Since common sense allows one to assume that a score of 65.24% in a subject does not imply a risk of failing, it was decided to simply label this subject the *target subject*. Their 1st semester results also confirmed that the School of Medicine accepts only above average candidates with high school admission symbols, probably due to the issue that they like reading (cf. 5.2.2.1). These students clearly seemed to fit Fouché's (2009, p. 27) reference to the "crème de la crème" who often have adequate financial support, are

hardworking and have a strong academic foundation or by Arendale (2002) as students are often viewed as "different and better than the rest of the institution" (p. 6). This confirmed the need to develop an adjunct course for them as Brinton et al., (1989) are of the opinion that such courses seem to be appropriate for adults or young adults with high intermediate to advanced proficiencies levels, to cope with the academic literacy demands of traditionally/historically known difficult courses, such as medicine. As mentioned in section 1.1, Arendale (2002) states that such courses could, among others, be identified as requiring students to read vast amounts from difficult sources and to sit for examinations that require schools and homes do not adequately prepare learners for AL and higher education (Boughey, 2013).

5.1.2 Research question 2

Still part of Step 9, once the target subject was identified, the topic of the adjunct (the two reading courses) had to be determined. In other words, research question 2 was developed to narrow down the focus of the adjunct. It comprised two subsections, as indicated in Table 33.

5.1.2.1 Data collection instruments

The following research tools were used to collect data to narrow down the focus of the adjunct:

(a) Questionnaire 2 (Questions 4 and 5)

(b) Questionnaire 3 (25 and 26 in questionnaire 3)

Questionnaire 2

Due to the nature of the study, as explained in section 4.9.1, questions 4 and 5 in questionnaire 2 were included not for piloting purposes, but already to commence with the needs analysis in 2012. Data were collected qualitatively through open-ended questions to answer research question 2 (a). Respondents had to identify the topics in the

Biochemistry 1 course that they found *the most interesting* (question 4) and *needed more help with* (question 5).

The same sample that completed questionnaire 2 in Phase 1 of the study answered these questions. From the information presented in Table 64 in Phase 1, it can be noted that in 2012, 53 volunteers, including fewer male (24.5%) and more female (75.5%) students completed the questionnaire. The majority of them were younger than 20 (79.2%), some between 20 and 29 years of age (18.9%) while a small percentage (1.9%) were between 30 and 39 years of age. With the exception of a small percentage (9.4%), the majority of all participants were Namibian of origin (90.6). Most participants were from the more urban, Khomas region (41.5%).

Questionnaires were coded and responses to questions 4 and 5 were divided into various themes, according to the topics mentioned by students and the frequencies of each occurring topic were recorded manually. Afterwards, similarities between certain topics necessitated the re-labelling of these (Dörnyei & Taguchi, 2010). For example, students mentioned organic chemistry and stereochemistry as two different topics, but the latter was actually a component of the former, the content lecturer explained afterwards.

Topics that students found most interesting were stereochemistry (34.7%) and organic chemistry (40.8%). In addition, the topics they indicated to need most help with were stereochemistry (30.2 %), organic chemistry (18.9%) and acids and bases (17%). As mentioned already, it is important to reiterate that, although students mentioned organic chemistry and stereochemistry as two different topics, the latter is actually a component of the former.

Questionnaire 3

Questionnaire 3 was originally developed as an interview with the content lecturer of Biochemistry 1. However, it had to be adapted to become a questionnaire to be administered electronically as the only content lecturer was out of the country at the time the target subject was determined, suggesting the importance of action researchers to be flexible (cf. 4.3). Only one lecturer was responsible for lecturing Biochemistry 1 to first-

year students at the UNAM School of Medicine in 2012, due to the small number of students (92). Introductions were made via e-mail, the aims and purposes of the study were explained and the informed consent to participate was obtained. Afterwards, the interview was e-mailed to this lecturer in the form of a questionnaire.

This questionnaire contained both open-ended and closed questions, hence it collected both qualitative and quantitative data. This questionnaire was predominantly administered to answer research question 5(b), i.e. establishing the reading needs of students from the content lecturer's perspective. However, the responses to questions 25 and 26 answered research question 2 (b). In other words, the aim was to establish, from the content lecturer what topics in biochemistry students perceived to be particularly interesting and challenging with the aim of triangulating these responses with those of the students for convergence or divergence.

In this section, only questions 25 and 26 of this questionnaire will be dealt with, but more details about the design and administration of questionnaire 3 will be provided in the section that deals with RQ 6. Both questions were open-ended questions. Closed questions could not be developed as I did not know much about the content of the course at that time. In addition, these were structured similarly to those in the student questionnaires in order to compare responses more effectively. For example, question 25 asked the lecturer to list as many topics or themes in the Biochemistry 1 course that his students experienced as *particularly challenging*, while question 26 asked him to mention those that were regarded, in his view, as *particularly interesting*.

At the time of completing the questionnaire, the content lecturer had been teaching this module for 2 years and had the following qualifications, Pharm. M.Sc., Ph.D. He resigned soon after the first term in 2012 was over and in January 2013, contact had to be established with the new Biochemistry 1 lecturer at the School of Medicine. Their responses were categorised and manually calculated as these were open-ended questions. The 2012 content lecturer listed 4 specific topics as areas he considered students needed more help with (*Stereochemistry, Resonance Structures, Organic Reactions, Orbital Hybridization* and *Reaction Mechanisms*) and two that he thought they found particularly

interesting (*Periodic Table* and *Atomic Structure*). The 2013 lecturer had no comments as he had not yet taught the course at the time of the interview, at the beginning of 2013.

5.1.2.2 Discussion and interpretation of results

In order to ascertain more confidently what topic of Biochemistry 1 the adjunct should focus on, it was decided to compare the views of students with those of their content lecturer. Questions 4 and 5 in questionnaire 2 of the students could not be constructed as specific, closed, quantitative questions, mainly because at that stage I was not familiar with the content and topics included in Biochemistry 1. As a result, I could not anticipate the range of possible answers respondents would provide in order to develop closed questions, a common reason for including open-ended questions in questionnaires (Dörnyei & Taguchi, 2010). Questions 26 and 27 in questionnaire 3 for the content lecturer were also open-ended questions. As a result, two qualitative strands were used (QUAL+QUAL) to determine the topic the adjunct would focus on. This could possibly be perceived as a weak option of the convergent parallel mixed methods design that should ideally converge quantitative and qualitative data in order to provide a comprehensive analysis of the research problem (QUAL + QUAN) (Creswell, 2014) and can be regarded as a possible shortcoming of the data collection methods of this stage of the study. In retrospect, I could probably have used the students' responses to design closed questions for the content lecturer to complete or the other way around to have a qualitative strand followed by a qualitative strand. As previously explained (cf. 4.9.1) due to the nature of this study, this step could not be repeated in 2013 when the main study took place.

At the time this questionnaire was administered to the 2012 group, I was still unsure whether the focus of the new reading course would be on *interesting* or on *challenging* topics. The reason for asking about the interesting one is because "one of the primary principles of good pedagogic materials is that they should be interesting" (Hutchinson & Waters, 1987, p. 68). By combining the responses to stereochemistry and organic chemistry, the scores indicated that these were the topics that most students from the 2012 intake of the School of Medicine at UNAM found 'particularly interesting' (75.1%) but also the topics they needed the most help with (49.6%) respectively.

Table 35: Interesting topics and those requiring more assistance

	'particularly interesting'			*'need help with'*		
Biochemistry topic	**Students (n=53)**	**%**	**Lecturer (n=1)**	**Students (n=53)**	**%**	**Lecturer (n=1)**
Stereochemistry	17	34.7		16	30.2	
Organic Chemistry	20	40.8		10	18.9	
Stereochemistry +Organic Chemistry	**37**	**75.1**		**26**	**49.6**	◊
Acids and bases	**2**	**4.1**		**9**	**17.0**	
Reactions	**4**	**8.2**				
Enzymes	**2**	**4.1**		**1**	**1.9**	
Molecule Building	**1**	**2.0**				
Periodic Table	**2**	**4.1**	◊			
Hydrolisation				**3**	**5.7**	
Cycloalkanes, Isomers, Resonance				**2**	**3.8**	
Radical Reactions				**6**	**11.3**	
Organic Reactions						◊
Heterocyclic				**1**	**1.9**	
Resonance Structures				**1**	**1.9**	◊
Orbital Hybridization						◊
Atomic Structure			◊			
Nucleophilic Substitution of Alkanes				**2**	**3.8**	
Functional Groups and naming				**2**	**3.8**	
Reaction Mechanisms						◊

Table 35 provides a summary of the topics students indicated to be '*particularly interesting*' (%) and those they seem to '*need more help'* (%) with, as well as the instances where the lecturer agreed with their views (◊). Additional topics the lecturer added were also added to the summary.

However, from the above, it would appear as if, to a large extent, there is a mismatch between students' and lecturer's perceptions about challenging and interesting content in the Biochemistry 1. In other words, there is a divergence in opinions. The only instance of convergence was that both students (49.6%) and the lecturer regarded stereochemistry to be a particularly challenging topic in Biochemistry 1. As a result, it was this topic, one that is regarded to be challenging, that became the focus of the adjunct. It is interesting to note that the lecturer and the students mostly had different opinions about both challenging and interesting topics. This finding seems to correspond with an observation made by Hutchinson and Waters (1987; 2009) (cf. 2.7.1) and further highlights the importance of a thorough needs analysis prior to the development of any EAP course. It could be that this lecturer based his responses also on what students encountered in the previous year (2011). However, as mentioned in section 2.7.1, needs analysis should be continuously carried out (Basturkmen, 2010; Brown, 1995; Hyland, 2006; Hutchinson & Waters, 1987). This study also had implications for lecturers of biochemistry, and could illuminate a possible mismatch between content lecturer and learner perceptions about learners' experiences with the course. For example, the content lecturer did not seem to realise that so many students actually found the topic "*stereochemistry*" interesting even though they seemed to struggle with it. Also, students appeared to have struggled with many more topics (10) than what the content lecturer mentioned (4), and of these, they only agreed on one topic namely "*stereochemistry*". Also, while students mentioned 6 topics they found interesting, the content lecturer only mentioned 2. Of these, they only agreed upon one topic, namely the *periodic table*.

It is worth noting a promising observation, namely that this was also the topic students perceived to be the *most interesting*. As a result, the topic of the adjunct would seem to be one that students found both *interesting* (75.1%) but *challenging* (49.6%) at the same time. This content lecturer did not respond to a follow up e-mail in which I asked why students seemed to struggle with stereochemistry. However, the content lecturer of 2013

explained that this was one of the few topics in Biochemistry 1 that students had not encountered in physical sciences at high school.

To summarise, Step 9 of the current study, namely the narrowing down of the focus of enquiry was addressed by formulating and answering research questions 1 and 2. In the process, it was established that the topic that would form the adjunct was stereochemistry, the topic that most students seemed to struggle with in the Biochemistry 1 course. Once this topic was determined, the development of the new reading course could commence.

Next, step 10, the second part of Phase 2, the needs analysis phase, will be elaborated.

5.2 Step 10: Set criteria for developing reading adjunct

Step 10 was based on Hutchinson and Waters's (1987; 2009) framework for a needs analysis (see table 5) and the learning, as well as target, needs of the target group were established to set criteria for developing reading adjunct. In short, **learning needs** provide researchers with various types of information about the students, as well as about practicalities regarding the course administration. In determining the **target needs** of students, on the other hand, three important aspects, namely their necessities, their lacks and their wants, are determined.

As indicated in Table 33, in order to carry out this step, various research questions were developed. Research questions 3 and 4 addressed the **learning needs analysis**, and research questions 5 and 6 dealt with the **target needs analysis**. Step 10 will, therefore, be explained by elaborating on the data collection process and tools for establishing the learning needs, followed by the relevant information regarding the target needs. Afterwards, the discussion and interpretation of both learning and target needs will follow in one section to present a coherent whole of the needs analysis done regarding the target group.

LEARNING NEEDS

An explanatory, mixed methods research strategy (QUAN→qual→QUAN) was used to establish some aspects of the learning needs of the target group that were regarded as vital to inform the development of an adjunct reading programme for the target group. These include information about their literacy backgrounds, reading attitudes, reading habits and vocabulary levels.

5.2.1 Research question 3

Research question 3, namely, *Who are my students and what are their literacy backgrounds, reading habits and attitudes towards reading?* was addressed in the following ways.

5.2.1.1 Data collection instrument

Questionnaire 4 (Sections A, B, C, F)

In order to determine the literacy backgrounds, reading habits and reading attitudes of the 2013 cohort (RQ 3)**,** Questionnaire 4 was administered to collect quantitative, as well as qualitative, data. Comprising a combination of piloted questions from questionnaires 1 and 2, (cf. Appendix C and D) it had a total of 32 questions and was administered to tap into the literacy backgrounds (Section A), reading attitudes (Section B) and reading habits (Section C) of the target group. In addition, this questionnaire included an evaluation of the generic ULEA course (Section D), the perceived reading needs students had in Biochemistry 1 (Section E), as well as the personal details of participants (Section F). In order to reduce questionnaire fatigue, Section F was put last. It should be noted that Sections D and E, collected data regarding the target needs (the needs of students) that are elaborated on in Section 5.2.3.

Section A of questionnaire 4 comprised questions 1-6 and was included to establish how much exposure to literature students had had in the homes in which they grew up, as this is an important predictor of academic achievement and reading ability (Grabe, 2009; Moje et al., 2011; Krashen, 2004; 2013; Komiyama, 2013; McQuillan, 2006). This was

done through a combination of closed and open-ended questions. The latter were included to clarify options selected in the closed questions, as well as to check for halo effects, in other words, if those who said they read magazines (in question 4) actually did. Therefore, in question 5 they were asked to list the names of the magazines they enjoyed reading. These two questions (4 and 5) were adapted from the Magazine Recognition Test (MRT) developed by Stanovich and West (1989) (cf. 3.4. 2). In Section B, questions 6-10 aimed at exploring the attitudes of students to reading. This section comprised closed questions only and aimed at establishing the attitudes of students to reading, as motivation to read is vital for academic reading success (Duke et al., 2011; Grabe, 2009; Guthrie et al., 1999; Guthrie, 2004; Kim & Krashen, 1998; Krashen, 2004; 2013) (cf. 3.4.1.8). The next section, Section C comprised questions 10-15, and aimed at exploring the reading habits of students. In this section, with the exception of question 12, all the questions were closed. Questions 11 and 12 were adaptations from the Author Recognition Task (ART), developed by Stanovich and West (1989) as elaborated on in section 3.4.1.2. Question 12, was included to clarify question 11. Here students had to name the titles of books they would recommend to others. It was important to establish whether students read for pleasure and also what genre they were interested in. At this stage of the research process, the content of the extensive reading material still had to be determined (cf. 3.4.1.7). It was hoped that the answers to this section would assist in the selection of content that students would find interesting. Section F was included to collect personal details of participants. This section comprised 3 questions and probed the ages, sex and nationality of students.

The questionnaire was administered to captive groups in the ULEA class during one of the ULEA lessons while I was present. After students had been informed about the study, they were asked to participate voluntarily. In addition, the date for the administration of the questionnaire was communicated to them, and only those who were willing to participate completed the questionnaire.

63 ULEA students from the 2013 cohort willingly participated in this phase of the data collection. Following the three stages suggested by Dörnyei and Taguchi (2010) after collection, the questionnaires were coded, data were cleaned and responses entered into

an SPSS spread sheet. Since the aim was not to make any generalisations beyond the population this group was representative of, data were analysed descriptively.
Table 36 summarises the bibliographical details of the 2013 cohort (cf. section F).

Table 36: Biographical details of the 2013 cohort

2013 cohort who completed questionnaire 3 (n=63)	**%**
Age	
< 20	85.2
20-29	13.1
30-39	1.6
Sex	
Male	34.4
Female	65.6
Nationality of students	
Namibian	90.3
Other	9.7
Regions in Namibia where students were from	
Caprivi Region	0
Okavango	16.1
Erongo Region	7.9
Khomas Region	37.1
Omusati	3.2
Oshana Region	6.5
Oshikoto Region	9.7
Otjozondjupa Region	4.8
Hardap	3.2
Karas	1.6
Other	9.7

As can be seen from the data in Table 37, the majority of respondents (85.2%) were younger than 20 while some (13.1%) were between 20 and 29 years of age. A small

percentage (1.6%) were older and in the 30-39 year age group. The group comprised more females (65.6) than males (34.4%). The majority were from Namibia (90.3) of which the bulk was from the urban, Khomas, region (37.7).

Literacy backgrounds of the 2013 cohort

According to their responses to question 1, it seemed as if the majority of students had rich literacy childhood experiences.

This is summarised in Figure 12 that follows.

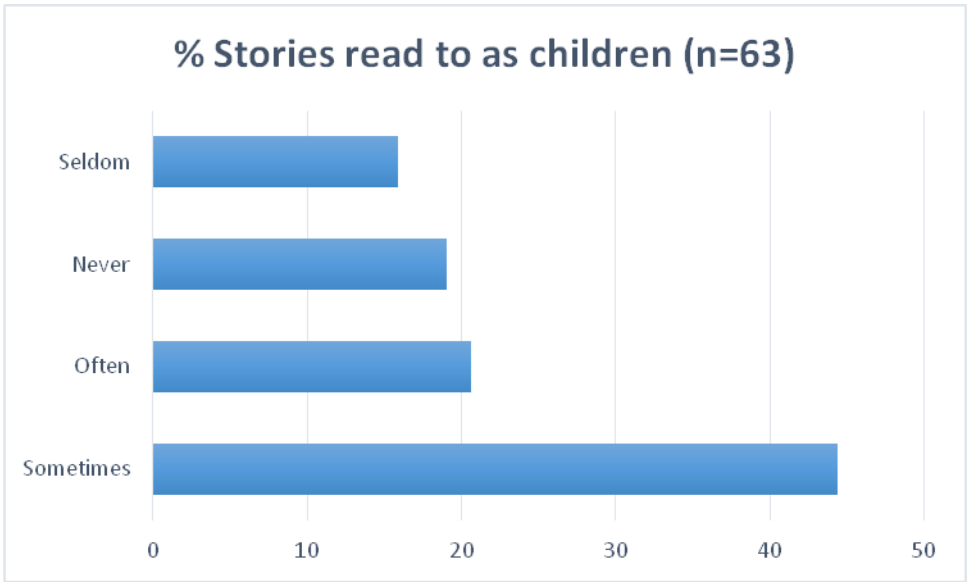

Figure 12: Rate of stories read to as children

As one can see, 44.4% of the respondents reported that either their parents or another family member had read to them *sometimes* as children. Another group reported to have had similar experiences often (20.6%) and seldom (15.9%), while some (19%) indicated that when they were children nobody ever read to them. Clearly the majority of students from this cohort of the School of Medicine had rich literacy experiences.

The same tendency was observed in their responses to question 2. When asked to indicate how many books they had at home, all of them indicated to have at least *some* books. The majority (66.7%) indicated to have about 50, 15.9% had about 20 and 17.5% about 10 books at home

From student responses to questions 3 and 4, it further seems as if they also had ample access to newspapers and magazines, respectively. With regards to buying newspapers (question 3), only one student (1.6%) indicated that newspapers were *never* bought in his or her home. For the vast majority (65.1%) this seems to be an everyday occurrence, followed by *once a week* (17.5%) and *occasionally* (15.9). Their responses were not checked for possible halo effects like in question 4, because the possibility that any of them would not be able to name Namibia's largest newspaper, *The Namibian,* was slim.

Similar findings were observed when asked about how often magazines were bought in their homes (question 5), the majority (46%) reported that a magazine was bought in their homes *once a week,* followed by *occasionally* (23.8%). 14.3% of respondents claimed to have a magazine bought *at least once a week.* The same number also reported to be regular subscribers.

In response to question 6, where they were asked to list the titles of some of the magazines they read, students mentioned a total of 45 different magazines. A list of their qualitative responses (names of magazines) were compiled and quantified, using an SPSS spread sheet. The most popular ones among them seemed to be *People's Magazine* (50.8%), *Drum* (38.1%), *Move* (25.4%), *You* (23.8%) *Seventeen* (15.9%), *Heat* and *Huisgenoot* that 12.7% of all respondents seemed to enjoy reading. One student admitted not to read any magazines, one mentioned to have forgotten the name of the magazine that was read and only 2 students did not answer this question. Furthermore, of those who did respond to this question (61) 10 students mentioned the name of at least one magazine and the rest at least 2 or more.

Here follows a summary of the responses to section B of the questionnaire.

Reading attitudes

The majority of respondents seem to enjoy reading (question 7), some students reported to like reading very much (25.4%) and others quite a lot (41.3%). Only (31.7%) reported to like reading only a little while just one student mentioned not liking reading at all.

Clearly the reluctant readers are in the minority and those who have positive attitudes towards reading formed a sizable portion (66.7%) of the research group.

Regarding their evaluations of their reading proficiencies (question 8), most of the respondents seemed to regard themselves as good (66.1%), followed by excellent (21%) readers. Only a few (12.9%) regarded themselves as average readers, and not a single one as a poor reader.

Figure 13 that follows summarises the most important language skill they expect a student would require to excel as a medical student (question 9).

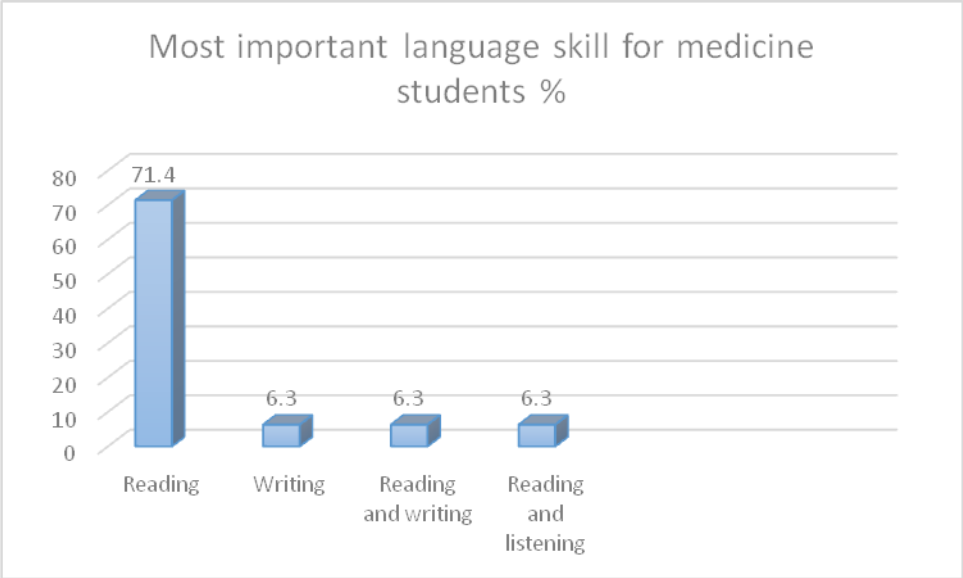

Figure 13: The most important language skill for medical student students

From the results, it seems as if the overwhelming majority selected reading (71.4%). Writing, listening, reading and writing and reading and listening were all rated as being of less importance (6.3%), with speaking as the least important skill (3.2%). It should be noted that even though students were asked to select only one option (either reading, listening, reading or writing), some of them selected more than one. This was unforeseen as it had not been picked up during the pilot study. Hence the decision to include two more options: reading and listening (6.3%) and reading and writing (6.3%).

Figure 14 presents a summary of how their responses to question 10, namely how they spent their free time, when they had no studies to attend to.

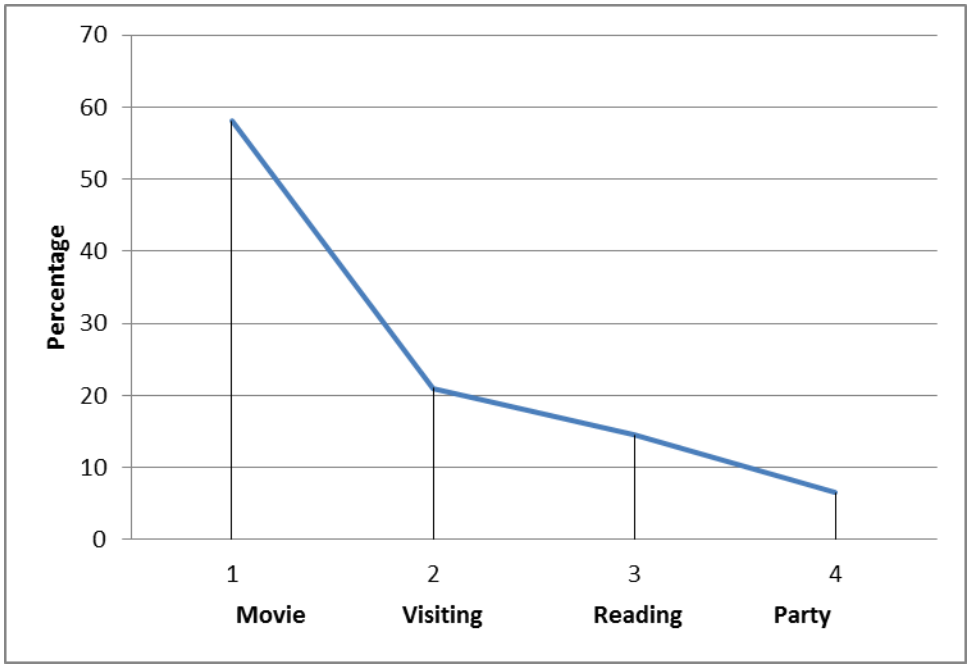

Figure 14: Student preferences to spend free time

The majority (58.1%) preferred to watch a movie, followed by visiting a friend (21%), then reading (14.5%) and lastly going to a party (6.5%).

Reading habits

Table 37 summarises the type of books these respondents preferred to read. In response to question 11, students could select as many options as they wanted to from the different options available.

Table 37: Books students enjoy reading

Books enjoy reading (n=63)	**%**
Biographies	19
Westerns	3.2
Romance	50.8
Detective stories	47.6
Plays	11.1
Science Fiction	25.4
Religious Books	41.3
Do not read for pleasure	11.1

In general, the majority of respondents reported to read romance novels (50.8%), followed by detective stories (47.6%) and religious books (41.3%). Some students (25.4%) liked reading science fiction, while a smaller number (19%) read biographies. The least preferred genres seemed to be plays (11.1%) and westerns (3.2). 11.1% of the respondents reported not to read for pleasure at all.

The next question, question 12, asked students to mention the titles of any 2 books they would recommend to a friend. Once again, this question was included to detect any halo effects in the previous answer. 55 mentioned the topics of at least 2 books, and 48 mentioned one book. 8 students could not (or would not) mention any titles. Most of the titles that were mentioned could be recognised by the researcher, for example, *Long walk to Freedom, Fifty Shades of Grey, Lord of the Rings, Prayer of Jabez, Goosebumps, Sweet Valley High, Twilight Series, Memoirs of a Geisha, the Biography of Steve Jobs* (*sic*). Some even included the names of the authors, even though this was not asked, implying their vast knowledge of literature. It was, however, noticeable that some mentioned the Bible, one a prescribed textbook and quite a few students also included their high school English prescribed story books, for example, *Of Mice and Men, Things Fall Apart, To Kill a Mockingbird.*

Question 13 was aimed only at students who indicated in question 11 that they did not read for pleasure, in other words, only the 11.1% of respondents who indicated that they did not do pleasure reading. However, a total of 23 students responded to this closed question. This question was not piloted during 2013, which could explain the confusion. If it was piloted, this confusion could have been picked up and the instructions could have been clarified better. It was, therefore, decided to disregard the answers to this question.

While question 11 explored what type of books respondents liked to read, question 14 wanted to probe when *last* they had read for pleasure. Their responses are summarised in Figure

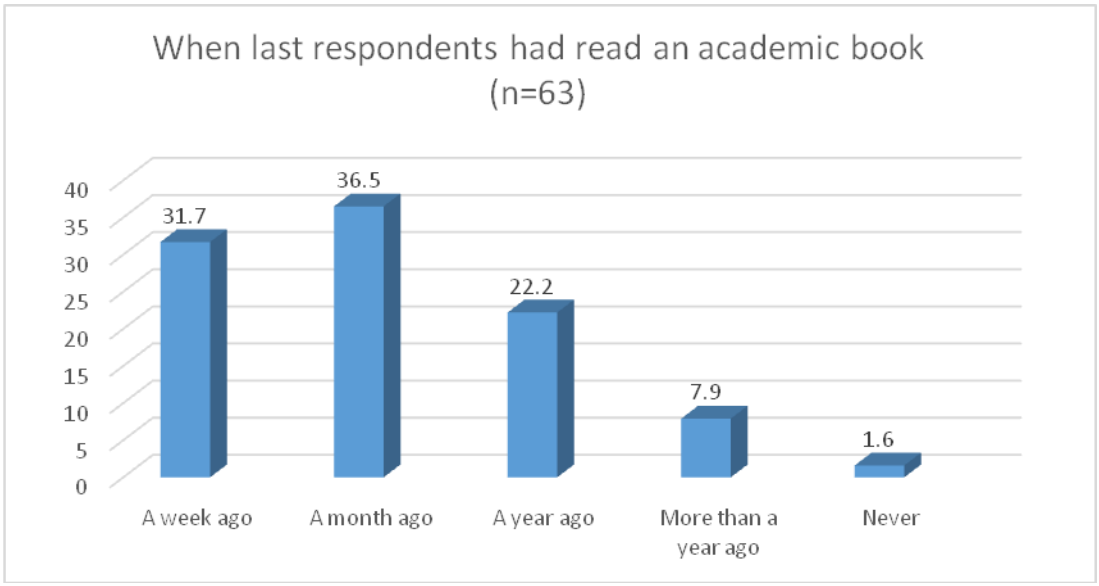

Figure 15: When last students had read a non-academic book

The majority of respondents (36.5%) reported to have done some pleasure reading more than a month ago, followed by those who said to have done so a week ago (31.7%). For others it was much longer than that. Some stated to have engaged in pleasure reading a year ago (22.2%), more than a year ago (7.9%) and one student (1.6%) indicated that he or she had never read any book for pleasure.

Question 15 took this line of probing further and asked students to estimate the number of non-academic books they had read the previous year, in other words, the year before they enrolled as students at the School of Medicine.

From their responses, it seemed as if the majority (50%) indicated to have read between 1 and 4 books, some had read more than 12 (19.4%), others between 5 and 9 (16.1%) and another group between 9 and 12 (9.7%). A small percentage (4.8%) suggested that they had not read any non-academic book in the previous year.

Questions 15 and 16 were aimed at exploring the extensive reading habits of students since becoming students at the School of Medicine. In question 16, they were asked to indicate the reasons why some may not have had time to read for pleasure during their first semester of being medicine students.

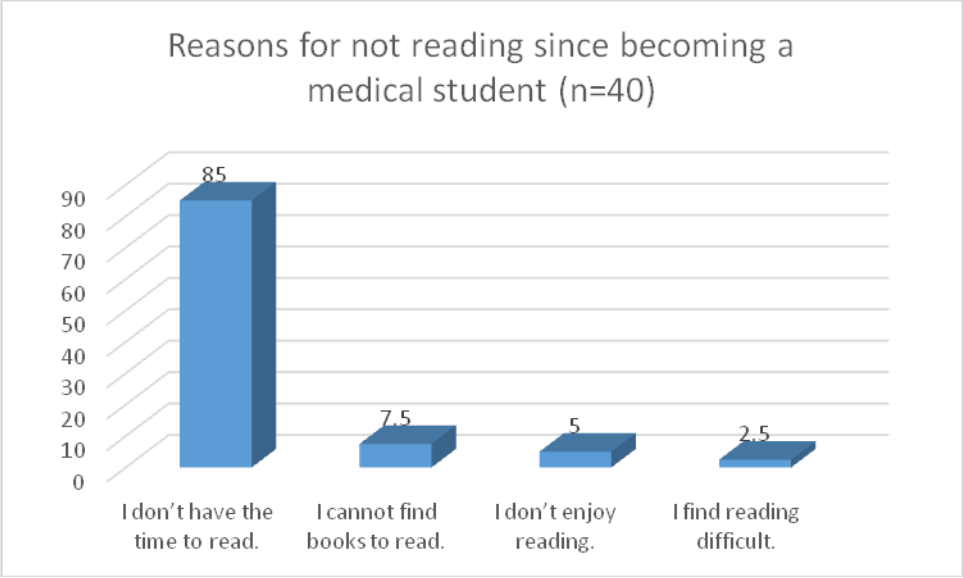

Figure 16: Reasons for not reading for pleasure since becoming a medical student

Only 40 students responded to this question. The overwhelming majority (85 %) indicated the reason to be a lack of time to read.

To sum up, this section has presented the data that were collected to determine the literacy backgrounds, reading habits and attitudes towards reading. This will be interpreted and discussed in Section 5.3 with all the other data collected to conduct Step 10 of the study. Next, the data collected to determine the academic vocabulary needs of the target group are presented.

5.2.2 Research question 4

Research question 4 namely, *What are the academic vocabulary levels of first-year students from the School of Medicine at UNAM?* was developed to determine the vocabulary levels of students in order to add more data to establish the learning needs of the target group. It was addressed in the following way.

5.2.2.1 Data collection instrument

a. Nation's Vocabulary Levels Test

Knowledge about the vocabulary levels of students was vital in planning the new reading course, particularly in deciding at what levels the extensive reading material should be pitched. Nation's Vocabulary Levels Test (Appendix I) was used to measure the written receptive vocabulary size of the target group quantitatively. This standardised test has reliability measures of around .96 at the 14 000 word levels version that comprises 140 multiple-choice items. Ten items from each 1 000 word family level were used.

Because this is a standardised test, a pilot study was not conducted. In addition, besides acknowledgement, permission was not required to use this test in research, as it is freely available online. However, the answers to this particular version of the test were not available online. As a result, Professor Paul Nation, one of the key role players in developing this test, was contacted via e-mail to request for such a copy. This, as well as good wishes, was readily provided.

A total of 75 students from the 2013 cohort voluntarily wrote this standardised test after the standard protocol, such as informing them about the test, its aims, as well as about

how knowing their vocabulary levels can assist the research, but also be of benefit to them. Enough copies of the online version of the test, as well as the letter of informed consent, were prepared for the test that was written on 18 April 2013. Using Nation's (2012b) guideline that 40 minutes should be adequate to sit the 140 item test, it was written during the ULEA lesson time, in the ULEA lecture hall. The first student to finish took just 15 minutes to complete it. The last one, 40 minutes. The tests were supervised, collected and marked by the researcher, using the answer key provided.

Since all questions were multi-choice, it was easy to mark and score objectively. A total out of 140 was multiplied by 100 to interpret the vocabulary size.

Table 38: Results from Nation's vocabulary test

n=72	**Score out of 14 000**
Mean	9 904.17
Std. Deviation	1 290.206
Minimum	7 200
Maximum	12 300

The results from Nation's vocabulary Levels Test at the 14 000 word level showed a range of results between 72 00 and 12 300 out of a possible 14 000. The mean score was 9 904.17, and the standard deviation 1 290.206. The results further indicated that the majority of students (36 or 50%) obtained scores between 10 000 and 12 300, followed by those scoring between 9 999 – 9 001 (20) and a small number of students (16 or 28%) scored between 7 200- 9000. Figure 17 presents these results.

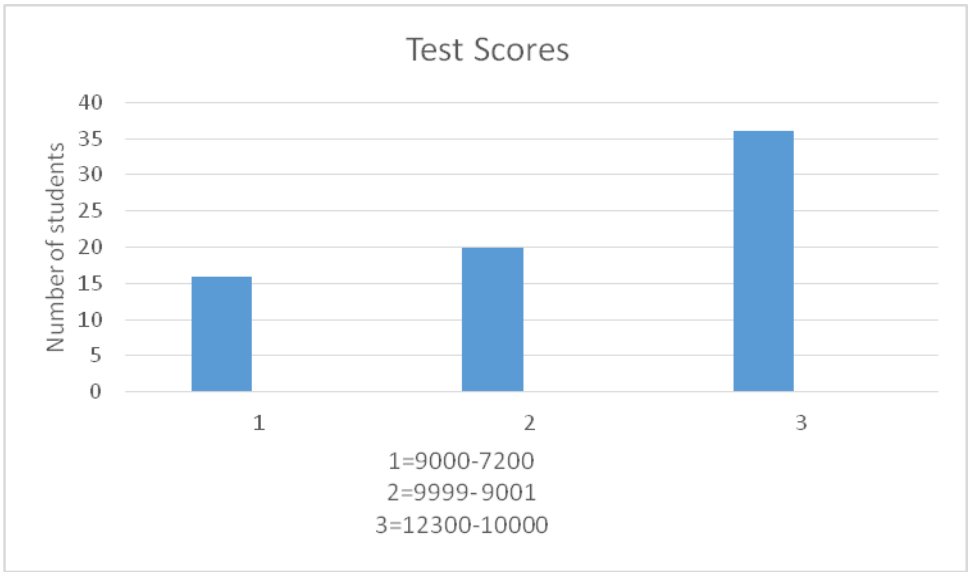

Figure 17: Test scores

So far the discussion has focused on the data collected to answer research questions 3 and 4 - in other words, to determine the learning needs of the target group. The following section will elaborate on their target needs. Thereafter, in section 5.3, the data collected regarding the learning, as well as the target, needs will be discussed and interpreted to present a coherent discussion regarding the needs of the target group to be considered in developing a reading course that specifically catered for their needs when reading the stereochemistry section in their Biochemistry 1 course book.

TARGET NEEDS

The target needs include the necessities, wants and lacks of the target group. This stage was carried out to determine the academic reading needs of students who were enrolled for the target subject, in other words, to determine their necessities (Hutchinson & Waters, 1987; 2009), or what learners need to know in order to function efficiently in the target situation (cf. table 5). This process was spread over almost 2 years, between January 2012 and June 2013. In the process, research question 5 was answered. This stage was divided into three steps, reflecting the importance of triangulating various viewpoints in order to determine the necessities in a comprehensive manner or to illuminate data, as will be elaborated next.

5.2.3 Research question 5

Research question 5 [5(a), 5(b) and 5 (c)] dealt with determining the academic reading needs of students from the target group, in other words, their necessities. In the process, their wants were also established (QUAN+QUAL).

5.2.3.1 Data collection instruments

Table 39: Summary of use of data collection instruments to determine the academic reading needs of students from the target group

Views probed	Tool
Students'	Questionnaire 4 questions 26, 27, 28
Content lecturer's	Questionnaire 3, questions 3-24; 27 – 28 Informal interview with content lecturer 2
Reading expert's	Content analysis Classroom observations

a. Academic reading needs for Biochemistry 1 according to students

Questions 26-28 in questionnaire 4 (cf. Appendix F) were closed questions aimed at collecting data quantitatively to determine the academic reading needs of students in biochemistry from their points of view, in other words, research question 5 (a). In question 26, students were asked what problems they experienced when reading for Biochemistry I. They could select as many options as they wanted to from the six options provided. There was also an option for students who thought they did not have any problems. Question 27 asked respondents to indicate to what extent they had done the compulsory reading for the target subject, Biochemistry 1, up to the time the questionnaire was administered. Finally, in question 28, students had to indicate which of the reading strategies that were covered in the generic reading course were used to understand their Biochemistry 1 text better. Again, they could select as many options as they wanted to from the options provided. Being familiar with the content, I could anticipate their responses, and I formulated this as a closed question. At the time this

questionnaire was administered, they had not yet covered the section on stereochemistry, therefore, I could not specifically solicit responses from that section alone.

As stated previously, (cf. 4.10), 63 volunteers completed this questionnaire as a captive group. Their characteristics are elaborated on in table 36.

Reading requirements of Biochemistry 1

While 17.5% of all respondents reported to have no real problems with reading for Biochemistry 1 (question 26), the majority (31.7%) indicated that it was not easy to keep track of the main ideas, followed by grammatical features not understood (30.2%), vocabulary (28.6%), that reading takes too long (23.8%) and that they did not understand graphs (22.2%).

Figure 18 that follows summarises their responses to question 27, where they were asked to indicate to what extent they had done the compulsory reading for Biochemistry 1.

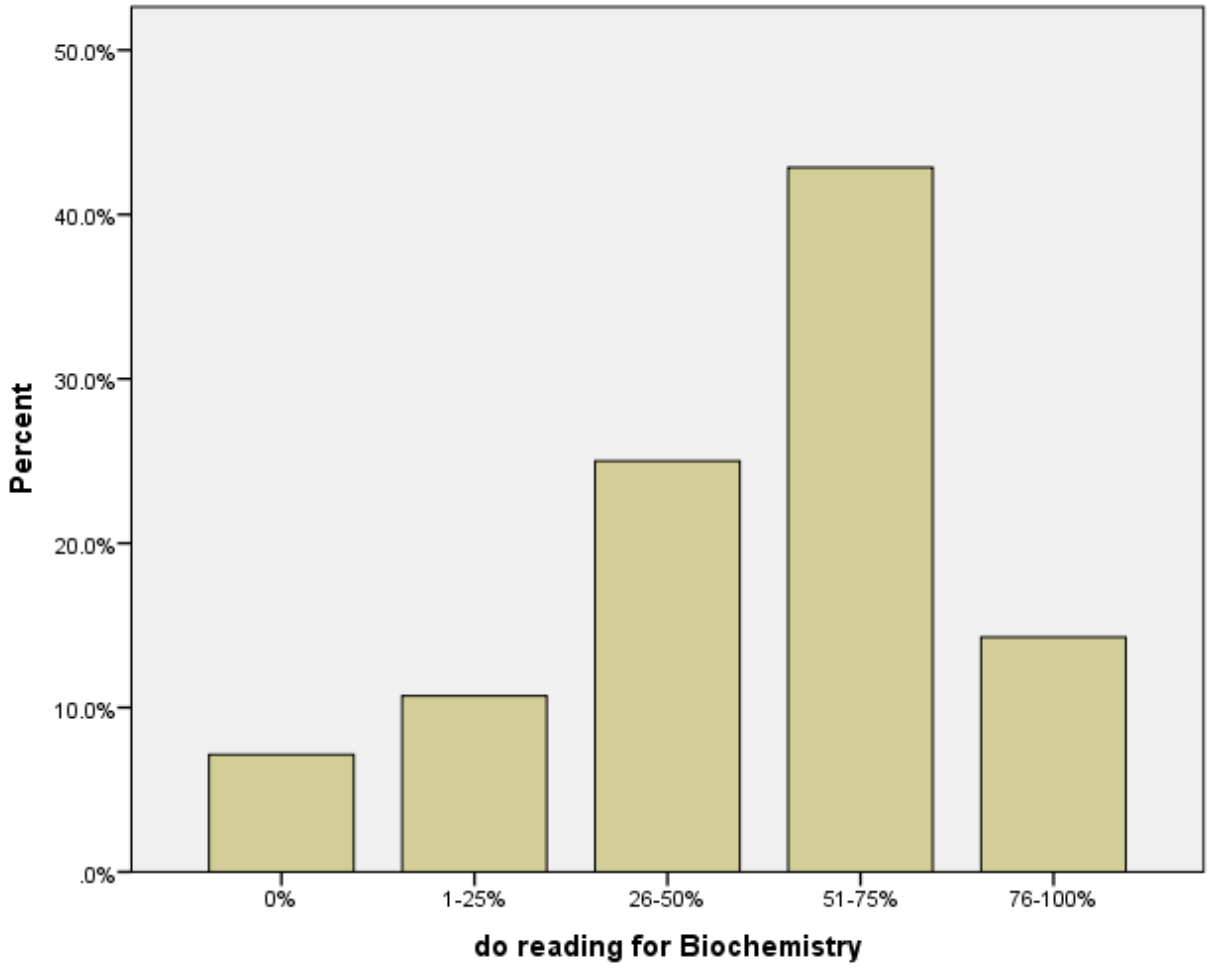

Figure 18: Reading done for Biochemistry 1

When asked to what extent students had read the compulsory reading for Biochemistry 1, the majority (42.9%) reported to have done between 51-75% of all the reading, followed by those having read between 26-50% (25%). Only 14.3% reported to have read between 76-100% of all the reading, while 10.7% seemed to have read between 1-25% of it. 7.1% of respondents reported not having done *any* of the reading.

From the reading strategies that were covered in the generic ULEA course that were used to understand their Biochemistry 1 texts better, it seemed as if the majority of students (60.3%) mostly relied on critical reading strategies, followed by vocabulary learning skills (54%), skimming (39.7%), scanning (34.9%), guessing the meaning of words in context (28.6%) and semantic relations (17.5%). Only small numbers indicated that they applied the skill of distinguishing between fact and opinion (9.5%) and anaphoric resolution (4.8%) in order to comprehend their content subject better.

Research question 5 (b) was developed to determine the academic reading needs of the target group, according to a content expert, their biochemistry lecturer. Two data collection tools, namely questionnaire 3 (cf. Appendix E), as well as informal interviews, were used in the process, as will be elaborated next.

b. Academic reading needs for Biochemistry 1 according to content lecturers

As previously explained, questionnaire 3 was originally developed as a combination of a structured and unstructured interview, but had to be adapted to a questionnaire to be administered electronically as the content lecturer of the 2012 cohort was out of the country at the time. It could only be administered at the beginning of semester 2, 2012, after the target subject was determined. After the second attempt at introducing myself and the aim of the research via e-mail the lecturer responded, agreed to participate, completed and returned the electronic questionnaire.

Both qualitative and quantitative data were collected (QUAN+QUAL). While the first two questions were included to establish the lecturer's background, questions 3-18 dealt specifically with the reading requirements of biochemistry students, 19-24 with the teaching methodology in the biochemistry classroom and 25 and 26 to assist in identifying a specific topic to focus on. As explained previously, the responses to questions 25 and 26 were used to conduct Step 9 in this needs analysis. In addition question 27 was included to explore options for the extensive reading programme and in question 28, the lecturer was asked to provide a course outline. With the exception of questions 3 and 4, all other questions were followed by a space to allow the lecturer to elaborate on the responses. Ideally this should have been an interview – for me to explore more and also for the content lecturer maybe to ask about reading strategies, etc.

Reading requirements for Biochemistry 1

In response to question 3, the content lecturer was of the opinion that students who enrolled for the Biochemistry 1 at UNAM needed to improve their listening (33.3%), writing (33.3%), as well as reading strategies (33.3%). Speaking was not listed as a

concern. Furthermore, reading appeared to be *quite important* for the success of students of Biochemistry 1, in general (question 4).

When asked to indicate which reading strategies were considered to be important for students of Biochemistry 1, obtaining information, being able to scan and skim, applying anaphoric resolution and understanding graphs and tables were selected as options. As with the student questionnaire, these were reading strategies that were covered in the ULEA course. In addition, understanding theories and ideas, scanning, skimming and applying anaphoric resolution were indicated as reading strategies students needed more assistance with. No comments were added (question 6, 8) possibly because he was in a hurry, but it could also have been because he did not understand the linguistic lingua. The issue that one cannot elaborate and probe as a shortcoming of questionnaires and electronic interviews has certainly been evident here.

The following list summarises the reading strategies that are currently taught in the general ULEA course that the lecturer deemed important for Biochemistry 1 students to be able to apply and also those that they need more assistance in.

Table 40: Reading problems of Biochemistry 1 students according to lecturer

Questions 5,6,7,8	**What they should do**	**Need more assistance with**
Obtaining general information	◊	
Understanding ideas or theories		◊
Scanning	◊	◊
Skimming	◊	◊
Anaphoric resolution	◊	◊
Understanding figures and graphs	◊	
Distinguishing between fact and opinion		
Deduce the meaning of unknown words in context		

In response to questions 9 and 10, the most important literature that students had to read for Biochemistry 1 seemed to be one textbook (Bettelheim, F.A., Brown, W.H., Campbell, M.K. & Farrell, S.O. 2006, *Introduction to General, Organic, and Biochemistry*. (9th ed.) Brooks/Cole), one study guide and one slide presentation per lesson. When I examined the 'study guide', it turned out to be just a course descriptor and semester plan. This explained why he viewed reading the textbook as more important than reading the study guide, but he did not mention how important reading the slide presentation was. The students were not required to read any journal articles or case studies.

Table 41 that follows summarises the texts that students are expected to read in Biochemistry 1:

Table 41: Texts that students are expected to read in Biochemistry 1

Type of Text		**Number**
Journal articles	X	
Textbooks	✓ ◊	1
Study guides	✓ ◊	1
Case studies	X	
Reports	X	
Slide Presentations	✓ ◊	One per lesson

Teaching methodology in the Biochemistry 1 classroom

In addition, the data suggests that lecture method and group work were indicated as common teaching methodologies, but not role-plays, discussions and debates. In addition, during lessons students were only required to take notes. After lessons, on the other hand, they were expected to write tests, submit assignments and attend practical sessions. No presentations, debates or the writing of summaries were indicated as activities.

The following table summarises the activities that students were required to do during and after Biochemistry 1 lessons.

Table 42: Activities of Biochemistry 1 students during and after classes

Activities for Biochemistry 1	During	After
Note taking	✓ ◊	x
Presentations	X	x
Tests	X	✓
Debates	X	x
Writing summaries	X	x
Writing assignments	X	✓
Practicals	X	✓

When asked to list any interesting novel with a setting that related in any way to the content of Biochemistry 1, it was replied "*None comes to mind*". In addition, the content lecturer attached the biochemistry scheme of work and semester outline to the electronic reply, as was asked in the last question of the questionnaire.

(i) 2012 lecturer

Informal interview

After analysing the completed, electronic questionnaire, I contacted the 2012 lecturer again via e-mail for a follow-up, some clarification and further assistance. For example, I briefed the lecturer about students' responses concerning the most interesting and most difficult topics in the Biochemistry 1 course and wanted to have an opinion on the issue that the only topic both the lecturer and students agreed on to be challenging was stereochemistry. In addition, I needed an opinion on the evidence that students listed 10 topics to be difficult, compared to the 5 listed by their lecturer. Moreover, I enquired about specific vocabulary and reading strategies to be included in the proposed adjunct, according to the lecturer's view. Finally, I asked to indicate, from a list of instructional

words, which words biochemistry/stereochemistry students would be more prone to encounter. These words were collected from the literature review on science students (cf. 3.3.2.1). The list included instructions such as *naming, describing, classifying, sequencing, explaining a process, hypothesising, predicting, comparing and contrasting and showing cause and effect*. Finally, I enquired whether the lecturer would be willing to assist with the development of the stereochemistry test that all students had to write at the end of the adjunct. I also asked whether the textbook used and the 2013 course outline would be similar to the one that was used in 2012 as I had to plan the adjunct reading course to be taught at the same time that the section on stereochemistry was taught in the biochemistry class. After the second time I sent this e-mail, the reply came that the lecturer had resigned from UNAM and would return to me if time allowed. The reply never came.

(ii) 2013 lecturer

Informal interview

At the start of the 2013 academic year, I made contact with the new biochemistry lecturer. Once again I introduced myself, the aims of the course, as well as requested for assistance. I also tried to corroborate some of the questionnaire responses from the 2012 lecturer and asked the questions the 2012 lecturer never replied to. The 2013 lecturer had the following qualifications: *BSc. Hons., MTech., MPhil*. It was his first time to lecture Biochemistry 1 at the UNAM School of Medicine. At the time of our first meeting, the lecturer had only been teaching the course for 3 weeks but confirmed the importance of reading, the teaching methodology used, the reading requirements of students, the activities they were required to do during and after lessons, as well as confirmation that the same textbook and course outline were still used. It was explained that students generally found the stereochemistry section rather challenging because they encountered this topic for the first time at university. Most other topics in the biochemistry course seemed to be dealt with in high school physical science and revised in the Biochemistry 1 course. The warm response and accommodating nature of the lecturer put me at ease. During this meeting I also explained our different roles in the research and emphasised my lack of content knowledge and desire to assist students with the required reading strategies to improve in their content subject (cf. 2.5.4). I asked for permission to attend

some of the Biochemistry 1 classes, especially the ones on the topic of stereochemistry. No formal recordings were made during the informal interviews with the 2013 content lecturer, hence no transcriptions of these conversations are included.

In order to determine the academic reading needs of students who were doing stereochemistry in the Biochemistry 1 course, in other words, to answer research question 5 (c), I engaged in analysing the content of their required reading and also in observing their stereochemistry lessons (QUAL+QUAL).

c. Academic reading needs for Biochemistry 1 according to content lecturers

Text analysis

The texts that were scrutinised were the textbook that Biochemistry 1 students used, as well as their lecture notes. Because I knew so little about the course, I started with this a long time before the lessons on stereochemistry were taught. I had my own copy of the textbook that I borrowed from the library in preparation for the ESAP/adjunct reading course. Throughout, I used the guidelines to follow during content analysis as suggested by Leedy and Ormrod, (2013) (cf. 4.4.5). In other words, I tried to be systematic, and as objective as possible, identified the 17 pages of the stereochemistry chapter as the specific section to be studied, defined specific reading strategies students might require in order to understand the text, and divided the lengthy, complex items into small, manageable segments to analyse separately. I subsequently scrutinised the different sections, for instances of each characteristic or quality identified. I tabulated the frequency of each characteristic found, as suggested by Leedy and Ormrod (2013) to be the last stage of content analysis due to the issue that I found that each time I read through the chapter, my understanding increased. As a result, every time I was able to identify more examples of the different reading strategies students required. Also, prior to each lesson, the content lecturer e-mailed the stereochemistry class notes to me, as he did to the students as well. The class representative also took it upon herself to e-mail these notes to me after the content lecturer had forgotten to do it once.

Like the students, I prepared for each lesson by reading through the notes. However, I also read the relevant sections in the textbook. I made notes about aspects I did not understand and researched these on the internet. I found YouTube clips especially useful to understand the content better. I probably could have, but did not want to impose too much on the content lecturer by bombarding him with questions about the content prior to lessons.

From analysing the prescribed textbook and slides students received as hand-outs before and after each lesson, I came to the conclusion that there were a number of reading strategies vital in Biochemistry 1 for students to comprehend stereochemistry. These are:

- Text mapping;
- Activating background knowledge;
- Understanding graphics and diagrams**;**
- Selecting and synthesising information from textbook, slides and lecture notes;
- Visualising concepts;
- Anaphoric and cataphoric resolution;
- Inferring the meaning of subject specific vocabulary using pre- and suffixes;
- Understanding symbols and abbreviations specific to stereochemistry;
- Understanding semantic relations that show cause/effect; definition; spatial order; comparisons and sequencing

b. Classroom observations

Because I realised I needed some background in order to comprehend the chapter on stereochemistry, I also attended the two lessons before the section on stereochemistry was taught. I attended all stereochemistry lessons as an unobtrusive observer (Leedy & Ormrod, 2013) making unstructured observations (Dörnyei, 2007) to allow for flexibility. However, during one of the lessons I sat next to a student who was repeating the biochemistry course. I recognised him from my ULEA class in 2012 and asked him a few questions about his experiences and why he thought he had failed the course. In

retrospect, this informal interview probably should have been handled differently, with the necessary consent forms to be completed. At that stage, because this was one of the students that participated in the preliminary stages of the research, the same informal consent that was given in 2012 was still assumed. This is another possible shortcoming of the current study.

Attending these lessons was, on the one hand, to assist me in understanding the content better and experience any challenges students may be confronted with first-hand. On the other hand, it was also to verify students' and content lecturers' earlier responses to the questionnaires administered to them, regarding the reading strategies required to comprehend stereochemistry better, as well as the classroom procedures.

Even though written notes may not capture the richness of the situation and require objectivity, I decided to write down my observations after the attempt to record the first stereochemistry lesson failed. A student volunteered to record the lesson, but when he arrived at the lecture venue the battery of the device he intended to use was flat and he had no charger to use. I also realised afterwards that if he had recorded the lesson, it could possibly have compromised his focus on the lesson or I could have made the lecturer and students uncomforable, a drawback suggested by Dörnyei, (2007) (cf.4.7.3). When I attended the stereochemistry lessons, I realised how helpful the slide presentation notes were and how important it was for students to read through these slide presentations before attending the actual lessons.

I attended all the lessons on stereochemistry in 2013, together with the students. Gaining these insights was necessary to plan reading lessons that would allow students to comprehend their stereochemistry lessons better, in other words, planning the new reading course.

It should be noted that not all students doing Biochemistry 1 necessarily also participated in my study as some were exempted from doing ULEA.

Here follows a summary of my observations that were recorded in a notebook while attending the stereochemistry lessons.

Teaching Methodology

- The lecture method dominated;
- All lessons consisted of PowerPoint presentations;
- Fast-paced lectures;
- Little time and opportunities for revision;
- Little time and opportunities for clarification.

Lesson content

- Main source the textbook;
- Additional sources mainly used to provide examples.

Student demands

- Had to revise every day's lesson before the next one on their own in order to comprehend the following lesson;
- Had to read the lesson notes (slides) before each lesson, as well as the relevant sections in their prescribed textbook afterwards;
- New content specific vocabulary was introduced daily;
- Had to comprehend subject specific pre- and suffixes vital to comprehend the content of the course;
- Students had to understand the different terms, definitions in order to follow each lesson;
- Students also had to be able to visualise aspects, such as rotations;
- A lot of reference was made to concepts learnt previously.

Student participation

- During lessons prior to stereochemistry, students did not ask many questions and even looked bored at times, used their cell phones and laptops during lessons, surfing the internet, like they often did during my ULEA lessons.
- During the stereochemistry lessons noticeably more questions were asked;
- Little interaction between lecturer and students – lecturer was teaching from slides and students were looking at slides;
- Students did not take many notes, because the notes were already e-mailed to them before each lesson.

The data collected will be interpreted and discussed in Section 5.3.

5.2.4 Research question 6

As part of the target needs analysis, namely to determine the lacks of the target group, research question 6 was developed to determine to what extent the content of the generic ULEA course catered for the academic reading needs of students from the School of Medicine at UNAM. First it was important to establish if the reading component of the generic ULEA course catered for the academic reading needs of all their content courses, in general and then it was necessary to establish whether it catered for their academic reading needs of Biochemistry 1, in particular, stereochemistry. Hence the development of research questions 6(a) and 6(b) respectively. The lacks were determined by comparing their necessities with what they already knew (Hutchinson & Waters, 1987; 2009) (cf. table 5)

5.2.4.1 Data collection tools

- Questionnaire 4 [Appendix F (Sections D, E)]

Questions 17- 23 in section D of questionnaire 4 dealt with answering research question 6 (a). *In other words, to what extent does the content of the generic ULEA course cater for the academic reading needs of students from the School of Medicine at UNAM, in general?*

This section of the questionnaire collected quantitative, as well as qualitative, data (QUAN+QUAL) and tapped into various aspects, using rating scales. For example, the students had to rate the reading component of the generic ULEA course (question 17), how useful they regarded the *reading strategies* that were included in the reading component of the course to provide them with the essential skills to read and understand the required reading for all their content courses (all of them) (question 18) and the extent to which the *different topics* (as opposed to the reading strategies in question 18) related to any of the other courses they did, in general (question 19). In addition, respondents had to rate the number of teaching hours spent on reading in the reading section of the ULEA course (question 20), to the lecturer's presentation in the reading section of the ULEA (question 21) and to indicate their preferred way of learning the reading component of the English for academic purposes (ULEA) course (question 22). Their responses to

questions 20-22 were important to decide upon an appropriate teaching methodology for the new reading course (Nunan, 1993; Watson, 2003), which is more a learning than a target need. Finally, in question 23, the only open-ended question in this section, respondents were asked to provide any suggestions to improve the current reading component of the ULEA course. Their responses to this question could be interpreted as wants

The questions in section E were included to answer research question 6 (b), namely: *To what extent does the content of the generic ULEA course cater for the academic reading needs of students from the School of Medicine at UNAM who are enrolled for the target subject?*

It was important to examine the responses to these questions, because if students seemed to be satisfied and if the topics covered similar topics than those in their content course, there would be no need to develop a new, CBI reading course. In question 24 students had to indicate the usefulness of the reading strategies that were included in the reading component of the course to provide them with the essential skills to read and understand the required reading for Biochemistry 1. In question 25 they were asked to indicate to what extent any of the topics that were discussed in the reading component of the course related to Biochemistry 1.

Data analysis and presentation

As already elaborated (cf. 4.5.1) the quantitative data were analysed descriptively by using SPSS. The qualitative data were scrutinised for themes and then quantified and also entered on a SPSS spread sheet. The results were analysed by using descriptive statistics.

Views on the reading component of the generic ULEA course

The majority of respondents (77.8%) rated the reading component of the generic ULEA course as good, 12.7% as excellent and a smaller number (9.5%) as average. Nobody, however, rated it to be ‘poor’. These results are summarised in figure 19 that follows.

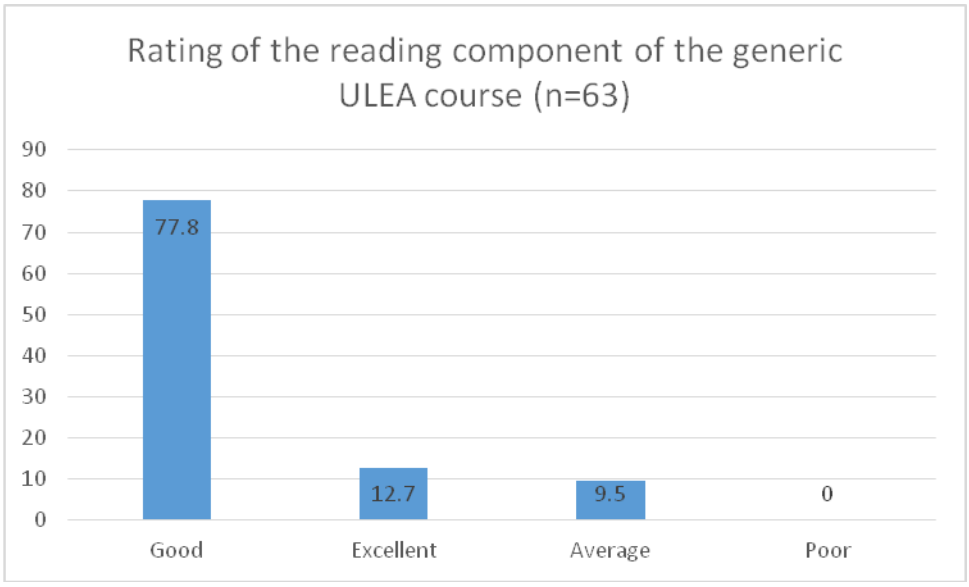

Figure 19: Rating of the reading component of the generic ULEA course

In addition, most students (52.4%) rated the value of reading strategies that were taught in the generic ULEA course to read and understand the required reading for their all their content courses as valuable. Others regarded these to have been extremely valuable (27%) and some regarded them to have been of some value (20.6%). Nobody regarded them to be of no value.

The majority (62.7%) of respondents indicated that none of the topics covered in the generic ULEA course appeared in any of their other courses, 23.7% of respondents indicated that some did, 8.5% indicated that all the topics appeared in one or more courses, while the minority (5.1%) indicated that an extreme number of topics also appeared in one or more of their other courses.

When asked to indicate which of the reading strategies, specifically those that were covered in the generic ULEA course, were used to understand the required reading in their different courses, students could choose more than one option. Because the researcher was familiar with the content of the course, it was not necessary to include a category for *other*, followed by an open-ended question as suggested by Dörnyei and Taguchi (2010).

The reading strategies this sample of students seemed to rely on the most were critical reading (65.1%), vocabulary (63.5%), skimming (57.1%), scanning (54%) and guessing

the meaning of words in context (52.4%). These were followed by distinguishing between fact and opinion (39.7%), semantic relations (17.5%) and anaphoric relations (4.8%).

When asked to rate the number of teaching hours spent on the reading section of the ULEA course, the majority of students (54.8%) seemed to be *satisfied*, followed by those that were *very satisfied* (27.4%). A small number of students reported to be *fairly satisfied* (17.7) but nobody was *not satisfied*.

In addition, when asked to rate the lecturer's presentation of the reading section of the ULEA course, the majority of students were *very satisfied* (52.4%) and *satisfied* (46%). Only one student (1.6%) reported being fairly satisfied and nobody was *not satisfied*. Table 43 summarises this information as follows.

Table 43: Rating of teaching hours and lecturer's presentation

N=63	**Rating of number of teaching hours**	**Rating of lecturer's presentation**
Very satisfied	27.4	52.4
Satisfied	54.8	46.0
Fairly satisfied	17.7	1.6
Not satisfied	0	0

In response to question 22, the majority of students (53.23%) seemed to have preferred to work individually, followed by those who preferred working in small groups (30.65%) and those who preferred working in pairs (16.13%). This information is represented in figure 20 that follows.

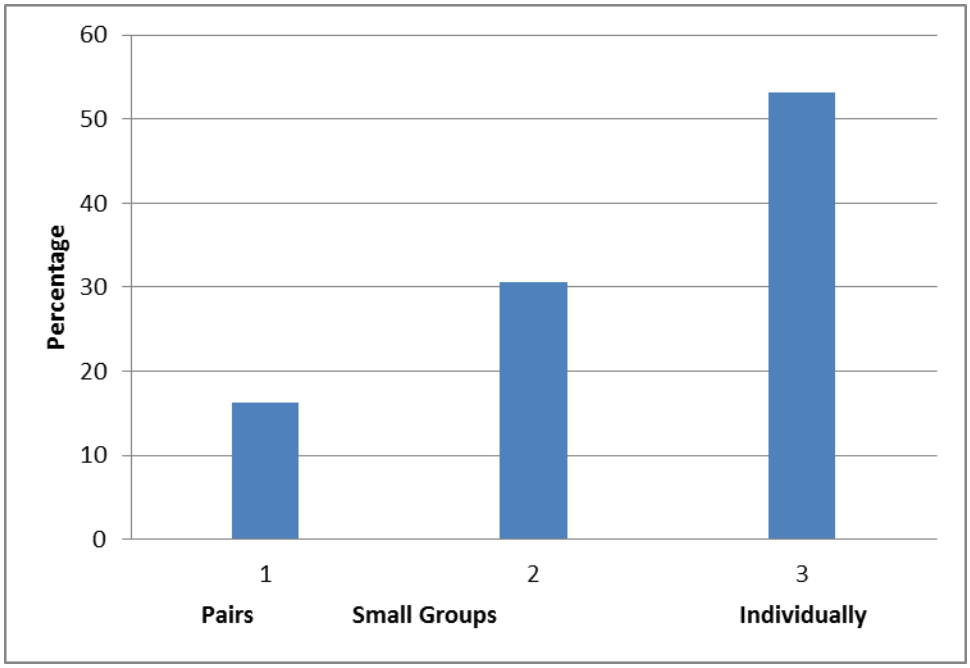

Figure 20: Preferred way of learning the reading component of the English for Academic Purposes (ULEA) course

The only open-ended question, where respondents were asked to make suggestions to improve the current reading component of the ULEA course generated 18 responses (35%).

Here follows a list of their responses:

1. *"Discuss articles together"*
2. *"Giving more assignments"…*
3. *"Helping learners find ways to read their least favourite subject with interest"*
4. *"Let students speak more to practice articulation"*
5. *"Make course more creative and encourage reading more"*
6. *"Make it more applicable to my current field of study"*
7. *"Make it more practical; allow for discussions"*
8. *"Make it more relevant to my field of study"*
9. *"Make it more relevant to specific courses"*
10. *"Make material more relevant to medicine"*
11. *"More activities to apply knowledge"*
12. *"More contemporary articles"*
13. *"More elaboration on reading strategies"*

14. *"More reading passages"*
15. *"Not too long"*
16. *"Prescribed books to read more"*
17. *"Provide diagrams to sum up main ideas"*
18. "*Students should read individually then be allowed to share"*

In order to limit subjectivity, each response was carefully considered and any distinctive content elements, essential statements or key points, were marked. Next, based on these elements, broader categories or themes were formed to describe the contents of the response in a way that allows for comparisons with other replies. These responses were grouped into the following six categories:

Group work

Some students wanted the course to include more group tasks where students could '*read individually and then be allowed to share*' as this would '*make the course more practical and allow for discussion'*.

Activities

A number of students asked for more assignments. As one student put it, *'to apply knowledge'*, and another one, '*to make the course more creative and encourage reading more'*.

Integration of all skills

Another suggestion was that reading should be incorporated with other language skills, especially speaking. As one student state, *'to let students speak more to practice articulation*' and another one, '*to discuss articles together'*. This, according to another student, would '*make it more practical'*.

Relevance

Generally, students wanted the reading course to be more relevant to their field of study. As one student put it, '*make it more relevant to medicine'* and another one '*make it more relevant to my field of study'*. More specifically, another student asked to '*make it more relevant to specific courses*'.

Reading passages

Other students asked for more reading passages even to the extent of asking for '*prescribed books to read more'*, and more reading activities, '*to apply knowledge'* as one student put it. Another student asked for *'more contemporary articles*'

Reading strategies

Some also asked for more focus on reading strategies, in an attempt to '*helping learners find ways to read their least favourite subject with interest',* as well as more schematic representation of reading. As one student put it, '*provide diagrams to sum up main ideas*'.

Usefulness of the generic ULEA reading component to read for Biochemistry 1

When asked to indicate how useful the reading component of general ULEA course was to help students to comprehend Biochemistry 1 texts, the majority (47%) reported these skills to be of some value, followed by being valuable (33.3%) and extremely valuable (12.3%). A small minority (7 %) suggested that these skills were of no value.

In addition, when asked to indicate how many of the topics appeared in the Biochemistry 1 course, the majority (77.6%) indicated that none of the topics did, followed by 19% that stated that some topics did. The rest indicated that quite a number (1.7%) and an extreme number (1.7%) of topics appeared. Nobody chose option 1, namely that all of the topics appeared in the course. This information is summarised as follows:

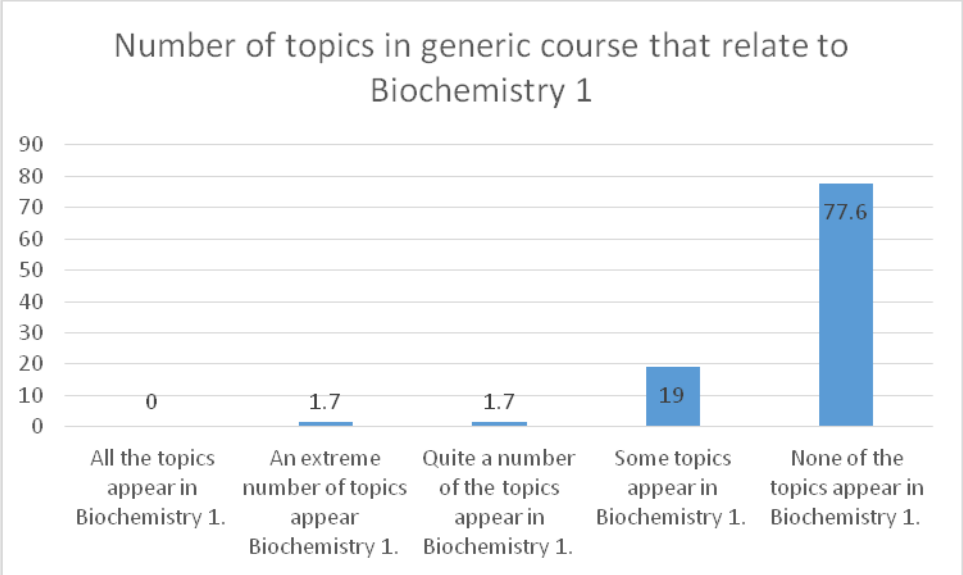

Figure 21: Number of topics in generic ULEA course that relate to Biochemistry 1

So far, all the data that were collected to carry out Step 10 in the study, namely to analyse and evaluate target and learning situations were presented. The next section discusses and interprets these results. First the learning and then the target needs are elaborated on.

5.3 Discussion and interpretation of results

Learning needs

From the data that were collected and presented, various assumptions can be made about certain aspects regarding the learning needs of students. This section will first elaborate on the similarities between the 2012 and 2013 cohort before a detailed discussion regarding the literacy backgrounds, reading attitudes, culture and vocabulary levels of the target group will follow. It was not necessary to collect all other data to have a complete learning needs analysis, as the researcher was familiar with the other aspects, as reflected in Hutchinson's needs analysis framework (cf. table 5).

Similarities between 2012 and 2013 cohort

The first, obvious similarity was that both groups were subject to the same admission criteria to enter the first-year programme of the School of Medicine. Another similarity

was that students from both groups had advanced English school leaving grades (1, 2, or 3 on HIGCSE or an A or B on ICGCSE).

However, because the 2012 cohort was used to determine the target subject and the target topic to become the adjunct, it was decided to compare the demographic information of the 2012 and 2013 groups. Table 44 contains a summary of the different age groups, sex, their countries of origin, as well as the nationalities of students.

Table 44: Demographics: 2012 vs. 2013 cohort

Details	**% 2012 (n= 53)**	**%2013 (n=63)**
Age		
< 20	79.2	85.2
20-29	18.9	13.1
30-39	1.9	1.6
Sex		
Male	24.5	34.4
Female	75.5	65.6
Nationality of students		
Namibian	90.6	90.3
Other	9.4	9.7
Regions in Namibia where students were from		
Caprivi Region	5.7	0
Okavango	3.8	16.1
Erongo Region	7.5	7.9
Khomas Region	41.5	37.1
Omusati	7.5	3.2
Oshana Region	7.5	6.5
Oshikoto Region	5.7	9.7
Otjozondjupa Region	11.3	4.8
Hardap	0	3.2
Karas	0	1.6
Other	9.4	9.7

From table 44, one can deduce that in both groups, more females (75.5% and 65.6%) than males had participated, covering a range of 3 different age groups, with the majority younger than 20 (79.2% and 85.2%) and a small minority older than 30 (1.9% and 1.6%). This suggests that one could expect these students to display characteristics similar to those of adolescents as suggested by Alexander and Fox (2011) and elaborated in section 3.1.5.3. For this age group, namely young adults, magazines would be important stimulants of reading (Rucker, 1982). Another similarity was that the majority of students (90%) from each cohort were from Namibia, suggesting an African culture of origin. Furthermore, the majority of participants from both groups seemed to come from urban Namibia, namely the Khomas region (41.5% in 2012 and 37.1% in 2013). In Namibia, all other regions are regarded as *rural*. All in all, based on these similarities one could assume the 2012 cohort to be representative of the 2013 group.

Culture

Establishing the culture of students can assist instructors to modify instructional methods in the reading classroom to maximise their cultural resources (Eskey, 2005; Grabe, 2009; Li, 2011). In other words, the cultural identity of learners can guide instructors to decide on learning content and also on how the content is presented. Even though instructors may have limited options in selecting the carrier content in the intensive reading component of adjunct reading courses (cf. 2.5), they seem to have more alternatives when selecting content for extensive reading programmes (cf. 3.4.1.7). However, from the proof that the majority of students in this cohort were Namibian (90%) it was clear that an African culture prevailed, and was an aspect to consider in developing the reading programme. However, even though this is the case, the urban/rural divide among these students cautions one to oversimplify the matter as these students were from 10 different Namibian regions. As a result, one could expect them to have different learning styles and preferences, as indicated in Figure 17. The majority seemed to prefer to work individually (53.23%), followed by those who preferred working in small groups (30.65%) and in pairs (16.13%). This data suggest the importance of needs analysis into all aspects instead of simply assuming that group work, the preferred methodology in EAP, would automatically be preferred by students in this particular study. In the study by Fouché (2009) reported on in section 2.3.1.1, a similar observation was made in the South African context. As a result, Fouché developed various group work, pair-work,

individual activities and whole-class feedback activities "to prevent students from feeling frustrated and left out" (Fouché, 2009, p. 131). Knowing the learning styles of students and how this relate to culture seems to be important to be established prior to the development and implementation of EAP reading courses (Eskey, 2005; Grabe, 2009).

Literacy backgrounds of the 2013 cohort

The research group (the class of 2013) can be described as being literacy rich. As elaborated on in section 2.3.1.1, children's exposure to print, such as the number of books at home and the amount of reading to the child, among others, is a strong indication of the literacy levels of students. Students from print-rich homes are more motivated to read and have higher vocabulary scores than those with less access (Grabe, 2009; Moje et al., 2011; Krashen, 2004; 2013; Komiyama, 2013;McQuillan, 2006). Their rich literacy experiences were evident from the high number of students who indicated that someone had read to them as a child. While 20.6% of all respondents indicated that they were *often* read to as children, 44.4% reported that they were read to *sometimes*. The minority indicated never (19%) and seldom (15.9%). Their literacy rich experiences were also reflected in the verification that the vast majority (66.7%) owned an estimate of more than 50 books, and only a few (17.5%) less than 10. Their literacy rich experiences were further reflected by the evidence that 65% of the participants reported that in their homes newspapers were bought every day, and 46% of them that magazines were bought at least once a week. The sign that most students could, in a variation of the ART and MRT tests developed by Stanovich and West (1989) (cf.3.4.1.2) mention the titles of magazines and novels, seemed to confirm their print-rich homes. Being able to name titles, instead of recognising them from a given list, as it was the case in original test by Stanovich and West (1989) was regarded as more challenging. One could, therefore, deduce that these responses were genuine and not due to social desirability or the halo effect in questionnaire responses (Dörnyei & Taguchi, 2010).

The findings reported on above are in direct contrast to results obtained in two others studies, which were undertaken in Namibia and Swaziland, another African country where students are generally regarded as print-poor.

In the Namibian study, Willemse (2006) (cf. 1.2; 3.4.1.4; 3.4.1.7) explored the literacy experiences of first-year UNAM students (n=108) who were enrolled to do ULCE at UNAM. This group had lower English school leaving symbols (C) than the group the current study reports on. The other difference is that the 2005 cohort were a combination of students from various disciplines and faculties, but none was enrolled to do medicine. Even though their school leaving results were not established at the time, one could infer that theirs were lower than those of the participants in the current study. Contrary to the results of the current cohort, 38.8% of the 2005 respondents stated that as children, their parents or caretakers *never* read to them, 8.2% were *seldom* read to and 45.9% were *sometimes* read to. Only 7.1% suggested that they were read to *often.* In addition, when asked about the number of books at home, 12% indicated to have more than 100, 14.8% more than 50, 25% more than 20, 42.6% about 10 and 5.6% none. These students from the 2005 cohort were regarded as having come from print-poor homes and it was also found that they were reading at very low, high risk levels. After a reading intervention of 10 weeks, even though the participants showed a significant improvement in their results, 26% of the participants still read at frustration levels, 70% were borderline readers and only 4% could read at instructional levels. These different categories of reading were determined by Pagé (1990) who recommended that readers who are reading at frustration and borderline levels still need intensive reading instruction while readers reading at the instructional levels can also still benefit from additional instruction. This suggests the need for explicit, intensive reading instruction for them to be reading independently to excel in their academic studies. After passing the ULCE course, this group had to do the same ULEA course the target group of the current study did. Since 2005 the course content underwent only superficial changes. Even though one could argue that there is a 10 year lapse between these two studies, one being conducted in 2005 and the current one reported on in 2015, and that the objectives and the participants are not the same, what these two groups have in common is the data that they were both enrolled at UNAM and that both had to do the generic ULEA course.

In another study, this time to explore if there were any relationships between access to leisure reading resources and reading ability among primary school teacher trainees (n=45) in Swaziland, Lukhele (2009) determined that 89% of the participants had less than 10 leisure books at home, 11% more than 10 and nobody had 50 or more. Consequently, the trainee instructors were, like those in the Namibian study (Willemse,

2006), classified as being print-poor. It was further determined that students who had better access to reading resources had better reading abilities "(r=0.261, p=0.017)" (Lukhele, 2009, p. 137). The same study also investigated student responses to an adapted version of the ART and MRT where students had to recognise the names of popular titles and authors. Extremely low percentages were revealed, suggesting very poor familiarity with popular literature and an inability to recognise the names of familiar authors. This is in contrast to the participants in the current study who were not asked to recognise book titles and authors, and magazine titles, but to actually mention them from memory, a seemingly more advanced task. In the current study, 55 mentioned the titles of at least 2 books, 48 of one and some the names of authors, even though that was not required. In addition, a total of 45 different magazine titles were mentioned. Even though no statistically significant relationship between their exposure to print (ART/MRT) scores and access to leisure reading scores were found "(r=0.048, p=0.536)" (Lukhele, 2009, p. 148) among the Swaziland cohort, the findings did suggest that participants engaged very little with leisure reading.

Comparing these statistics with those from the target group in the current study clearly indicates that even though all three groups are African, their literacy experiences are not the same. Due in part to their richer home literacy experiences, one might infer that the students from the target group in the current study had high school leaving symbols that might have ensured their admittance to the School of Medicine. However, such an assumption needs to be viewed with caution as more factual information is required to directly compare the school leaving symbols of participants from the various studies and from which data one could draw more clear cut conclusions.

Reading attitudes

The issue of positive attitudes and motivation to reading, as well as the importance of establishing this at the start of a reading programme (Grabe & Stoller, 2013), has been explored in detail in section 3.4.1.8. The suggestion that the majority of students seemed to enjoy reading *quite a lot* (41.3%) and that only 1.6% *not at all*, suggests that participants seemed to have positive attitudes towards reading. This could explain their high reading scores in the generic ULEA reading test. The value of extensive reading, as

was elaborated (cf. 3.4.1.7), is emphasised by Krashen (2004; 2013) who is of the opinion that extensive reading alone can be enough to improve reading comprehension. To support their positive attitudes towards reading, most students seemed to read when they can. The cohort's main preference was romance (50.8%). This is probably due to the demographics, as the majority of the group comprised female students (65.6%). In addition, they liked reading detective stories (47.6%), religious books (41.3%) and science fiction (25.4%) which are usually read by both males and females. These findings were important to consider in developing the extensive reading course, in particular in selecting material for this component of the adjunct reading course. A positive indication was that only a small number of students (11.1%) indicated not to read at all. I probably should have followed up this finding qualitatively to enquire about the reasons more explicitly. This is a possible shortcoming of this part of the study as such detail could have allowed me to provide a richer description of the reasons why some students in the target group do not read at all. However, Morgan (2014), as well as Grabe (2009), reminds one that this type of research always involves a choice of whether to pay more or less attention to some things, and it forces the recognition that everything that is observed is connected to everything else and that nothing is context-free.

From their responses (cf. figure 16) it further seemed as if the main reason why some of the respondents did not engage in much extensive reading during their first semester as medical students, was due to a lack of time (85%). This statement was supported by the verification that students seemed to be keen readers as the majority to have read a non-academic book either a week (31.7%) or a month (36.5%) ago. The suggestion that they seemed to be such keen readers could be a result of their literacy rich childhoods. In addition, the sign that they engaged in extensive reading could also be the reason for their high school leaving symbols, not only in English, but also in their other subjects. This finding seems to be in contrast with observations in LC classes at the main campus where the majority of students generally are not ardent readers. As a result, LC courses for students who enter UNAM with C symbols and lower scores in high school English have extensive reading as a compulsory component of their courses. Students from the 2005 study (Willemse, 2006) reported to have reading as their number one leisure activity (64.8%). This was in direct contrast to the indication that they had so little access to leisure reading sources. A follow up to their responses revealed that the 'reading' most students referred to was, in fact, reading their bibles.

However, even though the majority reported to like reading quite a lot and very much, reading was not the preferred activity during their leisure time (cf. figure 14). This could probably be explained by the evidence that the majority of them (85.2%) were younger than 20 years of age and the rest between 20 and 39 years old. Another possibility could be that they already had so much reading to do for their courses. This, however, could have been followed up qualitatively, a possible shortcoming of the study.

In addition, the majority regarded themselves to be *excellent* (21%) and *good* readers (66.1). This may indicate *Dunning-Kruger effects* (Kruger & Dunning, 1999), or even social desirability or prestige bias (Dörnyei & Taguchi, 2010), but the indication that these students could mention so many titles of books and magazines seemed to rule out those possibilities. Another reason to strengthen the credibility of these students being excellent and good readers was is their above average performances in their ULEA reading tests, compared to students from the main campus. Even though this was not used as a formal tool in the current study, the incidence that I was their lecturer allowed me to make these comparisons, one clear advantage of conducting action research. For example, the first test written in the generic ULEA course is always a reading test. By then all the reading strategies have been dealt with in the course, and the various reading strategies that are listed in questionnaire 4 (cf. question 19) are tested. In 2013, the students from the School of Medicine (n=81) scored 75% on average this test, while my students at the main campus (n=219) scored an average of 52.6% in the same test. In 2012 the same tendency was observed. In that year, the students from the School of Medicine (n=73) obtained an average of 71% in their reading test in semester 1, while those at the main campus (n=198) had an average of 53%. Students from the School of Medicine seemed to be able to achieve these results because they were indeed *excellent* and *good* readers, and not because of higher attendance rates or the content of the generic ULEA course. As mentioned earlier in Stage 1, these students very reluctantly attended classes and when they did, they often seemed uninterested and bored. At the main campus, students seem more motivated and interested to attend these classes, possibly because need more AL assistance to cope with the demands of their content courses. In addition, the main campus also has smaller classes where it is easier to monitor class attendance. Perhaps one recommendation would be to make ULEA ESAP classes smaller at the School of Medicine as well.

Vocabulary levels of participants

While the data from questionnaire 4 provided empirical data to explain the higher reading achievements of students, I wanted to explore the issue further by adding another quantitative strand. Since vocabulary levels are a high predictor of reading success, and the LC has no formal test for Academic Literacy, it was decided to administer Nation's vocabulary test (cf. Appendix I). More details about the relationship between academic vocabulary and academic reading, as well as how results from this vocabulary test can be interpreted, are provided in section 3.4.12. Results from this test would not only explain the seemingly higher reading comprehension abilities of these students, but also assist in developing the reading course, especially in selecting appropriate texts for the extensive reading programme (cf. 3.4.1.2).

The evidence that 75 students, many more than those who answered the questionnaires voluntarily, wrote this test after giving consent to do so, implies high motivation levels for evaluating themselves. According to Nation (2012), learners' motivation for taking this test is important for two reasons. Firstly, not being motivated may result in underperformance, which may, in turn, cause instructors to make flawed instructional decisions. Secondly, this would determine how serious they are when sitting for the test, a factor that would result in an increase in test validity. On a more personal note, the high rate of participation in sitting for this test, i.e. their willingness to assist with the study, seems to be a reflection of the good relationship that developed between us during the research process and their willingness to assist with the research. For Hutchinson and Waters (1987; 2009), this is the only requirement for developing successful ESAP courses, much more than content knowledge on the part of the EAP practitioner (cf. 2.5.4).

Several important observations based on the interpretation of the test scores of participants as presented in Figure 17 were made. Firstly, the confirmation that the minimum test score was 7 200, implies that all students who wrote the test were familiar with the high frequency words in English. In addition, the mean (9 904.17) suggests that 44.4% were familiar with the higher end of the mid-frequency range, bordering on the low frequency word continuum. Furthermore, 55.6% of the respondents scored 10 000 and above, putting them in the last category, namely the low frequency range, according

to Nation's classification (cf. table 10). One shortcoming of this classification seems to be the evidence that it does not seem to account for the range between 9 000 and 9 999, a range where a number of the participants (27%) in the study were placed. Based on this interpretation and the mean score of 9904.17, it was decided to combine students who scored between 9 000 and 9 999 with those in the last category. As a result, it is cautiously concluded that an abundant majority of participants (82.6%) scored at the low-frequency level, in other words, they were actually beyond the level where they would benefit from reading mid-frequency, graded readers and from deliberate learning. As a result, one can conclude that the majority of students from the School of Medicine in the 2013 cohort appeared to be ready for specialised study of a subject area, as well as for wide reading in an extensive reading programme. In other words, they would be ready for a CBI approach to EAP. This I considered to be a significant finding.

Another important conclusion from their vocabulary results is the fact that 82.6% of the 2013 cohort had vocabulary levels much higher than required from the average non-native undergraduate to cope successfully at an English speaking university. In fact, according to this interpretation (Nation, 2012b; Nation & Anthony, 2013), the majority knew the required number of word families (9 000) that non-native PhD students would require to successfully cope at English speaking universities. As a result, the reading of graded readers in the extensive reading and deliberate teaching and learning in the intensive reading programme would, therefore, not be appropriate for this group of students.

Other findings are that the students in the current study were mostly from urban Namibia, and did not have much time for reading, in spite of their rich literacy experiences and high motivation to read. In addition, the vast majority seemed to be able to cope with texts that PhD students at English speaking universities, like myself, should be able to cope with. The last three findings could explain their high school leaving symbols, particularly in English and also the verification that they achieved far above average reading marks in the generic ULEA test, much more than their peers at the main campus who were not enrolled for medicine (cf. 1.2). An important deduction based on the findings is that it looks as if the lessons in fact do not contribute in any meaningful way to their academic reading levels or needs. The findings led me to conclude that these

students were ready for a CBI approach to EAP and an extensive reading programme that would not limit them to graded readers, but to wider reading opportunities.

As mentioned in the introduction to this section, as I conducted the action research reported on, it was not necessary to collect data for every aspect as represented in the learning needs assessment (cf. table 5). I was always present on site and familiar with issues such as why the course was taken, what the available sources for the reading courses to be developed were and where and when the courses would be presented. The reason that I had access to the research site long before the actual research took place also allowed me to make important conclusions based on the findings. For example, I could make comparisons between the target group and other UNAM students. However, when an unfamiliar research site is entered it seems not only recommended but also compulsory to establish this information qualitatively, qualitatively or as a combination of both (Basturkmen, 2010; Brown, 1995; Hyland, 2002; Hutchinson & Waters, 1987; 2009).

Target needs

The target needs, the knowledge and abilities learners would require in order to perform competently in the target situation include determining their necessities, their lacks and their wants. First the necessities are determined, then, by comparing these with what they already know, their lacks, in other words, what they need instruction in, are established. These are all established objectively, but wants, on the other hand, are subjective needs that exist within learners themselves and may be interpreted differently by different stakeholders. Hutchinson and Waters (1987; 2009), however, are of the opinion that these cannot be ignored in order to maintain learner motivation. As elaborated in section 3.4.1.8 Prayan (2007) came to a similar conclusion when an EAP course was developed, in considering learner input as much as possible.

As suggested, the learners and their content lecturer were considered, but being the researcher and content expert in reading, I also had input in narrowing down the focus by determining what knowledge and reading strategies to include in the new reading course.

In addition, it was possible to establish the reading strategies would be needed to read for stereochemistry in their biochemistry course, for their university studies (cf. table 5).

Their necessities, in other words, their academic reading needs were determined by triangulating data (cf. 4.2.3) from various sources. In this section the data from the various sources will be integrated to present a coherent discussion regarding the academic reading demands and needs of students doing Biochemistry 1, in particular when reading for stereochemistry.

Reading requirements of Biochemistry 1

From the interviews with two content lecturers it emerged that Biochemistry 1 students are mainly required to read one text book and class notes, in the form of slides, in preparation for each lesson, as well as for the examination. During class observations, this was confirmed. In addition, I observed that the 2013 content lecturer mainly used information from the textbook but also from additional sources to prepare the slides. All in all, it was concluded that the textbook was the main source of information for the students. This was confirmed during an informal discussion with a student who was repeating the course. It was indicated to be the main source for examination preparation. The incidence that the textbook was their major source of information is probably because this seems to be the trend in first-year courses (cf. 3.3.1). As a result, it would be of great value to these students to comprehend the way texts are presented in textbooks. Even though the content lecturer mentioned that students were also required to read a study guide, this seemed to be just a booklet containing the course description and semester plan. Finally, these students were not required to read any journal articles or case studies, probably as they were in their first year of studies.

Reading problems experienced when reading Biochemistry 1

When asked to what extent students read the compulsory reading for Biochemistry 1, the majority (42.9%) reported to have done between 51-75% of all the reading, followed by

those having read between 26-50% (25%). Only 14.3% reported to have read between 76-100% of all the reading, while 10.7% seemed to have read between 1-25% of it. 7.1% of respondents reported not to have done *any* of the reading. Considering the suggestion that all Biochemistry 1 students were required to read the e-mailed class notes from their lecturer prior to each lesson and then again the relevant section in their textbooks after each lesson, it was surprising that not more students reported to do at least more than 50% of all the reading. This could be due to their heavy workloads. Another explanation for this suggestion could be that, as similar findings were reported by Spiegelberg (2013), Biochemistry 11 students at the University of Rider in New Jersey relied on the instructor's explanations to understand visuals presented in texts. Although the Spiegelberg study focuses mainly on reading habits when understanding visuals presented in texts, this still amounts to reading. Another possible oversight and shortcoming of this study could have been to compare the amount of reading done for their Biochemistry 1 course to their final examination mark to also quantitatively confirm to what extent reading the textbook prepared students for their examination and in that way combined qualitative and quantitative findings for a more conclusive result. Even though most students regarded themselves to be excellent and good readers in general (cf. 5.2.1.1) it does not seem to be the case when specifically reading for Biochemistry 1. As reported in section 5.2.3.1 only 17.5% of all respondents reported that they did not have any real problems with reading for Biochemistry 1 (question 26). The majority (31.7%) indicated that it was not easy to keep track of the main idea, followed by grammatical features not understood (30.2%), vocabulary (28.6%), that reading took too long (23.8%) and not understanding graphs (22.2%). This confirms the evidence that academic texts are challenging to comprehend and contain condensed information (cf. 3.3)

Although 30.2% of the respondents indicated that they struggled with grammatical features and did not understand when they read their Biochemistry 1 texts, this new reading course could not make provision for grammatical instruction. This came as a surprise as these students were not at beginning and low-intermediate levels (cf. 3. 4.1.4). It could, however, be that they underestimated their abilities. Follow-up programmes should, therefore, take note of this and should such a problem exist, students should be provided with appropriate training and instruction (Grabe, 2009; Grabe & Stoller 2013).

Reading strategies needed to improve comprehension in Biochemistry 1

The 2012 content expert regarded the ability to read with comprehension to be *quite important* for the success of students of Biochemistry 1, in general. However, the students' abilities to read were not singled out as the only concern. Evidently, this lecturer was of the opinion that students had to improve both their receptive skills, namely listening (33.3%) and reading (33.3%). Of the two productive skills, writing (33.3%) was also a concern, but not speaking. This could possible reflect the tendency that either students were not required to speak much or that they had higher developed BICS than CALP skills. It could also be in line with the common perception that being able to converse well in a language is an indication that all difficulties in proficiency in such a language have been overcome (Cummins, 2000) (cf. 1.1). A similar observation was made in South Africa (Fouché , 2009).

Table 45 summarises the integrated findings regarding the reading strategies that seemed to be required to read Biochemistry 1 texts. Because students and the content lecturer were not reading experts, they were provided with possible reading strategies to choose from. The former group were only asked to select from those reading strategies that are dealt with in the generic ULEA course as it was assumed that they would be familiar with those skills. At the time the content lecturer completed the questionnaire, three topics were added, namely understanding graphs and tables, obtaining general information and understanding ideas or theories, as I had, by that time started reading the texts and came to identify certain gaps in the reading instruction content of the generic ULEA course. Then, as I read the stereochemistry chapter in much more detail, later in the study, I added other reading strategies that I had not anticipated previously.

Table 45: Integrated findings regarding the reading strategies that seem to be required to read Biochemistry 1 texts

Reading strategies	**Students**	**Content lecturer**		**Reading expert**
		Required reading strategies	Students need assistance in	
#Critical reading strategies	60.3%			
Vocabulary learning	54%			X
Skimming	39.7%	x	X	X
Scanning	34.9%	x	X	X
Guessing the meaning of words in context	28.6%			X
Semantic relations	17.5%			X
Distinguishing between fact and opinion	9.5%			
Anaphoric resolution	4.8	x	X	X
*Understanding graphs and tables				X
*Obtaining general information				
*Understanding ideas or theories				
*#Text mapping				X
*#Activating background knowledge				X
*#Selecting and synthesising information from textbook, slides and lecture notes				X
*# Visualising concepts				X
*#Inferring the meaning of subject specific vocabulary using pre- and suffixes				X
*#Understanding symbols and abbreviations specific to stereochemistry				x

#item excluded from content lecturer's questionnaire
*item excluded from student questionnaire

From the Table one can see only some similarities among students' and the content lecturer's input and that of the reading expert. Among the three parties involved, I expected the content lecturer to know the least about the different reading strategies because unlike the students, these lecturers did not have any knowledge of the generic skills that were taught during the reading component of the ULEA course. If this data were collected during an interview, as was originally intended, there would have been an opportunity for clarification of terms such as *anaphoric resolution* and *semantic relations*. However, the former was briefly explained in brackets and the latter not. This could explain why the former was indicated to be a required reading skill and the latter not. In addition, it was also indicated that in the view of this lecturer, students needed more assistance in understanding anaphoric resolution. These were, in fact, two **crucial** reading strategies for students reading for stereochemistry, the content analysis revealed. In the same vein, the fact that so few students indicated that they applied semantic relations (17.5%) and anaphoric resolution (4.8%) when they read for Biochemistry 1, seemed to indicate a lack of metacognition and strategy awareness in spite of the issue that these strategies were dealt with in the reading lessons. Alternatively, this could point to the fact that perhaps these strategies were not sufficiently revised or that the purposes of applying these were not made explicit enough (Eskey, 2005; Grabe, 2009) (cf. 3.4.1.3) or that they simply did not know what these strategies meant due to absenteeism. Another aspect to highlight is that it was peculiar that not more students indicated vocabulary learning skills (54%) and guessing the meaning of words in context (28.6%) as impediments to when reading for Biochemistry 1. Similarly, the 2012 content lecturer did not indicate vocabulary (deduce the meaning of unknown words in context) as a reading strategy students should be applying or needed assistance with. It was not possible to enquire why the last strategy (vocabulary) was not selected as the lecturer had left UNAM employment soon after the questionnaire was completed and stopped replying to my e-mails.

All in all, the summary in Table 65 illustrates the contrast between the opinions between that of the content lecturer and that of the reading expert, and the importance of the input of a reading expert. This supports the idea that EAP classes should be offered by trained

EAP lecturers and that cooperation between content and EAP lecturers is vital in developing productive EAP courses. While Evans Commander and Smith (1995, p. 353) observe that their "experiences in the history class was an important part of their preparation", for me, analysing the authentic texts (the textbook and slide show notes) and attending the stereochemistry lessons and not only relying on responses of students and the content lecturer, were invaluable, as it gave the most insight into the true academic reading strategies a reading course for students doing stereochemistry should include, from a reading expert's view. Neither students, nor the content expert truly seemed to understand the demands that reading an academic text make on students, so their input alone would have been insufficient. This relates to Nunan's (1993) advice that it takes time for students to be in a position to make informed contributions about the learning content and the learning climate and that this might sometimes only be possible well into a course and at times even only at the end of it.

However, Hutchinson and Waters (1987; 2009) believe that there is little point in taking an EAP approach and then ignore learners' wishes and views. According to them, EAP course design should rather be a collaborative effort between instructors and students after which the course designer should negotiate and determine a satisfactory compromise as to what to include. Due to the collective input from the different stakeholders, the learners, the content lecturer, as well as the reading expert, a summary of the reading strategies required to read stereochemistry texts with comprehension could be created. I felt that the more I read the textbook and the more I attended the lessons, the better my content knowledge became. It was only then that I was able to make a better evaluation of what the reading needs might be. It is also worth noting that my assumptions were absolutely subjective and another researcher may come to other conclusions.

Teaching methodology in the Biochemistry 1 classroom

The suspicion that the lecture method dominated in the stereochemistry classroom (cf. 5.2.3.1) was confirmed by my classroom observations. I also did not notice any evidence of group work or discussions during the 6 lessons that I attended, as suggested to take place during lessons by the content lecturer. Also, it was confirmed, as indicated by the content lecturer, that no debates or role play opportunities and activities were given. In

addition, there was little interaction between lecturer and student. Throughout, the lecturer was teaching from slides, students were looking at slides and occasionally took notes. The lecture took place in an auditorium, the same one that was used for the ULEA lessons. The suggestion that the lecture method dominated and that many students preferred to work alone could, on the one hand, be in line with the fact that observation and deduction are more central to the learning style of a scientist (Dudley-Evans & St John, 1998), but could, on the other hand, also be a result of the teaching environment. In other words, being taught in an auditorium does not allow much room for interaction and group work activities.

The statement made by the content lecturer that the only activities that students engaged in during lessons was to take notes, was confirmed during the classroom observations. . After their lectures they were expected to write tests, submit assignments and attend practical sessions. My classroom observations of course did not stretch to after-class activities. No presentations, debates or the writing of summaries were indicated as activities.

In addition, I observed that all lessons consisted of fast-paced PowerPoint presentations, with little time and opportunity for revision and clarification. This suggests the reliance of these students on their textbook and the importance for them to be comprehending readers to prepare for and to revise these lessons by reading through their lecture notes and relevant sections in the textbook (cf. table 5). As suggested (cf. 3.3.1), these expository, informational or academic texts were “inconsiderate” (Grabe, 2009, p. 253).

Demands on students

I further observed that students had to revise every day’s lesson before the next one on their own in order to comprehend the following lesson; in other words, it was crucial not to skip reading the notes (slides) before, as well as the relevant sections in their prescribed textbook afterwards. The lecturer e-mailed the class notes every day prior to the following lesson for them to prepare. In addition, new content-specific vocabulary and terms were introduced daily and it was vital for students to comprehend subject specific pre- and suffixes (cf. 3.4.1.2) to grasp the content of the course. Much reference

was made to concepts learnt previously, suggesting the importance of activating background knowledge (cf. 3.4.1.9).

I further observed that, besides having to take notes, not much else was required from students. However, they could ask for clarification at any point. Noticeably, during lessons on the topic prior to stereochemistry (organic chemistry), students did not ask many questions and even looked bored at times, used their cell phones and laptops during lessons, surfed the internet, like they often did during my ULEA lessons. During the stereochemistry lessons noticeably more questions were asked. This could confirm the suspicion that stereochemistry was a particularly challenging topic compared to other topics in the biochemistry course.

This section has elaborated on the necessities, in particular, the required reading students have to do, the necessary reading strategies to read these with comprehension, what they were required to do during and after stereochemistry lessons and also what was expected of them during stereochemistry lessons. In determining these, the findings of the data collected from various sources were triangulated for purposes of crystallisation.

Lacks

The lacks are identified by comparing what students need with what they actually get in order to establish if there is any need for additions. In other words, in order to establish if there were any reading strategies these students were not already getting from the current ULEA reading course to be proficient readers when they read their stereochemistry reading material. If yes, there would be no need for a new reading course. If yes, then one would be developed.

In students had to indicate the usefulness of the reading strategies that were included in the reading component of the course to provide them with the essential skills to read and understand the required reading for Biochemistry 1 and in question 25, they were asked to indicate to what extent any of the topics that were discussed in the reading component of the course related to Biochemistry 1. It was important to examine the responses to these questions, because if students seemed to be satisfied and if the topics covered

similar topics than those in their content course, there would be no need to develop a new, CBI reading course.

The reading component of the current reading course

Generally, respondents seemed to be satisfied with the component of the general reading course. Question 24 of questionnaire (cf. Appendix F) only sought to provide a global overview (cf. figure 19). In general, students were satisfied with the reading section of the ULEA course, with the way lessons were presented and also with the number of teaching hours. All in all, it did seem as if there were no serious changes that had to be made to the way the reading lessons were conducted.

While 52.4% of the respondents rated the value of reading strategies that were taught in the generic ULEA course to read and understand the required reading for all their content courses as valuable, and even to be extremely valuable (27%), 47% reported these skills to only be of some value, followed by being valuable (33.3%) when they read for Biochemistry 1 in particular. A small minority (7%) suggested that these skills were of no value. Once again, these quantitative responses could have been followed up with qualitative interviews to explore their reasons in more detail, a possible shortcoming of this stage of the current study, mainly due to time constraints.

With reference to the earlier distinction between real and carrier content, one could argue that real content can be taught with any carrier content (cf. 2.3.1), the characteristics of adjunct courses (cf. 2.5), the argument that students perceive reading courses as more meaningful when these relate to their studies (cf. 3.4.1.8), as well as the suggestion that over-exposure increases reading comprehension and vocabulary input (cf. 3.4.1.9), it was necessary to establish whether any of the topics (carrier content) covered in the reading section of the generic ULEA course also appeared in any of their other courses. While the majority (62.7%) of respondents indicated that not any of the topics covered in the generic ULEA course appeared in any of their other courses, 23.7% of respondents indicated that some did, 8.5% indicated that all the topics appeared in one or more while the minority (5.1%) indicated that an extreme number of topics also appeared in one or more of their other courses. Being familiar with the content of the reading section of the

generic ULEA course, but not so much with the content of all their courses, I had a sense that none of the topics appeared, an element that was later established during an informal discussion in the ULEA class after the questionnaire responses were analysed. The fact that some respondents were of the opinion that some, an extreme number and all the topics also appeared in their other content courses, could be perceived that either they did not know the content of the reading section of the ULEA course or they did not know the content of all their other courses. Even though I provided the topics of the texts used in the questionnaire (question 19), these were only to jolt their memories about what they had read in the texts, and not necessarily what the texts entailed. Since I did not compare notes about class attendance with their other lecturers, I am assuming that the fact that some students were of the opinion that some, an extreme number and all the topics also appeared in some of their content courses implied that they had not read the texts in the ULEA course, confirming my earlier observations of poor class participation and not doing the requested homework. Not surprisingly, the same trend was observed when they were asked to indicate how many of the topics appeared in the Biochemistry 1 course. Even though it was later confirmed during the textbook analysis that none of the topics covered appeared in the course, only 77.6% of the respondents seemed to realise that. In fact, 19% stated that some topics did. The rest indicated that quite a number (1.7%) and an extreme number (1.7%) of topics appeared. Nobody chose option 1, namely that all of the topics appeared in the course. This could be an indication of questionnaire fatigue, halo effects, social desirability/prestige bias or acquiescence bias. But it could, once again, be an indication of being unfamiliar with the ULEA course content. Jordan (1997; 2009) maintains that EAP students prefer to devote time to studying texts and topics related to their particular disciplines; this at least gives face validity and is valuable as a familiarisation activity. This is especially appropriate if all the students in a class are from one discipline. It was also interesting to note that the carrier content of the texts in the generic ULEA course, which were not bound to any subject content or genre, are not reflecting an African context.

When asked which of the reading strategies included in the generic ULEA course were used to understand the required reading in their different courses. (cf. section 5.2.4.1), it transpired that the reading strategies were very similar to those when students were asked about reading strategies they relied on mostly when reading for Biochemistry 1 (cf. table

5.2.4.1), suggesting they might not have put much thought into answering these questions, possibly due to questionnaire fatigue.

Although a number of students (60.3%) mentioned critical reading to be an important reading strategy to understand their biochemistry texts better, I could not find any indication of the importance of that in the chapter that I scrutinised. Even though this strategy was not included in the options the 2012 content lecturer could choose from as those that students required and/or needed more assistance with, the content lecturer did not make any reference to it in the spaces provided to add any omissions. Not including this in the content questionnaire is perceived to be a shortcoming of that data collection tool.

On the other hand, the reason why so many students indicated critical reading strategies to be a valuable reading strategy to comprehend their biochemistry texts better could be as a result of the differences between their home-based literacies and the academic literacies they were exposed to. As elaborated in section 2.1, university students need to acquire multiple literacies rather than a single literacy as a result of socialisation and the various disciplines they need to become members of (Lea & Street, 2006). Taking this argument further, Boughey (2013) comments on the role of home-based literacies to acquire academic literacies. The incidence that the majority of the respondents from the target group were from rural Namibia, who generally do not question what they read, one could assume that critical reading strategies were new to them and that they only became exposed to these in my class. Hence the differences in our opinions. For me it is probably such an automatic skill to practise that I was not even aware of it while reading the biochemistry texts, while for them, being a new reading skill to practise, they probably did that consciously. Boughey (2013) argues that applying critical reading as a skill could be difficult for some learners as this might challenge their values and belief systems causing them to often have to do so in uncomfortable positions. In other words, students have to understand they have the right to question claims made by others.

Their wants could be interpreted by their suggestions to improve the content of the generic ULEA course. It seemed to include six prominent topics (cf. section 5.2.4.1). These include the request for more activities, especially group work, as well as reading activities. In addition, they suggested integrating all skills in reading lessons, to make the

course and content of reading passages more relevant to their field of study (medicine) and other courses, and to focus more on the instruction of specific reading strategies.

In summary, the needs analysis was done to carry out Phase 2 in the research project. In the process, the focus of the adjunct (Step 9) and the target and learning situations were analysed and evaluated (Step 10). In the process, research questions 1,2,3,4 and 5 were answered. It was established that the target subject would be Biochemistry 1, and the target topic, stereochemistry. In addition, it transpired that the students were keen readers with a positive attitude towards reading, but they did not find much time to read due to their busy timetables. Furthermore, they had high receptive vocabulary scores, and the reading strategies they required to comprehend their stereochemistry texts were determined. In addition, even though students were satisfied with the general reading instruction and time in the current ULEA course, this course did not contain any carrier content; various real content (i.e., reading strategies) that was not covered were identified. Based on this, one can recommend the development of an adjunct reading course that should combine these elements.

5.4 Conclusion to Chapter 5

This chapter has elaborated the needs analysis, in other words, Phase 2 of the current study. During this stage, Steps 9 and 10 (cf. Figure 9) were conducted. In other words, the focus of the enquiry was narrowed down (Step 9) and the target and learning needs were determined (Step 10). Based on the findings, it was recommended to develop an adjunct reading course based on the findings presented and analysed in Chapter 5. Chapter 6 will elaborate on Phases 3 and 4 of the current study, in other words, setting the criteria for developing the new subject specific reading course and then how the new reading course was developed.

CHAPTER 6

DEVELOPING A NEW SUBJECT SPECIFIC READING COURSE

6.0 Introduction

This chapter describes Phases 3 and 4 or steps 11 and 12 in the current study (MMAARR), as summarised in Figure 22.

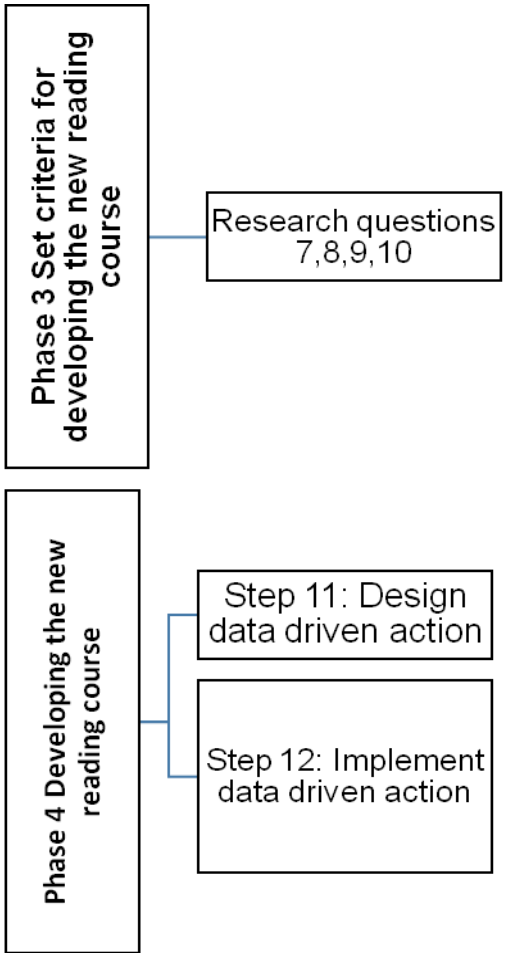

Figure 22: Summary of Chapter 6

6.1 Phase 3: Design and evaluation of an academic English reading course for specific purposes

In the process of Phase 3, research questions 7 and 8 were developed and answered, as summarised in Table 46. As indicated in Chapter 1, Chapters 2 and 3 of this thesis dealt with informing the development of Stage 3 of the study, namely setting the criteria to design the course.

Table 46: Summary of research questions to determine the possible criteria for the design and evaluation of an academic English reading course for specific purposes

Phase 3	Research questions
	7. What are the possible criteria for the design of academic English reading courses for specific purposes?
	8. What are the criteria against which such a course may be assessed?

Answers to these research questions were explored by extensively reviewing the literature (cf. Chapters 2 and 3) regarding the development of EAP courses with specific reference to reading skill development. It should be noted, though, that Phase 3 took place iteratively (Fig. 8) and not only during the implementation of Phase 1 (cf. table 2).

As the aim was to develop a very specific EAP reading course for students from the UNAM school of Medicine to assist them in improving their reading comprehension of the stereochemistry chapter in their Biochemistry 1 course, the principles of CBI adjunct course development, as suggested by Brinton et al. (1989) (cf. 2.4), as well as suggestions for the development of adjunct courses as presented in section 2.5 (Andrade & Makaafi, 2001; Arendale, 2002; Brinton et al., 1989; Evans Commander & Smith, 1995) were considered. With reference to the continuum presented by Dudley-Evans and St John (1998; 2000) (cf. figure 1), this course was aimed to be at position 5, in other words, very specific. By applying the principles of implicit and explicit learning (cf. 3.4) and drawing from Grabe and Stoller's generic reading framework (cf. figure 6), the new reading course comprised an intensive, as well as an extensive, component. Using the criteria established in section 2.7.4, a "multi-syllabus approach" (Jordan, 1997; 2009, p. 63), that was flexible and iterative, informed by the results from the needs analysis in order to

avoid an "post-hoc approach" to syllabus design (Hutchinson & Waters, 1987, p. 94) was considered and applied to develop this reading course for students doing stereochemistry in the Biochemistry 1 course at the UNAM School of Medicine.

Next, Phase 4, namely the development of the new reading course will be elaborated.

6.2 Phase 4: Developing the new reading course

Phase 4 represents Steps 11 and 12 of the research plan (cf. table 2), in other words, the design and implementation of the new reading course. Each of these steps will now be discussed.

6.2.1 Step 11: Designing and evaluating data-driven action

This phase of EAP course design indicates what will be learnt and addresses the 'what' of the course (cf. 2.7) (Alexander et al., 2008; Hutchinson & Waters, 1987; Watson, 2003).

By applying the principles of implicit and explicit learning (cf.3.4) and drawing from Grabe and Stoller's generic reading framework (cf. Figure 6), the new reading course comprised an intensive, as well as an extensive, component. The syllabus design of each will now be reported on separately, starting with the former.

6.2.1.1 The intensive reading component

Syllabus design

The syllabus of the new reading course included eight of the key components to consider in developing EAP reading courses section 3.4.1 (cf. Figure 6). These are summarised in Table 47.

Table 47: Key components of new reading course

Key components to include in a reading course (Grabe & Stoller, 2011)	**New course**
Promote word-recognition skills and build language knowledge	
Build a large recognition vocabulary	◊
Teach strategies for reading comprehension	◊
Build awareness of discourse structure	◊
Develop strategic reading *(indirectly)*	◊
Practice reading fluency (*indirectly*)	◊
Provide exposure to a volume and range of texts i.e. promote extensive reading	◊
Develop motivation for reading by providing motivational contexts for reading	◊
Build disciplinary and world knowledge	◊

Based on the results of the needs analysis (cf. table 45), the intensive reading component covered various reading strategies as summarised in Table 48. In addition, based on Nation's (2007) principle of "Time on Task" (cf. 3.4.1.3), students were presented with a number of opportunities to practise these.

Table 48: Reading strategies covered in new reading course

Reading strategy	**Also in generic ULEA course**	**Application**
Text mapping	◊	Lesson 1
Skimming	◊	Lesson 1
Scanning	◊	Lessons 1, 2, 3, 4
Vocabulary	◊	Lessons 2, 3, 4, 5
Anaphoric references	◊	Lessons 2, 3, 4, 5
Semantic relations	◊	Lessons 2, 3, 4, 5
Selecting and synthesising		Lessons 2, 5

Academic thought patterns		Lessons 2, 3, 4, 5
Reading and understanding graphical information		Lessons 2,4,5
Summarising	◊	Lessons 4,5
Read for general comprehension	◊	Lessons 3,4
Abbreviations and symbols		Lesson 5
Visualising information		Lessons 2,3
True/False		Lesson 2

Even though some of these reading strategies, (for example, text mapping, skimming, scanning, anaphoric resolution, semantic relations, summarising, reading for general comprehension) are also dealt with in the reading section of the generic ULEA course, it was decided to include them in the new course. This is mainly because these strategies are only briefly introduced in the packed generic ULEA course without allowing instructors to pay much attention to the development of automaticity (cf. 3.1.2), i.e. deliberately teaching these strategies to become reading strategies (Afflerbach & Cho, 2011; Afflerbach, et al., 2008; Eskey, 2005; Grabe, 2009; Nation, 2007; RAND Reading Study Group, 2002; Wilkinson & Hye Son, 2011). In the generic ULEA component, students are not exposed to these strategies repeatedly or in combination with others or in various texts or activities that would reinforce, consolidate and maximise retention of such skills (Kasper, 1996), resulting in a lack of strategic reading. The latter was assumed when students were unaware of the importance of applying these skills when reading for biochemistry (cf. table 45), suggesting a lack of metacognition (cf. 3.4.1.5).

In considering the syllabus for the intensive reading component, the guidelines proposed in the 6T's approach (Grabe & Stoller, 2011) (cf. 3.4.1.9) were applied. In the process, the types of units, items in each unit, the sequencing of units, the texts to use, exercises to include, the teaching methodology, as well as evaluation criteria, were considered.

Types of units

With the exception of Unit 1 that was skills based, all other units were thematic, as determined by the content and the sequence of the information in the chapter on stereochemistry in the Biochemistry 1 textbook of the target group. As a result, the title of Unit 1 was *Text Mapping* (to familiarise students with the layout of textbooks), and Units 2, 3 and 4 were *What is Enantiomerism?, Enantiomers, Chirality* and *R, S configuration,* respectively.

Items in each unit

Several considerations had to be taken into account in deciding on the reading strategies to be included in each unit. For example, the 17 pages of the chapter on stereochemistry were roughly divided into 4 pages per lesson (lessons 2-5) and the content of the reading passages for each lesson determined which specific reading strategies to focus on. This also allowed for full exploitation of each reading passage, one of the differences between general English teaching (ELT) and EAP, according to Alexander et al,. (2008) (cf. table 3), something that is not the case in the current generic ULEA course. The tendency is currently to use a different text to demonstrate each reading strategy. With reference to the development of the new course, as it is indicated in Table 69, some of these strategies were reinforced and others introduced for the first time. In addition, I had to plan lessons well to allow for feedback as the duration of each lesson could not exceed 2 hours. It was decided not to give students any homework, because they had the extensive reading component to do in addition to doing work for their other courses.

Sequencing of units

Theme-based units were sequenced according to the way information was presented in the textbook (see above).

Texts to use

When I considered the aims of the course, it was clear that the material, that is the textbook, was authentic and specific to the target course. The carrier content was drawn directly from the students' textbook and the slides/class notes they were required to read (cf. table 51), without simplifying it. This was due to the homogeneity of the students in terms of taking similar courses, and having similar language levels (Cheng, 2011; Dudley-Evans & St John, 1998; 2000), an assumption that was made based on their admission criteria to the School of Medicine (cf. 1.2) and from their vocabulary levels (cf. table 49; Figure 11). In that way, their prior knowledge could be capitalised on in the comprehension of texts (cf. 3.4.1.9), one of the many advantages of adjunct courses (cf. 2.5.2).

Teaching methods

Throughout, student participation was encouraged as this is assumed to be the preferred way to learn EAP courses (cf. 2.7.4). But an EAP instructor is reminded that all techniques and methods should be a response to a particular situation and texts (Alexander et al., 2008; Cheng, 2011; Dudley-Evans & St John 1998; 2000; Watson, 2003). As a result, I considered the learning preferences of students (cf. table 20) and how they were instructed in their content subject (cf. 5.2.3.1); hence, students had a choice to either work in groups, pairs or individually. As noted earlier, the lecture method dominated in the Biochemistry 1 classroom and some students preferred to work in groups while others preferred working alone. In addition, like Suk (2015), activities were prepared keeping FLOW and MINUS principles in mind (cf. 3.4.1.3).

Watson (2003) recommends that activities should be designed to be authentic in order to assist students to transfer skills and strategies from the new reading course to their content subjects. However, in this case, 'authentic' to the target group implied the lecture method and mainly working alone, deducing and observing.

Since EAP is best taught through discussion and discovering, using a problem-solving, practical approach that involved authentic tasks Alexander et al,. (2008), an eclectic approach Hutchinson & Waters, 1987) that combined individual, as well as group, work and discussions was used. The activities were varied to keep students alert and involved, cognitively as well as emotionally, (Watson, 2003), applying principles of MINUS and FLOW (cf. 3.1.4.3), developed from the texts used. Free computer software was used to create some of these activities.

The following list summarises the different activities used in the new reading course:

- unscrambling words and instructions;
- matching definitions and meanings;
- gap filling activities;
- true/false questions;
- reading graphs,
- comparisons in the form of a table;
- visual representation of texts;
- jigsaw puzzles;
- completion of diagrams.

Evaluation criteria

As suggested in section 2.7.5 formative, as well as summative assessment, was used to evaluate this course. Students were motivated to complete each activity by allowing time for feedback after each activity. Providing feedback was also important, as each activity progressed from the previous one, reflecting the theme-based nature of each lesson. At the end of the course, students completed an evaluation questionnaire and they also wrote one summative test. More details regarding these are provided in Chapter 7 that deals with the issue of course evaluation.

Based on the discussion of the criteria for materials development (cf. table 6), Table 49 represents a summary of the syllabus that was created to develop the intensive reading component of the new reading course. It contains the topics/themes of each unit, as well as the reading strategies dealt with in each. The teaching methods used in each lesson

was the same, i.e., students could either work in groups, pairs or individually (see study guide attached CD).

Table 49: Syllabus for intensive reading course

Lesson	Outcome/ objectives.
1.Text mapping **2 May 2013**	Apply text mapping in understanding layout of textbook; Skim textbook to overview stereochemistry chapter; Scan Biochemistry 1 textbook in order to find specific information in the chapter on stereochemistry.
2.**What is Enantiomerism?** **7 May 2013**	Vocabulary to discuss and describe enantiomerism; Use and comprehend the meaning of prefixes to form words in stereochemistry; Interpret information from a diagram; Integrate and draw conclusions from information from two different diagrams.
3.**Enantiomers** **8 May 2013**	Recognise suffixes to form functional groups; Perceive and understand how writers indicate spatial order in academic texts; Understand how words in texts refer to each other; Comprehend the functions of semantic relations; Show comprehension of the content of academic texts.
4. Chirality **9 May 2013**	Recognise prefixes indicating numbers in Biochemistry 1, with reference to stereochemistry; Summarise paragraphs diagrammatically; Academic patterns for comparison and contrast; Answer questions based on information from the text; Recognise the use of semantic relations; Understand how ideas refer to each other.
5.R,S configuration **13 May 2013**	Define and use key vocabulary in stereochemistry; Recognise sequencing in Biochemistry 1 texts, with special reference to stereochemistry; Sequencing to unscramble a passage; Present a summary in the form of a diagram; Integrate information from two sources on the same topic.

An objective materials evaluation, considering various factors such as the audience, aims, content, methodology, pricing and availability (Belcher, 2009; Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; 2009) was done (cf. 2.7.3). However, no ready-made material to assist students specifically to improve their academic reading abilities in stereochemistry in biochemistry 1 and to be used either for intensive of extensive reading purposes, could be identified. The other option, materials adaptation, was also considered. Firstly, the reading section of the ULEA course was looked at. However, as revealed by the students, as well as content analysis done by the researcher, even though some of the reading strategies in the course are applicable to comprehending stereochemistry texts better, none of the reading passages, in other words, the carrier content, were appropriate. The generic ULEA course does not have an extensive reading component that could have been considered for adaptation.

I, therefore, decided to develop my own materials. Due to time constraints, the reading material was not piloted, but I would like to note here that course evaluation is an integral part of the process of designing. Not piloting the material therefore does not mean that no reflection took place during the course of this study.

The characteristics of good EAP materials (cf. table 6) were applied. The intensive reading material was compiled in a booklet. It contained the lesson content for each of the five sessions in the intensive reading section of the new reading course which was prepared for each participant in the new reading course. Because I was allowed to use the facilities of the LC, it did not cost me anything to copy the booklets. Not all students from the 2013 cohort participated in the study (cf. 4.9.1), only 26 students did, and this booklet was afterwards e-mailed to those who opted not to participate to allow them to also benefit from the course. In addition, I asked students to bring their Biochemistry 1 textbook to all the reading lessons to refer to the passages. On the one hand this reduced the number of pages to be photocopied and included in the booklet, but most importantly, I was hoping that this would make them realise the relevance of the reading course even more. In other words, to enhance comprehension of their textbook.

It should be noted that because the content lecturer agreed to provide his input in the lessons, I e-mailed my lessons to him beforehand for comments. Unfortunately he did not have to time to provide any feedback, or maybe he was simply unwilling to do so, and the lessons continued without the input of any content expert. This could be a possible shortcoming of the current research as the materials could not be piloted for content. On the other hand, this experience is evidence of the unpredictability of cooperation between content and language specialist. This experience seems to be opposite to that of Carstens (2013), Jacobs (2007a;b) and Marshall (2011) as reported in section 2.5.4.3.

The general layout of all units was similar, stating the unit outcomes. Certain icons were used to indicate lesson outcomes, group activities and discussions, where appropriate. I also included pictures and illustrations to make the material more interesting. In addition, space for students to write their answers was also provided. In the margins, reminders such as: '*Does your group have a spokesperson?*' and '*Do you know each other's names?*', as well as the explanations of some stereochemistry terms, were included. Because of this, and because the textbook comprised one, no glossary was included. The academic reading terms were described and elaborated on as they were practised in the different units. In order to develop the word search and gap filling activities, I used free online software, obtained from *toolsforenglish.com.*

Finally, in order to encourage students to re-read the chapter in their textbook, I asked them to re-read the relevant sections on their own and to apply the reading strategies dealt with in class. It was hoped that this would provide a better understanding of the texts, and improve reading fluency and reading speed (Stoller et al., 2013), two reading strategies that were not specifically dealt with in this new reading course. They had to do this in class, if time permitted, or otherwise on their own, whenever they had time. As previously said, because they had to do their extensive reading too, they were not expected to do any homework.

6.2.1.2 Extensive reading

In developing the extensive reading programme for the new reading course, the principles for extensive reading as suggested by Day and Bamford (1998; 2002) (cf. table 18) were applied as far as possible. Similar to studies reported on by Moje et al. (2011), it was decided to include only science related literature in the extensive reading component. As it had already been established that these students were keen readers and had had literature rich experiences (cf. 5.3), unlike in some other extensive reading courses (Lukhele, 2009; Suk, 2015; Willemse, 2006), my aim was not to develop extensive reading practices for these students with the aim of improving their general reading levels, but ideally to show them that even within their busy schedules, content-related extensive reading material could assist them in understanding the content of their demanding courses, in this case, Biochemistry 1. Therefore, another requirement was that the texts selected or considered for inclusion would have to relate to the different genres the target group preferred reading (cf. table 37). All in all, it was hoped that if they could perceive the purpose of doing this, it might motivate them to read more extensively.

This intention to use content-related literature in the extensive reading programme was supported by two factors, the results of the Vocabulary Levels Test (cf. table 17), as well as the characteristics of adult readers (Alexander & Fox, 2011) (cf. 3.1.5.3). The Vocabulary Levels Test results of the target group (cf. table 49; fig. 11) indicated that using texts other than graded readers would be appropriate with the participants and also that they would benefit from specialised studies of a subject area (cf. tables 10, 11). In addition, their student profiles provided concrete evidence that the majority of these students were adolescents. Consequently, as suggested by Alexander and Fox (2011), they would be able to read abstract, non-literature, content-related texts, among others (cf.3.1.5.3), efficiently.

Unlike Suk (2015), who investigated the longitudinal effect of a 15 week extensive reading programme in the Korean context (cf. 3.4.1.7), I did not have any funding available for purchasing sources for extensive reading. Since the UNAM library does not

stock many books or sources of extensive reading, it was decided to source for free online sources. In order to ensure a variety of reading materials to allow readers a choice in what they read and to ensure that they could read as much as possible, as suggested by Day and Bamford (1998; 2002)'s extensive reading principles (2, 3, and 4), I looked for material that had a chemistry, particularly a stereochemistry, theme. In response to the findings that the majority of students (85%) did not have time for reading since they enrolled for medicine, it was decided to include shorter reading pieces rather than requiring novels to be read. In that way, a bigger variety of reading material could be provided and, even if only one story was read, the student would still experience a sense of completion.

Through several internet searches, I came across a website that is dedicated to uploading case studies, mainly for the use of science instructors, but the content is protected by copyright. I contacted them, (http://sciencecases.lib.buffalo.edu/cs/collection/uses/), explained the purpose of the current study and asked for official permission to use the case studies in the current research (cf. Appendix L). .The effect of using case studies as a learning tool is elaborated on in section 3.4.1.7.

Through a process of elimination, I selected 20 case studies to include in the extensive reading booklet. I used the criteria suggested by Day and Bamford (1998; 2002), namely that the content should contribute to pleasure, information and general understanding on a wide range of topics. Students' preferences (cf. 45) were also considered, as far as possible. Another requirement was that the case studies should not be too far above the reading levels of students (i+1). Therefore, I calculated the readability (Flesh Reading Ease) and grade levels (Flesch-Kincaid Grade Level) of each of the case studies, as these were not provided with the documents on the website from where they were obtained, possibly because they were not originally intended to be used as a linguistic tool to promote reading among students, but to enhance their understanding of scientific content.

I also made other changes to the original case studies. Firstly, the original case studies were in PDF format, so I had to change them to MS Word format to allow for editing. In

addition, since these were intended to be used in content lessons, they included various content-related questions. I removed these to promote reading for pleasure only (cf. 3.4.1.7) (Day & Bamford, 2002). It should be noted that at the time of developing the extensive reading booklet, even though all case studies were science related, only 1 had stereochemistry as a theme. As a slight deviation from the principle that students could choose what they wanted to read, I made the reading of this case story compulsory, as it was the only one that completely tied in with some of the content of the intensive reading component, namely *chirality*. However, all the other case studies were science related.

In the end, I developed an extensive reading booklet containing 20 case studies that took the form of content-related short stories. Similar to when I developed the booklet for the intensive reading course, I also applied the principles of EAP materials design (cf. table 6). Also, in order to promote active reading, I included some questions in the side margins to encourage students to write down reflections or to underline all the words that they did not understand, if they wanted to. As far as possible, I retained the pictures and other illustrations of the original case studies.

By using the information from Table 70, one can deduce that, being first-year university students, the target group for this study was classified as Grade 13, according to the Flesch-Kincaid Grade and should be reading content at the 30-49 Flesch Reading Ease scores. According to Krashen's input hypothesis (cf. 3.4.1.7), readers would benefit from being exposed to literature just beyond or *above* their current reading levels. This contradicts the suggestion made by Day and Bamford (1998; 2002) that reading material should be easy and *below* the students' current levels. However, in this current study, I used the suggestion by Maley (2010) of "different strokes for different folks" and included case studies that were above, as well as below, their current reading levels. The reading levels and readability scores were not included in their reading booklets, so their reading selection was not based on that. It was anticipated that students would make the selection based on the titles, hence, the inclusion of the various titles, such as "*The chemistry of cocaine*", "*Prayer study: Science or not*", "*Murder by HIV*", "*Love Potion*", and that, based on their preferred genres (cf. table 37) that the latter case study would be a favourite.

Here follows a summary of the title of each case study, its readability (Flesh Reading Ease) and grade level (Flesch-Kincaid Grade Level). The literature review section contains a detailed discussion of the meaning of each of these indicators (cf. table 19). It is important to re-iterate that the original case studies were very technically oriented and also did not have the readability and grade levels worked out. The latter were done purely to ensure that texts were not too far above the reading levels of participants.

Table 50: Extensive booklet information (2013)

Unit	Title of case study	Readability	Grade level
1	An Adventure in Stereochemistry	77.1	5.2
2	Sweet Truth: Not all carbohydrates are alike	62.1	7.3
3	Thiamine deficiency	31.2	13.4
4	The Chemistry of Cocaine	56.3	8.5
5	Bilirubin	53.5	10.3
6	Artificial Sanity	54.7	9.9
7	Prayer study: Science or not?	41.8	12.3
8	A simple plan	42.7	12.8
9	Murder by HIV?	57.1	9.5
10	Love potion	22.3	16.2
11	The Tired Swimmer	79.0	5.4
12	Giving Birth to Someone Else's Children?	64.6	7.5
13	Colon Cancer	72.8	6.7
14	A Rose By Any Other Name	54.7	9.9
15	Mystery in Alaska: Why Have All the Sea Lions Gone?	48.7	10.7
16	Cooking under pressure	68.8	7.0
17	A Cool Glass of Water	79.5	5.2
18	Dust to Dust	59.4	7.9
19	Those Old Kentucky Blues	60.8	8.5
20	Facing the Pain	86.5	4

When one looks at the Table, it is clear that only one of these case studies (10) would be regarded as above their level. This case study was classified as 'very difficult', with a Flesh Reading Ease level of 22.3. In addition, only a small number (4) seem to be in the range they should be reading, namely case studies 3, 7, 8 and 15. These could be regarded as 'difficult' with Flesh Reading Ease levels of 31.2; 41.8; 42.7 and 48.7 respectively. In addition, 15 case studies can, therefore, be regarded as *below* their required level of reading, ranging from levels appropriate for senior high school (6), 13-15 year old's (4), 12 year olds (4) and 11 year olds (1). From these scores one can deduce that content-related literature does not necessarily mean more complicated reading with higher Flesch Reading Ease scores and Flesch-Kincaid Grade levels.

Although the aims of the extensive reading programme, the content, as well as the instructions regarding the programme, were discussed in class, the introductory pages of the booklet also elaborated on these. For example, students were reminded that they would not write any test or assignment on these short stories, but that, except for a short reflection at the end of the booklet, they had no formal questions to answer or tasks to do, except to complete questionnaire 6 that was included at the end of the guide. Furthermore, they were reminded that only case study 1 *(An adventure in Stereochemistry)* was compulsory and were asked to read it first, after which they could choose which units they wanted to read, and also as many as they wanted to read. They were also reminded to return the guide (with the completed questionnaire 6) to me at the end of the reading programme, as the extensive reading was done out of class.

This section has provided an overview of the considerations regarding Step 11 in Phase 4, namely the designing of the reading course based on various criteria as identified in the literature review chapters (chapters 2 and 3). In the process, the syllabus that was developed to produce the reading material for the intensive reading component, as well as the topics and readability scores and grades of the content for the extensive reading component of the new reading course, were provided. Next, Step 12 that is also part of Phase 4 of the current study is discussed, in other words, the strategies that were employed to implement the reading course based on various criteria that was considered.

6.2.3 Step 12: Strategies for implementation of data-driven action

6.2.3.1 The Intensive reading course

The new reading programme, even though it was narrow-focused and dealt with the immediate needs of students, was implemented as a variation of the adjunct prototype (cf. 2.5.3) a week after the lessons on stereochemistry were taught. This was to allow me, who assumed the roles of being the provider of input as well as the facilitator, not only an opportunity to obtain a complete overview of the student needs, but also to give me enough time to understand the content better and to design the course. With reference to the various options available for engagement with faculties (cf. 2.5.4), cooperation was definitely established, but the rest was not representative of the team teaching option and more representative of limited cooperation.

Prior to this, the possible benefits of attending such a course were explained to the entire 2013 ULEA cohort, as well as that attending the course would be voluntarily. In addition, the procedures involved were also discussed with students. Because of the full timetables of students and also to cause minimal disruption to the research site (cf. 4.7.3), the adjunct course was taught during normal ULEA lesson times, as well as lesson free times the students had on their timetables. It was arranged that instead of attending ULEA lessons, students would use the time for independent research for their academic essays and prepare for oral presentations that were due soon after the adjunct was completed. In other words, students who participated in the adjunct, had to work on their essays and presentations during another time.

Regular attendance was kept. Not necessarily the same students attended each day, but a total of 26 students attended at least one of the 5 2-hour lessons. The ULEA lecture venue had a gallery, and students who did not want to become formally part of the experimental group could sit there and observe the lessons. Table 51 summarises how many students attended each lesson. It also shows that while only 4 students attended all five lessons, 7 attended more than 80% of all lessons.

Table 51: Intensive reading course class attendance

Lessons	**Number of students *(n=26)**
Lesson 1	18
Lesson 2	13
Lesson 3	21
Lesson 4	8
Lesson 5	18
Attendance 80% +	7
100% attendance	4

*not the same students attended all the lessons

These volunteers became the experimental group and the others, who did not attend, the control group to test Hypothesis 1. The notes were after the adjunct e-mailed to the entire group. In that way, students in the control group could also benefit. Hard copies were made available to the students in the experimental group.

As far as possible lessons were taught in the pre-, while- and post-reading stages. Other suggestions made in section 3.4.1 were also incorporated.

Lesson 1: Text mapping

The main aim of lesson 1 was to familiarise students with the discourse structure of a textbook (cf. 3.1.4.4), in particular, their prescribed text book for Biochemistry 1. I also hoped that they would be able to transfer this strategy to their other courses, as reading textbooks seemed to be their most important reading resource, at least in their first year. In the process, text mapping, skimming, as well as scanning, skills were revised. This need was not mentioned by either the content lecturer or students, but perceived to be essential by myself, the reading expert (cf. table 45).

All three these skills are dealt with in the generic ULEA course (cf. 5.2.4.1), albeit not very thoroughly, and out of context while exposing students to two different texts as carrier content, one on smoking and one about crime prevention, neither of which relate to any of the content they would usually encounter in any of their content courses. In this lesson though, the "reading passage" was the entire textbook as they were asked to bring it to class. The first section of this unit dealt with text mapping skills. By encouraging students to make use of their background knowledge about text mapping features, they were asked to explain where, in any textbook, one would locate each of the features. Afterwards they had to find each of those features in their biochemistry textbook, and also to discuss what specific information regarding the textbook each of these features generated.

The next activity also required students to explore their textbook further through scanning for chapters dealing with organic chemistry and stereochemistry specifically. In practising their skimming skills, they were asked to skim the chapter on stereochemistry to get an overview of the different topics discussed in it. The last three questions were more of a personal nature and students had to reflect on how familiar those topics that were dealt with in the stereochemistry chapter were to them, how easy or how difficult each was to understand in the Biochemistry 1 classroom and also if there was anything they wanted to know more about each. At this stage, they had already done the work in the biochemistry class and this was an ideal opportunity to re-learn content or to clarify certain concepts, which are generally some of the advantages of adjunct courses (cf. 2.5).

In short, the general aim of this unit was to introduce students to the layout of their Biochemistry 1 textbook, more specifically to the unit on stereochemistry. Another important aim of this unit was for students to realise the connection between their content lessons and the English course, something that perhaps could not be perceived in the generic ULEA course due to the inauthenticity of the carrier content.

At the end of this lesson, the extensive reading component of the course was introduced and the booklets were distributed to the 21 participants who attended the first intensive reading lesson.

Lesson 2

The theme of lesson 2 was '*What is Enantiomerism*? This mainly reflected the introductory section in the chapter dealing with stereochemistry in their textbook, in other words, the first 4 pages. The reading strategies that were dealt with in this lesson emerged from this content (cf. table 49).

After the unit outcome, I included pictures displaying enantiomerism. These were not in their textbook, but obtained from their lecture notes. The lesson was divided into several sections, each reflecting one of the unit outcomes.

The first section of the unit dealt with vocabulary. Because the results from the Vocabulary Levels Test indicated that all these students seemed to be familiar with the low-frequency words and the majority were familiar with the 9 000 word families (mid-frequency words), I decided to focus mostly on subject-specific vocabulary, low-frequency words that were unique to stereochemistry (Nation & Anthony, 2013). As suggested by Nation and Webb (2011), the verification that the content of the biochemistry course was limited to one particular area seemed to be beneficial for vocabulary development for a number of reasons (cf. 3.4.1.2).

Even though only 28.6% of the respondents indicated finding the unknown vocabulary in their Biochemistry 1 course problematic and even though the 2012 content lecturer did not include this as an important aspect or one his students needed assistance with, the 2013 lecturer concurred with my expert opinion, which was that a well-developed, subject-related vocabulary was of the utmost importance to these students. This was also confirmed by a number of respondents (54%) indicating that they used vocabulary learning skills that were taught in the generic ULEA course when they read for Biochemistry 1. In this particular activity, students had to revise basic, stereochemistry

vocabulary, as identified from their textbook and the lecture notes. Because of the importance of these words, these were reinforced in lessons 3, 4 and 5. Students had to find 13 words as a word search activity by either working alone, in pairs or as a group. Some of these words were, for example, *isomers*, *diastereomers*, *chiral*, etc.

Still aiming to develop vocabulary, next the role of prefixes in guessing the meaning of words was revised. The role of prefixes in word formation was already covered in the generic ULEA course and students were, therefore, familiar with this concept. The difference in this lesson was that they had the opportunity to analyse words and prefixes that related specifically to stereochemistry. From my observations, it seemed as if it was imperative for students to understand the meaning of prefixes in understanding the meaning of concepts, not only in stereochemistry, but in the entire biochemistry course, in general (cf. 3.3.2.1). In the process, we discussed the meanings of specific prefixes. For example, the prefix in *stereo*isomer means three-dimensional, the one in *en*antiomers means to make, or cause to be, to strengthen a term, to make it even more forceful, the one in *dia*stereomers is used to indicate opposite directions, or across, while the one in *a*chiral means not, the one in *cis*transisomer is Latin, meaning on this side and the second one, Cis*trans*isomer is Latin, meaning across. Afterwards, in another activity, students had to scan only pages 423-430 in the textbook and find as many more examples of words that were formed, using prefixes. During feedback, together we compiled an extensive list of all the examples, and afterwards the meaning of each prefix was discussed in detail. In the textbook, the meanings of some, but not all these words, were given in the margins. Even though I had done additional research to find the meanings, more prefixes were identified. When I admitted to students that I did not have all the answers, it became a collaborative effort to find them. Some students already knew the answers, and others they researched. Afterwards, I encouraged them to find more examples on their own in the remaining pages of the chapter.

Another vocabulary activity followed. This time, the definitions of the words they encountered in Activity 1 were provided, and students had to match the words with their definitions. Once again, they could work in groups, pairs or individually. A fourth, gap filling activity, where students had to complete a summary of the definition of

stereochemistry, completed the vocabulary section in lesson 2. Afterwards, feedback to the activities was provided. Even though the students knew I was not a content expert, I prepared thoroughly. However, every time, when I got stuck, there was always someone in class to explain some of the content-related issues. In this way, I never had the need to consult with the content lecturer. Even though fluency was not one of the unit outcomes, we practised the pronunciation of words throughout, as this was one of the recommendations students made to improve the generic ULEA course (cf. 5.2.4.1). We mainly took our cues from the content lecturer or from online dictionaries and this proved to be an extremely enjoyable activity, suggesting the need for even advanced EAP students to be assisted with the pronunciation of content-related vocabulary. It would seem to confirm the earlier argument that CALP skills are also visible in oral situations, as in content-related situations and that the general perception that students are good speakers only relate to BICS situations (cf. 1.1.4.1).

Section 2 dealt with academic thought patterns (McWhorter & Sember, 2014), the specific patterns, systems or structures in which texts are organised, and indicated the goals of writers and the purposes of specific texts, also referred to as rhetorical genre analysis (Hatch, 1992). The importance of knowledge about these structures, as well as the support that patterns are unique to certain disciplines (Richardson et al., 2012; McWhorter & Sember, 2014) and subcultures (Moje et al., 2011), was elaborated in detail in section 3.3.2. The generic ULEA course briefly introduces this aspect by referring to it as semantic relations. Even though I considered this strategy as essential to the comprehension of stereochemistry, only a small number of respondents indicated (17.5%) that they used this strategy (semantic relations) when reading for biochemistry.

In this unit, students were specifically introduced to how academic authors indicate definition. In the process, we looked at examples relating to stereochemistry that were provided, for example, Stereochemistry *is*, Stereoisomerism *means*, Stereochemistry *can be defined as*, Stereochemistry *is another term for*. Afterwards, I asked students to scan only the relevant pages from the textbook for this particular lesson to find any examples where the authors had used this thought pattern. 2 examples were found, one that was not listed as an example, but clearly indicating definition (*Stereoisomers that are non-*

superposable mirror images refers to a relationship between pairs of objects, p. 425) and another one that was listed (*Racemic acid is the name originally given to the equimolar mixture of the enantiomers of tartaric acid, p. 427*). Once again, I encouraged them to come up with more examples as they read through the rest of the chapter.

The importance of visual literacy, especially for science students is elaborated on in detail in section 3.3.2.1. In this section of lesson 2, I firstly, introduced students to the aims and purposes of graphics in academic writing, especially with relation to science and then to the detailed steps in reading and understanding this type of information, as suggested by McWhorter and Sember (2014) (cf. table 13). This was new to students as this aspect is not included in any of the components of the generic ULEA course. It was also suggested to be an important reading strategy for Biochemistry 1 students, according to the content lecturer of 2012, but not necessarily one they were regarded to require assistance with (cf. table 65). Also, only 22.2% of students reported to experience this as a problem when reading for Biochemistry 1. However, due to the nature of the reading texts, as revealed through analysing the content of their textbook and based on my expert opinion, I included it as an important strategy in the new reading course. Firstly, students were asked to visualise the written information as presented in the text and make a drawing of it. Next, they had to read and interpret the visual information that was presented as a drawing. As a third stage, they had to integrate the information from both the text and the drawing, in other words, integrate or synthesise information from two sources. This is a concept that was regarded to be a vital reading strategy for them. In the process, it was necessary to revise and use the semantic relations and anaphoric resolution skills, being important in comprehending stereochemistry texts and already introduced in the generic ULEA course. Even though only 4.8% of all students indicated that they only applied anaphoric resolution to comprehend their biochemistry texts, the content lecturer (2012) indicated the need for students to use and improve on this strategy. This I confirmed during the content analysis. Finally, in this section, all the new vocabulary that was introduced in Activity 1 was revised.

The evidence that various reading strategies were applied and revised simultaneously was due to the nature of the text, but is an important example of multiple strategy instruction,

a practice that appears to increase the comprehension of texts in various contexts (Duke et al., 2011; Pressley, 2002) significantly. More details regarding this practice is provided in section 3.4.1.5.

One example of multiple strategy instruction was the combination of revising anaphoric resolution and semantic relations. As mentioned previously, both these concepts were dealt with in the generic ULEA course, so I asked students to identify what certain ideas/words/phrases did, what the underlined words referred to and also what the purpose of the words in bold was. For example, this is how I introduced the section in their notes:

In this section, we study the relationship between objects and their mirror images; ***that is****, we study stereoisomers called enantiomers and diastereomers. Figure 1 (from your text book) summarises the relationship among these isomers and those you studied in Chapters 11 to 14.*

As another example of multiple strategy instruction, the next section practised their abilities to synthesise information from more than one source, but also to read and interpret visual information. This section of the work dealt specifically with mirror images (Enantiomerism), a particularly challenging concept in stereochemistry, according to both the lecturer and students. Students were required to determine whether structures were mirror images or not, for example, the horns of animals, the right and left feet or hands of individuals, etc. Using graphic organisers is one example of how visual information is presented in science texts (cf. 3.4.1.3) (Grabe, 2009; McWhorter & Sember, 2014; Richardson et al., 2012), I presented them with two diagrammatic summaries of the concept of enantiomerism, one from their textbook and the other one from their lecture notes on the same topic. Although both presented the same process, they were slightly different from each other. Becoming familiar with these synonyms was a challenging, but satisfactory experience. I asked students to synthesise the information from both sources, identify the purpose of each, and then, as a method to evaluate their comprehension, they had to indicate whether certain statements were True (T) or False (F), according to the information displayed in both diagrams. Doing this prepared them for the questioning format of the test that was written at the end to evaluate their

performance in stereochemistry compared to those in the control group. Once again, students could work in groups, pairs or individually.

In the pre-reading activity of this task, I applied guidelines for reading activity development as per MINUS (Macalister, 2011, p. 162) and FLOW as observed by Csikszentmihalyi (1990) in Grant and Fischer (2010) (cf. table 14). For example, as enantiomerism is an occurrence commonly observed in twins, as a pre-reading activity, we discussed the extent to which twins were similar and how they differed. Then they had to work in pairs, each drawing the other. Afterwards this drawing and the real student were compared for similarities and differences, an activity that not only activated background knowledge, but also stimulated much interaction and pleasure. Later, the entire group was involved in providing feedback. This helped to create some interaction, especially as some students had worked alone. Also, it took some of the pressure off me to play the role as sole means of information.

Finally, students were asked to read a few more pages of the textbook in order to facilitate comprehension of the content and to apply the reading strategies that we had dealt with. I was hoping that this would increase their metacognition and, in the process, promote strategic reading.

Lesson 3

Following the discussion of topics in the text book, the title of this unit was *Enantiomers*. This lesson was also divided into pre-, while- and post-reading stages.

The first section of this lesson dealt with vocabulary, introducing students to the use of suffixes to form functional groups. Functional groups are specific groups of atoms of bonds within molecules that are responsible for the characteristic chemical reaction of those molecules. Knowing about these is of cardinal importance in understanding the concept of stereochemistry in particular, but also organic chemistry in general. Since the

general ULEA course also had a section on suffixes, I briefly revised the concept here and then presented students with content-specific examples where different suffixes were used to form different functional groups. For example, adding the suffix *oic acid* makes a functional group a carboxylic acid, adding *oate* makes a functional group that is esteral, adding *aldehydeone* makes one that is ketoneol, and adding *alcoholamine* makes one that is an amine. Even though students had to know this in order to comprehend the section on stereochemistry, this particular information was already dealt with in a previous one. This indicated the importance of applying and creating new background knowledge in biochemistry (cf.3.4.1.9). It also made me realise that no unit in the course could be studied in isolation, and students needed to be made aware of that. It further made me realise that I needed a broader overview of the course, something that would probably come with time. An activity followed in which students had to draw on their previous knowledge in order to classify atoms into different functional groups.

Section 2 dealt with academic thought patterns, specifically introducing them to how writers indicate spatial order when writing (see section 3.4.1.4 in literature review). Knowing this was identified during content analysis as particularly important for students to be able to visualise information presented to them. This ability would also facilitate the comprehension of the text that was selected for close reading in Section 3 of this lesson. I introduced this concept and specific content-related examples were provided. A quick activity followed, asking students to scan the stereochemistry chapter in their textbooks for any examples of these thought patterns. Because this formed such an integral part of understanding stereochemistry, they found numerous examples from the selected pages for this lesson in the text book.

Section 3 of the lesson dealt with reading for comprehension. A number of reading strategies were revised in the process, for example, anaphoric resolution and semantic relations. Because Butanol is such an important compound in the discussion of stereochemistry, and in the reading passage that followed, students were encouraged to revise and consider its characteristics in the pre-reading activity. In the process they had to compare and contrast different compounds by completing a T- diagram.

During the while-reading activity, students had to read an authentic text from the textbook. In the process, they had to consider the use of various examples of anaphora and semantic relations and applied what they had learnt about academic thought patterns indicating spatial order by making a drawing of 2-butanol only based on this information. I also provided them with the definitions of some of the important terms already dealt with in the text margins.

The last paragraph ended with an illustration, showing that the mirror image of 2-butanol is not superimposable on the original molecule. Students were asked to study the illustration and then to do a gap-filling activity that represented a summary of the diagram. The summary actually came from the last four paragraphs of the section in the textbook, but the words showing spatial order were deleted.

Even in this summary, words indicating anaphora and semantic relations were underlined and highlighted respectively, in order to remind students of their importance in comprehending texts. Their functions were discussed afterwards, during the post-reading activity.

Although 31.7% of respondents indicated that they struggled to keep track of the main idea, and even though Grabe and Stoller (2011) regard main-idea comprehension to be the core of reading instruction (cf. 3.4.1.3), I had to prioritise (cf. table 45) and did not spend much time on discussing summary writing in the new reading course. The reason for this was that this was a strategy that the generic ULEA course dealt with extensively, so much so that anything between 25%-50% of the total reading mark for this course was based on the abilities of students to summarise, in other words, to identify main ideas. However, even though I did not revise this strategy in the new reading course, I expected students to be able to summarise here, as well as in the next lesson.

During the post-reading activity, students had to answer questions based on the information in the reading text. Answers were discussed afterwards. Finally, students

were asked to read a few more pages of the textbook in order to facilitate comprehension of the content and to apply the reading strategies that we had dealt with. As usual, I was hoping that they would actually do this and that this would increase their metacognition and, in the process, promote strategic reading.

Lesson 4

Following the sequence in which topics were presented in the textbook, the theme of this lesson was 'Chirality'. The lesson was divided into a pre-, while- and post-reading phase.

During the pre-reading stage, vocabulary, as well as academic thought patterns, was dealt with explicitly. This time, I introduced students to specific prefixes that indicated the number of atomic bonds in carbon, because knowing this was vital to full comprehension of stereochemistry in particular, and biochemistry in general. For example, in the word *tetrathedral*, the prefix '*tetra*' means 4, in other words, indicating a carbon with bonds to four atoms. I prepared a jigsaw activity where students could work in pairs or groups. Jigsaw activities have been proven to support team learning and empathy as each group only had a piece of the sum of the information required. Although some of the information could have been already known to them (background knowledge), they had to circulate amongst the different groups to find all the answers as each group had received only some of the information. Afterwards feedback was given in the big group. Even though it required a significant amount of preparation, this activity, specifically, generated so much fun that it was truly worth it, as suggested by the proponents of MINUS and FLOW activities (cf. 3.4.1.3).

The academic thought patterns that were required to understand this particular section of the work required students to notice how academic writers indicated comparisons, for example in discussing the differences between chiral and achiral objects. Although an activity in lesson 3 also required students to compare, this issue was only dealt with here, explicitly. Together we looked at how comparisons were typically introduced (cf. 3.4.1.4) and afterwards students were asked to scan a section of the textbook to find such

examples. As previously mentioned, because I did not want them to write in their textbooks, I provided ample space in their intensive reading booklet for such purposes.

Next, students had to read a passage that was taken directly from their textbooks. I included questions and comments in the text margins to help them pay attention to the highlighted and underlined words and consider their functions and purposes. In addition, I asked them to underline all the unfamiliar words for later discussion. This was done to encourage and promote active reading, as opposed to readers just reading passively without engaging with the text (cf. 3.2.3).

During the post reading phase of the lesson, students had to answer various questions, tapping into an array of reading strategies that were already dealt with in this course. For example, they had to complete diagrams that summarised paragraphs 1 and 8 respectively, they had to apply the knowledge gained from reading by classifying a number of objects as either chiral or achiral, they had to compare and contrast chiral and achiral compounds by using a Table. In this Table they had to consider specific aspects such as other synonyms for each, their causes, examples and anything else about each. They also had to answer contextual questions, based on the information obtained from the text.

After feedback was provided to all the questions, including discussing the anaphoric references and semantic relations, I once again asked them to read a number of pages from their textbook on their own. Unfortunately I never followed up on how many actually did this, a perceived shortcoming of the reading course.

Lesson 5

The theme of this last lesson was RS configuration, following the order in which information is presented in the textbook. Once again, the lesson was divided into a pre-,

while- and post-reading stage, focusing on reading strategies that seemed relevant to comprehend the reading material.

During the pre-reading stage, we looked at vocabulary, academic thought patterns, as well as abbreviations and symbols. In the vocabulary section, we revised words that were also practised in lessons 2, 3 and 4 in an unscrambling activity. These words also appeared in the reading passage that followed. The discussion of academic thought patterns focused on those indicating sequencing as the reading section for this lesson included typical examples. After we had discussed this, I asked students to scan the remaining pages of the chapter in their textbook for any other examples.

Also, because understanding the meanings of some abbreviations appeared to be important in understanding the reading passage, it was decided to include a discussion on abbreviations and symbols in biochemistry in general and stereochemistry in particular. After the discussion in this lesson, I asked students to make lists of as many other symbols and abbreviations that related to biochemistry and then to present these to the entire group. They enjoyed being the instructors for a change and learnt from and corrected each other in the process.

During the while-reading stage, students had to read a passage that came from their textbook. Similar to other lessons, I encouraged them to read actively by including questions and comments in the text margin for them to consider, and asked them to take note of any unfamiliar vocabulary and ideas for further discussion.

During the post-reading stage, they had to apply and revise a number of reading strategies. For example, they had to answer specific questions based on the information from the passage, unscramble instructions, specifically making use of words that indicated sequence. Then, in order to revise the strategy of selecting and synthesising information, I asked them to combine information from both their textbook and lecture notes on the same topic (Determining R/S configuration by mentally rotating the

molecule) and then present the information in one diagram. This diagram required them to sequence steps outlining how to determine R/S configuration by mentally rotating the molecule. In another gap filling activity, students had to complete a description of how optical activity was detected in a laboratory, as presented in their biochemistry text book. Afterwards, feedback was provided.

A clip showing a simple discussion of stereochemistry, downloaded from the internet, was shown at the end of all the lessons to reinforce the content, as well as the academic reading lessons. It was very well received by the students, so much so that some who did not form part of the intervention group asked to watch it afterwards.

6.2.3.2 The extensive reading course

During the first lesson of the new reading course, the importance of extensive reading was explained, and the extensive reading booklets were handed out. All students who initially joined the new reading course received extensive reading booklets, but only 10 extensive reading booklets were returned. This happened despite several e-mails and SMS messages sent requesting students to return these. Their personal details were collected when they joined the new reading course, allowing me to contact them, a definite advantage when collecting personal information of students.

The extensive reading component took place outside of the lecture venue. The initial timeframe for reading the booklet was until the intensive reading course ended (about 20 days), but was later extended to the end of semester 1 to allow more students to read more of the case studies. This they requested as they did not have much time for reading as this adjunct took place at a time when all their courses had tests to be written and assignments to be handed in. Students were required to hand in their extensive reading booklets at the end of the reading programme, as permission was granted to use the material for research purposes only. The booklets could, therefore, not be made available to students who did not participate in the extensive reading programme. This is a possible limitation of the current research. As already mentioned in the section about the pilot

during Phase 1 (cf. 4.7.1.2), the guide was piloted on some volunteers from the researcher's ULEA classes at the main campus. They were not students from the School of Medicine, but science majors.

6.3 Conclusion to Chapter 6

This chapter dealt with the process of designing a reading course for specific purposes. It elaborated the details regarding Phases 3 and 4 of the study that involved Steps 11, 12, 14 and 14. The detailed literature review reported on in Chapters 2 and 3 was conducted to set the criteria for the design of the new reading course. This, as well as the needs analysis, informed the development and design of the syllabus and material for the new reading course. These also informed the instruction of this course. A detailed description of the course and its presentation was given. The next chapter outlines the evaluation of the reading course during Phase 5 of the current study.

CHAPTER 7

EVALUATION AND REFLECTION ON THE NEW READING COURSE

7.0 Introduction

This chapter reflects conducting Phase 5 of the current study. In the process, Step 13 was carried out to evaluate and monitor the course as well as the results. By doing so, the data were examined analysed and interpreted.

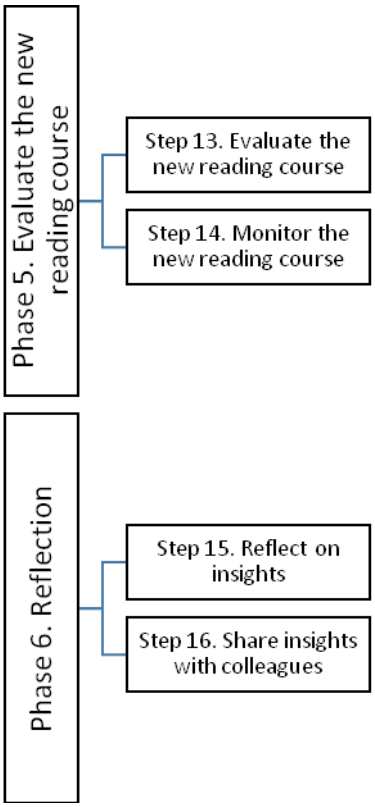

Figure 23: Summary of phases 5 and 6

7.1 Phase 5: Evaluating the reading course

Step 13: Evaluation of the new reading course

Step 13 in phase 5 was addressed by the formulation of research questions 9(a), 9(b) and 9(c). In short, these research questions that are presented next were developed to *evaluate* the new reading course.

Research questions

9 (a) To what extent did the intensive reading component of new reading course meet the expectations of students?

9 (b) To what extent did the extensive reading component of new reading course meet the expectations of students?

9 (c) Did the students in the intervention group outperform those in the control group in the stereochemistry test that was written at the end of the new reading course?

It should be noted that even though course evaluation was done at this stage, it is actually an on-going process.

Next, each of these research questions will be dealt with separately.

7.1.1 To what extent did the intensive reading component of new reading course meet the expectations of students?

Questionnaire 5 (see Appendix G) was used to evaluate the intensive reading component of the new reading course, in other words, to answer research question 11(a). This questionnaire was administered to volunteers from the experimental group the day after the presentation of lesson 5 of the intensive reading course in the ULEA venue. Because it was a short questionnaire to complete, the last 20 minutes of the lesson were reserved for this purpose. Students were informed about the importance of completing this evaluation questionnaire well in advance. I urged them to assist in this regard. I was present and collected the questionnaires afterwards. As mentioned previously, through

purposive sampling 26 volunteers attended the new reading course, albeit not all at the same time.

The questionnaire had two sections, A and B and comprised 13 closed and 3 open-ended questions (QUAN+qual). In Section A of questionnaire 5, respondents had to rate the various aspects about the intensive reading component of the new reading course in 11 questions that were mainly closed, with the exception of questions 5(b), 8 and 11 that were open-ended questions. All questions were phrased in a way to emphasise that responses should only concern the reading strategies development and not the listening, writing and speaking practise that was inevitably part of the different lessons. For example, in question 1, instead of just asking: *In general, how would you rate the English for Biochemistry/Stereochemistry course that you have recently completed?* the question stated: *In general, how would you rate the reading component of the English for Biochemistry/Stereochemistry course that you have recently completed*?

In addition, respondents were asked to rate the usefulness of the reading strategies that were covered in the course to assist them to do the required reading for stereochemistry in their textbooks (question 2), and to indicate to what extent the topics that were dealt with in the new course related to stereochemistry in their biochemistry course (question 3). Thereafter they had to mention which of the reading strategies that were covered in the new reading course assisted them in doing the required reading (question 4). Students could select as many options as they wanted to from the options that included only reading strategies that were dealt with in the course. With regards to questions 3 and 4, it anticipated that the quantitative data would concur with the qualitative results I had gathered during the analysis of their textbook in Phase 2 of the study.

The next question 5(a) required them to rate the number of teaching hours that were spent on the course. In question 5(b), they were asked to elaborate on their responses to question 5(a). This exploratory, open-ended question allowed for the collection of qualitative data to enrich the quantitative responses in 5(a). This information would also be invaluable in constructing similar reading programmes.

Questions 6, 7, 9 and 10 were closed questions with the aim of collecting information quantitatively regarding: their rating of the lecturer's presentation of the new reading

course (question 6), their preferred way(s) of learning during the course (question 7), to what extent they enjoyed the activities they had to do in the course (question 9) and whether they would recommend the course to other students or not (question 10). Questions 8 and 11 collected similar information, namely suggestions for improving the course, although slightly differently phrased. This was done deliberately to elicit as much qualitative data as possible to add depth and detail to the data collected. Suggestions for course improvement are vital in the course development procedure which is never complete, but due to time constraints, it was decided to invite students for follow-up interviews only when it was absolutely vital to clarify responses. It was hoped that those students who did not really reflect on their answers in question 8, or those that opted not to answer the question, would be encouraged to do so when they came to question 11. It was anticipated that these qualitative data would enrich and converge with or diverge from quantitative data collected from questions 1, 2, 6, 9 and 10. If not, or if divergence occurred, interviews, formal or informal would be considered.

In Section B, personal data were collected, and included 5 questions to elicit information regarding: their age (question 12), whether they had also attended the generic ULEA course (question 13), their sex (question 14) year of first enrolment at UNAM (question 15), as well as the regions where their secondary school careers were completed (question 16). Their responses to question 13 were particularly of interest as it became apparent that some students who were exempted from doing the generic ULEA course also attended the new course. Although these students did not do the generic ULEA course, they were doing Biochemistry 1, hence the decision to allow them to attend the new reading course.

7.1.1.1 Data analysis and presentation

Due to absenteeism, only 21 participants completed the evaluation questionnaire. Of these, 19 also attended the generic ULEA course. 2 students were exempted from this course, but asked to attend as they were also Biochemistry 1 students. After collection, these completed questionnaires were coded, responses entered into an SPSS spread sheet, data were cleaned and analysed. Since the aim was not to make any generalisations beyond the population this group was representative of, data were analysed descriptively.

I analysed the qualitative data manually and looked for themes among the responses. More females (76.2%) attended than males (23.8%). It transpired that only one participant (4.8%) did not complete secondary school education at a Namibian school. Of those who did, the majority (38.1%) came from the Khomas region, followed by the Otjozondjupa region (23.8%), the Kavango region (14.3%), Erongo (4.8%) and the Hardap region (4.8%).

When asked to rate the reading component of the new reading course (question 1), the majority (71.4%) rated it as having been good and excellent (23.8%). While one student regarded it as average (4.8%), no-one, rated it to be poor.

Regarding the usefulness of the reading strategies covered in the course to assist them in understanding the required reading for the section on stereochemistry in their biochemistry textbook, in particular, most students seemed to have found these valuable (42.9%) and extremely valuable (33.3%). While fewer students (23.8%) regarded these to have had some value, no one rated it to have had no value (0%).

When asked to indicate how many topics dealt with in the course also related to the discussion on stereochemistry in their textbook, the majority (66.7%) mentioned that all the topics appeared in it, followed by those who stated that an extreme number of topics did (19%). A small number of respondents indicated that quite a number of the topics (9.5%) or some of the topics did (4.8%). Nobody stated that none of the topics appeared in the course.

When asked to indicate how many of the reading strategies covered in the new reading course they applied when reading for stereochemistry (cf. table 52), students could choose as many of the options provided as they wanted to. With the exception of distinguishing between true and false (14.3%) all the reading strategies seemed to have been used extensively. The most widely reading strategies used seemed to have been vocabulary (72.6%) followed by understanding diagrams and visualising information (66.7%), combining ideas from different sources (66.7%), diagrammatic representation of information (61.9), scanning (57.1%), understanding anaphoric resolution (52.4%), academic thought patterns and semantic relations (52.4%), skimming (52.4%) and guessing the meaning of words in context (47.6%)

Table 52: Reading strategies mostly used when reading for stereochemistry

Reading strategies mostly used when reading for stereochemistry (n=21)	**%**
Vocabulary	72.6
Anaphoric resolution	52.4
Semantic relations/ Academic thought patterns	52.4
Skimming	52.4
Scanning	57.1
Guessing the meaning of words in context	47.6
Distinguishing between fact and opinions	14.3
Diagrammatic representation	61.9
Understanding diagrams/ visual information	66.7
Selecting and synthetizing	66.7

In response to question 5(a), when they had to rate the number of teaching hours that were spent on the new reading course, the majority of students were equally *satisfied* and *fairly satisfied* (47.3%). A small minority was *very satisfied* (5.3%) but no one was unsatisfied. In the open-ended question that followed to comment on their answers to 5(a), 18 students responded. Their qualitative responses ranged between those who regarded it to be enough (44.4%) and those who wanted more lessons (55.5%). In fact, 16.6% of the respondents asked for more reading, in particular. Their quantitative responses to question 5(a) are summarised in Figure 24.

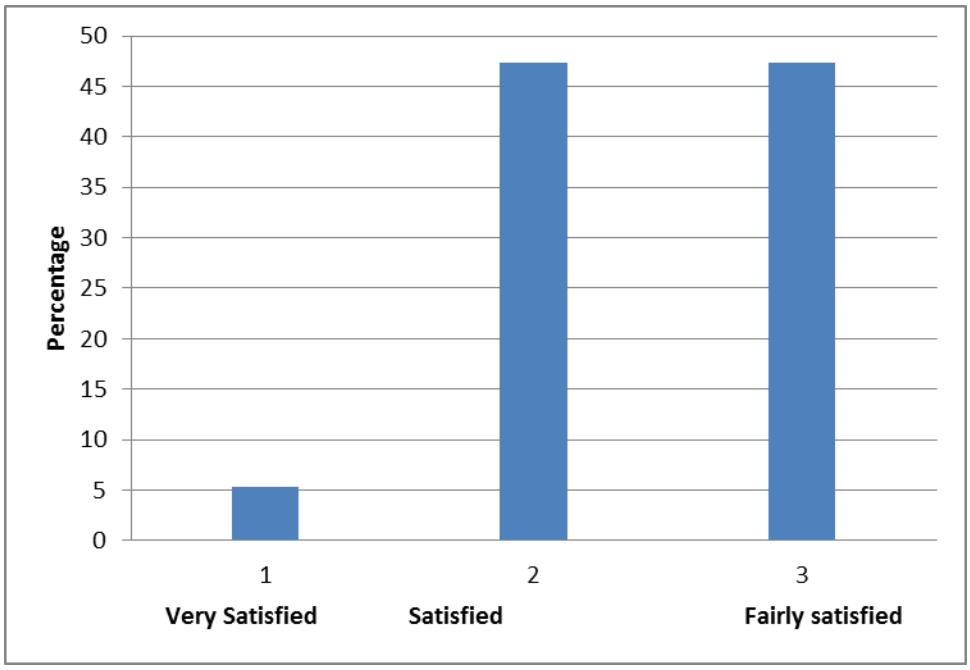

Figure 24: Rating of teaching hours

From the open-ended responses to the question to comment on time, two broad categories, namely those stating it was 'enough' and those stating that they wanted more sessions were determined.

All comments are listed below:

Comments on time	
Enough	*Enough* *Enough to cover the important aspects* *No* *Satisfactory, everything completed in given time* *Satisfied* *Sufficient* *Teaching hours not too long--i liked that* *Was ok*
More sessions	*Lessons good; more time for reading during the lessons* *More of this it was fun and simplified Stereochemistry* *More sessions please*

	More time *More time on reading please* *More time; Group work sessions very useful* *Not all the work was completed.* *Wish we had more time; excellent* *Longer please 2 weeks too short* *More time for reading*

When asked to rate the lecturer's presentation of the course (question 6), the majority of students were very satisfied (61.9%) and the rest satisfied (38.1%). There was no indication of anyone being either *fairly* or *not* satisfied.

Their preferred ways of learning in the course (question 7) were in small groups (57.1%), in pairs (28.6%) and individually (14.3%). Since questions 8 and 11 solicited similar information, the data generated here will be elaborated in the section dealing with the data description of question 11.

In question 9, student views on the different activities they had to do during the 5 lessons of the new reading course were collected and summarised in table 54 that follows. It should be noted that students only had to indicate the level of enjoyment, not rating it as the purpose was not to compare activities. Regarding word searches, the majority of students regarded it to be extremely enjoyable (57.1%), while some enjoyed it quite a bit (33.3%) and others (9.5%) felt it was ok. Nobody indicated not to have enjoyed this activity at all. Furthermore, the majority of respondents (61.9%) experienced the unscrambling of words as an extremely enjoyable activity, followed by those finding it to be ok (23.8%) and those enjoying it quite a bit enjoyable (14.3%). Nobody stated to not have enjoyed it at all. Regarding the unscrambling of paragraphs, the majority of students seemed to have enjoyed it quite a bit (52.4%), some as extremely enjoyable (28.6%), some that it was ok (14.3) and a small minority did not enjoy doing this activity at all (4.8%).A large majority of students found the jigsaw activity as extremely enjoyable (70%), followed by those who seemed to have enjoyed it quite a bit (25%). 5% of the

respondents regarded it to be ok, and no one did not enjoy doing this activity at all. In addition, the gap filling activities had more or less similar levels of enjoyment among the extremely enjoyable (38.1%), quite a bit (33.3%) and ok (23.8%) categories. A small number (4.8%) did not enjoy doing this type of activity at all.

The majority of students (52.4%) seemed to have enjoyed the activities that required them to read and answer questions to quite a bit (52.4%), followed by those who seemed to have found it extremely enjoyable (28.6%) and those who found it to be ok (19%). 28.6% of the respondents did not enjoy this type of activity at all.

When asked about the activities that required them to match vocabulary with the correct meanings, the majority (61.9%) of respondents found them extremely enjoyable, followed by those indicating to have enjoyed these quite a bit (23.8%) and those that found them to be ok (14.3%). Regarding diagrammatic presentations, a large number of students (66.7%) found these to be extremely enjoyable, followed by those indicated to have enjoyed doing it quite a bit (23.8%) and those that found these to be ok (9.5%). Nobody indicated not to have enjoyed these activities at all.

Regarding activities to select and synthesise information, an equal percentage of students (40%) regarded these activities to be both extremely enjoyable, as well as having enjoyed these quite a bit. 20% of the respondents found these to be ok, while nobody indicated not to have enjoyed these activities at all.

Table 53: Rating of different activities

Activity (n=21)	Rating (%)			
	Extremely enjoyable	**Quite a bit**	**It was ok**	**Not at all**
Jigsaw puzzle	70.0	25.0	5.0	0
Diagrammatic presentations	66.7	23.8	9.5	0
Matching vocabulary with meanings	61.9	23.8	14.3	0
Unscrambling words	61.9	14.3	23.8	0
Word searches	57.1	33.3	9.5	0
Gap filling activities	38.1	33.3	23.8	4.8
Unscrambling paragraphs	28.6	52.4	14.3	4.8
Selecting and synthesising information	40.0	40	20	0
Read and answer questions	28.6	52.4	19.0	28.6

When asked if they would recommend this course to other students, the majority (90%) said yes, 10% maybe but nobody selected no as an option.

I identified 7 broad topics in their combined responses to questions 8 and 11 (Suggestions to improve the current reading component of the English for Biochemistry/Stereochemistry). These are presented in the table that follows.

Table 54: Suggestions to improve new reading course

Overall rating of the reading course	*Excellent* *Good and i learnt a lot* *It was well done* *Perfect* *Was ok* *I really benefitted from doing this reading experimental, thank you* *Fun and enlightening.* *Not a waste of time* *Nice course* *Satisfactory*
Usefulness of reading strategies	*Lots of reading but necessary,* *Helped understanding the lectures* *Learnt a lot from attending* *I learnt new ways to study* *Course was enjoyable and informative* *We learnt a lot of new vocabulary* *Enabled me to see the daily applications of biochemistry knowledge,*
Lecturer's presentation	*Fun* *The best, i am thankful and grateful* *Excellent method*
Learning style	*More group discussions* *More group discussions not only in smaller groups* *Groups worked well together* *Let students give feedback about what they have learnt*
Activities	*More activities*

	More practical examples please *More video's* *More visuals* *Let students already do the reading before class.* *More individual activities- not only for groups* *More videos* *informative sessions; good to look at aspects from different angles*
Recommendation of course	*Everything is fine* *Course should be implemented; very important* *"Enlightening and recommend course to all first-years*
Other	*More information on R/s configuration; optical activity* *Have sessions on a Saturday* *Do not rush through the content*

7.1.2 To what extent did the extensive reading component of new reading course meet the expectations of students?

Questionnaire 6 (Appendix H) was used to collect the data to answer research question 11(b). Students were asked to complete questionnaire 6 at the end of the booklet, before returning it, even if they had not read all the case studies. This questionnaire had no section on personal details, (a shortcoming that was not determined during the piloting phase) and only had 4 open-ended questions that students could complete during their own time.

In question 1, participants of the extensive reading component had to specify how many stories they had read and then, in question 2, they were asked to indicate which ones they had read. They simply had to tick next to the ones they had read, from the list of all the case studies in the guide. This would be important to consider on the content of a follow up, extensive reading booklet and also to determine if there was an agreement between their preferred genre when reading for pleasure (from questionnaire 4) and the case studies selected from this selection for the extensive reading programme. In question 3,

they had to mention both the stories they had enjoyed and disliked reading the most, and then had to provide reasons for their answers. It was anticipated that these answers would indicate how students, in general, view reading case studies in an extensive reading programme, for future course development. Finally, in question 4, students had to rate to what extent reading these short stories had assisted in improving their general and scientific English vocabularies, their motivation for reading, as well as their understanding of chemistry. Questions 1 and 3 were open-ended, while questions 2 and 4 were closed questions.

Only students who attended the reading programme took part in the extensive reading component. The booklets were distributed during the first intensive reading lesson of the new reading course and the procedures were explained to students. I emphasised that they could read as many or as few stories as they had time for, provided that they all read the first one and completed the final questionnaire. They had to read out of class and had to return the booklets at the end of the reading programme. This date was later extended to the end of the 1st semester, i.e. at the end of the generic ULEA course. Although extensive reading booklets were provided to all participants of the intensive reading course, only 10 booklets were returned.

7.1.2.2 Data analysis and presentation

From their responses, it appeared as if all 10 students who returned their booklets had read the first story, as requested. Furthermore, they had read between 2 and 10 case studies respectively. While only one student indicated to have read a total of 10 case studies, no one had read all 20 case studies in the guide. Others had read 2 (3 students), 4 (1 student), 5 (2 students), 6 (1 student), 7 (1 student) and 9 (1 student).

When asked to list the case studies they had enjoyed reading the most, 6 different case studies were listed. The case study the majority (4) seemed to have enjoyed the most was the one about stereochemistry, followed by Sweet truth (2), Chemistry of cocaine (1), Bilirubin (1), Prayer study (1) and Artificial sanity (See Table 56). Their reasons for having enjoyed reading these case studies ranged from the suggestion that these case studies helped them understand concepts better, as one student put it '*It helped me*

understand some concepts I was struggling with', and another student suggested that *t helped me understand stereochemistry better'* to the fact that they could relate the content of the topics to other topics done in their courses. As one student put it, '*It relates to one of the topics that i had to study for my physiology exam'* and another one '*It attempts to link prayer to medicine'*. Other reasons given were that the particular case studies were '*short, easy to read and understand'* and that '*the content was enjoyable'*. As one student put it, '*I love stereochemistry'*. Furthermore, they also seemed to like the issue that these case studies '*were written like narratives'*. For example, one student liked reading a particular case study because '*it had a twist'* and another one because '*it read like a crime story'*. Another reason why students seemed to like a particular case study seemed to be because it introduced new ideas. For example, one student said that '*the whole concept was new - i learnt new things'*.

The next question asked respondents to first name the stories they did not enjoy and then to provide reasons why not. All 10 respondents answered this question and listed a total number of 6 case studies. (cf. Figure 25) Sweet truth (3), An adventure in Stereochemistry (1), Chemistry of cocaine (1), Bilirubin (1), Prayer study (1), Murder by HIV (1). Their reasons for not enjoying reading the particular case study ranged from the topic being too complicated to understand, as one student put it '*Carbohydrates are complicated*' and another one suggested that, '*It was hard to understand some concepts*', to new topics being difficult to understand. As one student put it '*The topic of stereochemistry was new to me when reading the story so it was confusing*'. Other reasons were that the particular case study was too long, too boring, contained too many new terms or too technical, too short or not making sense. For example, one student said *'it was not quite clear about the positive testing of the nurse'*.

Table 55 that follows summarises the case studies they enjoying reading, as well as those they did not enjoy reading. Each time, the Readability Scores and Grade Levels of the case studies are provided.

Table 55: Summary of case studies enjoyed and not enjoyed

Title of case study not enjoyed	(n=10)	Title of case study enjoyed	(n=10)	Readability (Flesh Reading Ease)	Grade level (Flesch-Kincaid Grade Level)
An adventure in Stereochemistry	1	An adventure in Stereochemistry	4	77.1	5.2
Sweet truth	3	Sweet truth	2	62.1	7.3
Chemistry of cocaine	1	Chemistry of cocaine	1	56.3	8.5
Bilirubin	1	Bilirubin	1	53.5	10.3
Prayer study	1	Prayer study	1	41.8	12.3
Murder by HIV	1	Murder by HIV	1	57.1	9.5
		Artificial sanity	1	54.7	9.9

Figure 25 that follows summarises their reasons for enjoying, as well as not enjoying, reading particular case studies.

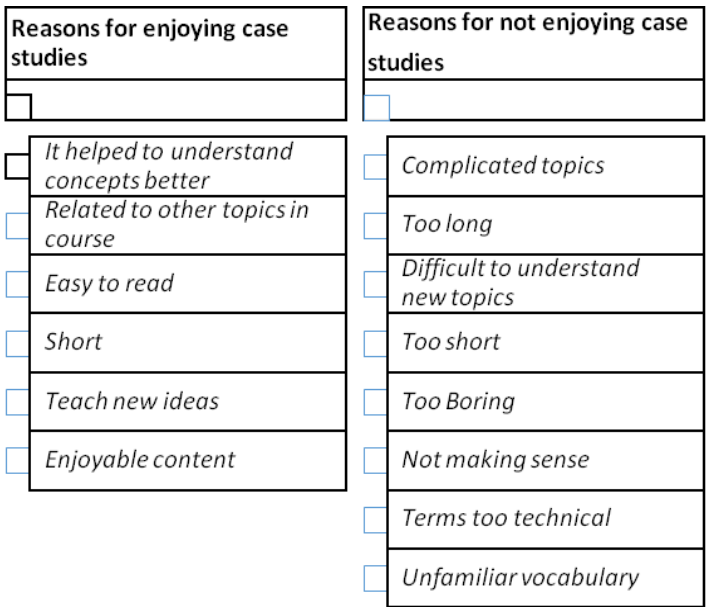

Figure 25: Reasons for enjoying and not enjoying case studies

When asked to what extent reading these case studies assisted in improving their general English vocabulary levels, most students (6) indicated that it had helped *to some extent*, 2 that it helped them *substantially* while 1 respondent regarded it to have helped *a little* and another one as *not at all*. A similar trend was observed when 5 students stated that reading the case studies helped to improve their scientific vocabulary *to some extent*, 3 that it helped *substantially*, with one each stating that it helped *a little* and *none*. In addition, 4 respondents reported that reading these case studies increased their motivation for reading *substantially* and 3 that it helped to *some extent* and *a little* each. No one selected none as an option.

When asked to rate to what extent the extensive reading course that was specifically focused on scientific case studies assisted in their general understanding of chemistry, 4 students indicated that it helped *substantially* and 3 that it helped *to some extent*. 2 students stated that it helped *a little* and 1 student responded that it *did not help at all*.

7.1.3 Did the students in the intervention group outperform those in the control group in the stereochemistry test that was written at the end of the new reading course?

The last stage in evaluating the effectiveness of the new reading course, took place after the reading programme had been taught in 2013 and was necessary to answer research question 9(c). In other words, the aim was to establish whether the participants in the experimental group outperformed those in the control group in the stereochemistry test that was written at the end of the new reading course.

This subdivision of research question 11 resulted in the formulation of hypothesis 1.

Hypothesis 1, as well as the null hypothesis, was formulated as follows:

Hypothesis 1

H1

After attending a 10 hour intensive reading course as well as having had exposure to an extensive reading programme, there will be a significant difference in the test scores of the experimental group compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Null Hypothesis

After attending a 10 hour intensive reading as well as exposure to an extensive reading programme, there will not be a significant difference in the test scores of the experimental group compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Even though the students who participated in the new reading course are referred to as the experimental group and those who did not as the control group, it should be reiterated this study was not intended to be a reading intervention. Rather, it was to reflect on the development and evaluation of a tailor made ESAP reading course. Therefore, no pre- and post-tests measuring reading performance were used. Being cautioned that one needs to be clear what is assessed during any assessment procedure in adjunct courses, and that language instructors should also consider content knowledge and not only evaluate L2 capabilities (Brinton et al., 1989), I developed a test to determine whether attending the new reading course enhanced their understanding of stereochemistry.

One option was to consider the test scores in a Biochemistry 1 test that all students wrote as part of their normal Biochemistry 1 assessment. It was planned to be written soon after the section on stereochemistry was taught. However, the content lecturer indicated that it would be about more units than only the stereochemistry section in the course. Therefore, it was decided to develop a new test for this purpose, as suggested by Evans Commander and Smith (1995) in the literature review section. When the 2013 lecturer could not assist in developing such a test due to time constraints, it was decided to use a combination of the True and False revision questions that appeared at the end of the stereochemistry chapter in the Biochemistry 1 textbook, as well as some questions from the stereochemistry lessons that were included for revision purposes. The confirmation that answers were provided for questions from both these sources enabled me to develop and mark the test accurately without any assistance from the content lecturer.

Because the majority of participants indicated in questionnaire 4 that they did not do all the prescribed reading material for the course (cf.3.6.1), it was assumed that not many would work through the revision questions without being told to, about a month prior to the June examinations. My assumption was later confirmed when, during an informal class discussion, it seemed as if the majority of them (control and experimental groups) did not even know that each chapter in their Biochemistry 1 textbook contained a section for revision.

A total of 57 students voluntarily turned up to write the test, 19 (out of a possible 26 students) from the experimental and 38 (out of a possible 62 students) from the control group.

7.1.3.1 Procedure

Before the new reading course commenced, I had already asked all students (the experimental, as well as the control group) in the ULEA class to write the test and we set a date for one of the ULEA lessons, a few days after the new reading course ended. Although the test was anonymous, students were asked to provide their student numbers and also to indicate whether they attended the new reading course or not on the cover page. This helped me to group their results into control and experimental group results. This test was administered during a ULEA lesson, a few days after the new reading course was completed.

7.1.3.2 Data analysis and presentation

The results of this test were used to test hypothesis 1, in other words, the results of the experimental group was compared with that of the control group. Table 56 represents the descriptive data of the participants' scores.

Table 56: Experimental group test scores compared to control group test scores

Categories	Mean	Standard deviation
Experimental group (N=19)	12.47	1.867
Control group (N=38)	11.61	1.897

In order to compare the two means, an independent samples t-test was used, testing Levene's test for homogeneity between the two means. Equal variances between the two groups were assumed (p >0.5= 0.944; t=1.638), but the null hypothesis was accepted (p >0.5 =0.108). Therefore, although there were differences between the mean scores of the two groups, with the experimental group performing better than the control group, these differences were ***not*** significant and the null hypothesis was accepted.

Upon further scrutinising of the data it became obvious that some students attended lessons more frequently than others, suggesting higher levels of motivation. For example, a total of 26 students attended the lessons, but not necessary on the same day. As can be seen in Table 58, on day 1, 18 students attended, day 2, 13, lesson 3, 21, lesson 4, 8 and for lesson 5, 18 students. Their range of attendance was between 1-5 lessons. It should be emphasised that each of the 5 lessons were 2 hours each, in other words, a total of 10 hours.

Table 57: Number of participants per lesson

Category	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Participants (N)	18	13	21	8	18

By looking at their attendance, students were placed in two categories:

- Those that attended 60% and less of all lessons
- Those that attended 60% and more of all lessons

It was concluded that 15 participants who wrote the stereochemistry test attended 60% and more of all lessons.

Based on these results, Hypothesis 1, as well as the null hypothesis, was adjusted as follows:

H1 (b)

After attending a 10 hour intensive reading course, as well as having had exposure to an extensive reading programme, there will be a significant difference in the test scores of participants in the experimental group who attended 60% and more of all lessons compared to those participants in the experimental group who attended less than 60% of all lessons, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Null Hypothesis 1: (b)

After attending a 10 hour intensive reading course, as well as having had exposure to an extensive reading programme, there will not be a significant difference in the test scores of participants in the experimental group who attended 60% and more of all lessons compared to those participants in the experimental group who attended less than 60% of all lessons, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Table 58 represents the descriptive data of the participants' scores.

Table 58: Descriptive data of the participants' scores

Categories	**Mean**	**Standard deviation**
Experimental group (N=15)	12.60	1.993
Control group (N=38)	11.61	1.897

Once again, in order to compare the two means an independent samples, a T–test procedure was used, testing Levene's test for homogeneity between the two means. Equal

variances between the two groups were assumed (p>0.5= 0.772; t=1.659), and the null hypothesis was rejected (p <0.5 =0.096). Therefore, these differences were significant. One can, therefore, conclude that the course did have a significant impact on these students' scores, but only those with a 60% attendance rate and more. **In other words, the null hypothesis for hypothesis 1(b) was rejected.**

7.2 Discussion and interpretation of results

It should be emphasised that this section of the chapter deals with the evaluation of the new reading course, namely step 13 in phase 5.

7.2.1 Intensive reading component

Overall rating of the reading course

It was interesting, yet motivating to note that two of the participants in the new reading course were exempted from doing the ULEA course at the beginning of the semester as they had done similar courses elsewhere prior to their studies at UNAM School of Medicine. It is also worth noticing that one of these students attended 100% of all the lessons of the adjunct and was also one of the 10 who had read and returned the extensive reading booklets and questionnaire 6. During informal discussions, after the first lesson, this particular participant claimed to have attended this adjunct initially because it was *'interesting*' and later on, after lesson 4, the adjunct was described to be regarded to be '*interesting*' as well as '*useful'*.

These observations seem to be echoed in the other responses to evaluate the new reading course. Most students regarded it to be '*good*' and '*excellent*' However, in spite of the evidence that all the topics and content of the new reading course came directly from their stereochemistry text book, some students still did not seem to be aware of this. This seems to indicate some of the shortcomings of questionnaires, as identified in Table 27 (Dörnyei & Taguchi, 2010), namely that respondents are often reluctant to spend too much time on answering questions, are unreliable and unmotivated and, therefore, prone to omit responses and give superficial answers. The ignorance of the students regarding the content of the course could also be as a result of absenteeism. A student who missed a

lesson may not have made the effort to find out what was covered, even though he/she had the notes as these were given out during lesson 1 already. However, the verification that they did not know that all the topics and content of the new reading course came directly from their stereochemistry text book could also mean that they did not do all the reading for their stereochemistry unit in the Biochemistry 1 course, as suggested in figure 18.

Usefulness of reading strategies

Respondents indicated that the reading strategies covered were '*extremely valuable'* and '*valuable*' to understand the required reading for stereochemistry. The issue that more students reported to have applied the reading strategies that were covered suggest higher levels of metacognition and strategic awareness, an aspect that was apparently not present previously, during the instruction of the reading component of the generic ULEA course, before the adjunct. For example, previously, when they had to evaluate the usefulness of the reading section of the generic ULEA course when reading for their content courses (Biochemistry 1 included), only 4.8 % of respondents indicated to use anaphoric references, 17.5% to use semantic relations, even though these reading strategies were taught in the generic ULEA course and are important for thorough understanding of any content. This time, after the adjunct, respondents indicated to use both anaphoric resolution (52.4%) and semantic relations (52.4%) more often. However, the reading strategies they seemed to be using the most were vocabulary (72.6%), diagrammatic presentation (61.9%), understanding diagrams and visual information (66.7%) and selecting and synthesising information from various sources (66.7%). All in all, they seemed more aware of the value and application of the reading strategies taught and practised in the adjunct to enhance their understanding of stereochemistry. The suggestion that they were more aware of this could perhaps be explained by the reason that some of these strategies were repeated, suggesting the value of repetitive learning of reading strategies until they become strategies, i.e. strategic reading (cf. 3.4.1.5). But the three strategies they indicated to be most useful (diagrammatic presentation (61.9%), understanding diagrams and visual information (66.7%) and selecting and synthesising information from various sources (66.7%)) were not explicitly instructed in the generic ULEA course. The reason for perceiving the value of these strategies could possibly be

because these strategies were what they actually needed most to comprehend their stereochemistry texts. This underscores the value of conducting a thorough needs analysis and then to include the strategies needed (cf. 2.7.1).

Teaching hours

Generally students seemed to be satisfied with the teaching hours and the suggestion that they wanted more sessions seems encouraging. The qualitative data were used to elaborate on their qualitative responses. In this case the quantitative data were followed up with qualitative data for further elaboration. There does not seem to be a large discrepancy between those who wanted more and those who felt it was enough, and no negative responses were given. Two broad categories, namely those stating it was 'enough' and those stating that they wanted more sessions were determined. One student from the former group stated that the '*teaching hours were not too long, I liked that'* and another '*enough to cover the important aspects'* while some students who wanted more stated reasons such as 'm*ore because it was fun and simplified stereochemistry* and '*excellent, wish we had more time'* and '*more time for reading during lessons*'. As one student put it '*more time on reading please'*.

Lecturer's presentation

Generally students seemed to be satisfied with the lecturing style. Similar to when they evaluated the generic ULEA course. This is probably because they had the same lecturer in both cases. Their similar responses could possibly rule out the suggested possibility of halo effects, as indicated previously.

Learning style

It seems as if attending the new reading course encouraged students to work more in groups. While previously, when evaluating the reading component of the generic ULEA course, most students (53.3%) preferred working individually, and the rest in groups (30.7%) or in pairs (16.1%). However, after attending the new reading course, most students seemed to prefer working in groups (57.1%), with fewer indicating preferences to work in pairs (28.6%) or individually (14.3%). This is possibly because in the adjunct, students were more exposed to group and pair work activities, compared to when they were taught in the generic ULEA course. The reasons why the lecture method often prevails in my ULEA classes are because classes are too big to do group work, lessons in the study guide are not always structured around pre-, while- and post-reading activities, and finally, the guide is so bulky that it is often felt that no time can be spent on group work activities. These three issues were redressed in the adjunct. In other words, the class number was relatively small (+/- 26, compared to 88 in the generic ULEA class), lessons were arranged according to pre-, while- and post-reading activities that were stimulating and, finally, the work to be dealt with was carefully planned to fit into the duration of each lesson. In that way, it seemed to have allowed more students to experience the benefits of group work, as elaborated on in the literature review.

Activities

From the results, participants seemed to have enjoyed the activities that were designed, keeping FLOW and MINUS principles in mind, such as word searches, unscrambling words, jigsaw puzzle, matching vocabulary with meanings and diagrammatic presentations. However, they seemed to enjoy the more traditional 'read and answer questions' less. The reading section in the current generic reading section is dominated by these type of questions. This suggests that more should be done to improve the way activities in study guides are developed in LC courses. Also the teaching style which is currently very traditional, perhaps due to classroom sizes and the way students are seated.

Recommendation of the course

Their positivity towards the course in general reflected that 90% of all respondents indicated that they would recommend the course to other students. In fact, one student was even recommending that this course should be taught on a Saturday.

7.2.2 Extensive reading component

Although the low return rate of the extensive reading booklets was disappointing, it was probably to be expected. That is considering their workloads, the evidence that they had to read this at a time, late in the semester, when they had many tests to prepare for. This also confirmed their earlier response that the main reason why they did not read, was because they did not have the time to do so (85%). This low reading rate of the extensive reading material is contrary to the study reported by Suk (2015). In that study, all students had done the required reading, in spite of the fact that they, too had little time. In a follow up-interview, Suk (2015) discovered that they would not have done the required reading if it was not a requirement that contributed to a mark that was linked to passing the course. One of the shortcomings of this study could be the element that I did not follow up the reasons why so few stories were read. As previously stated, it was not possible to link the returned booklets with the students as there was no place of personal details to be included on either the booklet or the questionnaire.

Of all the case studies indicated to have been read, the first and compulsory case study (stereochemistry) seemed to have been the one that more students also enjoyed reading. This could be due to three possible reasons. Firstly, because of the topic, stereochemistry, that directly related to the content of the intensive reading course, as well as a section in their Biochemistry 1 course. As elaborated on in the literature review section, Duke et al.(2011), for example, are of the opinion that if extensive reading texts relate to content areas, understanding of, as well as engagement with, such texts will be enhanced. Another reason why more students enjoyed reading this case study could also be due to the fact that, having a 77.1 Flesch Reading Ease and being on a 5.2 Flesch-Kincaid grade level, it seems to have been the easiest case study to read. As it was elaborated on in the literature review, Day and Bamford (1998; 2002) argue that if reading is easy, text comprehension would be rapid and fluent. Another reason for selecting this case study as more enjoyable to read could simply be because that was the only case study all the

respondents had read (cf. 7.1.2.2). Determining the Flesch Reading Ease and Flesch-Kincaid grade levels of these case studies, (cf. table 55) seems to have dispelled the assumption that all content related reading material is challenging. As stated previously, text difficulty, was not the only reason for including case studies in this extensive reading programme. In fact, it was not even the most important criterion. The content (science-related) and topics (that seemed to have indicated the genres) of the case studies were.

Students indicated a number of reasons for enjoying reading some of the case studies, but also as many for not enjoying reading them. Their reasons for having enjoyed reading these case studies ranged from the suggestion that these case studies helped them understand concepts better, to the issue that they could relate the content of the topics to other topics done in their courses. Other reasons given were that the particular case studies were short, easy to read and understand and that the content was enjoyable. Furthermore, they also seemed to like the element that these case studies were written like narratives. Another reason why students seemed to like a particular case study seemed to be because it introduced new ideas. Contrary to my earlier expectation nobody seemed to have read case study 10, Love Potion. Perhaps some had started to and then stopped due to its difficulty score. Another shortcoming is that the specific reasons why certain case studies were selected for reading could perhaps have been followed up.

Their reasons for not enjoying reading the particular case study ranged from the topic being too complicated to understand, to new topics being difficult to understand. Other reasons were that the particular case study was too long, too boring, containing too many new terms or being too technical, too short, or not making sense. Generally, the extensive reading course seemed to have assisted in improving their general English vocabulary, scientific vocabulary, motivation to read for pleasure, as well as understanding of chemistry. However, it seems as if it mostly helped to increase their motivation for reading.

7.2.3 Overall

Finally, the test results seem to indicate that students who attended at least 60% of all lessons outperformed those in the control group significantly. This indicates the

importance of motivation in attending EAP courses, as elaborated on in the literature review section (Grant & Fischer, 2010; Guthrie et al., 1999; Komiyama, 2013; Macalister, 2011; Richardson et al., 2012; Yu & Xiao, 2013.

Step 14: Monitor the course

The monitoring element in Step 14 implies the need to continuously evaluate such courses, if these are to be implemented as regular courses in a curriculum. This step of the MMRS model will be take place in the future as it could not have been done at the time of this study.

7.3 Phase 6:

Step 15: Reflection

In this phase, namely Step 15 my reflection on the action research project is given, even though it is something that took place throughout the project. In the process, research question 10, the reflection on my personal experiences of being an EAP/ adjunct instructor who is not a content expert will be deliberated. Phase 6 also represents Steps 15 and 16 of the current study.

A research journal was the data collection instrument to answer research question 12.

Because of the development of LC courses currently does not include consultations with stakeholders (cf. 1.2), involving stakeholders in the current study had been a new, but empowering experience for me. In order to cope with the specialised content of the biochemistry material, I made use of all three options available, as elaborated on in section 2.6, namely faculty support, the students and investigation of the target discourse. Of all the stakeholders involved (cf. 1.5), for me, the most difficult was to obtain the support of the Biochemistry Department. To me this was, in fact, more difficult than the issue that I did not have much prior knowledge of the subject matter, namely stereochemistry. Such an observation seems to contradict others who, as was elaborated on in section 2.6, regard this (not having content knowledge), as one of the main challenges encountered by EAP instructors (Alexander et al., 2008; Basturkmen, 2010;

Belcher, 2009; Dudley-Evans & St John, 1998;2000; Flowerdew, 2011; Hutchinson & Waters, 1987;2009; Johns & Makalela, 2011a). This discussion will explain my reasons for making this statement, as well as how I dealt with the perceived difficulty of not being a content expert and, finally, recommendations of how other, similar issues could be tackled.

Engagement with the Department of Biochemistry

Once it was established that the target subject would be biochemistry (cf. 5.1.1.2), I realised the need to engage the Department of Biochemistry to conduct the needs analysis, and also to develop and implement the adjunct (cf. 2.5.4). As suggested in section 2.5.1, of all the different types of engagement with faculties, all EAP course developers should, at least, have their cooperation. Because of the small student body at the School of Medicine, only one lecturer is responsible for teaching the biochemistry course. Ideally I wanted to have a larger sample of lecturers to draw answers from for the needs analysis (cf. questionnaire 3), as a result, I contacted the Biochemistry Department at the main campus, where there are more lecturers for input. However, various attempts were fruitless. For example, appointments to introduce my study were confirmed, but not turned up for, emails were not responded to and as a last attempt, questionnaires that were pushed through under office doors got lost and were never returned. As a result, I decided to continue without their input. Even though the biochemistry colleagues from the School of Medicine were more forthcoming, than those at the main campus, their willingness to cooperate was limited. As elaborated on in Step 4 of the current study (cf. 4.9.1), only after the second attempt, the 2012 lecturer who was out of the country at the time, completed and returned questionnaire 3. Thereafter, I did not make any further requests for assistance, due to the fact that the lecturer resigned (cf. 4.9.1).

In 2013, cooperation from the new content lecturer was also restricted. For example, the first meeting where I explained the aims of course, established the guidelines about our roles and asked for permission to attend classes, as suggested by various scholars (Andrade & Makaafi, 2001; Brinton et al., 1989; Carstens, 2013; Jacobs, 2007a; 2007b; Evans Commander & Smith, 1995) went well. Ideally I would have wanted to form a variation of collaboration (cf. 2.5.1.2) and asked for the content lecturer to look at my lessons beforehand, to help me in selecting case studies for the extensive reading

programme and also to assist with the final test. In spite of a verbal agreement, this offer did not materialise. All lessons and case studies, as well as the test that was written at the end of the adjunct, were e-mailed to him, but none of the emails returned. He, however, did e-mail me all the slides of the stereochemistry lessons beforehand. We sometimes saw each other before or after the stereochemistry lessons I attended, but at that point I felt grateful that I was even allowed to observe the lessons and did not want to ask why he never responded to my e-mails. I probably should have been more persistent, but I did not want to be a bother, so I intruded as little as possible in order to ensure a harmonious relationship (Brinton et al., 1989), for the sake of my study.

Hutchinson and Waters (1987;2009) advise one to identify instructors who are willing, but in my case, I did not have many to choose from and had to settle for any type of assistance. However, I did not take this personally and ascribed his lack of assistance to a heavy teaching load. Therefore, contrary to the experiences of others (Jacobs, 2007a; 2007b; Carstens, 2013;) the level of engagement with the faculty of biochemistry was one of cooperation, but a limited or weak form of collaboration (Lee, 2013). The reason for this could that in the studies reported by Carstens (2013) and Jacobs (2007 a; b), content lecturers had to participate as it had been a university wide incentive to engage in collaborative teaching efforts and, therefore, engaged actively in participating to develop content-based EAP courses. In the current study, however, they were under no institutional obligation to assist, which could be the reason for their partial assistance. Even so, I have achieved some success, but it probably could have been so much more meaningful had full collaboration from the biochemistry faculty been available (Brinton et al., 1989).

Student engagement

The biggest source of assistance to develop and implement the adjunct reading course came from the students. I, therefore, concur with Belcher (2009) that students are the easiest accessible sources of information about the specialist knowledge required in the EAP classroom. Both the 2012 and 2013 cohorts were so motivated and willing to assist with the needs analysis and in spite of their busy schedules, those in the 2013 cohort also participated in the adjunct. They also assisted with other practical arrangements, such as

providing me with their timetables, informing me about the biochemistry lesson venue, collecting the extensive reading booklets etc.

During the adjunct, our equal roles, as suggested in Table 3 (Alexander et al., 2009) were apparent. In other words, I acted as the facilitator or reading consultant (Belcher, 2009; Dudley-Evans & St John, 1998; 2000) that assisted them to generate better comprehension of the reading they had to do for stereochemistry. In the process, they helped each other (as well as me) to understand some concepts, and we practised pronunciation together. Lee (2013) reports on an experience with team teaching, (cf. 2.5.1.3) where students were noisy or ill-behaved. However, those who participated in my adjunct seemed to be more engaged. One of the reasons for this could be the small sample of students in my study (n=21), compared to those in the other study (n=127) as it is an established fact that large classes struggle with discipline.

A possible shortcoming of the current study is that I did not explicitly ask how students felt about the fact that I was not a content expert, as was done in the study reported by Wu (2009) (cf. 2.6). I only used one of the strategies that the teachers in that study have reportedly used, namely admitting a lack of knowledge. Wu (2009) reported that this strategy did not contribute to the EAP practitioner losing face, as it appears to be the same with students in the current study. This can be inferred by their positive responses regarding the adjunct course (cf. figure 54; table 54; 7.1.1): the lecturer's presentation (cf. Figure 83) as well as their recommendations of the course (cf. Figure 16). All in all, I was encouraged by the regular attendance, the curiosity of others who visited by sitting on the gallery and much encouraged when 2 students who were exempted from doing the course also attended and indicated to have learnt so much from it. The feedback from the evaluation questionnaires that were elaborated on in the previous section confirmed what many had told me while the course was being taught. They had learnt from it and they did not feel that it was another generic ULEA course, but one that made their content learning seem easier - the ultimate aim of such courses.

Investigation of target discourse

In spite of the element that I was able to attend the lessons and students' assistance, I felt that I needed to understand the content as well as possible; therefore, I concur with others that it is not sufficient to adopt the role as interested student (Hutchinson & Waters, 1987;2009), but that while specialist knowledge is not required, some understanding of the key concepts is essential (Belcher, 2009; Dudley-Evans & St John, 1998;2000; Strevens, 1988). I felt that I was unable to get an understanding of their perceived reading needs without understanding the content and that reading needs involved much more than simply understanding the vocabulary. As elaborated in section 5.2.3, the more I read the texts, the more I understood the content and the more reading needs I could identify. I also needed a thorough understanding of content in order to develop MINUS and FLOW activities to match the course aims. So before each lesson in the adjunct, I had read the notes and textbook sections several times, attended the stereochemistry lessons with the students and even watched some YouTube clips. I relied on students mainly for discussions in class about content-related topics. However, I even found that students asked me to explain some concepts to them, suggesting that they may have sometimes been confused about my role. A similar finding was observed by Lee (2013) who reported that students were confused about the roles of the EAP and content lecturers.

All in all, my general observation is that it is not necessary to have content knowledge to design EAP courses, even very specific ones, like the adjunct, as was the case in the current study. For me, having had little knowledge of the target subject was not the "single, most daunting aspect of ESP teaching" as observed by Belcher (2009, p. 11), but one that could be easily overcome with target discourse analysis, student assistance and limited cooperation from content experts.

Implications for the future

The fact that this study was undertaken as action research with the aim of improving practices at the LC at UNAM for the mutual benefit of the students as well as my own practice at the LC, implies that the implications of this study for future course development at the LC as well as services offered to current and future students must also be reflected on. This is mainly because like all action research studies, the process of the

development of these two reading courses (intensive as well as intensive) is not yet completed. In addition, the study has implications for the actual design of reading courses, not only offered at the LC but also in all EAP contexts.

Step 16: Share insights with colleagues

As elaborated on in section 4.3.2, sharing insights with colleagues has a "multiplier effect" (Grabe & Stoller, 2011, p. 190). This means that not only does the action researcher achieve a sense of self- improvement and is able to make meaningful changes, but the sharing of experiences with colleagues implies that increasing numbers of students can become beneficiaries of the research through the enhanced teaching and learning in multiple classrooms and in multiple instructional contexts. Dörnyei and Taguchi (2010) argue that this will also prepare the ground for future surveys. This stage, which is not necessarily the final stage, is still to be carried out. In other words, even though my colleagues at the LC are aware of the study, I have not yet presented the findings of the study. to them. This is one of the tasks still to be done after the writing up of the thesis has been completed. I will also make recommendations on how the adjunct reading course that was developed could be implemented and integrated in the current ULEA course offered to students at the School of Medicine. More details regarding this are provided in section 8.6

As far as the School of Medicine is concerned, it should be mentioned that in spite of 2 e-mails already sent to the biochemistry lecturer at the School of Medicine to set up a meeting to discuss the results of the study, no reply has to date been received. It would be of particular importance to alert that department of the possible mismatch between their perceived student challenges and that of the students (cf. table 35).

Step 17: Share insights with the wider academic community

Results will also be disseminated by means of presenting papers at conferences and publishing these papers.

7.4 Conclusion to Chapter 7

This chapter has dealt with the last two stages of the current study, as outlined in Table 2, namely Steps 5 and 6. Step 5 dealt with the evaluation of the intensive, as well as extensive, components of the new reading course in order to answer research question 9. In Step 6 research question 10 was addressed and the researcher reflected on the development of the course, especially with regards to the experiences of an EAP instructor who is not a content expert, one of the challenges of being an EAP practitioner.

CHAPTER 8

DEVELOPING A METHODOLOGICAL MODEL FOR DESIGNING A READING COURSE

One of the core objectives of this study was to develop mixed-methods, action research **methodological model** for the design of academic reading courses for specific subject fields. Subsequently, a reading course based on this methodological model was developed and evaluated.

In order to do this, a thorough literature review into three key areas, namely ESAP course design, academic reading course development as well as conducting action research using mixed methods research, was carried out. In the process, three main prototypes, Hutchinson and Waters (1987; 2009)'s framework for establishing learning needs, Grabe and Stoller's (2011) generic reading framework for conducting action research with the focus on academic reading and Onwuegbuzie and Dickinson's (2007) 10 step PMARS Process (2007) for mixed methods action research were considered and surveyed.

By combining relevant elements from these models, but also by addressing certain perceived lacks in the above mentioned prototypes, the result was the development of a generic 17-step model to design academic reading courses for specific fields using mixed methods action research. I named the model **Mixed Methods Academic Action Reading Research** (or MMAARR). The model was then subsequently used to design the ESAP reading course for first-year university students at UNAM doing Biochemistry that the current study reports on (cf. table 33).

With reference to ESAP course design, Hutchinson and Waters (1987; 2009)'s framework for establishing learning needs (cf. table 5) was considered. This framework for needs analysis can be applied to any EAP setting and has since its development been used in various EAP needs analysis procedures and adapted according to the desired context (e.g. Fouché, 2009; Sanmugam, 2013).

Next, Grabe and Stoller's (2011) generic reading framework for conducting action research with the focus on academic reading (cf. 4.3) was considered. It is referred to as a "multiple-technique, mixed-model approach" (Grabe & Stoller, 2011, p. 174) as it combines elements of mixed methods action research to develop reading courses. It is important to note that Grabe and Stoller (2011) advise that the 12 steps in their approach are interrelated, with considerable overlap between them, and that they can be adapted as required. This was kept in mind when I developed a model suitable for this study.

Furthermore, because the current study employed a mixed methods methodology combined with action research, Onwuegbuzie and Dickinson's 10 step PMARS Process (2007) for mixed methods action research combined with active participation from stakeholders (PARS) (cf. 4.3.2) was considered in developing and shaping MMAARR.

The MMAARR as developed by me consisted of various steps from the three relevant prototypes referred to above. These are as follows:

First the issue or problem to investigate should be identified (Grabe & Stoller, 2011; Hutchinson & Waters, 1987; Onwuegbuzie & Dickinson, 2007) followed by the establishment of collaboration with key stakeholders (Onwuegbuzie & Dickinson, 2007). Thereafter, it is important to understand the context and to review the relevant literature (Onwuegbuzie & Dickinson, 2007). After the focus of enquiry (Grabe & Stoller, 2011) is established, it is possible to formulate research questions and/or hypothesis (Onwuegbuzie & Dickinson, 2007). Another important step is to develop a collaborative research plan of action (Onwuegbuzie & Dickinson, 2007) and to, simultaneously, anticipate time and outcomes (Grabe & Stoller, 2011). One also has to specify the type(s) of data to collect in an ethical manner (Grabe & Stoller, 2011) before the data could be collected systematically (Onwuegbuzie & Dickinson, 2007). Next the data has to be examined and analysed (Grabe & Stoller, 2011; Onwuegbuzie & Dickinson, 2007). In addition, the target situation and the learning situation (Hutchinson & Waters, 1987) need to be analysed. Once results are obtained, it is crucial to reflect on them (Grabe & Stoller, 2011). Thereafter these can be interpreted (Onwuegbuzie & Dickinson, 2007) in order to design data-driven action/intervention (Onwuegbuzie & Dickinson, 2007) and to generate practical solutions (Grabe & Stoller, 2011). It is also important to write the

syllabus; write materials and then to teach materials (Hutchinson & Waters, 1987). An important element is to evaluate the action/ intervention (Onwuegbuzie & Dickinson, 2007) and to experiment with and to monitor solutions (Grabe & Stoller, 2011). Learner achievement is crucial (Hutchinson & Waters, 1987) as well as sharing insights with others (Grabe & Stoller, 2011).

From these steps, a model to conduct the current study was developed by combining relevant elements from each of these three models, but also by adding some perceived lacks, such as the development and piloting of data collection tools as well as sharing the research results with the wider research community. It resulted in the development of a 17-step model, namely MMAARR (Mixed Methods Academic Action Reading Research). It comprised of the following 17 steps:

1. Identify issue to investigate;
2. Obtain ethical clearance;
3. Form collaboration with key stakeholders;
4. Review the relevant literature;
5. Formulate research questions and or hypotheses;
6. Specify the type(s) of data to collect;
7. Develop data collection tools;
8. Pilot data collection tools;
9. Analyse and evaluate target and learning situations;
10. Narrow the focus of enquiry;
11. Design strategies for data-driven action based on criteria identified;
12. Implement data-driven action;
13. Evaluate the course;
14. Monitor the course;
15. Reflect on insights;
16. Share insights with colleagues
17. Share insights with wider research community

It should be noted that even though these steps are represented in a linear fashion in figure 11 (page 279), an "emergent design" (Leedy & Ormrod, 2013, p. 260) and not a fixed one was followed, as most of the steps in the action research cycle were carried out in a recursive fashion (Creswell & Plano Clark, 2011).

As a second aim of the current research (cf. 1.5) was to develop a very specific EAP reading course, I decided to also consider the principles of CBI adjunct course development as suggested by Brinton et al. (1989) (cf. 2.4), as well as suggestions for the development of adjunct courses by Andrade & Makaafi, 2001; Arendale, 2002; Brinton et al., 1989; Evans Commander & Smith, 1995 (cf. 2.5). Based on the 17 steps suggested in the generic MMAARR model, the current research was conducted in six phases, namely exploration, needs analysis, setting criteria for developing the new reading course, developing the reading programme, evaluating the reading programme and reflection (cf. table 32 page 246).

In summary, not only was a purpose-made model, based on theoretical insights, as highlighted in chapters 2, 3 and 4, developed for the current study, but it was also applied in the design of a reading course and after the course was presented, evaluated. In doing this, I illustrated the reality that applied linguistics is first and foremost a linguistics of design, (Weideman, 2013).

In the final chapter a general overview of the study and its findings are provided. It also defines the significance and the limitations of the study and concludes with possible suggestions to improve course design practices in general, but at UNAM in particular. Suggestions for further research are also provided.

CHAPTER 9
CONCLUSION

9.0 Introduction

As stated in the introduction to this thesis, (cf. 1.2, 1.3 and 1.4), the rationale for the present study was to improve current practices of AL instruction at the LC where the researcher had been lecturing for the past 15 years. The two major problematic aspects of the courses currently offered by the LC at UNAM are firstly that the content of all courses and that of ULEA in particular, is based on the intuition of lecturers, resulting in unplanned or "ad hoc" course designs (Hutchinson & Waters, 1987; 2009, p. 94). Furthermore, the content of the present LC courses, ULEA in particular, is the same for all students from all faculties. Hence General Academic Literacy skills or EGAP courses are taught. This, in spite of official recommendations for ESAP courses at the LC by Bennet (2013) and The Centre for Quality Assurance and Management (2013) (cf. 1.2).

The lack in EAP/ ESP instruction based on sound methodological models at the LC at UNAM is evident from increased complaints about LC courses not equipping UNAM students, who are mainly second language speakers of English (cf. 1.2) with the necessary linguistic support required from their faculties. This, as well as the researcher's internal drive to understand the underlying causes of the problem in order to improve conditions in a desirable way, motivated the researcher to undertake the study. As the researcher is a lecturer at the LC, action research, using a multi-phased mixed-methods research design, was employed to develop a methodological model to be used at academic institutions, such as the LC. The research drew mainly on the insights regarding frameworks for adjunct course development (Evans Commander & Smith, 1995), needs analysis (Hutchinson & Waters, 1987; 2009) and EAP reading course design (Grabe & Stoller, 2011).

As the LC provides AL support to the entire student population, a sample of first-year students from the UNAM School of Medicine became the target audience for an adjunct

reading course. The research resulted in the development of a methodological model which was then used to design an adjunct academic reading course specifically for Biochemistry 1 medical students at UNAM.

Data were collected in six phases over a period of two years through various tools such as questionnaires, tests, interviews, classroom observations, content analysis and journal entries, involving all stakeholders (cf. table 2). The objective was to extend the knowledge gained from this experience to LC course development in general.

In chapter 8 the model that was developed was discussed. This chapter considers the outcomes of the current study by returning to the ten research questions (and sub questions) and one hypothesis that were developed to address the problem of serious reflection on the criteria and strategies for developing EAP courses for specific purposes, especially in the context of academic reading, at the LC at UNAM.

9.1 Research questions and hypothesis

The study posed the following research questions and one hypothesis:

1. In what subject did first-year students from the School of Medicine at UNAM need more assistance?

(a) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by informal interviews with students?

(b) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by questionnaire responses of students?

(c) In what subject did first-year students from the School of Medicine at UNAM need more assistance, as revealed by the 1st semester examination results?

2. In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance?

(a) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance as revealed by the questionnaire responses of students?

(b) In what topic of the target subject did first-year students from the School of Medicine at UNAM need more assistance as revealed by the content lecturer of the target subject?

3. Who are my students and what are their literacy backgrounds, reading habits and attitudes towards reading?

4. What are the academic vocabulary levels of 1st year students from the School of Medicine at UNAM?

5. What are the academic reading needs of students who are enrolled for the target subject?

(a) What are the academic reading needs of students who are enrolled for the target subject according to their own point of view?

(b) What are the academic reading needs of students who are enrolled for the target subject according to the view of their content lecturers in 2012 and 2013?

(c) What are the academic reading needs of students who are enrolled for the target subject according to a reading expert?

6. To what extent does the content of the generic ULEA course cater for the academic reading needs of first-year students from the School of Medicine at UNAM?

7. What are the possible criteria for the design of academic English reading courses for specific purposes?

8. What are the criteria against which such a course may be assessed?

9. How effective was the new reading course?

(a) To what extent did the intensive reading component of the new reading course meet the expectations of students?

(b) To what extent did the extensive reading component of new reading course meet the expectations of students?

(c) Did the students in the intervention group outperform those in the control group in the stereochemistry test that was written at the end of the new reading course?

10. What are the challenges experienced by an EAP course developer who is not a content expert?

Hypothesis 1

From research question 9 (c), the following hypothesis was developed.

Hypothesis 1

H1

After a 10 hour reading intervention programme, there will be a significant difference in the test scores of the intervention group when compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Null Hypothesis:

After a 10 hour reading intervention programme, there will not be a significant difference in the test scores of the intervention group when compared to the control group, as reflected in the results of the stereochemistry test written at the end of the adjunct.

Answers to these were explored by the implementation a methodological model for Mixed Methods Action Academic Reading Research (MMAARR) as described in Table 32. Next, a brief overview of the most important activities and findings of each of the 6 phases are provided.

Phase 1

Phase 1 of the study comprised 8 iterative steps (steps 1-8) and took place over two years between 2012 and 2013. The issue that was identified in Step 1 was to improve LC course design and to develop an adjunct academic reading course based on principles of EAP course design for students from the School of Medicine, who are generally regarded as the choicest and very best of a university student population. The pilot study served as an exploratory phase (cf. 4.2.3; 4.9.1) for the development of the survey tools employed.

In addition, due to the nature of this research, data were already collected during this stage to explore and inform issues relevant to Phases 2 and 3.

Phase 2

Phase 2, the needs analysis, represents the heart of the current study as no previous formal needs analysis has ever been conducted at the LC (cf. 1.9). As per conducting very specific adjunct courses, it was important to narrow the focus of enquiry (Step 9 and also Research questions 1 and 2). Being the lowest scoring subject (65.24%), Biochemistry 1 was determined to become the target course. It was decided not to label it as a "high risk" course as it is commonly done in adjunct courses (Evens Commander & Smith, 1995) as the students actually achieved relatively high scores. The target topic in Biochemistry 1 to pair with the adjunct was determined to be *stereochemistry* (cf. 5.3.2). It was established that students regarded this topic *interesting* (75.1%) but *challenging* (49.6%) at the same time (cf. table 35).

The next part of Phase 2 dealt with the analysis and evaluation of the target and learning situation (Step 10) and also addressed research questions 3, 4, 5 and 6. 90% of the participants were from Namibia with the majority younger than 20. They were from urban areas and indicated a preference to work individually. In addition, contrary to students in the two other Namibian studies that were aimed at high-risk students (Murray, 2013; Willemse, 2005), the majority of students who participated in this study seemed to have had rich literacy experiences with ample access to resources to read for pleasure. It was further evident that the majority of these students were keen, motivated readers who enjoyed reading a variety of genres, but who, due to a lack of time, since being medical students, did not have much time for engaging in pleasure reading activities. This was supported by the results from Nation's vocabulary test. According to these test results, students who wrote the test were familiar with the high frequency words in English, and the majority of participants (82.6%) were in the low-frequency level (cf. 5.3.1), in other words, they had vocabulary levels much higher than required from the average non-native undergraduate to cope successfully at an English speaking university. In fact, according to this interpretation (Nation, 2012b; Nation & Anthony, 2013), the majority knew the required number of word families (9 000) that non-native PhD students would

require to cope successfully at English speaking universities. Another assumption that could be made from their vocabulary levels scores was that they were ready for an intensive reading course based on CBI principles and also for an extensive reading programme that would include content-related material. All this could serve as reasons for their high school leaving symbols, particularly in English, and ultimate acceptance to the UNAM School of Medicine. This could also explain their high scores in biochemistry that prompted me to label this as the "target" and not the "high risk" subject, as previously explained.

It was further determined that the textbook was the main source of information for these students, followed by lecture notes in the form of slides that were e-mailed prior to each lesson. In spite of the fact that these students were high achievers, had rich literacy experiences and high vocabulary level scores, it was interesting to note that only a small number (17.5%) of all respondents reported not to have any real problems with reading for Biochemistry 1 and some (30.2%) even struggled with the grammatical features of their Biochemistry 1 texts. This finding supports the argument that all students, not only those at risk of failing, need AL support and should not be left alone to cope with academic literacy demands that they are ill-prepared for. Student AL needs should not be determined by student deficiencies, rather by the nature and content of courses they attend. In that way, their practical education needs will be met (cf. 1.1.4.1). Due to the collective input from the different stakeholders, the learners, the content lecturer, as well as the reading expert, a summary of the reading strategies required to read stereochemistry texts with comprehension was created to guide the development of the new reading course.

Through addressing research question 6, it was determined that even though respondents seemed to be satisfied with the reading component of the general reading course, none of the carrier content was, in any way, related to *biochemistry*, more specifically, *stereochemistry.* Their wants could be interpreted by their suggestions to improve the content of the generic ULEA course; it seemed to include six prominent topics (cf. table 61). These included the request for more activities, especially group work, as well as reading activities. In addition, they suggested integrating all skills in reading lessons, to make the course and content of reading passages more relevant to their field of study

(medicine) and other courses, and to focus more on the instruction of specific reading strategies. These important findings prompted the development of an adjunct reading course that combined these elements.

Phase 3

Phase 3 dealt with answering research questions 7 and 8. This phase was conducted by extensively reviewing the literature regarding the development of EAP courses with specific reference to reading skill development. Like all other stages, this one was vital, but more so because of the need for self-improvement. Even though I have extensive ELT training, completed an ESP module during studies towards an honours degree and had previously developed a reading course for general English purposes for my master's degree, I felt inadequately prepared to prepare EAP courses confidently. I also knew that in order to make a meaningful contribution to LC course development, I would need theoretical knowledge to inform my actions, thus the need to extensively review the literature on EAP and academic reading course development in order to develop an ESAP adjunct reading course. That would ensure the development on a course that is "research based" (Hyland, 2002, p. 386) one of the characteristics of such courses.

Phase 4

Building on Phases 1 and 2 and making use of insights gained during the review of the literature, specific criteria for the development of intensive, as well as extensive, components of the new adjunct reading course were generated. The material was authentic and specific to the target course, and carrier content was drawn directly from the textbook and the slides/class notes students were required to read (cf. 5.3.2), without simplifying it. This was due to the homogeneity of the students in terms of them taking similar courses, and having similar language levels. The reading strategies that were determined to be essential to comprehending stereochemistry were: text mapping, skimming, scanning, vocabulary, anaphoric references, semantic relations, selecting and

synthesising, academic thought patterns, reading and understanding graphical information, summarising, reading for general comprehension, abbreviations and symbols, visualising information, true/false. For the extensive reading programme, content-related literature in the form of case studies was used. Free online case studies were adapted for the current study (cf. 6.2.1.2)

This comprises Step 11 in the study, after which this new reading course was implemented. 26 Volunteers attended the adjunct reading course during their very few lecture-free lessons.

Phase 5

In this phase, research question 9 was answered to evaluate the effectiveness of the new reading course.

Students seemed to have benefitted from and enjoyed attending the new reading course. Most students regarded the intensive reading component to be '*good*' and '*excellent*', that the reading strategies covered were '*extremely valuable'* and '*valuable*' to understand the required reading for stereochemistry. It was noticeable that the three strategies they indicated to be most useful [diagrammatic presentation (61.9%), understanding diagrams and visual information (66.7%) and selecting and synthesising information from various sources (66.7%)] were reading strategies not instructed in the generic ULEA course. This suggests that the reading section in the generic ULEA course, besides not containing any relevant carrier content, also does not include relevant real content.

Generally students seemed to be satisfied with the course. One student from the former group stated that the '*teaching hours were not too long, I liked that'* and another '*enough to cover the important aspects'* while some students who wanted more stated reasons such as '*more because it was fun and simplified stereochemistry* and '*excellent, wish we had more time'* and '*more time for reading during lessons*'; as one student put it, '*more time on reading please'*. Prior to the adjunct, the majority

preferred to work individually, but afterwards, after attending the new reading course, most students seemed to prefer working in groups (57.1%), with fewer indicating preferences to work in pairs (28.6%) or individually (14.3%). From the results, participants seemed to have enjoyed the activities that were designed, keeping FLOW and MINUS principles; however, they seemed to enjoy the more traditional 'read and answer questions' less. The reading section in the current generic reading section is dominated by these types of questions. Their positivity towards the course in general is reflected in that 90% of all respondents indicated that they would recommend the course to other students. In fact, one student was even recommending that this course should be taught on a Saturday.

Only 10 students returned the extensive reading booklets, having read between 1-10 case studies on average, each. Of all the case studies indicated to have been read, the first and compulsory case study (stereochemistry, having a 77.1 Flesch Reading Ease and being on a 5.2 Flesch-Kincaid grade level) seemed to have been the one that the majority of students also enjoyed reading. Students indicated a number of reasons for enjoying reading some of the case studies, but also as many for not enjoying reading them (cf. table 55). Generally, the extensive reading course seems to have assisted in improving their general English vocabulary, scientific vocabulary, motivation to read for pleasure, as well as understanding of chemistry. However, it seems as if it mostly helped to increase their motivation for reading (cf. 7.1).

Finally, the test results from the stereochemistry test that was written at the end of the adjunct seem to indicate that students who attended at least 60% of all lessons outperformed those in the control group significantly (cf. table 56). This indicates the importance of motivation in attending EAP courses, as elaborated on in the literature review section (Grant & Fischer, 2010; Guthrie et al., 1999; Komiyama, 2013; Macalister, 2011; Richardson et al., 2012; Yu & Xiao, 2013).

Phase 6

In Phase 6, research question 10 was addressed to give an account of the challenges experienced by the researcher, an EAP course developer who is not a biochemistry

content expert. In that section it was explained that three options for support, namely faculty support, the students and investigation of the target discourse were used to overcome the challenge of being unfamiliar with the content. Of all the stakeholders involved, the most difficult to obtain was the support from the Biochemistry Department, possibly because the 2013 lecturer was not involved from the start of the study as the 2012 content lecturer had resigned. That proved to be more difficult than not having much prior knowledge of the subject matter, namely stereochemistry, a challenge that was easily overcome with target discourse analysis, student assistance and cooperation, as well as the limited cooperation from content experts.

In the following sections of this chapter I offer a critical reflection on my study – a necessary part of the process of action research which paves the way for the next cycle.

9.2 Contributions and researcher's reflections.

After identifying a gap in the literature, as well as identifying a real-life concern that is faced (Creswell & Plano Clark, 2011) (cf. 1.1, 1.2 and 1.3), this study aimed to find specific solutions to respond to criticisms against LC course development in a practical way and not just simply implement theoretical ideologies (Arendale, 2002) or follow the default solution to use remedies that had worked elsewhere, without considering local contexts (Weideman, 2013). In the process, the way in which action and research can simultaneously bridge the gap between theory and practice was explored.

The contributions that my research made to stakeholders such as myself, the students and the LC but also to the body of literature, in particular regarding the southern African context were also issues for consideration.

Through a practical, participative and interpretive process the researcher aimed to understand the underlying causes of problems in order to improve conditions in a desirable way. The study therefore contributed in the following major ways to current

knowledge in this field as well as to the personal academic development of the researcher.

9.2.1 Contribution to personal knowledge and experience

Being a language practitioner, I personally benefitted from undertaking this research for various reasons as set out in this section.

Since "social change is more likely to occur as a practical response to specific events rather than the implementation of a well-developed ideology" (Arendale, 2002, p. 6), perhaps the most significant contribution of this study is the conclusion that the inclusive method charted here for the development and evaluation of an EAP academic reading course is practically possible. Having experienced this process of data collection first-hand has been an empowering experience. As an EAP practitioner, I feel empowered because now that I have done what I always knew had to be done at the LC, I have shown that it is possible to develop an EAP course for a specific target group based on their specific academic reading needs. The course evaluation (cf. Stage 5) that was done is something that LC practitioners at UNAM have not yet done, despite recommendations from others (Bennet, 2013; The Centre for Quality Assurance and Management, 2013). Furthermore, as elaborated on in Chapter 7, there is evidence that this course had real benefits for the students. In the process, I have learnt much about EAP course development in general (cf. chapter 2), and now have first-hand knowledge of how EAP courses are different from ELT courses. In addition, I am now able to see the different courses offered at the LC in perspective (cf. Figure 1). I have a better understanding of how students can benefit from courses that are not "ad hoc" (Hutchinson & Waters, 1987; 2009, p. 94) but "research based" (Hyland, 2002, p. 386), grounded on the identification of the specific linguistic needs of target groups. This allowed me to explore the "typicality" (Weideman, 2013, p. 18) of biochemistry in order to develop a very specific EAP course to cater for the students' academic reading needs when reading for stereochemistry, a topic in biochemistry, This undertaking has been the first of this nature (cf. 1.4). While much has been done to develop EAP courses for science students in general, in an exploration of the literature only one study could be found that had been

conducted on the academic reading needs of biochemistry 1 students at the University of Rider in New Jersey (Spiegelberg, 2013) (cf. 3.3.2.2). No previous study on establishing the reading needs for stereochemistry anywhere in the world could be traced, another reason for the significance of this study. In this process, this study has addressed the mistaken view that science instruction is monolithic (cf. 3.3.2.1).

Burns (2009) recommends that action researchers should focus on one aspect that the researcher is interested in and motivated by to explore. Linked to this idea, my previous knowledge about general reading course development has taken on a new dimension (cf. Chapter 3) by developing an intensive as well as an extensive adjunct reading course to assist the participants in the study to cope with the academic reading demands of the target course, in particular the target topic. It was rewarding to learn how students who are generally seen to be high achievers have benefitted from attending this course (cf. Chapter 7). With regards to EAP reading course development, my role as a reading instructor is now so much more pronounced.

9.2.2 Contribution at the institutional level

By conducting a thorough literature review I have developed new insights by combining ideas from fellow researchers and I now understand the possibilities of applying my knowledge to LC course development at UNAM. Consequently, I am hoping that my colleagues will be able to learn from me – not only in terms of EAP course development and reading instruction, but also in conducting action research at the workplace in order to effect meaningful changes. Many of my colleagues seem to be interested in conducting studies elsewhere in Namibia, yet we have unlimited opportunities for research right here at the LC. All in all, I feel that I am now in a position to assume a mentor role for younger colleagues. As it has been mentioned in the introduction (cf.1.2) the research on academic reading at UNAM is limited, but so is research about academic writing, listening, as well as speaking. Therefore, it is further hoped that my experiences will stimulate EAP research and instruction at UNAM LC and in broader educational setups in Namibia and abroad.

In addition, I have aimed to make educators – at UNAM but also elsewhere – aware of the issue that all students, even those enrolled in traditionally difficult courses, such as those in the current study, require AL assistance and should not be ignored. The academic reading requirements and challenges of a specific group of undergraduate students from the School of Medicine, a student population who is often viewed as "different and better than the rest of the institution" (Arendale, 2002, p. 6), were examined by exploring the literacy background, reading habits and reading attitudes of the students in the research group.

I have further provided evidence for arguments by Hyland (2002) and Weideman (2013) that very specific EAP courses increase student motivation by illustrating that even when students are very busy, and have the option not to, like those in the current study, they would still attend EAP courses, if they can perceive the purpose for doing so. In other words, the ability to directly apply skills acquired to increase performance in their content subjects increased their motivation for attending ESAP courses.

In spite of the reality that the target audience could be described as coming from literature rich homes (cf. 5.3), only a small number **(**17.5%) of all respondents reported not to have any real problems with reading for Biochemistry 1. Some (30.2%) even struggled with the grammatical features of their Biochemistry 1 texts. This suggests a need to consider the AL needs of all students, not only those traditionally labelled as high risk, in order to prevent high attrition rates, but also for those who are enrolled for traditionally difficult courses, to improve their learning experience, to inculcate a culture of lifelong reading and to indirectly improve their productive skills (cf. 1.1.3). As suggested previously (cf. 1.1.4), medical students, the subjects of this study, need to have advanced levels of academic reading strategies (Myerson et al., 2000) to keep up with all the information needed to be successful in their careers. They need to read extensively, not only to advance through medical school, but also to meet the requirements of the medical profession once they are qualified. As these students generally do not have much time to read, the adjunct reading course attempted to equip them with the most useful skills in the least amount of time to excel in stereochemistry, a section of the subject they seem to need more assistance in. It is hoped that they would be able to transfer these

skills to the essential reading routine that seems to be part of their medical careers. In other words, this study contributes to the view that all students, irrespective of their admission symbols, require assistance to improve their AL skills, especially in reading (cf. Arendale, 2002 in 1.1.4).

This reading programme still has to be incorporated in the current generic ULEA course and at that stage, further reflection and evaluation will continue.

9.2.3 Contribution to the academic discourse on designing literacy courses

As my knowledge of the development of mixed methods studies research (cf. Chapter 4) has increased, my contribution was to develop the MMAARR methodological model (cf. table 31; figure 8) for developing a specific academic reading course, employing action research and using mixed methods as a research paradigm. To date, EAP research has largely been qualitative and to a lesser extent quantitative, with only a small number of studies combining the strengths of these two approaches in mixed methods research. In my particular context, that of the LC at UNAM, it must be noted that two reports (Bennet, 2013; The Centre for Quality Assurance and Management, 2013) made recommendations to improve course development at the LC at UNAM by using qualitative data only.

In the African context in particular, there has not been much educational research where mixed method research was used. One example of such a study is that of Ukwuoma (2015).

In particular the contribution of this study was to produce a methodological, theoretical model in particular for the design of academic reading courses for specific fields. As detailed in chapter 8 , this was done by conducting an investigation into EAP course design, as well as the characteristics of academic reading and approaches to the teaching and learning of EAP reading, with specific reference to the available literature. Thereafter, a set of criteria against which such a course may be assessed and criteria for

the evaluating the effectiveness of the said reading course were proposed. Insights from Evans Commander and Smith, (1995) regarding adjunct course development (cf. section 2.5.3), the Hutchinson and Waters (1987; 2009) model for needs analysis and Grabe and Stoller's (2011), framework for developing EAP reading courses, using action research, were used to develop this model [see Mixed Methods Action Academic Reading Research (MMAARR), Figure 8], a 17-step model to design a mixed methods action research project to develop the EAP reading for specific purposes course for the current study (cf. table 33). The insights offered here can also be applied to other aspects of academic literacy.

Furthermore, I have contributed to the on-going discussion about the challenges encountered by EAP practitioners that are not content experts. Very little research has been carried in this regard [(Alexander, 2008) cf.1.4] To this effect, this study emphasises the need for EAP instructor training, in particular LC instructor in-service training, in order to conduct action research, to design, implement and evaluate EAP courses, as well as academic reading courses in particular. It also underscores the reality that EAP lecturers cannot conduct ESAP courses in isolation and would require good collaboration with content lecturers and that, contrary to some belief, not all content lecturers are reluctant to assist EAP lecturers to become more effective (cf. 2.5.4).

The relatively high rate of participation of students who have very busy academic schedules could be a reflection of the good relationship that developed between us during the research process and their willingness to assist with the research. For Hutchinson and Waters (1987; 2009), this is the only requirement for developing successful ESAP courses, much more than content knowledge on the part of the EAP practitioner (cf. 2.5.4). A positive observation was that when I admitted to students that I did not have all the answers, it became a collaborative effort to find them. Every time, when I got stuck, there was always someone in class to explain some of the content-related issues. In this way, I never had the need to consult with the content lecturer. However, even though I had the support of students who knew I was not a content expert, I prepared thoroughly, thus demonstrating an important characteristic of academic literacy lecturers.

As suggested, the learners and their content lecturer were considered, but being the researcher and content expert in reading, I also had input in narrowing down the focus by determining what knowledge and reading strategies to include in the new reading course. In addition, it was possible to establish what reading strategies would be needed to read for stereochemistry in their biochemistry course, for their university studies. I felt that the more I read the textbook and the more I attended the lessons, the better my content knowledge became. It was only then that I was able to make a better evaluation of what the reading needs might be. This underscores the importance of trained EAP practitioners.

All the above further highlights the importance of a thorough needs analysis prior to the development of any EAP course (Basturkmen, 2010; Brown, 1995; Hyland, 2006; Hutchinson & Waters, 1987) as the findings illuminated a possible mismatch between content lecturer and learner perceptions about learners' experiences with the course (cf. table 35), similar to an observation made by Evans Commander and Smith (1995) (cf. 2.5.3). For example, the content lecturer did not seem to realise that so many students actually found the topic "*stereochemistry*" interesting, even though they seemed to struggle with it. Also, students appeared to have struggled with many more topics (10) than what the content lecturer mentioned (4), and of these, they only agreed on one topic namely "*stereochemistry*". Also, while students mentioned 6 topics they found interesting, the content lecturer only mentioned 2. Of these, they only agreed upon one topic, namely the *Periodic Table*. All in all, this emphasises the importance of providing feedback to content lecturers.

The needs analysis was not only useful for developing an intensive reading component that were in line with a CBI approach to EAP (cf. 2.4), but also for the extensive reading section. For example, not only could the genre students could be interested in reading about be established (cf. 7.1.2), but it was also concluded that these students were ready to be exposed to an extensive reading programme that would not limit them to graded readers, but to wider reading opportunities, such as content-related reading (cf. table 10).

Another contribution was that by employing pragmatism as a worldview, in particular the use of mixed methods research, a more complete understanding of the research problem was seeked. Even though the use of mixed methods research is on the rise in EAP, it is still lagging behind (17.6%) with qualitative and quantitative research taking more priorities, possibly as it MMR seems to be the most challenging study that can be undertaken (Leedy & Ormrod, 2013) as it requires about twice as much effort, planning resources and time than one method alone would require. (Brynman, 2004; Creswell & Plano Clark, 2011; Morgan, 2014).

9.3 Challenges and difficulties

This study was not conducted without any challenges. A major challenge was the lack of initial assistance from the Biochemistry Department at the main campus (cf. 7.4). In addition, the 2012 content lecturer at the School of Medicine who completed the initial questionnaire resigned and he was unavailable for follow-up questions (cf. 5.2.3.1). Linked to this challenge is the issue that information had to be solicited via e-mail and not during an interview, as was originally intended. So there was no opportunity for clarification of answers (cf. 4.4.4.1).

Another challenge was that ULEA is only offered in one semester at the School of Medicine. This complicated the piloting process, as elaborated on in section 4.8.1.

When I attempted to visually record the first stereochemistry lesson (cf. 4.4.1.2), the battery of the DVD recorder died. In the end, I overcame this by observing the lesson and by writing everything down.

It should be noted that because the content lecturer agreed to provide his input in the lessons, I e-mailed my lessons to him beforehand for comments. Unfortunately he did not have time to provide any feedback. Linked to this is the fact that no content expert input was used in developing the stereochemistry test (cf.7.1), so even though students wrote one, it might not have been typical of a test they would normally write in the biochemistry classroom. The fact that this was an end-of unit test at the end of their text

books, specifically developed to establish content comprehension was regarded as sufficient indication of test reliability.

Because of the preliminary data collected during the informal, qualitative interviews, I expected Anatomy 1 to be the target subject (cf. 4.9.1) but the results did not corroborate this view. This is an aspect that was a setback in time and wasted resources as I had already started with preliminary preparations for developing an ESAP intensive and extensive reading adjunct for students going Anatomy 1. I might have been subjective during these informal class discussions and only heard what I wanted to hear. Alternatively, students who did not struggle with Anatomy 1 might have been either absent or did not participate in class discussions or were not verbal enough. More structured focus group discussions or individual interviews probably would have been more appropriate. I could also have probed deeper and asked about their marks for this course as well as their other courses. Because I am not a content expert, I did not think to ask about what role the memorization of large amounts of information might have played in the perception that the course was more difficult than their other courses. This experience taught me that researcher and participants alike are often subjective in their views of what is considered to be difficult. More reliable data such as tests results should carry more weight. This is an important insight for future course design.

9.4 Limitations

I fully acknowledge that this research only presents an initial step in finding solutions to LC course development at UNAM, since it has been subjected to the following limitations:

Firstly, two qualitative strands were used (QUAL+QUAL) to determine the topic the adjunct would focus on (cf. Phase 2). This could possibly be perceived as a weak option of the convergent parallel mixed methods design that should ideally converge quantitative and qualitative data in order to provide a comprehensive analysis of the research problem (QUAL + QUAN) (Creswell, 2014) and be regarded as a possible shortcoming of the data collection methods of this stage of the study. In retrospect, I

probably could have used the students' responses to design closed questions for the content lecturer to complete or the other way around to have a qualitative strand followed by a qualitative strand.

Secondly, more quantitative strands could have been followed up with qualitative strands such as focus groups or individual interviews. For example, one could have explored the results of the vocabulary levels test in more detail to establish why some students did better than others. Another example could be to have followed up the biochemistry test results to explore if that had made any difference to their overall biochemistry results in semester 2. It also would have been interesting to establish why only a small number of students (11.1%) indicated that they did not read at all. Qualitative detail could have allowed for a richer description of the reasons why so few students in the target group did not read. However, linked to this is a limitation regarding this particular group of students. Being medical students with extremely full timetables, who already attended the adjunct in some of their lecture-free lesson times, students had limited time for interviews and/or focus group discussions.

Within the context of MMR, Creswell and Plano Clark (2011) and Teddlie and Tashakkori, (2009) remind researchers that MMR sample sizes typically include combining two different types of sample sizes: larger quantitative samples and smaller qualitative research samples. This study did not have different numbers for the qualitative and the quantitative strands. A follow- up study should plan ahead and to ensure that the sampling size is consistent with the research goal(s), objective(s) and question(s), data collection tools/instruments. However, one probably needs to take a more flexible approach when combining MMR with action research, a type of research that is emergent. Often researchers would have to gather additional data and they cannot always determine all samples beforehand. Taking this into account, Grabe and Stoller (2011) believe that in spite of the often unpredictable nature of action research, what should remain constant in action research is the careful, regular and systematic collection of data.

In addition, regarding data collection for the target subject (Phase 2), it could be that too much time had lapsed between the collection of data for the first strand (March, 2012) and that of the second (June 2012) and third strands (August 2013). This could indirectly have been responsible for the limited commitment from the biochemistry content lecturers.

Yet another shortcoming concerns piloting. Even though the extensive reading booklet was piloted, neither the booklet nor the questionnaire (6) at the end of the booklet had a section for personal details. This was not picked up during the piloting of the booklet and, thus, made it impossible to trace the students to follow up some of their responses. For example, even though I suspected the reason for the low return rates of the extensive reading booklets was due to their busy schedules, I would have liked to confirm it, similar to what Suk (2015) had done (cf. 3.4.1.7). Linked to this is another shortcoming, namely that the specific reasons why certain case studies were selected for reading could perhaps have been followed up.

At a practical level, the small subject sample, and the issue that the course was developed for one group only, could be perceived by some as a shortcoming as the results have limited ability for generalisation. However, generalisation is not a key factor and the use of inferential statistics not so important. To this end, Koshky (2005) emphasises that big claims of generalisation can only be made with big samples. Consequently, descriptive statistics that do not allow for any general conclusions that would go beyond the sample are appropriate for action research projects (Christ, 2010; Dornkyei & Taguchi, 2010; Larson-Hall). However, this could also be regarded as one of the strengths of this study. This is corroborated by others like Cheng (2011) and Hyland (2002) who are of the opinion that each EAP situation is best examined in its' own context. Through this study, an in-depth understanding of the reading requirements of medical students at UNAM doing biochemistry for a very specific reason, namely to read for stereochemistry was obtained. However, even though participants in this study seemed to have benefitted from attending this specific reading course, the ultimate value lies in that what can be taken from this, namely the process of design, implementation and evaluation to improve LC course design. Since the intent of this study was to evaluate and improve current practices

in EAP course design at the LC at UNAM, EAP instructors or course designers can glean invaluable information and ideas from this report to help in course development, especially with regards to needs analysis procedures that should form the basis of any EAP course.

Although a number of students (60.3%) mentioned critical reading to be an important reading strategy to understand their biochemistry texts better (cf. 5.2.3.1), I could not find any indication of the importance of that in the chapter that I scrutinised. Even though this strategy was not included in the options the 2012 content lecturer could choose from as those that students required and/or needed more assistance with, the content lecturer did not make any reference to it in the spaces provided to add any omissions. Not including this in the content questionnaire is perceived to be a shortcoming of that data collection tool.

Burns (2011) is of the opinion that confidentiality becomes of particular importance in localised situations, such as action research projects, where participant identity may easily be uncovered. To this end, the confidentiality of the participants in the study may have been compromised to a certain extend. Also, another consideration is that, especially in action research studies, the identity of certain participants could easily be inferred, especially as the sample was small.

Another possible shortcoming of the current study is that I did not explicitly ask how students felt about the fact that I was not a content expert, as was done in the study reported by Wu (2009) (cf. 2.6). I only used one of the strategies that the teachers in that study have reportedly used, namely admitting a lack of knowledge. Wu (2009) reported that this strategy did not contribute to the EAP practitioner losing face, as it also appears to be with students in the current study.

Another possible oversight and shortcoming of this study could have been to compare the amount of reading done for their Biochemistry 1 course to their final examination mark to also quantitatively confirm to what extent reading the textbook prepared students for their examination and in that way combined qualitative and quantitative findings for a more conclusive result.

9.5 Future studies

Several suggestions for further studies can be made, especially in context of the current study, namely at the LC at UNAM.

Firstly, in the following action research cycle of this study, in order to learn more about the reading habits of these students, vocabulary levels results could be used to explore the differences between students with the highest and lowest scores. One could also enquire about parental qualifications and levels of income, as these are two factors that are commonly linked to the determination of print impoverished or print rich homes, as well as the academic performance of a student. One could also empirically determine how students feel when instructed by an EAP expert who is not a content expert.

Another suggestion is that one could extend this study to establish the effect of attending an adjunct by comparing the biochemistry examination results of the two groups and focusing on the section(s) in that examination that dealt with Stereochemistry.

In addition, one could ask students to do only the extensive reading component and see if it has any effect on their overall biochemistry results. This would be important to consider on the content of a follow up, extensive reading booklet and also to determine if there was an agreement between their preferred genre when reading for pleasure (from questionnaire 4) and the case studies selected from this selection for the extensive reading programme.

Yet another important suggestion for further research is that this generic MMAARR model could be extended to conduct similar studies with all other faculties at UNAM. This model is not only applicable to academic reading courses, but can be used for an EAP course that includes more or all the language skills. It can also be used for various variations of the prototypes of EAP and CBI course design.

Research opportunities at the LC are endless, so as a final suggestion only in this study, there seems to be a need to explore the relationship between the writing skill and the others, especially the reading skill in order to correctly identify the perceived writing problems of UNAM students (cf.1.1.3).

9.6 Recommendations

Based on the experiences gained from, and results of this study, various recommendations can be made as follows:

Engagement with faculties

- The LC should start engaging seriously with faculties in order to develop tailor-made EAP courses, as highly effective courses cannot be taught in isolation, but should be fully integrated into all faculties at UNAM.
- Tailor-made EAP course could be introduced gradually (cf. table 1), with courses pitched for general academic fields and specific, content-related adjunct courses, as required or as done at one South African institution (Carstens, 2013) (cf. table 4). If adjunct courses cannot be offered in as many academic disciplines as possible, one should offer these for the most difficult courses and also for the most underprepared students;

Timetabling

- The UNAM timetabling committee should be requested to design the generic timetable in such a way that students from similar faculties can attend LC courses at specific times to allow for homogeneity among students to facilitate the optimising of the educational benefits of very specific EAP courses;

Course development

- LC course designers need to consider the use of readability formulas to match texts with readers in the selection of materials for reading;
- The reading course developed in this study could replace the reading section in the current generic ULEA course for students from the School of Medicine (and possibly Biochemistry 1 students other campuses) .
- An instructor's guide could be developed for all specific EAP courses;
- Course designers should keep principles of designing effective EAP materials in mind (cf. table 6).
- Until the time ESAP courses are developed and include relevant carrier content, the reading section in the generic ULEA course, should at least also include:
  - relevant real content.
  - carrier content reflecting an African context.
- LC courses should encourage the development of automaticity (cf. 3.1.2), by fully exploiting texts and deliberately teaching these strategies to become reading strategies.
- Variations of the adjunct prototypes (cf. 2.5.3) could be considered, depending on individual contexts.
- More attention should be paid to the development of local AL textbooks to select from, as there are currently none available, a situation could possibly indicate a gap in the current Namibian produced textbook market.

Course evaluation

- EAP course should continuously be evaluated.

Student evaluations

- In addition to the LC criteria for admission, one could use a test like the Vocabulary Levels Test to establish students' language proficiency, until such time that we develop/adopt a formal test for AL;
- Follow-up programmes should take note of the issue that 30.2% of the respondents indicated that they struggled with grammatical features and did not understand when they read their Biochemistry 1 texts, and should such a problem exist, students should be provided with appropriate training and instruction.
- Learning preferences of students and how they were instructed in their content subject should be considered in classroom teaching methodology

Staff training

- LC instructors should receive in-service training on how to develop EAP courses and conduct action research.

Teaching Methodology

- The culture of students should be established in order to assist instructors to modify instructional methods in the reading classroom as the cultural identity of learners can guide instructors to decide on learning content and also on how the content is presented.
- ULEA classes at the School of Medicine should be made smaller and be instructed in smaller venues as an auditorium does not allow much room for interaction and group work activities.
- More interactive activities, especially group work should be included in the LC courses;
- Activities should be authentic and prepared keeping FLOW and MINUS principles in mind (cf. 3.4.1.3).

Other

- A local EAP workshop to be organised at UNAM.

- An international EAP conference to be organised at UNAM

9.7 Conclusion

Chapter 9 concludes this study. Using a mixed-methods research design, the study explored the possibility to develop an adjunct academic reading course for first-year Medical students doing biochemistry at UNAM (MMARS). Since the development of such a specific AL course had not been done previously at UNAM, and seemingly elsewhere, it was essential to set specific criteria and strategies for developing and evaluating such a course. Constant reflection was needed, not only during the process, but also afterwards.

The study indicated that it is indeed possible to develop tailor-made ESAP courses at the LC, as recommended by others (Bennet, 2013; The Centre for Quality Assurance and Management, 2013), even when the AL lecturer is not a content expert. The current study's successful implementation was mainly as a result of the positive input from the students, and to a lesser extent their content lecturer. However, much of its success can also be ascribed to the motivation of the researcher. Finally, it is also worth noting that by employing a mixed methods study, all efforts were made to reduce subjectivity.

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APPENDIX A

APPROVAL TO CONDUCT STUDY AT UNAM LC

UNIVERSITY OF NAMIBIA

Private Bag 13301, 340 Mandume Ndemufayo Avenue, Pionierspark, Windhoek, Namibia

L Willemse

Lecturer: Language Center

University of Namibia (UNAM)

24 March 2011

The Pro Vice Chancellor: Professor OD Mwandemele

University of Namibia (UNAM)

CC: The Director: Mr M Nakale

Language Centre: University of Namibia (UNAM)

Permission to conduct research at the Language Centre (UNAM) for Phd studies.

Dear Professor Mwandmele,

I am a full time lecturer at UNAM who is on staff development. Currently, I am a registered Phd student at the University of Pretoria. The proposed title of my study is: 'Designing a reading course for specific purposes: criteria, strategies and evaluation'.

My study will be based on a needs analysis which will include questionnaires and interviews with students at the Language Centre, particularly those from the School of Medicine. I will also administer a questionnaire which will be followed up with interviews with some of the staff at the Language Centre and School of Medicine as part of the study.

I am hereby requesting formal permission from the University (UNAM) to carry out this research at the Language Centre.

Yours Sincerely L Willemse

Laetitia Willemse

I Mr Metusalem Nakale hereby give permission for the above research project to be conducted at the Language Centre of the University of Namibia.

Signed: M. Nakale Date: 29. 3. 2011

I Professor OD Mwandemele hereby give permission for the above research project to be conducted at the Language Centre of the University of Namibia.

Signed: Date: 29.03.2011

APPENDIX B

LETTERS OF CONSENT

A. FROM STUDENTS

TO WHOM IT MAY CONCERN

Dear Student,

You are invited to participate in a research study whose details follow below, by completing the attached questionnaire anonymously. Please read this letter carefully and confirm your willingness to participate in the study by filling in your contact details and signing in the spaces provided. These details will be treated as confidential and will only be used to contact you in case some of your responses need to be clarified. Your questionnaire will be coded and no clues to your identity will appear in any publication or presentation from the information collected from you or with the research findings from this study. Please be informed that data collected for this study will be stored for research purposes and that research findings will be published. There are no known or anticipated risks to you as a participant in this study.

RESEARCH TITLE

"Designing an academic reading course for medical students at the University of Namibia - criteria, strategies and evaluation"

RESEARCHER'S DETAILS **Laetitia Willemse**

Lecturer: Language Centre, University of Namibia

Email : lwillemse@unam.na

SUPERVISOR'S DETAILS **Prof. H J Bosman**

Department of Afrikaans

University of Pretoria

Pretoria

0002

Tel : +2712 420 2335

Email : nerina.bosman@up.ac.za

AIM OF THE RESEARCH

I am a PhD student registered at the University of Pretoria. My study focuses on the development of an academic reading component for the English for Academic Purposes

(ULEA) course that is a compulsory module for students from the School of Medicine at the University of Namibia (UNAM).

The aim is for this course to be subject specific, and to be based on an in depth needs analysis.

Permission has been obtained from the relevant authorities at UNAM to carry out this study at the Language Centre where I am currently based.

TASKS IN PARTICIPATION

Your participation in the study will involve:

(i) Completing a questionnaire to assist me to find out more about your reading habits.
(ii) A possible interview for clarification on some of your answers to the questions in the questionnaire.

OTHER DETAILS

- There are no specific financial or material benefits in the participation, but sharing in the experience of the language will be greatly appreciated.
- The interview will be audio-tape-recorded.
- The information you give as well as your identity will remain anonymous and be treated with utmost confidentiality.
- You have the right to withdraw from the study at any point without any repercussions.
- You may contact the researcher at any time should you have any questions.

DECLARATION

Having read through the contents of this consent document and understood their

implication, I……..……..

hereby declare that I will participate in the study.

Signature of researcher: L Willemse

Signature of participant: _____

Signature of parent/guardian: _____

(In case of a minor)

Date: _____

B. FROM COLLEAGUES

TO WHOM IT MAY CONCERN

CONSENT FORM TO COMPLETE A QUESTIONNAIRE

Dear Colleague,

You are invited to participate in a research study whose details follow below, by completing the attached questionnaire anonymously. Please read this letter carefully and confirm your willingness to participate in the study by filling in your contact details and signing in the spaces provided. These details will be treated as confidential and will only be used to contact you in case some of your responses need to be clarified. Your questionnaire will be coded and no clues to your identity will appear in any publication or presentation from the information collected from you or with the research findings from this study. Please be informed that data collected for this study will be stored for research purposes and that research findings will be published. There are no known or anticipated risks to you as a participant in this study.

RESEARCH TITLE

"Designing an academic reading course for medical students at the University of Namibia - criteria, strategies and evaluation"

RESEARCHER'S DETAILS **Laetitia Willemse**

Lecturer: Language Centre, University of Namibia

Email : lwillemse@unam.na

SUPERVISOR'S DETAILS **Prof. H J Bosman**

Department of Afrikaans

University of Pretoria

Pretoria

0002

Tel : +2712 420

Email : Nerina.bosman@up.ac.za

AIM OF THE RESEARCH

I am a PhD student registered at the University of Pretoria. My study focuses on the development of an academic reading component for the English for Academic Purposes (ULEA) course that is a compulsory module for students from the School of Medicine at the University of Namibia (UNAM).

The aim is for this course to be subject specific, and to be based on an in depth needs analysis.

Permission has been obtained from the relevant authorities at UNAM to carry out this study at the Language Centre where I am currently based.

TASKS IN PARTICIPATION

Your participation in the study will involve:

(i) Completing a questionnaire to assist me to find out more about the reading requirements of the content subject that you specialize in.
(ii) A possible interview for clarification on some of your answers to the questions in the questionnaire.

OTHER DETAILS

- There are no specific financial or material benefits in the participation, but sharing in the experience of the language will be greatly appreciated.
- The interview will be audio-tape-recorded.
- The information you give as well as your identity will remain anonymous and be treated with utmost confidentiality.
- You have the right to withdraw from the study at any point without any repercussions.
- You may contact the researcher at any time should you have any questions.

DECLARATION

Having read through the contents of this consent document and understood their

implication,

I……..……..hereby

declare that I will participate in the study.

Signature of researcher: _____

Signature of participant: _____

Signature of parent/guardian: _____

(In case of a minor)

Date: _____

APPENDIX C

Questionnaire 1

ULEA (English for Academic Purposes) reading component evaluation and general

A. Views on the ULEA Reading Component:

1. In general, how would you rate the reading component of the ULEA course:

Excellent	1
Good	2
Average	3
Poor	4

2. **Comment (only if you want to)**

……
……

3. How useful were the reading strategies that were included in the reading component of the course to provide you with the essential skills to read and understand the required reading for your content courses?

Extremely valuable	1
Valuable	2
Of some value	3
Of no value	4

4. **Comment (only if you want to)**

……
……

5. To what extent did the topics that were discussed in the reading component of the course relate to your field of study?

Extremely valuable	1
Valuable	2
Of some value	3
Of no value	4

6. **Comment (only if you want to)**

……
……

7. **How would you rate the number of teaching hours spent on reading in the ULEA course?**

Very satisfied	1
Satisfied	2
Fairly satisfied	3
Not satisfied	4

8. **Comment (only if you want to)**

……
……

9. **How would you rate the lecturer's presentation in the reading course?**

Very satisfied	1
Satisfied	2
Fairly satisfied	3
Not satisfied	4

10. **Comment (only if you want to)**

……
……

11. **What was your preferred way of learning the reading component of the English for academic purposes (ULEA) course?**

In pairs	1
In small groups	2
Individually	3

12. Do you have any suggestions to improve the current reading component of the ULEA course?

……
……

The following set of questions deal specifically with your reading habits now that you have been a UNAM student for almost 1 semester.

13. In your view, which of the following are the most important to excel at as a student in your field?

Reading	1
Writing	2
Listening	3
Speaking	4

14. When last did you read a non-academic book (in other words, reading for pleasure)?

A week ago	1
A month ago	2
A year ago	3
More than a year ago	4
Never	5

15. Approximately how many books (non-academic) did you read this semester?

More than 12	1
Between 9 and 12	2
Between 5 and 9	3
Between 1 and 4	4
None	5

16. If you did not read for pleasure during the semester so far, which of the following statements apply to you?

I don't enjoy reading.	1
I find reading difficult.	2
I don't have the time to read.	3
I cannot find books to read.	4

17. Which of the following subjects did you find the most difficult?

Anatomy	1
Physiology	2
Biochemistry	3

18. Which of the following subject did you find the easiest?

Anatomy	1
Physiology	2
Biochemistry	3

B. Something extra: Your daily activities

19. Please complete the following table to indicate how you spend an average week as a student from the School of Medicine.

Activity	**Number of Hours from a total of 168.**	
Attending lectures		1
Labs/ small groups		2
Reading: Reading class notes		3
Reading handouts		4
Reading required books		5
Reading recommended books		6
Doing assignments		7
Studying		8
Eating/ drinking		9
Washing		10
Commuting		11
Social Activities		12
Other activities		13
Total number of hours:		14

C. General Information

Your Student Number ……

Telephone number ……

E-mail address ……

20. How old are you?

Under 20	1
20-29	2
30-39	3
Older	4

21. What is your sex?

Male	1
Female	2

22. In which region did you complete your secondary school education?

Caprivi Region	1
Erongo Region	2
Hardap Region	3
Karas Region	4
Kavango Region	5
Khomas Region	6
Kunene Region	7
Ohangwena Region	8
Omaheke Region	9
Omusati Region	10
Oshana Region	11
Oshikoto Region	12
Otjozondjupa Region	13
Other	14

23. When did you enrol as a UNAM student for the first time?

This is my 1st year	1
This is my 2nd year	2
This is my 3rd year	3
More than 3 years ago	4

THANK YOU FOR YOUR COOPERATION

APPENDIX D

Questionnaire 2

ULEA Evaluation Questionnaire Section B

A. The following questions relate to your experiences with Biochemistry 1 that you did in the first semester of 2012 as a subject.

1. To what extend did you do the COMPULSORY reading for Biochemistry 1 as indicated by your lecturer.

0% - did not read at all	1
1%-25% of total reading	2
26%-50% of total reading	3
51%-75% of total reading	4
76%-100% of total reading	5

2. When you read for Biochemistry 1, which aspects did you have problems with: Tick as many boxes as you need to.

There were many words that I did not know.	1
There were a lot of grammatical structures that I didn't understand.	2
It was not easy keeping track of the main idea.	3
I had problems understanding graphs, diagrams and tables.	4
I am a slow reader, so reading took a lot of my time.	5
I did not really have any problems with reading for this course.	6

3. Which of the following reading strategies that were covered in the ULEA course did you use to understand Biochemistry 1 texts better:

Anaphoric resolution	1
The different types and functions of semantic relations	2
Skimming	3
Scanning	4
Guessing the meaning of words in context.	5
Distinguishing between fact and opinions.	6
Critical reading	7
None of the above	8

4. **List any topics from the Biochemistry 1 course that you have completed that you found particularly interesting. (As many as you can think of, please).**

_____

_____

5. **List as many topics as you can from the Biochemistry 1 course that you have completed that you think new students would need more help with.**

_____

_____

_____

_____

B. The following questions are about your *general* academic reading habits. In other words, how you read your textbooks and other study materials for ALL your academic courses.

6. **When you are reading your textbooks and course guides for ALL your academic courses, which of the following things do you do *before* reading? Please tick all the options that apply to you:**

I look at how many pages I had to read.	1
I look up all the difficult words in the dictionary.	2
I look at the pictures, headings, subheadings and title to guess what the general idea of the passage is.	3
I check to see that no pages are missing.	4
None of the above, I just start reading.	5

7. **Now, please make a list of things you do *while* you are reading your textbooks and course guides for all your academic courses. Please tick all the options that apply to you:**

I read very slowly so that I don't miss any important parts.	1
I stop to retell the main points to see if I am understanding what has happened so far.	2
I look up all the words that I don't understand in a dictionary.	3
I keep thinking about the title and pictures to help me decide how things relate.	4
I check to see if my predictions are right or wrong.	5

I make a lot of guesses about what is going to happen next.	6
I say every word in my mind to make sure I know all the words.	7

8. Now make a list of all the things you do *after* you have read your textbooks and course guides for all your academic courses. Please tick all the options that apply to you:

I underline the main ideas.	1
I retell the main points in the chapter to check if I understood it.	2
I think about how this information might relate to a specific situation.	3
I look up all the difficult words in the dictionary.	4
I practice reading the chapter aloud.	5
I think about why this information is important.	6

C. General information

9. How old are you?

Under 20	1
20-29	2
30-39	3
Older	4

10. What is your sex?

Male	1
Female	2

11. In which region did you complete your secondary school education?

Caprivi Region	1
Erongo Region	2
Hardap Region	3
Karas Region	4
Kavango Region	5
Khomas Region	6
Kunene Region	7
Ohangwena Region	8
Omaheke Region	9
Omusati Region	10
Oshana Region	11
Oshikoto Region	12
Otjozondjupa Region	13
Other	14

12. When did you enrol as a UNAM student for the first time?

This is my 1st year	1
This is my 2nd year	2
This is my 3rd year	3
More than 3 years ago	4

Student Number: ……..

Telephone number: ……...

E-mail address: …….

THANK YOU VERY MUCH FOR YOUR CONTRIBUTION.

APPENDIX E

Questionnaire 3

Questionnaire for lecturers of Biochemistry 1 at UNAM.

A. Contact Information

UNAM Staff number ……

Faculty ……

Phone number(s) ……

E-mail address ……

Office number ……

B. Background

1. Number of years teaching this specific module?

1-3 years	1
4-6 years	2
More than 6 years	3

2. What are your academic qualifications?

_____

C. Reading requirements of students enrolled for the Biochemistry 1 at UNAM

3. In your opinion, which of the following academic English skills do students of Biochemistry 1 need to improve on:

Listening	1
Speaking	2
Reading	3
Writing	4

4. **How important is reading for the success of students of Biochemistry 1, in general:**

Very important	1
Quite important	2
Not very important	3
Not at all important	4

5. **In your view, which of the following reading strategies are important for students to read well in Biochemistry 1? Please tick all that are appropriate.**

Obtaining general information	1
Understanding ideas or theories	2
Discovering the author's viewpoints	3
Seeking evidence for their own point of view	4
Reading for specific information (scanning)	5
Reading to get the overall main idea (skimming)	6
Read and understand how ideas relate to each other (anaphoric resolution)	7
Reading for main ideas	8
Understanding tables and graphs	9
Distinguishing between fact and opinion	10
Deduce the meaning of unknown words/ terminology in context	11

6. **Anything else, please list.**

_____

_____

7. **To what extent were previous student able to demonstrate the reading strategies listed in the question above? Please indicate the skills that you think they needed more assistance with:**

Obtaining general information	1
Understanding ideas or theories	2
Discovering the author's viewpoints	3
Seeking evidence for their own point of view	4
Reading for specific information (scanning)	5
Reading to get the overall main idea (skimming)	6
Read and understand how ideas relate to each other (anaphoric resolution)	7
Reading for main ideas	8
Understanding tables and graphs	9
Distinguishing between fact and opinion	10
Deduce the meaning of unknown words/ terminology in context	11

8. **Anything else, please list.**

_____

_____

9. **Which of the following texts are students expected to read for their studies in their first-year in Biochemistry 1:**

Journal articles	1
Textbooks	2
Study guides	3
Case studies	4
Reports	5

10. **Anything else, please list.**

_____

11. Please rank the literature students are expected to read in Biochemistry 1 in order of importance (1-5):

Journal articles	
Textbooks	
Study guides	
Case studies	
Reports	

12. How many <u>compulsory</u> textbooks are students expected to read for Biochemistry 1?

0	1
1-2	2
3-4	3
More than 4	4

13. **Please list the titles of these textbook(s).**

_____

_____

14. How many <u>recommended</u> textbooks are students expected to read for Biochemistry 1?

0	1
1-2	2
3-4	3
More than 4	4

15. How many study guides are students expected to read for Biochemistry 1?

0	1
1-2	2
3-4	3
More than 4	4

16. Please list the titles of these study guide(s).

_____

_____

_____

_____

17. How many journal articles are students expected to read for Biochemistry 1?

0	1
1-2	2
3-4	3
4-5	4
More than 5	5

18. If you chose (5) as the answer to the question above, please estimate how many journal articles students are required to read for their 1st semester of studies in Biochemistry 1?

_____

_____

19. To what extent do you use the following teaching methodologies in your classes:

Lecture method	1
Role plays	2
Group work; Discussions	3
Debates	4

20. Anything else, please list.

_____

_____

21. What kind of activities are students mostly required to do <u>during</u> your lessons:

Note taking	1
Presentations	2
Tests	3
Debates	4
Writing summaries	5
Writing assignments	6

22. Anything else, please list.

_____

_____

23. What kind of activities are students mostly required to do <u>after</u> your lessons:

Note taking	1
Presentations	2
Tests	3
Debates	4
Writing summaries	5
Writing assignments	6

24. Anything else, please list.

_____

_____

25. Please list topics or themes in the Biochemistry 1 course that you think students experience as particularly <u>challenging</u>. As many as you can think of, please.

_____

_____

26. Please list topics or themes in the Biochemistry 1 course that you think students experience as particularly interesting. As many as you can think of, please.

_____

_____

_____

27. Should any of your students come to ask you about an interesting novel with a setting that relates in any way to the content of Biochemistry 1, which one(s) would you recommend? Please list as many as you can think of. If at all possible, please indicate titles as well as authors.

_____

28. If at all possible, could you attach a copy of your Biochemistry 1 scheme of work or course outline to this completed questionnaire?

Your help is highly appreciated. Thank you.

APPENDIX F

Questionnaire 4

Questionnaire for ULEA students from the School of Medicine/Pharmacy (Group of 2013).

Student number ……

Telephone number ……

E-mail address ……

A. Literacy background

1. **When you were a child, did your parents (or other family member) ever read stories to you?**

Never	1
Seldom	2
Sometimes	3
Often	4

2. **How many books (approximately) do you have in your home (where you grew up in)?**

About 50	1
About 20	2
About 10	3
None	4

3. **How often is a newspaper bought in your home (where you grew up in)?**

Every day	1
Once a week	2

Occasionally	3
Never	4

4. How often do is a magazine bought in your home?

Once a week	1
Occasionally	2
Once a month	3
Never	4
Regular subscriber	

5. List the magazines that you enjoy reading.

_____

B. Reading attitudes

6. Do you enjoy reading?

Very much	1
Quite a lot	2
A Little	3
Not at all	4

7. Please evaluate your own level of reading proficiency:

Excellent	1
Good	2
Average	3
Poor	4

8. In your view, which of the following are the most important to excel at as a student in your field?

Reading	1
Writing	2
Listening	3
Speaking	4

9. What is your preferred way of spending time when you have absolutely no studies to attend to:

Read a book	1
Watch a movie	2
Visit a friend	3
Go to a party.	4

C. Your reading habits

10. What kind of books do you enjoy reading for pleasure (in your free time)? Tick all the options that apply to you.

Biographies	1
Westerns (cowboy stories)	2
Romance (love stories)	3
Detective stories	4
Plays	5
Science fiction	6
Religious books	7
I don't read for pleasure	8

11. Name the titles of any 2 books that you would recommend to a friend to read.

_____

_____

12. If you don't read for pleasure, which of the following statements apply to you?

I don't enjoy reading.	1
I find reading difficult.	2
I don't have the time to read.	3
I cannot find books to read.	4

13. When last did you read a non-academic book (in other words, reading for pleasure)?

A week ago	1
A month ago	2
A year ago	3
More than a year ago	4
Never	5

14. Approximately how many books (non-academic) did you read per year (before you enrolled as a student at the School of Medicine/Pharmacy)?

More than 12	1
Between 9 and 12	2
Between 5 and 9	3
Between 1 and 4	4
None	5

15. If you did not read for pleasure during the semester so far, which of the following statements apply to you?

I don't enjoy reading.	1
I find reading difficult.	2
I don't have the time to read.	3
I cannot find books to read.	4

D. Views on the ULEA Reading Component:

16. In general, how would you rate the reading component of the ULEA course that you have recently completed:

Excellent	1
Good	2
Average	3
Poor	4

17. How useful were the reading strategies that were included in the reading component of the course to provide you with the essential skills to read and understand the required reading for your content courses (all of them)?

Extremely valuable	1
Valuable	2
Of some value	3
Of no value	4

18. To what extent did the topics that were dealt with in the reading component of the course relate to other courses in your field of study (all of them, in general)? ***(****Smoking; Martin L King; Marx and Lenin political party; Evolution; Potato peelers; Domestic security; Importance of good breakfast; Male/female grades; Reproduction of turtles; Giftedness)*

All the topics appear in one or more of my other courses.	1
An extreme number of topics appear in one or more of my other courses.	2
Quite a number of the topics appear in one or more of my other courses.	3
Some topics appear in one or more of my other courses.	4
None of the topics appear in one or more of my other courses.	5

19. Which of the following reading strategies that were covered in the ULEA course do you use to understand the required reading in your different courses (in general). You may choose as many as you want to:

Vocabulary (guessing the meaning of words in context, pre- suffixes).	1
Anaphoric resolution	2
The different types and functions of semantic relations	3
Skimming	4
Scanning	5
Guessing the meaning of words in context.	6
Distinguishing between fact and opinions.	7
Critical reading	8

20. How would you rate the number of teaching hours spent on reading in the reading section of the ULEA course?

Very satisfied	1
Satisfied	2
Fairly satisfied	3
Not satisfied	4

21. How would you rate the lecturer's presentation in the reading section of the ULEA course?

Very satisfied	1
Satisfied	2
Fairly satisfied	3
Not satisfied	4

22. What was your preferred way of learning the reading component of the English for academic purposes (ULEA) course?

In pairs	1
In small groups	2
Individually	3

23. Do you have any suggestions to improve the current reading component of the ULEA course

---

---

24. How useful were the reading strategies that were included in the reading component of the course to provide you with the essential skills to read and understand the required reading for <u>Biochemistry 1?</u>

Extremely valuable	1
Valuable	2
Of some value	3
Of no value	4

25. To what extent did the topics that were discussed in the reading component of the course relate to Biochemistry 1? (*Smoking; Martin L King; Marx and Lenin political party; Evolution; Potato peelers; Domestic security; Importance of good breakfast; Male/female grades; Reproduction of turtles; Giftedness)*

All the topics appear in the Biochemistry 1 course.	1

An extreme number of topics appear the Biochemistry 1 course.	2
Quite a number of the topics appear in the Biochemistry 1 course.	3
Some topics appear in the Biochemistry 1 course.	4
None of the topics appear in the Biochemistry 1 course.	5

26. When you read for Biochemistry 1, which aspects do you have problems with: Tick as many boxes as you need to.

There are many words that I do not know.	1
There are a lot of grammatical structures that I don't understand.	2
It is not easy keeping track of the main idea.	3
I have problems understanding graphs, diagrams and tables.	4
I am a slow reader, so reading takes too much time.	5
I don't really have any problems with my reading.	6

E. The following set of questions relate to your experiences with <u>Biochemistry 1as</u> a subject.

27. So far, to what extend did you do the COMPULSORY reading for Biochemistry 1:

0% - did not read at all	1
1-25% of total reading	2
26-50% of total reading	3
51-75% of total reading	4
76-100% of total reading	5

28. Which of the following reading strategies that were covered in the ULEA course do you use to understand Biochemistry 1 texts better. You may choose as many as you want to:

Vocabulary (pre- and suffixes)	1
Anaphoric resolution	2
The different types and functions of semantic relations	3
Skimming	4
Scanning	5
Guessing the meaning of words in context.	6
Distinguishing between fact and opinions.	7
Critical reading	8

F. General Information

29. How old are you?

Under 20	1
20-29	2
30-39	3
Older	4

30. What is your sex?

Male	1
Female	2

31. When did you enrol as a UNAM student for the first time?

This is my 1st year	1
This is my 2nd year	2
This is my 3rd year	3
More than 3 years ago	4

32. In which region did you complete your secondary school education?

Caprivi Region	1
Erongo Region	2
Hardap Region	3
Karas Region	4
Kavango Region	5
Khomas Region	6
Kunene Region	7
Ohangwena Region	8
Omaheke Region	9
Omusati Region	10
Oshana Region	11
Oshikoto Region	12
Otjozondjupa Region	13
Other	14

Thank you for your cooperation.

APPENDIX G

Questionnaire 5

Questionnaire for English for Biochemistry/ Stereochemistry students from the School of Medicine/Pharmacy (Group of 2013).

Student number ……

Telephone number …….

E-mail address ……

A. Views on the new reading course (English for Biochemistry/ Stereochemistry):

1. In general, how would you rate the reading component of the English for Biochemistry/ Stereochemistry that you have recently completed:

Excellent	1
Good	2
Average	3
Poor	4

2. How useful were the reading strategies that were included in the reading component of the course to provide you with the essential skills to read and understand the required reading for the section on Stereochemistry in your Biochemistry text book?

Extremely valuable	1
Valuable	2
Of some value	3
Of no value	4

3. **To what extent did the topics that were dealt with in the reading component of the course relate to the section on Stereochemistry in your Biochemistry course?**

All the topics appear in the lessons on Stereochemistry.	1
An extreme number of topics appear in in the lessons on Stereochemistry.	2
Quite a number of the topics appear in the lessons on Stereochemistry.	3
Some topics appear in the lessons on Stereochemistry.	4
None of the topics appear in the lessons on Stereochemistry.	5

4. **Which of the following reading strategies that were covered in the English for Biochemistry/ Stereochemistry do you use to understand the required reading in your** lessons and readings on **Stereochemistry. You may choose as many as you want to:**

Vocabulary (pre- and suffixes).	1
Anaphoric resolution	2
The different types and functions of semantic relations/ Academic thought patterns	3
Skimming	4
Scanning	5
Guessing the meaning of words in context	6
Distinguishing between fact and opinions	7
Diagrammatic representation	8
Understanding diagrams/ visual information	9

5. **How would you rate the number of teaching hours spent on reading in the reading section of the English for Biochemistry/ Stereochemistry?**

Very satisfied	1
Satisfied	2
Fairly satisfied	3
Not satisfied	4

Please comment

_____
_____
_____

6. **How would you rate the lecturer's presentation in the reading section of the English for Biochemistry/ Stereochemistry?**

Very satisfied	1
Satisfied	2
Fairly satisfied	3
Not satisfied	4

7. **What was your preferred way of learning the reading component of the English for academic purposes (ULEA) course?**

In pairs	1
In small groups	2
Individually	3

8. **Do you have any suggestions to improve the current reading component of the English for Biochemistry/ Stereochemistry**

---

9. **How useful were the reading strategies that were included in the reading component of the course to provide you with the essential skills to read and understand the required reading for <u>Biochemistry 1?</u>**

Extremely valuable	1
Valuable	2
Of some value	3
Of no value	4

10. To what extend did you enjoy the following activities that were included in the English for Biochemistry/ Stereochemistry course:

Word searches

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

Unscrambling Scrambled words

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

Unscrambling Scrambled paragraphs

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

Jigsaw puzzle

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

Gap fill activities

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

Read and answer questions

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

Matching key vocabulary with their meanings

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

Diagrammatic representation

Extremely enjoyable	1
Quite a bit	2
It was okay	3
Not at all	4

11. Would you recommend this course to other students?

Yes	1
Maybe	2
No	3

Any other comments?

_____
_____
_____
_____
_____

B. General Information

12. How old are you?

Under 20	1
20-29	2
30-39	3
Older	4

13. Are you also attending the ULEA classes?

Yes	1
No	2

14. What is your sex?

Male	1
Female	2

15. When did you enrol as a UNAM student for the first time?

This is my 1st year	1

This is my 2nd year	2
This is my 3rd year	3
More than 3 years ago	4

16. In which region did you complete your secondary school education?

Caprivi Region	1
Erongo Region	2
Hardap Region	3
Karas Region	4
Kavango Region	5
Khomas Region	6
Kunene Region	7
Ohangwena Region	8
Omaheke Region	9
Omusati Region	10
Oshana Region	11
Oshikoto Region	12
Otjozondjupa Region	13
Other	14

Thank you for your cooperation.

APPENDIX H

Questionnaire 6

Extensive reading questionnaire:

i. How many case studies have you read?_____

ii. Please indicate their titles by ticking the boxes below:

Unit 1 An Adventure in Stereochemistry	
Unit 2 Sweet Truth: Not all carbohydrates are alike	
Unit 3 Thiamine deficiency	
Unit 4 The Chemistry of Cocaine	
Unit 5 Bilirubin	
Unit 6 Artificial Sanity	
Unit 7 Prayer study: Science or not?	
Unit 8 A simple plan	
Unit 9 Murder by HIV?	
Unit 10 Love potion	
Unit 11 The Tired Swimmer	
Unit 12 Giving Birth to Someone Else's Children?	
Unit 13 Colon Cancer	
Unit 14 A Rose By Any Other Name	
Unit 15 Mystery in Alaska: Why Have All the Sea Lions Gone?	
Unit 16 Cooking under pressure	
Unit 17 A Cool Glass of Water	
Unit 18 Dust to Dust	
Unit 19 Those Old Kentucky Blues	
Unit 20 Facing the Pain	

iii. Which story/ case study did you:

- enjoy reading the most?_____
  Why?

  _____

  _____
- enjoy reading the least?_____
- Why?

  _____

  _____

iv. To what extend would you say did reading these case studies/ units help to improve your:

General English vocabulary?

None	
A Little	
Some	
Substantially	

Scientific vocabulary?

None	
A Little	
Some	
Substantially	

Motivation to read for pleasure?

None	
A Little	
Some	
Substantially	

Understanding of chemistry?

None	
A Little	
Some	
Substantially	

APPENDIX I

Vocabulary levels test

Vocabulary Size Test[1]

Circle the letter a-d with the closest meaning to the key word in the question.

1. SEE: They **saw** it.
   a. cut
   b. waited for
   c. looked at
   d. started

2. TIME: They have a lot of **time**.
   a. money
   b. food
   c. hours
   d. friends

3. PERIOD: It was a difficult **period**.
   a. question
   b. time
   c. thing to do
   d. book

4. FIGURE: Is this the right **figure**?
   a. answer
   b. place
   c. time
   d. number

5. POOR: We are **poor**.
   a. have no money
   b. feel happy
   c. are very interested
   d. do not like to work hard

6. DRIVE: He **drives** fast.
   a. swims
   b. learns
   c. throws balls
   d. uses a car

7. JUMP: She tried to **jump**.
   a. lie on top of the water
   b. get off the ground suddenly
   c. stop the car at the edge of the road
   d. move very fast

8. SHOE: Where is your **shoe**?
   a. the person who looks after you
   b. the thing you keep your money in
   c. the thing you use for writing
   d. the thing you wear on your foot

9. STANDARD: Her **standards** are very high.
   a. the bits at the back under her shoes
   b. the marks she gets in school
   c. the money she asks for
   d. the levels she reaches in everything

10. BASIS: This was used as the **basis**.
    a. answer
    b. place to take a rest
    c. next step
    d. main part

[1] The test is created by Paul Nation, Victoria University of Wellington, and found at http://www.lextutor.ca/. This test is freely available and can be used by teachers and researchers for a variety of purposes.

Second 1000

1. MAINTAIN: Can they **maintain** it?
   a. keep it as it is
   b. make it larger
   c. get a better one than it
   d. get it

2. STONE: He sat on a **stone**.
   a. hard thing
   b. kind of chair
   c. soft thing on the floor
   d. part of a tree

3. UPSET: I am **upset**.
   a. tired
   b. famous
   c. rich
   d. unhappy

4. DRAWER: The **drawer** was empty.
   a. sliding box
   b. place where cars are kept
   c. cupboard to keep things cold
   d. animal house

5. PATIENCE: He has no **patience**.
   a. will not wait happily
   b. has no free time
   c. has no faith
   d. does not know what is fair

6. NIL: His mark for that question was **nil**.
   a. very bad
   b. nothing
   c. very good
   d. in the middle

7. PUB: They went to the **pub**.
   a. place where people drink and talk
   b. place that looks after money
   c. large building with many shops
   d. building for swimming

8. CIRCLE: Make a **circle**.
   a. rough picture
   b. space with nothing in it
   c. round shape
   d. large hole

9. MICROPONE: Please use the **microphone**.
   a. machine for making food hot
   b. machine that makes sounds louder
   c. machine that makes things look bigger
   d. small telephone that can be carried around

10. PRO: He's a **pro**.
    a. someone who is employed to find out important secrets
    b. a stupid person
    c. someone who writes for a newspaper
    d. someone who is paid for playing sport etc

APPENDIX J

Biochemistry 1 test:

Stereochemistry

May 2013

Please indicate the following before doing the test:

Were you part of the experimental reading group? (Even if you did not attend all of the sessions)

Yes ☐ No ☐ No

Are the following statements True or False? Please indicate your answer by circling your answer.

1. This cis and trans stereoisomers of 2- butane are achiral. T / F
2. The carbon of an aldehyde, ketone, carboxylic acid, or ester cannot be a stereocentre.

   T / F
3. Stereoisomers have the same connectivity of their atoms. T / F
4. Constitutional isomers have the same connectivity of their atoms. T / F
5. An unmarked cube is achiral. T / F
6. A human foot is chiral. T /
7. The most common cause of chirality in organic molecules is the presence of a tetrahedral carbon atom with four different groups bonded to it.

   T / F
8. If a molecule is not superposable on its mirror image, the molecule is chiral.

   T / F
9. 2-butanol as well as 2-propanol is chiral. T / F
10. CH3CH2OH has asymmetric carbons. T / F
11. For a molecule with three stereocentres, $3^2 = 9$ stereoisomers are possible. T / F
12. Enantiomers, like gloves, occur in pairs. T / F

13. 2- Pentanol and 3- Pentanol are both chiral and show enantiomerism. T / F

14. Diastereomers are stereoisomers that are not mirror images. T / F

15. We use the R,S system to specify the configuration of a stereocentre. If reading the groups proceeds in a counterclockwise position, it is designated as R. If reading the groups proceeds in a clockwise position, it is designated as S. T / F

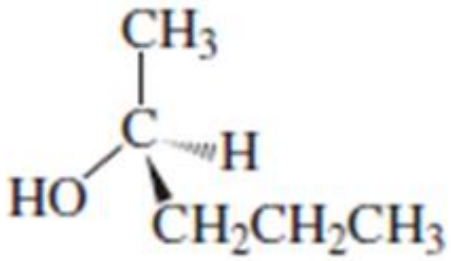
16. All stereoisomers are optically active. T / F

17. Plane- polarized light consists of light waves vibrating in parallel planes. T / F

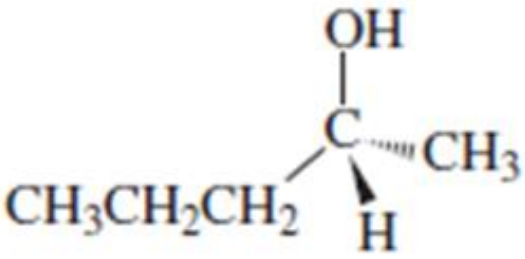
18. The 2 compounds in **a** are enantiomers of one another. T /

19. The 2 compounds in **b** are enantiomers of one another. T /

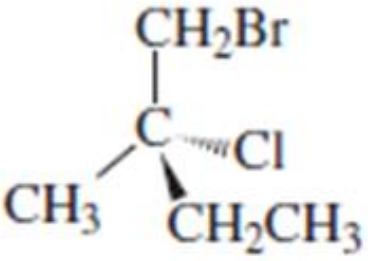
a.



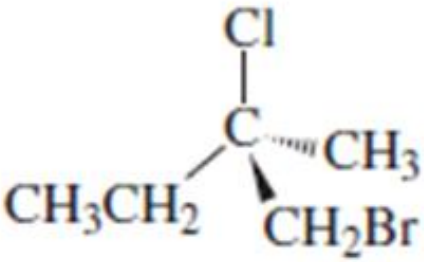
and



b.



and



Total:_____/20

APPENDIX K

Intensive reading booklet

(on CD)

APPENDIX L

Approval to use online case studies and Extensive reading booklet

(on CD)