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A LEARNING MANAGEMENT SYSTEM BASED FRAMEWORK FOR HIGHER EDUCATION QUALITY PROGRAMME REVIEW

by

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Study leader:

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26 June 2020

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A journey of a thousand miles must begin with a single step (Lao Tzu)

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(3 February 1944 – 25 May 2017)

She was a South African pioneer in the field of remedial teaching with a focus on learning and spelling needs. Her compassion for special education ignited my academic interests, which lead to my professional career. Her unconditional love for me, and trust in my ability to complete this thesis, as well as our shared passion for education and psychology, will continue to keep us connected.

SOLI DEO GLORIA

PREFACE

MAIN STRUCTURE OF THIS THESIS

The thesis is divided into two parts. Part I is an overview of the study and provides in Chapter 1 the introduction and background to the study and outlines the research design and methodology for this study in Chapter 2.
Part II deals with the development of the LMS based framework for quality programme review in higher education (Chapters 3-9).

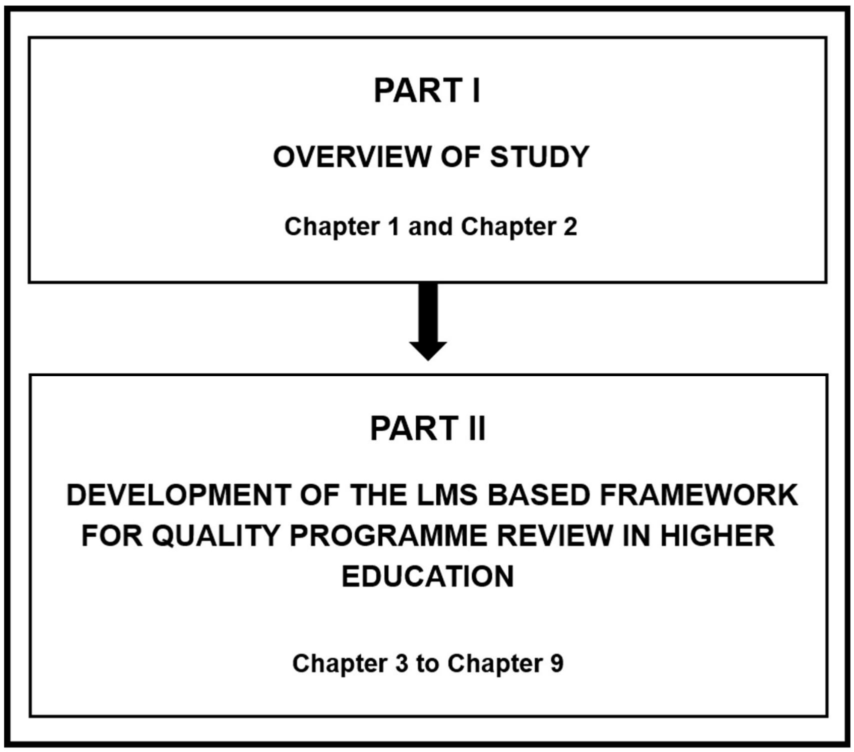

Figure 1: Thesis Structure

PUBLICATIONS AND CONFERENCE PRESENTATIONS

The following peer-reviewed publications emanated from this study:

- Chapter 6: A. Botha, C. De Villiers (2017). From Accreditation compliance to improving reporting on learning outcomes: The use of an LMS, Seville, Spain. ICERI2017 Proceedings, pp. 4707-4714.
- E. Muller, A. Botha (2017). Moving towards hybrid teaching in alignment with accreditation requirements: Curriculum review of Professional Orientation in the ENGAGE programme. CSET ODL Conference, 14-15 September 2017, Book of Abstracts, Pretoria.
- Chapter 5: A. Botha, H. Smuts, C. de Villiers (2018). Applying Diffusion of Innovations Theory to Learning Management Feature Implementation in Higher Education: Lessons Learned. Third International Symposium, SETE 2018, Held in Conjunction with ICWL 2018, Chiang Mai, Thailand, August 22–24, 2018, Revised Selected Papers. Lecture notes in the book: Emerging Technologies for Education
© Springer Nature Switzerland AG 2018. T. Hao et al. (Eds.): SETE, 2018, LNCS 11284, pp. 1–10, 2018. https://doi.org/10.1007/978-3-030-03580-8_7 (Presentation)

Conference presentations (June 2019):

- A. Botha, R. Newberry, C. de Villiers (2019). Assessment Is Global: Developing a Program Effectiveness Model for South Africa. AALHE2019 (Association for the Assessment of Learning in Higher Education) – Ninth Annual Assessment Conference. St Paul, Minnesota.
- A. Botha, B. Zulch (2019). A South African Construction Economics Department evolved into a blueprint for quality programme assessment through its leadership and collaboration. AALHE2019 (Association for the Assessment of Learning in Higher Education) – Ninth Annual Assessment Conference. St Paul, Minnesota.

An international interview resulted from this study:

- A.Botha, D. Jordaan, D. Scheepers (2018). University of Pretoria: Educational Technology opens the door to Organisational Change. Blackboard Global Openness Initiative. E-Learn Magazine. https://blog.blackboard.com/university-of-pretoria-educational-technology-opens-door-to-organizational-change/

A book chapter emanated from this study – to be published in January 2021:

- Invitation as co-author with Dr Ruth Newberry (Principle Education Consultant, Blackboard International) and Dr Robin Robinson (Framingham University, USA) for a book-chapter contribution: Proposed co-edited book, tentatively titled *Using Context-based Technology-enabled Assessment,* to be published by Stylus Publishing, LLC in summer 2020. Authors: Peggy Maki, Editor and Education Consultant Specializing in Assessing Student Learning, and Peter Shea, Instructional Designer, Emerging Learning Technologies Geek, and Open Education Advocate. The chapter titled: Enabling a solution for assessment and technology, is included under the section that addresses adoption and integration of learning technologies across the institution.

PROJECTS AND CONSULTING SERVICES

The following projects and consulting services emanated from the study:

- Deputy Vice-Chancellor's Office: A. Botha. Presentation: Aligning University of Pretoria Graduate Attributes with Programme Exit Level Outcomes utilising the Blackboard (Learning Management System) Goals Area. March 2019.
- Cape Peninsula University of Technology (CPUT): Presentation: A. Botha. Three-day workshop (May 2019): Implementing the Blackboard Goals Area as an institutional teaching and learning initiative.
- Design, develop and deliver a short course for the Department of Construction Economics, to be offered through Enterprises, University of Pretoria: *Programme review and assessment cycle utilising technology: Alignment, implementation and reporting on programme outcomes*. November 2019.

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ABSTRACT

Grounded in the Design Science Research Approach in Information Systems, the goal of this research project was to conceptualise, design, and develop, an innovative framework for Programme Alignment, Implementation, and Reporting (PAIR)[1] in order to facilitate student success at a South African higher education institution (University ABC)[2]. For this study, the researcher applied PAIR to two academic departments at University ABC. Construction of the framework was interpretively considered and informed by the Diffusion of Innovations Theory of Everett Rogers (1995). The Blackboard Learn® Goals Area (BbGA), a feature embedded in the official Learning Management System (LMS) of University ABC, was incorporated into PAIR as it afforded the two departments mentioned above the opportunity to provide proof of evidence that programme outcomes were constructively aligned with course content, course assessment, student digital activities, the tracking of students' performance, and the monitoring of students' progress. It was argued that PAIR could also provide a basis for professional programme outcomes in the departments mentioned above when aligned to their respective Professional Boards' accreditation criteria requirements.

It was found that, within a decentralised higher education institution (such as University ABC) where an annual quality review of programme and module outcomes alignment and reporting in departments is not compulsory, that PAIR could facilitate such a process as part of a faculty's and a department's teaching goals.

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[1] For the purpose of this study, conducted during 2015 - 2019, the acronym PAIR was proposed and used.

[2] University ABC refers to the University of Pretoria, South Africa.

It was also concluded that PAIR could afford South African higher education institutions in general the opportunity to contextualise outcomes coverage and achievement reporting to improve programme quality and to inform intervention strategies to advance effective student learning and student success.

Keywords: Accreditation, Assurance of Learning, Constructive Alignment Learning, Design Science Research, Diffusion of Innovations, Effective Student Learning, Framework development, Management System, PAIR (Programme Alignment, Implementation, and Reporting), Programme Outcomes, Programme Review, Student Success

PART I: OVERVIEW OF THE STUDY

PART I

OVERVIEW OF STUDY

Chapter 1: Introduction

Chapter 2: Research Design and Methodology

PART II

DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION

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Chapter 4: Learning Management Systems in Higher Education

Chapter 5: Introduction to the Diffusion of Innovation

Chapter 6: Design and Development of the Framework

Chapter 7: Outline and Components of the PAIR Framework

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Part I provides an introduction and background to the study in **Chapter 1**. In particular, it focuses on the identification of the research problem and outlines the purpose and rationale for the study. The main research question and five associated research objectives are also indicated. **Chapter 2** outlines the research design and methodology.

1 INTRODUCTION

1.1 BACKGROUND INFORMATION TO THE STUDY

It is expected of higher education institutions in South Africa, through the implementation of educational policies and guidelines, to align teaching, learning and assessment with programme outcomes, and in so doing, to also align their applicable professional accreditation requirement outcomes (Crespo et al., 2010).[3]

University ABC, referred to in this research, defines the concept of teaching and learning as follows:

> "**Teaching / Pedagogy** is a theory-based discipline that is realised in practice in the context of different domains of knowledge (disciplines). Teaching in higher education is a designed/ planned process, for a specific context, during which the lecturer thoughtfully and passionately creates opportunities for students to engage actively and authentically, cognitively and non-cognitively, with the knowledge, skills, attitudes and values of a particular discipline/ field, and the profession(s) to which it leads, in order for students to learn (grow in understanding and experience and change as a result), in ways that can be appropriately measured, and contribute to the learning of others. Each discipline or professional field might be said to have a signature pedagogy related to the knowledge, skills and ethics that students must acquire in order to function effectively with a particular field or profession. Also, the student profile influences how a discipline is taught. Contemporary understanding of teaching is that it is the facilitation of learning, not the transmission of content. There are

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[3] South Africa is not an exception to the rule. In an era of globalisation the country follows for instance in the footsteps of the Bologna Process established in 1999 to ensure *inter alia* the standards and quality of higher-education qualifications in a number of European countries. The Process comprises agreement on qualification frameworks and covers amongst others quality assurance so that students, graduates, universities and all other stakeholders can be confident in the educational quality that tertiary institutions provide. (https://www.goodschoolsguide.co.uk/university/europe/bologna-process-explained).

constant interaction and balance between the lecturer, students, and the discipline. Teaching for transformation requires a theory to be realised in teaching strategy.

Learning is a continual process in which knowledge is transformed into something of meaning through connections between sources of information and the formation of useful patterns, which generally results in something that can be acted and reflected upon appropriately, in a contextually aware manner. Learning in formal education is mediated and facilitated in many ways" (Vice-Principal, 2017).

The value and relevance of the two definitions stated above lie in the notion that teaching and learning in higher education is a process characterised by intentional planning and design. This process needs to provide for students a continual process to acquire meaningful and necessary knowledge, skills and ethics to function effectively in their particular fields of discipline and/or profession.

Lecturers should be provided with guidance, training and support to be able to design, plan and execute these planned processes. Students, on the other hand, need to have access to this information and efficient ways should be investigated on how to communicate their academic pathway to them to ensure student success. For both lecturers and students, innovative methods should be investigated to support these planned processes and communication to students. This study will focus on how the implementation of this academic and educational process, as well as the use of technology, can provide an answer to this requirement.

Higher education institutions in South Africa all need to align their qualifications, learning programmes, modules, and outcomes to the requirements set by the Council on Higher Education (CHE), as well as the South African Qualifications Authority (SAQA), and for the purpose of the present project, to two accreditation bodies, namely the Accreditation Board for Engineering and Technology (ABET) and the Engineering Council of South Africa (ECSA). This process has become paramount in South African higher education. However, not all universities have a comprehensive framework for such an alignment. Hence the development of such a framework as the *raison d'etre* for this study.

The introduction of innovative information technology at higher education in South Africa to facilitate alignment has often and still is, problematic because the implementation of such technologies could stall. Part of the problem is the large number of possible complexities that higher education institutions have to deal with, such as the availability of technology; or the fact that available technology is underutilised due to its perceived relative unknown value (Bennett & Bennett, 2003). The absence of formal frameworks also hampers the introduction, application and evaluation of new technology, even though such technology might be advantageous (Al-Busaidi & Al-Shihi, 2010, Iivari, 2000). Even so, on an institutional level, the introduction and application of continually changeable information technology development at higher education institutions worldwide are changing the way teaching and preparation for professional accreditation are conducted. As the Handbook on Information Technologies for Education and Training (Adelsberger et al., 2002) puts it: “The rate and growth of IT-based education and training appear to be phenomenal”. The challenges higher education institutions are faced with, are the adoption and utilisation of these blooming information technology and information system enterprise solutions. But more so, the adoption, effective implementation, and continuous use of educational technologies across an institution. This challenge cannot be met without reviewing and planning how these technologies are going to be incorporated into current or future academic structures and processes.

SAQA (2013) jointly with the South African Quality Councils (SACS) already developed the National Qualifications Framework (NQF). This framework is characterised by a set of principles and guidelines for education institutions in South Africa through which records of learner achievement are registered. The framework enables national recognition of learners’ acquired skills and knowledge. Institutions are then legally held responsible for reporting on institutional effectiveness and student success (Department of Higher Education and Training, 2013). For its part, SAQA is the official vehicle for the recognition and quality assurance of all national education and training qualifications (SAQA, 2013).

Accreditation of professional programmes are guided and regulated by Professional Board Accreditation Criteria and formulated by its stakeholders, such as ECSA, and ABET. Each of these boards also has its requirements for university degree accreditation apart from that of the professional bodies' accreditation criteria.

Between 2012 and 2014, there was a national drive for the 'cleaning up' of the programme qualification mix (PQM) in higher education institutions. It was evident from these developments that definite proof of evidence would in future be required of universities to certify that teaching, student activities and learning and assessment, have successfully been aligned with qualification exit level outcomes as well as the programme outcomes of the learning programmes recorded against these qualifications (SAQA, 2013).

A directive from the Department for Higher Education and Training (DHET) to Higher Education Institutions, notes the following abstract from the White Paper for Post-School Education and Training: "As participation increases, universities must simultaneously focus their attention on improving student performance. Improving student access, success and throughput rates, are all grave challenges for the university sector and must become a priority focus for national policy and for the institutions themselves" (Department of Higher Education and Training, 2013).

In a draft document of the Quality Enhancement Project (QEP), released in November 2013, the Council on Higher Education (CHE) (Chemboli & Boughton, 2011) emphasised the following:

> "For the first phase of the QEP, the intention is to focus on aspects of student support and development that are directly related to academic performance, including academic and career advising, life and academic skills and literacies, counselling and performance monitoring linked to referral systems. (Education, 2013). The Council on Higher Education requested institutions to propose innovative projects that can form part of the Quality Enhancement Project initiative."

The present research does not formally form part of University ABC's contribution to the Quality Enhancement Project initiative. However, the development of the present framework for providing a quality process for programme review (utilising a learning management system feature such as the Blackboard Learn® Goals Area (BbGA)), could contribute to the performance monitoring and referral systems knowledge base of the Quality Enhancement Initiative.

In a more recent document from the Council on Higher Education (2015), it states that:

> "Another important aspect of curriculum content is the identification and specification of outcomes and graduate attributes, including knowledge, skills, values and dispositions, and indications of how the curriculum is designed to enable students to attain them."

This directive is in line with the request by professional bodies,[4] such as ECSA and ABET, that University ABC should through reporting provide proof of evidence on how graduating students have met the professional programme exit level outcomes as set by the professional bodies as part of the professional accreditation process of their programmes. These professional bodies' further request that higher institutions offer these professional programmes to provide proof of evidence indicating:

- The alignment of each outcome or graduate attribute to a module in which the assessment of the outcome or attribute takes place at exit level; the assessment criteria and the method of assessment; the level of performance required of the student; and the consequences for the student of not satisfying the outcome or attribute (ECSA, 2019).
- The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program (ABET CAC Criterion 4 requirements). (ABET, 2019).

[4] The professional bodies form the focus of this study.

These types of assessment processes are exactly one of the key purposes for the use of BbGA and other similar tools.

Obtaining effective student learning and success through student and lecturer engagement is a golden thread that runs through the Department for Higher Education and Training's requirements for programme accreditation, the structure and requirements of focus areas two, three and four of the Quality Enhancement Project of the Council on Higher Education (Chemboli & Boughton, 2011). To pursue excellence in teaching and learning is also currently the first goal of University ABC's 2025 Strategic Plan and in alignment with departmental expectations and directives.

The aspects discussed above contributed to a growing need, specifically amongst academic staff of professional programmes, for the implementation of an innovation that can support quality programme review and a process of constructive alignment of teaching and learning activities and assessment with programme outcomes, module outcomes and professional bodies/boards accreditation criteria and requirements. Subsequently, academic staff began to realise that they should be able to manage the input, processing, and output of data in the form of learning analytics and provide reports for constructive outcome alignments achieved. The latter refers to 'Assurance of Learning' (AoL) which will be discussed in section 3.2.5. The extent of the assurance of learning process is not the key focus area for this research project, although it will be briefly deliberated in Chapter 2. The following definition and statement of the University of Sydney Business School give an excellent example of what is meant by assurance of learning:

> "Assurance of Learning refers to the systematic process of collecting data about student learning outcomes, reviewing and using it to continuously develop and improve the School's degree programs. Assurance of learning ensures our graduates achieve the goals and outcomes we say they will achieve when we advertise our degree programs. It is a means of holding ourselves accountable to delivering what we say we will deliver to students and other stakeholders, as well as a way of supporting the continuous improvement of our degree programs" (The University of Sydney Business School, 2002-2018).

To enable higher education institutions such as University ABC, and to comply with the definition as indicated above, proper academic and assessment processes need to be in place before technology could be incorporated to report on the assurance of learning.

A large-scale Canadian study (Lopes & Dion, 2015) found that while there is a drive to improve technology-enhanced teaching, “rarely do instructors make explicit reference to the learning outcomes its implementation is intended to support”.

The integration of an innovation, such as the proposed framework mentioned in the previous paragraph, as part of the utilisation of an LMS, is considered necessary. The official LMS of University ABC is Blackboard Learn®; the in-house name for the LMS is called clickUP. The use of the LMS is governed and in line with University ABC strategic plan for teaching and learning. Although University ABC proved an increase in adoption rate and active use of the LMS, there are still specific LMS features that form part of the total enterprise package that is not available to academic staff (Blackboard, 2018). One such a feature that is accessible to lecturers can be perceived as a potential innovation to address the educational needs and requirements for reporting and consequently improve on the constructive alignment of programme outcomes and assurance of learning.

This research aims to develop a framework for implementing such an Information System (IS) feature, namely the Blackboard Learn® Goals Area (BbGA), at University ABC in order to align, implement, and report on teaching and learning and assessment against professional programme outcomes as part of an annual quality programme review process. The University ABC is still an emerging hybrid university, where not all programmes have embraced the use of an LMS as part of their teaching and learning philosophy and educational approach. Consequently, this study will only deal with one faculty of Engineering, Built Environment, and Information Technology (EBIT) for its empirical analysis and focus on two departments (Informatics and Mining Engineering) that voluntarily engaged in this research.

1.2 RESEARCH APPROACH TO THE STUDY

Research over the last decade and more has shown that developments in the field of Design Science Research, as part of the broader area of Information Systems (IS) research, offer sufficient research results to affirm that a Design Science Research approach could be utilised to address the issue raised under the background and introduction to this study. On a theoretical level, the seminal article by Hevner et al (2004) has led the way for researchers such as Indulska and Recker (2010) and Niehaves and Becker (2006) to develop not only a more comprehensive, but also a more detailed approach to the use of Design Science Research (Vaishnavi & Kuechler, 2015) in IS research (Crespo et al., 2010).

The research strategy adopted for this study was that of a qualitative approach to inquiry. Informing the decision for a qualitative research approach was based on the philosophical assumptions of an interpretive view she brings to the study. Design Science Research (Vaishnavi & Kuechler, 2015) used in the IS discipline, was applied as the procedure of inquiry. The specific research methods for collecting, analysing, and interpreting data were undertaken with semi-structured interviews, documentation, and case studies. An extended literature search on the internet was conducted to find relevant sources that give expression to the present topic under discussion. Most sources dealing with BbGA in different contexts than the present one, such as the implementation of BbGA in classroom situations through the Blackboard® Help Site and higher education institutions' teaching and learning and information technology websites. Research related to the present study, but not directly informing it, is for instance that of Peffers et al. (2006) who developed a model within design science in order to produce and present IS research results. Indulska & Recker (2010) published a valuable literature analysis of the role of design science in IS research to which the present author could relate.

As none of the previously cited, nor other, works lend a sufficient basis to understand and apply the knowledge to design an accepted framework for lecturers at University ABC of which the components would provide sufficient grounding and structure for a quality programme review at University ABC utilising BbGA, the researcher consequently turned to

Everett Rogers (2003). Rogers is a well-respected source outside the field of Design Science Research and IS which supplied the conceptual model of innovation acceptance.

The Diffusion of Innovations Theory of Everett Rogers (2003) offers a long-standing approach to the development and application of new concepts, such as the one presently being described. In order to utilise Rogers' (2003) work, a Design Science Research approach in IS research, for the research and design of the quality programme review framework was developed. The rationale for grounding the design of the framework on Design Science Research lies in its strength for problem-solving. By utilising Design Science Research, the researcher could develop and apply an artefact, such as a conceptual framework (Section 3.4), to identify and solve IS problems by gaining sound knowledge and understanding of an organisation's such as University ABC's vulnerable areas (Hevner, March & Park, 2004).

The literature related to curriculum mapping, alignment and reporting tools used in higher education institutions, such as Watermark, Weave, Rubicon Atlas, Angel, and in-house designed outcomes alignment tools, prove to be successfully implemented for constructively aligning course outcomes, content, assessment, and student activities at institutions worldwide. Rubicon Atlas was previously piloted at University ABC during 2009 and 2010. For this study, these tools will be briefly referred to in Chapter 4. The focus of discussion will, however, be on the BbGA already part of the official LMS of University ABC. According to the Blackboard Learn® international website, the BbGA potentially allows higher education institutions to provide proof of evidence that their programme outcomes are indeed aligned.

The BbGA is a LMS feature available for University ABC, however, it is not known to the academic community or institutional management, therefore underutilised. For the departments where BbGA were introduced, the implementation and correct use for the purpose it is designed for, is still in a premature stage. The investigation to its functional applicability and educational value is ongoing. The reasons why this is an ongoing investigation, is firstly to solve the technical aspects regarding the use of the BbGA and what it can afford in its current state; and secondly to investigate and develop a (institutional /

faculty / departmental-wide) programme review process which will include the use of BbGA and potential training that will be required for lecturers.

A preliminary literature review of past research with specific attention to the application of BbGA in the context described above yielded limited results. The development of a framework for quality programme review with the likely successful implementation of BbGA at University ABC could therefore not only lead to a better underlying theoretical understanding of the process, but also of the factors influencing the application thereof. It is also anticipated that such a framework will have potential for broader application in the South African higher education context.

The sections to follow will outline the purpose of this study, the problem statement, a brief reference to the primary research design and research methods used in this study, followed by the delineations and limitations of this study, as well as the underlying assumptions of this study. This chapter will conclude with the rationale for this study and a chapter overview.

1.3 PURPOSE OF THE STUDY

The study will focus on the development of a framework for quality programme review, implementing an LMS feature, in this regard the BbGA, to align, implement, and report on programme outcomes at a higher education institution in South Africa. In particular, the components of the framework will direct lecturers systematically to constructively align professional body accreditation criteria and programme outcomes with course content, course assessment, teaching and learning, and student activities within a hybrid-learning environment. To enable this process, two undergraduate professional programmes in the Faculty of Engineering, Built Environment and Information Technology (EBIT), have been identified based on the need to align their programme outcomes and professional skills and competency criteria as set by their Professional Boards, namely the Department of Informatics and Department of Mining Engineering. The outcome of the implementation of the framework will facilitate the process of quality programme review (for accreditation) in the relevant programmes and assist lecturers in taking action for planned interventions, based on the BbGA reports, in improving programme delivery and student learning aspiring towards student success.

1.4 PROBLEM STATEMENT

Internationally and nationally, there is a growing awareness of the importance of aligning teaching and learning and assessment with programme outcomes to ensure adequate student learning and student success. The awareness will involve a quality process for programme review to enable reporting on the performance of these outcomes to improve programme- and institutional effectiveness. At University ABC, due to the historical decentralising nature of the operations of the teaching and learning mandate of the different faculties, such a process is not yet institutionalised. Information systems, more specific an LMS, can assist University ABC in the management of alignment, implementation, and reporting of programme outcomes.

University ABC moved over the past years from a traditional face-to-face model of teaching and learning to a hybrid-teaching model that is characterised by separate or a combination of different modes of delivery. The University ABC is also growing into a seamless learning environment where education can take place as formal or informal, anywhere and at any time, providing their students with a learning environment where self-directed learning and lifelong learning can be fostered and enculturated (Mouri et al., 2018; Mong et al., 2007). Against this background, it has, therefore, become more critical to monitor and track student learning against achieving the set programme outcomes and being able to generate hard evidence for accountability that is all possible if the LMS is used optimally.

To move from a traditional to a more hybrid-teaching and learning model is a challenging task for academics. More so, are the acceptance of IS and Information Communication Technology (ICT) in the classroom and learning venues where large classes, technical aspects, such as bandwidth and electricity challenges, are issues to be dealt with daily. Before the start of the research process, the researcher, in her capacity as educational consultant for the participating faculty, documented the resistance experienced by some lecturers towards technology that can assist in the reporting on programme effectiveness and student success. The resistance experienced was mainly linked to the threat of an additional administrative load and the use of unknown technology.

At University ABC a policy exists for eLearning (S4463/16) indicating, the proper use of the Blackboard Learn® LMS, but features unknown or not available to lecturers can initially be overwhelming when they first encounter the system, and they realise the scope of these features. In this research, the BbGA feature of the LMS is such an example. It is therefore critical to develop and design a framework for implementation to expose the university community to currently underutilised functionalities (features) within the current LMS they are already broadly familiar to them. Acceptance of such features will be more likely if current and existing free in-house support structures and professional development training opportunities, are highlighted to lecturers. Alongside training and support, lecturers need to be made aware of the advantages of using the features available to them and made visible how the use thereof can ease into their educational practices.

A significant advantage for having IS in place and workable is the fact that it could contribute to the accreditation process by delivering proof of evidence of assurance of learning using learner analytics, and course reports. An additional advantage of implementing IS such as goals and outcomes tracking tools is that it can assist academics in supporting students to achieve their goals and in the process develop into self-directed, life-long learners, competent and skilled in moving to the industry once they have graduated. A typical framework in this regard will address curriculum matters such as programme and module review, eLearning and hybrid learning matters, graduate throughput, and student support, faculty development, and support, steps to be taken towards interventions (actions) for improved student learning (Banta & Palomba, 2015; Maki, 2010; Suskie, 2018). Through the implementation of such a framework, decisions for planned interventions can be made based on data and learning analytics that can have a positive effect on student success. Blackboard International (Sousa, 2018) reports on issues that can affect student success in this regard with specific reference to two of the key issues:

- too many uncoordinated and non-integrated teaching and learning approaches in the different departments on campus and

- students and lecturers not utilising resources provided for them and challenges with technology that is not supporting programmes efficiently.

This study aims to address the factors as mentioned above through the development of a framework where these uncoordinated practices, specific related to programme review processes, can be implemented for the current two departments, but also be rolled out on an institutional level at University ABC and other higher education institutions in South Africa. In order to develop a framework for programme review which could facilitate the alignment, implementation and reporting process, it was decided to concentrate on the application of Blackboard Learn® (Prebble, et al., 2004), a Learning Management System (LMS) tool, and more specifically its Goals Area (Mong et al., 2007) as part of the proposed framework.

> "A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting, and delivery of electronic educational technology (also called e-learning) education courses or training programs" (Ellis, 2009).

The inclusion of the BbGA in the development of a framework is considered an innovative way to address the underlying goals and research objectives of this study. Lopes and Dion (2015) note:

> "There is no single, unified, universally accepted model or theory that could be applied to ensure optimal learning in all educational settings. That which constitutes effective and enhanced teaching and learning practices depend on the content and the desired learning outcomes."

The educational authorities in South Africa had also not yet explicated a model or a way to ensure optimal learning in a different type of higher educational settings. Consequently, University ABC had to develop a university-based approach to move from a traditional face-to-face teaching model to a more a hybrid one, making use of IS and ICT applications, for assessment, instructional activities, and report of learner analytics.

To conclude, BbGA is available at University ABC as part of their official LMS but is currently not utilised for aligning programme outcomes and professional body accreditation criteria to course content, course assessment and teaching and learning activities. The researcher was unable to locate any relevant local or international literature dealing directly with a research approach for the implementation of BbGA for the present research. The probability of such an approach has not been established. Since 2013, the Descobridores investigating team at University ABC (Drysdale, 2013) in the eLearning unit of the Department for Education Innovation had explored and documented the feasibility of the application of BbGA. The initial focus of the investigation was to determine which universities, local and international, were using BbGA. The result was limited to only two international institutions with the focus on good practices for BbGA implementation, and possible technical issues experienced associated with the implementation of BbGA. This investigation was revived towards the end of 2014 and is now the focus of this research.

The problem statement for this study was thus delineated to focus on the development of a quality programme review framework utilising an LMS. The theory of Diffusion of Innovations (Rogers, 2003) informed the design and development of the components of the framework. The research process followed the Design Science Research approach within the IS field for the implementation of BbGA in order to report on the alignment of programme outcomes and professional body accreditation criteria with course content, student activities and assessment.

1.5 MAIN RESEARCH QUESTION

The following primary research question was created based on the discussion above:

How should a framework be developed for quality programme review implementing the BbGA in order to constructively align, implement, and report on content, student activities, and assessment against programme outcomes?

The research objectives below supported finding answers to the primary research question. Reference is given to the chapters where the research objectives are addressed:

1.5.1 Research objective RO1 (Chapter 3):

To define a framework for quality programme review.

1.5.2 Research objective RO2 (Chapter 3):

To define and identify the critical concepts of constructive alignment.

1.5.3 Research objective RO3 (Chapter 4):

To investigate the use of Learning Management Systems (LMS) in higher education concerning the availability of and reasons for the possible non-utilisation of LMS features.

1.5.4 Research objective RO4 (Chapter 5, 6 and 7):

To develop a framework for quality programme review applying the principles of Diffusion of Innovations theory.

1.5.5 Research objective RO5 (Chapter 7):

To identify the current support structures in place at University ABC, where the research is accepted to ease the decision of adopting a framework for quality programme review using the BbGA.

In order to find applicable answers to the research problem posed at the beginning of this section, an interpretivist paradigm stance was followed in the context of University ABC. The reason for this lies mainly in the present researcher's approach and goal to find a solution to a particular problem identified at University ABC and not to test any empirical hypotheses in this regard.

The two pilot departments in this study display both:

- an absence of a framework for an annual process for quality review of programme outcomes alignment, implementation and reporting; and
- the underutilisation of available LMS features that can inform and support such a process.

This study proposes a solution to this problem.

1.6 DELINEATIONS AND LIMITATIONS

There is a possibility of applying the findings elsewhere, although the applicability of findings was limited to two professional programmes at University ABC. The study focuses only on two undergraduate professional programmes in the faculty of EBIT. The Design Science Research approach to this study provides an opportunity to add to the knowledge base and application of the artefact, provisionally called *Programme Outcomes Alignment, Implementation and Reporting – A Partnership toward Student Success (*PAIR*)* that can be adapted and applied to post-graduate programmes as well as programmes at other higher education institutions in South Africa.

The following are limitations concerning the use of the BbGA:

- There was not an institutional policy or directive available for the implementation of technology to ease a programme review process and cycle at University ABC. The responsible department and authority to drive such a process and using the appropriate technology are currently not yet established.
- Although the BbGA is available for use by lecturers who are active on the LMS at University ABC, there is not yet an official institutional policy or structure for the use and support of BbGA in place.
- The researcher knows the immediate functionalities available as an instructional designer and education consultant on the BbGA area in the LMS. However, she has no back-end administrative access to BbGA or Analytics for Learn and therefore limits the investigation of additional reporting functionalities apart from BbGA reporting. For the proposed framework to be adopted and implemented extensive training on the BbGA and Analytics for Learn is essential for the LMS Administrator and the BbGA manager at University ABC.

1.7 UNDERLYING ASSUMPTIONS

The assumption made is that the professional programmes identified in the relevant faculty at University ABC are Senate approved programmes and adhere to the Council on Higher Education, South Africa Quality Authority and professional programme accreditation requirements. Therefore, one would assume that one can align programme outcomes and professional board accreditation criteria with course content, course assessment, and student activities, and use BbGA for alignment and reporting.

1.8 RATIONALE FOR STUDY

The rationale for this proposed study was to support University ABC lecturers of professional programmes in need of a means to align their programme outcomes and professional board accreditation criteria with course content, assessment, and student activities. Furthermore, it proposes to empower lecturers, to demonstrate and provide proof of evidence that their programmes and curricula are constructively aligned to professional board requirements. It further envisaged that through the implementation of the proposed framework, departments would introduce an annual quality programme review to improve student learning towards student success.

1.9 BRIEF CHAPTER OVERVIEW

The structure of the chapters is divided according to **Part I** and **Part II** of the overall thesis structure, as indicated in Figure 2:

Part I: Overview of the study

Chapter 1 provides an introduction and background to the study. **Chapter 2** outlines the research methodology that guides the process and approach of this research done in the field of IS.

Part II: Development of the LMS based framework for quality programme review in higher education

This part of the thesis contains **Chapter 3 to Chapter 9.** The focus of Part II is on the development of the framework and is structured according to the Design Science Research Cycle (DSRc) as proposed by Vaishnavi and Kuechler (2005). It covers three incremental DSRc's (Figure 3).

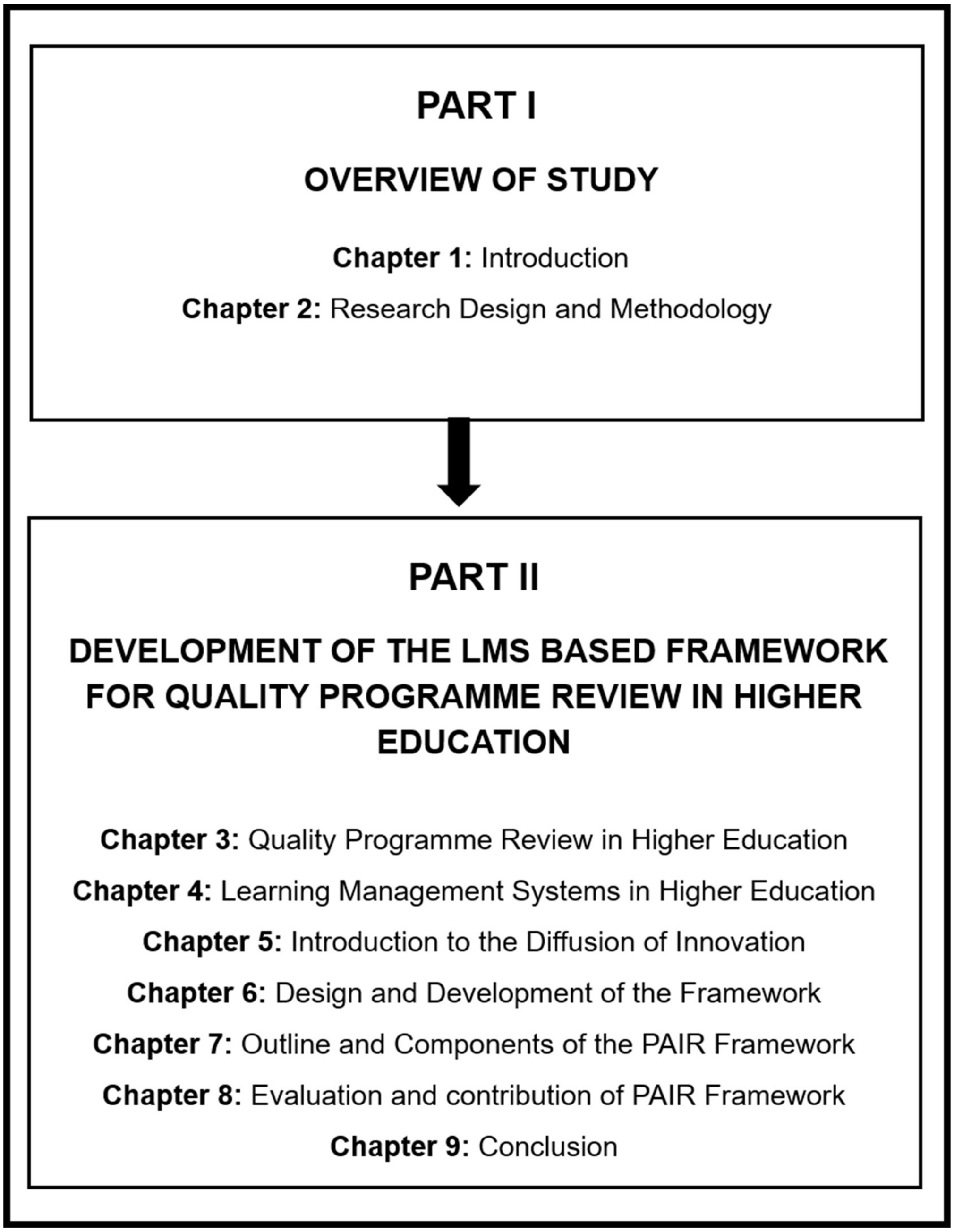

Figure 2: Overall visualisation of thesis structure

The main and outer cycle of part II is indicated as DSRc-1 and structured according to the five phases of a Design Science Research cycle. The phases are iterative and are labelled: Awareness, Suggestion, Development, Evaluation, and Conclusion. **Chapter 2** will expand on how these phases unfold and location will be given to the chapters as well as the DSRc-2 and DSRc-3, as indicated in Figure 3.

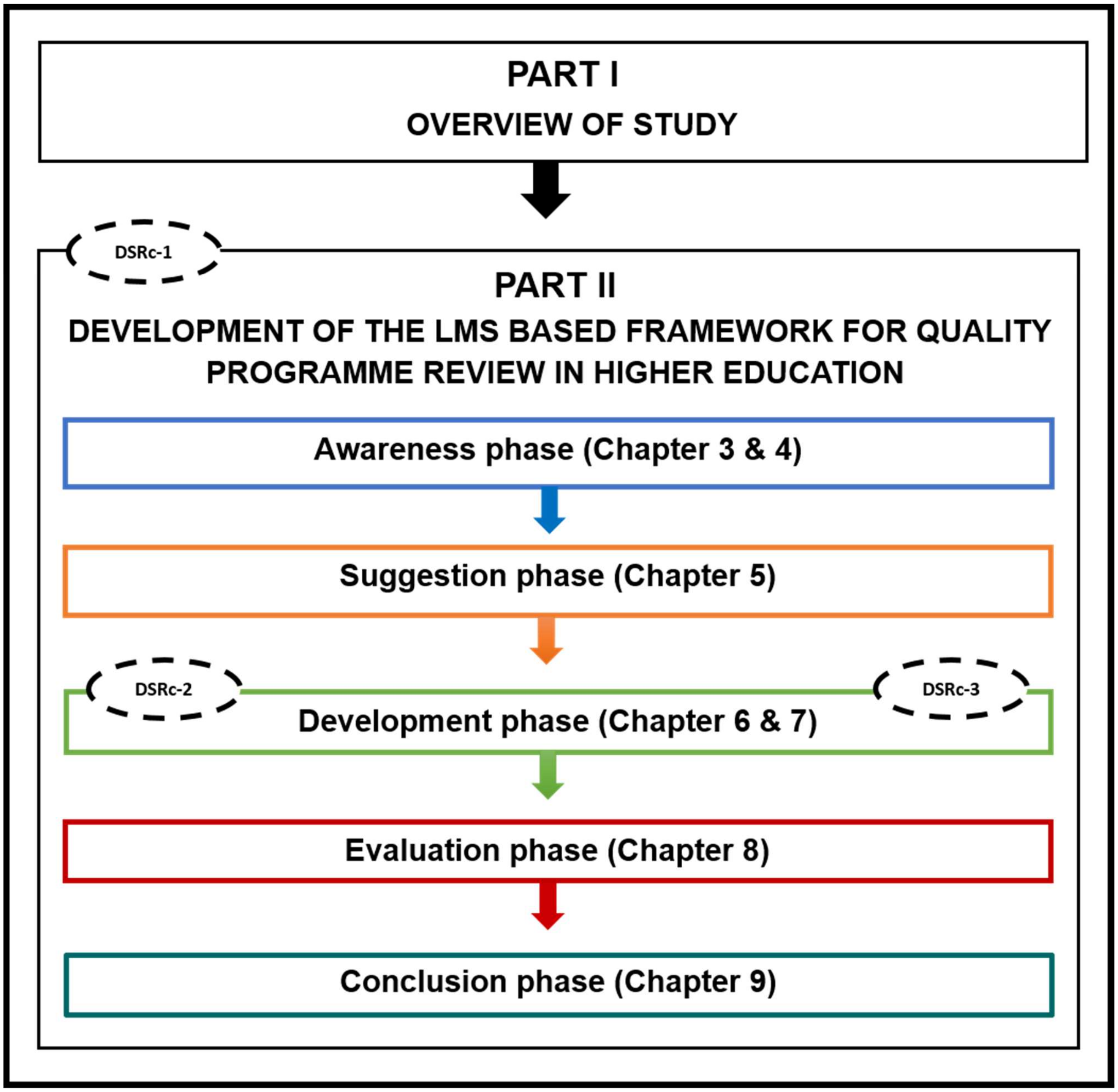

Figure 3: Part II of the thesis structure indicates three design science research cycles (DSRc 1-3) with a chapter overview

Chapter 3 and **Chapter 4** focus on an overview of the literature to clarify the concepts of the higher education landscape and the use of an LMS in the context of the research in higher education in South Africa.

Chapter 5 introduces the underlying theory for the design of the components and process flow of the proposed framework.

Chapter 6 will introduce and report on the design, and analysis of findings of the development of the framework through the two case studies used in this research.

Chapter 7 will give a detailed outline of the framework and its possible affordances if decided to be implement at University ABC.

Chapter 8 will report on the workshop titled: *School of Information Technology (SIT) Improvement Plan and BbGA workshop.* The workshop formed part of the final evaluation phase of the design of the framework and this research in its entirety. The workshop report provides comprehensive recommendations on the framework as well as recommendations for the implementation of the framework after the completion of this study.

Chapter 9 provides a summary and conclusion of the research in its completeness based on the findings and recommendations gathered from the research. Also, this chapter will refer to the contribution this study makes to the theory and practice of the design, development, and implementation of the framework in University ABC and the broader higher education institution landscape in South Africa, as well as to the research within the field of IS. The chapter concludes with suggestions for future research.

1.10 CONCLUSION

In the introduction to the thesis, an overview was provided of the background information as it relates to the problem statement in section 1.4. The research philosophy and approach for the design of a framework for quality programme review in higher education utilising an LMS were noted. The main research question was broken down into five research objectives to guide this study.

In the next chapter, Chapter 2, the researcher will demonstrate how the research question and the associated research objectives were approached by presenting a view of the research design and methodology used in this study.

PART I

OVERVIEW OF STUDY

Chapter 1: Introduction

Chapter 2: Research Design and Methodology

PART II

DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION

Chapter 3: Quality Programme Review in Higher Education

Chapter 4: Learning Management Systems in Higher Education

Chapter 5: Introduction to the Diffusion of Innovation

Chapter 6: Design and Development of the Framework

Chapter 7: Outline and Components of the PAIR Framework

Chapter 8: Evaluation and contribution of PAIR Framework

Chapter 9: Conclusion

2 RESEARCH DESIGN AND METHODOLOGY

2.1 INTRODUCTION

The desire for knowledge about the world we live in - searching for answers to complex problems and challenges, finding solutions for unresolved issues - is grounded in the heart of education. In the search for knowledge, one might find that answers to some of these questions and issues are unknown and might remain unknown. A research inquiry provides, when following a structured and systematic process for gathering data, the opportunity to find answers to research questions and objectives that are credible in a qualitative sense and valid and reliable in a quantitative sense (Justham, 2006).

The researcher thus identifies with UNESCO's definition of research as "any creative, systematic activity undertaken in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications" (OECD, 2008).

The purpose of research should then be to inform actions that address the research problem effectively and ultimately make it possible to find solutions. To give guidance in this process, a worldview about the nature of research and philosophy of scientific research should inform the research approach. The research methodology, research design and data collection methods and strategies should then be established. A research pathway, as illustrated in Figure 5, enabled and guided this research to address the main research question and research objectives within the field of IS.

In the sections to follow a brief overview and explanation of the research pathway will be discussed in Section 2.2. The research plan (Hevner et al., 2004) and design (Vaishnavi & Kuechler, 2015), as extracted from the research design section of the research pathway will be discussed under Section 2.3. The ethical considerations are mentioned in Section 2.4. The chapter will conclude (Section 2.5) with a summary of how the study aimed to align the research design and methodology to well-referenced authors and professionals in the field of IS concerning strategic recommendations and suggestions for:

- the use of frameworks and guidelines on how to conduct Design Science Research in IS;
- aspects to consider for evaluation of the artefact, and
- the contribution to Design Science Research in the field of IS, with specific reference to the practical and theoretical knowledge base.

2.2 RESEARCH PATHWAY

Selecting the most appropriate research methodology and design to conduct research, in order to provide answers and solutions for the research question and objectives, the worldview that will inform the research choices regarding the methodology, design and methods to be used, should be described (Saunders et al., 2009).

Figure 4 illustrates the research pathway of the foundational choices that were made at the beginning of this study which will be explored in more detail in sections 2.2.1 to 2.2.5.

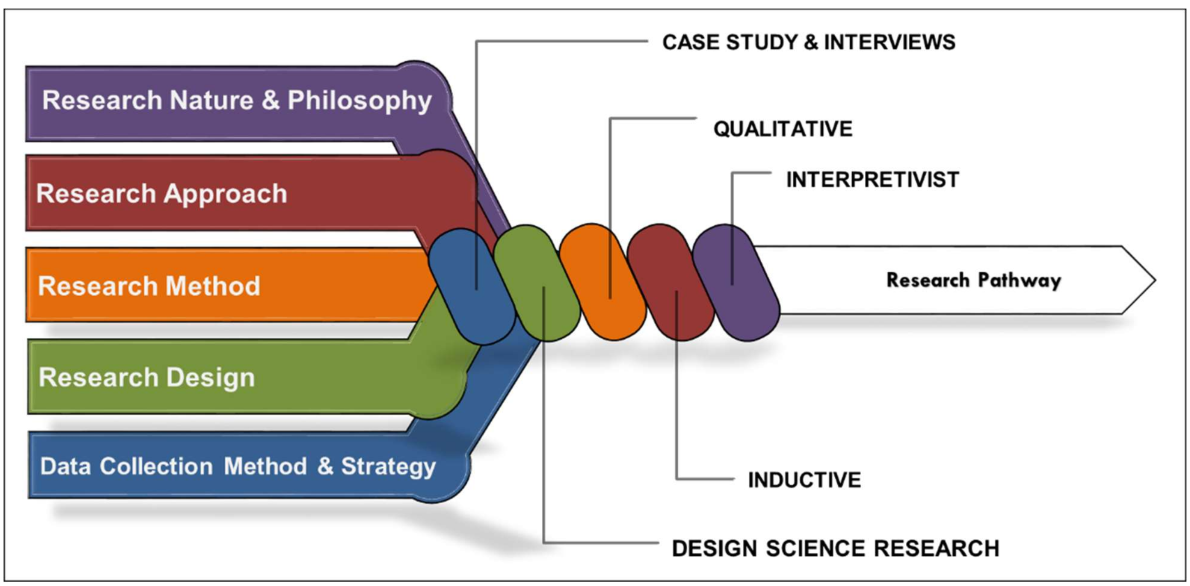

Figure 4: Research Pathway for the current study

2.2.1 Research Approach

The research approach in this study was inductive (Peffers, et al., 2007). Existing literature were interrogated on theories in the field in order to guide the development of the proposed framework. Working from an extended number of approaches, the field was narrowed down to a more limited group of relevant sources. This was a continuous process to enable movement to and through the design cycles.

The importance of a relationship between the concepts ontology, epistemology and research paradigm, and having an understanding of these concepts and how they inform the research approach, should be recognised. Pretorius (2018) explains that ontology is the examination of the nature of reality and that it seeks answers to the question: What is reality? Epistemology looks at how one can imagine reality, and seek an answer to the question: How can one know reality? Pretorius (2018) further argues that ontology can have single or multiple truths about reality and that reality is consistently debated or (re-) interpreted. She further explains that epistemology includes the way how people understand ontology (reality); their own thinking processes about reality and how people think others think about or “know reality”.

Pretorius (2018) highlights three epistemologies that are relevant to this study:

- The belief that knowledge can be measured using reliable designs and tools.
- Reality needs to be interpreted to discover the underlying meaning.
- Knowledge should be examined using the best tools suited to solve the research problem.

Pretorius (2018) indicated that when a researcher combines ontology and epistemology, it becomes possible to obtain a holistic view of how to understand the knowledge base of the problem at hand, which is embedded in a particular research paradigm. For this study, the paradigm or conceptual lens is that of interpretivism.

2.2.2 Research Nature and Philosophy

The research question is strongly related to the nature of the research. The departing point of choice is that of an interpretive paradigm which is embedded in Design Science Research as well as IS. Iivari et al. (2000) argue that there is also a ‘myriad’ of other methodologies available with which to understand IS.

In the same way, Gregor (2006) examines the structural nature of IS to help understand the role of IS theory while Njenga (2005) shows how a design system can provide an argument for its implementation.

This research took a step away from the positivist approach in Hevner’s et al. (2004) framework, which according to Niehaves and Becker (2006) is “based on an implicit positivist assumption”. The latter named authors argue that design science is concerned with designing artefacts that are used to understand the nature of the research problem. This approach is unlike positivistic models, such as behavioural science, that seek to produce ‘true knowledge’. One reason design science is separated from the positivistic sciences is that it is essentially applying existing knowledge instead of seeking new knowledge in a positivistic way.

Despite Niehaves and Becker (2006)’s assumption that the approach of Hevner’s et al. (2004) might be based on positivism, this study uses an interpretive lens to view and reflect on Hevner’s et al. (2004) seven guidelines for Design Science Research in IS (Table 1).

Table 1: Design Science Research Guidelines according to Hevner et al. (2004) in Design Science in Information Systems Research

Guideline	Description
Guideline 1 Design as an Artefact	Design Science Research must produce a viable artefact in the form of a construct, a model, a method, or an instantiation.
Guideline 2 Problem Relevance	The objective of design science research is to develop technology-based solutions to important and relevant business problems.
Guideline 3 Design Evaluation	The utility, quality, and efficacy of a design artefact must rigorously be demonstrated via well-executed evaluation methods.

Guideline 4 Research Contributions	Effective Design Science Research must provide transparent and verifiable contributions in the areas of the design artefact, design foundations, and design methodologies.
Guideline 5 Research Rigor	Design Science Research relies upon the application of rigorous methods in both the construction and evaluation of the design artefact.
Guideline 6 Design as a Search process	The search for a useful artefact requires utilising available means to reach desired ends while satisfying laws in the problem environment.
Guideline 7 Communication of Research	Design Science Research must be presented effectively both to technology-orientated as well as management-oriented audiences

Consequently, this research does not seek to find postulated 'truth' but seeks to understand the design science process in order to develop an *LMS based framework for higher education quality programme review,* as the artefact. For this purpose, reflection on the guidelines of Hevner et al., guided by Klein and Myers's principles for interpretive field research, is necessary to align the latter study to the seven guidelines of Hevner's et al. (Table 2).

Table 2: Principles for interpretive field research. Adapted version of Klein and Myers (1999), as well as Hevner et al. (2004)

Hevner et al.'s (2004) Guidelines	**Reflection based on Klein and Myers's (1999) principles for interpretive field research**	**Mapping the application to the current study**
Guideline 1: Design as an Artefact	Principle of: • Hermeneutic (interpretation) circle	In this Design Science Study a viable artefact in the form of a framework for quality programme review utilising an LMS will have a significant influence on

	• The interaction between the researcher and the subjects	institution effectiveness; programme review, programme assessment, and programme effectiveness; module assessment; student learning and student success; instructional and IS practice at University ABC. The researcher is also the education consultant in the faculty at University ABC, where the research is conducted. She has access to staff members daily. The researcher will use case studies and semi-structured interviews, guided by the Design Science Research cycles, to gain knowledge and understanding of the research problem to enable her to design an artefact that can address the need identified at University ABC.
Guideline 2: Problem Relevance	Principles of: • Multiple interpretations • Suspicion • The interaction between researchers and the subjects • Contextualisation	Developing a framework for quality programme review utilising an LMS, at University ABC seems to be a technology-based solution to address the proof of successfully aligning the intended programme outcomes and professional programme outcomes within University ABC as an emerging hybrid institution. Interviews took place at University ABC on an institutional, programme and module level.

Guideline 3: Design Evaluation	Principles of: • Hermeneutic circle • Contextualisation	In this study, University ABC is the environment (which includes the management and academic staff; University ABC's strategic plan and Information Technology infrastructure) where the artefact was to be implemented to establish the requirements at which the artefact, in this case, the framework, will be evaluated against. The following evaluation methods appropriate to the evaluation of the framework will be utilised: semi-structured interviewing, documentation, case studies and a workshop.
Guideline 4: Research Contributions	Principles of: • Dialogical reasoning • Contextualisation	Through the development/build phase of the artefact and the justification/evaluation of the implementation of the framework at University ABC, the research will contribute to design construction knowledge and design evaluation knowledge to University ABC learning environment.
Guideline 5: Research Rigor	Principles of: • General indicating which methods should be used in order to conduct and to evaluate Design Science Research? What are the assumptions of these methods?	This project will follow a rigorous qualitative approach with Design Science Research as the research design. Data will be collected through semi-structured interviews and case studies and workshops during the design, development and evaluation phases of the framework (artefact).

Guideline 6: Design as a Search process	Principles of: • Suspicion • Multiple interpretations	This study will follow an iterative process to the design of the framework (artefact) where the means will be utilised to reach the end and at the same time, become valuable and relevant to address the problem that it is designed for. The means in this study will refer to the current information technology infrastructure which includes BbGA LMS, University ABC policies on teaching and learning, current practices and relevant data/information that can add value to the relevancy of the implementation of the framework at University ABC. The design and development of the framework will take place in two phases or design cycles, which are embedded in an overarching and main Design Science Research cycle. After the implementation of the framework in each phase or cycle, a rigorous evaluation will be conducted before implementation of the reviewed and adopted framework in the next phase. The iterative and incremental nature of design can provide indispensable feedback during the evaluation phase of the design process and development of the framework. The framework will only be complete once evidence can prove that the BbGA is successfully implemented and that

		it addresses the need for aligning instructional and Professional Programmes outcomes to student activities, content, and assessment.
Guideline 7: Communication of Research	Principles of: • Multiple interpretations • The interaction between the researcher and the subjects	Research outcomes are to be communicated to the management, academic staff and staff support units of University ABC and the end-users of BbGA. The information should be of a high standard with excellent visibility and needs to be readily available. Results of the study will also be presented at international conferences and published as conference proceedings and lecture notes in accredited journals.

As an interpretive researcher, attempts were made to make sense of the research problem by exploring its current status. The University ABC staff ‘s perceptions, their shared values and meanings in the dynamic social context and environment they are operating in, in this case, the higher education landscape at University ABC, were also investigated. The interpretive researcher acknowledges that her role is not neutral in this study and therefore is aware of her involvement and influence (Hevner et al., 2004; Bhattacherjee, 2012). To ensure objectivity in her involvement in this project, apart from the case studies and interviews, she regularly consulted with an international expert in the field of assessment solutions within the higher education landscape at a well-established international LMS company. For rigour, credibility, and consistency in the research findings, a workshop facilitated by the international expert was conducted to evaluate the proposed framework and related processes to bring the results and artefact in alignment with national and international practice.[5]

2.2.3 Research Method

Informing the decision for a qualitative research method for this study is based on the philosophical assumptions and the procedures of inquiry (Research Design) that is brought to the study (Creswell, 2014).

Because the project finds its theoretical home in the interpretive paradigm and is to a large extent concerned with human interaction with new technology, it was decided to use qualitative research methods in order to produce rich, meaningful and credible results which could not only lead to the understanding of the research problem, but also to the solution of a design science and IS problem.

As an interpretive researcher, she will use research methods in general associated with qualitative research to collect and analyse the information to be used during the development and evaluation of the artefact (Klein & Myers, 1999; Klein & Myers, 2001; Vaishnavi & Kuechler, 2015). The two methods used in this study are that of semi-structured interviews and case studies. Under Section 2.2.5 in Table 3, a summary is given of some of the strengths and weaknesses of the strategies that are relevant to the data collection, method and strategy of this study (Kemper et al., 2003).

As far as the methodological approach for this study is concerned, the work of Hevner et al. (2004) was used as depicted in Figure 6 which concerns the environment where the research will be conducted; the IS research design to be used to conduct and guide the

[5] ''Unlike quantitative research which deals primarily with numerical data and their statistical interpretations under a reductionist, logical and strictly objective paradigm, qualitative research handles nonnumerical information and their phenomenological interpretation, which inextricably tie in with human senses and subjectivity" (Dixon-Woods et al., 2004).

research and finally the knowledge base cycle. The cycles indicated in Figure 6 will be explained in more detail under Section 2.2.4.

As in the majority of qualitative research studies, the researcher will start with certain assumptions based on previous knowledge and would use interpretive frameworks that will address for example the individuals and groups at University ABC assign to the research problem at hand. The bulk of the work will be in the natural setting of University ABC. Consequently, much of the research will be carried on in a face-to-face situation during individual, small group and extensive group consultation sessions and workshops.

The qualitative researcher plays a strategic part in the research process and will be responsible for the information and collection of data. At the end of the research process, the researcher ought to be able, if not to develop a new theory, then to contribute to building at least a new model, or as the case in this research, a framework that can be applied to a quality programme review process utilising an LMS in a higher education institution in South Africa.

2.2.4 Research Design

The worldview of the researcher will inform her understanding of the concept of research design. A research design is an overall strategy and blueprint for the collection of data, the analysis thereof, and the communication of the results in an attempt to answer the research question. The research design affords the researcher to indicate her research plan to fulfil the research aim and objectives. This study will follow a Design Science Research approach (Vaishnavi & Kuechler, 2005) of which the five phases of the approach is embedded in the Design Science Research second cycle called Information Systems Research as illustrated in Figure 5 and 6 (Hevner, et al., 2004).

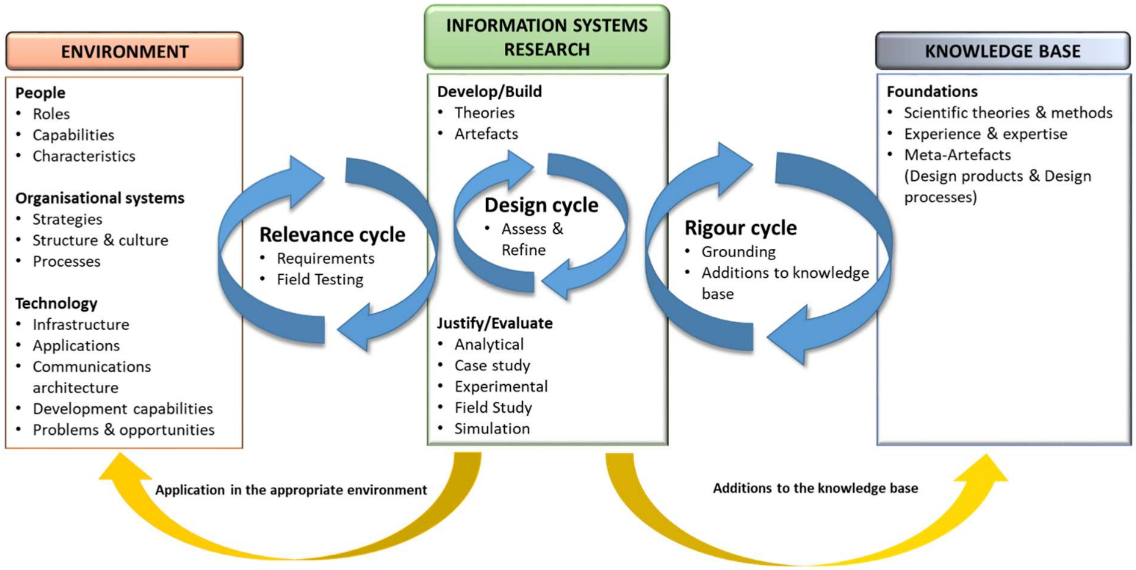

Figure 5: Design Science research approach in Information Systems adapted from Hevner et al. (2004)

Design science is a problem-solving paradigm, and Hevner et.al (2004) presents an "Information Systems Research Framework" in the field of IS as briefly described in Chapter 1 and illustrated in Figure 6, that provides a structured approach for verification and validity with regards to the design science relevance and rigor cycle covering the landscape of IS research (Hevner, March & Park, 2004; Hevner and Chatterjee, 2010).

To this framework, Hevner et al. (2004) developed and added seven guidelines, as indicated in Table 2. These guidelines will be applied to understand, execute, and evaluate the research in this project.

For Hevner et al. (2004) design science is "inherently a problem-solving process". In order to understand a design problem and to come to a solution, the building and application of an artefact are essential. Moreover, design science requires the creation of a 'special' artefact, namely a purposeful and innovative one. It must produce utility for the specified problem. A thorough evaluation is, therefore, crucial.

As is the case with the present study, the artefact cannot merely be a copy of something similar, but should indeed be innovative in order to solve a here to unsolved problem or solving a known problem more efficiently. In this regard the example and focus of the research design can be seen as two folded (1) to create a framework (which is the artefact) (Kotze, et al., 2015) for quality programme review and (2) to incorporate the LMS feature as part of the framework process to optimise the usability thereof. In the case of University ABC, none of these two aspects is institutionalised to report on programme effectiveness and student success. Consequently, this research aims to rigorously define and develop the artefact, present it formally to University ABC for consideration for implementation and in this process, be consistent to make the artefact valid, reliable, and credible. After a solution has been found through the application of the artefact, the results will be communicated effectively, to both the academic staff and academic support staff (technical audience), critical stakeholders for implementing and managing the framework (managerial audience) and other partners still to be identified through the Design Science Research process. In the present research, this would also mean communicating on the "How" to apply the results and solution of the research in University ABC environment.

Several excellent models and frameworks exist for guiding IS researchers in the Design Science Research process. This study used Hevner et al.'s. (2004) work as they provide a process perspective for their 'Information Systems Research Framework' (Figure 6). The researcher could identify with this approach as the framework provides the sequence in which the existing project's research process would unfold.

Figure 6 illustrates further the key design research elements of Hevner's Design Science Research approach, also referred to as the Design Science Research process. Regarding the role and difference between Design Science Research approach suggested by Hevner et al. (2004) and the Design Science Research cycle suggested by Vaishnavi and Kuechler (2015) and the relevance thereof for IS was demystified for this study through the critical viewpoint of Hevner's statement that "all three cycles of the design science approach have to be present and identifiable in a Design Science Study (Hevner et al., 2004)" such as the present study.

In Figure 6, these three cycles are illustrated and briefly described below to position the current study within this framework.

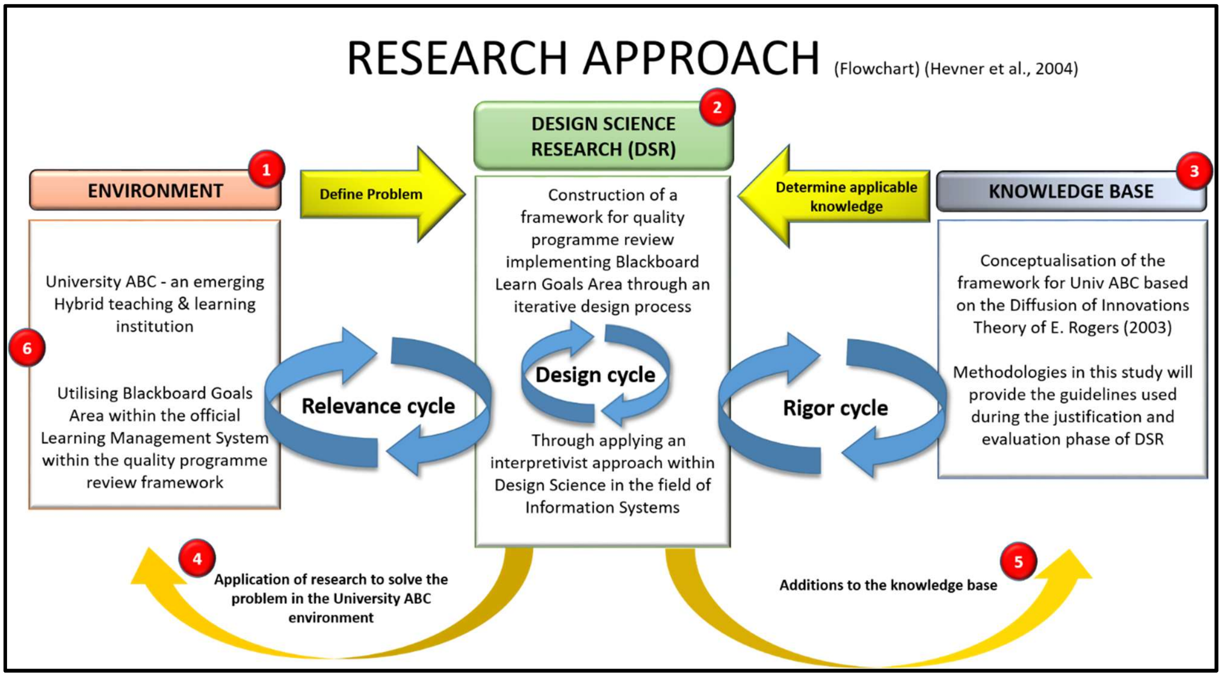

Figure 6: Process flow of the Design Science research approach as applied to this project (Hevner et al., 2004)

The **outer framework**, indicated by the black border, in which this Design Science Research is conducted and positioned, represents society and societal factors such as the South African Department of Higher Education landscape, other universities, nationally and internationally. The numbers in Figure 6 illustrates the description as presented in the Design Science research approach (Hevner & Chatterjee, 2010):

- **Number 1:** The first cycle refers to the '**Environment'**, where the problem is identified, within the context of University ABC and includes aspects of the people, the organisation and the technology in the context of University ABC.
- **Number 2:** The second cycle refers to **'IS (Information Systems) research'** that is done at University ABC and includes the development and evaluation of the artefact through the research elements of the Design Science Research approach.
- **Number 3:** The third cycle represents the **'Knowledge base'** which includes the foundations of raw data; scientific theories and methodologies; experience and expertise; and meta-artefacts design products and design processes. The

knowledge base refers to both existing knowledge, as well as that which is needed to accumulate new knowledge through reflection, design, development, suggestion and improvement to the artefact. The knowledge base includes: the 'Diffusion of Innovations Theory' of Rogers (2003) and serves as the scientific foundation; the researcher's role as education consultant in University ABC and the knowledge she draws from the participating lecturers and academic support staff is the experience and expertise she brings to the study; existing Information Technology artefacts such as the LMS and BbGA and the processes informing their implementation.

- **Number 4: 'Business needs and applicable knowledge'** for the present project refer to the need for the development of a quality framework for programme review utilising an LMS, conditionally termed PAIR*,* an acronym for Programme Outcomes Alignment, Implementation and Reporting.
- **Number 5: 'Additions to the knowledge base'** should entail the contribution the present project could make.
- **Number 6: 'Application in the appropriate environment'** means for the existing project not only the development of an artefact*,* PAIR but also its application within University ABC.

Hevner and Chatterjee (2010) expand and refine the relationship between the three-cycles by including three integral research cycles, namely the '**relevance cycle',** the **'design cycle',** and the **'rigour cycle'**. The relevance cycle in this project links University ABC environment where the research is conducted with the requirements of the study as input and at the same instance gives criteria for acceptance for the evaluation of the research results. The output, in this case, the research results gathered from the research is then returned to the environment through this relevance cycle for the application of the artefact and its instantiation.

Through the rigour cycle, the researcher has the opportunity to connect the Design Science Research phases and the activities embedded in these phases with the knowledge base.

The **Design Science Research approach** (Vaishnavi & Kuechler, 2005) with its five phases, (indicated in the green area of Figure 7) is embedded in the IS Research cycle as illustrated in Figure 7. The five phases are (1) Problem awareness, (2) Suggestion, (3) Development, (4) Evaluation and (5) Conclusion. The black arrows indicate the workflow (which is the knowledge gained through using the process flow of Design Science Research). The knowledge flow is indicated by the blue arrows and applies to the study as a whole.

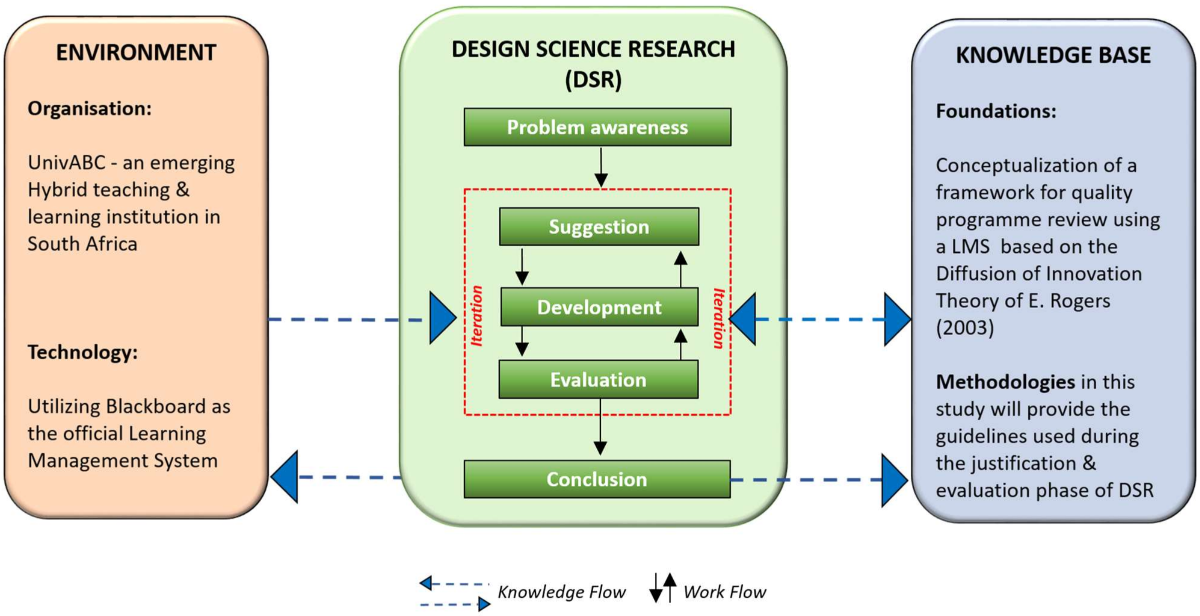

Figure 7: Design Science Research (DSR) approach embedded in the Information Systems Research cycle

The case studies as presented in Chapters 5 and 6 are incorporated to contribute to the design and development of the artefact (framework) and are outlined in more detail in alignment with the Design Science Research phases in Section 2.3

Although this research is consistent in the use of Design Science Research as proposed by Hevner et al. (2004) and Vaishnavi and Kuechler (2015) the iterative nature of the design science research process as introduced by Peffers et al. (2007), are acknowledged. Readings on Design Science Research showed that authors in the field of Design Science and Design Science Research incorporate, or place emphasis or have additions to the work of Peffers (2007). In this regard, one of the critical criteria and reasons for following the work of Vaishnavi et al. (2015) was the focus and emphasis they place on the evaluation phase of the Design Science Research process.

For this study to be relevant and be able to contribute to a solution in University ABC and the broader higher education landscape in South Africa, the researcher had to use a research paradigm and methodology with robustness concerning the evaluation of the artefact. Peffers et al. (2007) acknowledged the work of Vaishnavi and Kuechler by stating: "Solutions vary from a single act of demonstration to prove that the idea works, to a more formal evaluation of the developed artefact" (Peffers et al., 2007).

Through the work of Vaishnavi and Kuechler, this solution (the framework) can be elevated, to a level of adoption for University ABC because of the rigour that the evaluation phase of Design Science Research is conducted in. In Chapter 8, the guidelines provided by Vaishnavi and Kuechler (2015) will be used for evaluating the framework.

The next section will describe the data collection and strategies used for this study.

2.2.5 Data collection method and strategy

- ***Case Study***

The **case study** selection was made through convenient sampling (Oates, 2008) and the target population at University ABC. By implication, this means that respondents can be selected that are convenient for the study, meaning accessible and quick to reach. It will also refer to respondents who require an innovative solution for their existing problem that can be related to the study, and those who are willing to participate in the research (Oates, 2008).

PowerPoint presentations were used (Appendix C-2) at four occasions to present the Framework to the two departments which formed the two case studies, as well as the instructional designers, education consultants and the management of the unit where the BbGA resides in University ABC. A short survey was administered to collect data on the proof of concept of the framework. The completion of the survey was not compulsory. However, twenty six participants provided their qualitative and quantitative feedback and their responses were collected and analysed. The PowerPoint presentation and the short survey were used as an interim evaluation step before the final evaluation of the proposed framework to establish if the framework needed some primary design and development changes. The questions asked in the survey and report on the results obtained are summarised and presented in Section 6.5.1 (See also Appendix C-5).

- ***Interviews***

There are **three types of interviews** (Oates, 2008) to gather data to inform the design of an artefact. The first type of interview is a ***structured interview*** that comprises of pre-defined questions, ensuring that they are standardised and identical so that more than one researcher can administer them. The second type of interview is that of an ***unstructured interview*** where the researcher has less control over the direction of the conversation, but it leaves a space for her to form and develop her ideas and opinions as well as behaviour and beliefs about the topics and themes that were presented for research. The participants might experience unstructured interviews as less invasive, leaving the opportunity to have discussions without any interruptions (Oates, 2008). The third type of interview, which were used in this study, is a ***semi-structured interview.*** Through this style of interviewing, it provides the researcher with an opportunity to have a list of topics available that needed to be covered. These questions are less strict in the order they are administered, and one can add additional questions throughout the conversations.

The following semi-structured questions where submitted as part of the application process for ethical clearance for this study. These questions were used to guide informal and formal interviews, dialogues and discourse about the research topic and for feedback throughout the study:

Question 1: Do you have a process or framework in place for programme review as part of your accreditation review process?
Question 2: In the absence of a framework or process for programme review, how do you align your teaching, learning, assessment with the programme and Accreditation Board outcomes?

Question 3: If you do have a process or framework in place, can you please share how you implement, monitor and track the process for programme review with specific reference to the different steps involved?
Question 4: Which IT/ICT/LMS or computer programmes do you use for programme review and reporting to the Accreditation Board?
Question 5: How does your programme inform students on how they are performing against the programme outcomes (Example for ABET and ECSA programme outcomes)?
Question 6: What do you know about the Blackboard Learn® Goals Area?
Question 7: How best should a framework be developed to implement the Blackboard Learn® Goals Area in order to align teaching, learning, assessment with programme- and Accreditation Board outcomes within the context of a hybrid university in your programme? (Discussion question)

The type of data that were generated from these interviews informed the reasons why the BbGA has not yet been available or in use by academics, instructional designers and educational support staff at University ABC. The data gathered through interviews, case studies and documentation, provide further clarity on the latter and contributed to the knowledge base to inform the elements/aspects that need to be included in the framework for the implementation of the BbGA. The data gathered through the interaction with the participants can further indicate the level of readiness and level of acceptance of the implementation of the BbGA.

Ethical clearance was initially sought for three programmes in three faculties as a **convenient sample group**, but only two programmes were approached, Bachelor of Commerce in Informatics and Bachelor of Engineering in Mining Engineering in the same faculty at University ABC. Both are Professional Programmes that have been accredited with SAQA and their respective Professional Bodies/Councils.

Table 3 highlights some of the strengths and weaknesses taken into consideration, of the two strategies used as an instrument to collect data and that are relevant to this study (Kemper, Stringfield & Teddlie, 2003):

Table 3: Strengths and weaknesses of case studies and semi-structured interviews

Research Instrument	Strengths	Weaknesses
Case Studies	Can provide more detailed information and are needed to deal with creativity, innovation and context. The focus is on in-depth data based on a particular context. The emphasis is on exploration and therefore makes it a comparatively flexible method of scientific research. Broad questions can be narrowed somewhat instead of predicting the outcome before the research is finalised.	Might be challenging to analyse due to researcher subjectivity and lack of rigour. Usually, data is based on qualitative, subjective data which only makes it generalisable to a particular context. Ethical considerations for the origin of the data are paramount.
Semi-Structured Interviews	Suitable for measuring attitude and other content of interest relevant to the study. Can provide in-depth information and provide an opportunity for interpretive validity. There is a quick turnaround via telephone or consultation. Able to use with a probability sample. Ideal for exploration and confirmation.	If in-person – it can be time-consuming and expensive. Measures in need of validation and data analysis can become time-consuming with open-ended items. Anonymity will be perceived low by respondents. A possibility of researcher and respondent reactive effects is present.

2.3 DESIGN SCIENCE RESEARCH: PLAN AND DESIGN

This section of Chapter 2 will outline the research plan (Hevner, et al., 2004) and design (Vaishnavi & Kuechler, 2015), as extracted from the Research Design section of the research pathway under Section 2.2. As indicated in Section 2.2.4, a research design affords the researcher to indicate her research plan to fulfil the research aim and objectives. This study will follow a Design Science Research (Vaishnavi & Kuechler, 2005) approach of which the five phases of the approach is embedded in the Design Science Research second cycle called IS Research as indicated in Figure 7 under Section 2.2.

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2.3.1 Introduction to Design Science Research

The research departure point for this project positions itself in an approach well known in the field of IS, namely Design Science Research. As the authors of the seminal article "Design Science in Information Science" state: "The design-science paradigm seeks to extend the boundaries of human and organisational capabilities by creating new and innovative artefacts" (Hevner et al., 2004), the latter being one of the objectives of the present study. As Hevner et al. (2004) put it: "In the design-science paradigm, knowledge and understanding of a problem domain and its solution are achieved in the building and application of the designed artefact." Through the Design Science Research approach and process of this study, one will, in addition to the contribution of an artefact, aim to position the knowledge contribution to the knowledge base already at the onset of this study. Therefore, the second objective for choosing Design Science Research for this research is to contribute to the existing body of knowledge.

Design Science Research in IS only really started to emerge in 2004, and a pool of sound referenced publications saw the light over the past sixteen years of which the following authors are referenced in this study: Simon (1996); Hevner et al. (2004); Vaishnavi & Kuechler (2005); Hevner & Chatterjee (2010). To fully understand the magnitude of the journey Design Science Research in IS travelled to date, one needs to grasp a full understanding of how Design Science Research evolved throughout the years. In most cases, the authors and professionals in the field, especially in the field of Design Science

Research for IS, build on each other's contributions, but also provided, with substantial evidence, their points of view by referring to gaps and limitations in Design Science Research as well as areas for further research. To some extent the authors interrogated aspects of Design Science Research such as: the impact of Design Science Research in IS; the status of Design Science Research as a paradigm or as an approach; types of artefacts as an output and practical contribution to Design Science Research, not just in the field of IS with reference to ICT and Information Technology, but also IS within the higher education environment.

2.3.2 Introduction to Design Science Research: Plan and Design

According to March and Storey (2008) IS professionals aim at improving the performance of business organisations to maximise a long-term profit for a firm. They achieve this through the design and implementation of Information Technology artefacts. Managers in industry, often ask the questions on why the ICT they invested in does not increase their firm's value or provide a return of investment? In the same instance, they will also probe the right choice of a correct type of artefact that will address the problem and eventually have the desired effect.

Researchers in IS will typically perceive the last question as a design-based-problem-solving question as opposed to the first question that is seen as a theory-based, causal-related type question. Lee (1999) as cited by March and Storey (2008) argued, that to be able to answer the first question as a researcher in IS, there should be an understanding of the phenomena of the central area of interest of the IS discipline namely the intersection of organisations, people, and information technologies. Theories aiming to explain the principled explanations of these phenomena's has been the focal point in published IS literature for more than a decade. These theories enable managers in organisations to design artefacts that can improve their organisation's performance (Alter, 2008; Benbasat & Zmud,1999) as referenced in March and Storey (2008). Therefore, an answer to the second question within the context of this study would propose a design task that will create and shape an artefact to enable a more desirable outcome and future for quality programme review utilising an LMS at University ABC. The focus of Design Science Research in IS, therefore, is on building and evaluating Information Technology artefacts that go beyond the apparent application thereof in addressing problems that are not perceived to be responsive to the use of computational approaches (Hevner et al., 2004; March & Storey, 2008).

The introduction in the previous paragraph of the underlying assumptions of Design Science Research in IS within a business organisation environment is also applicable to the higher education environment. Within higher education various Information Technology artefacts are instantiated for example human-resources software, student information management software packages, library systems, security systems, assessment management systems, and related to this study, learning management systems. The operational running and decision making processes are often not managed centrally but within the units or departments where it is deployed. In the case of the BbGA, this LMS tool is housed and managed by the Department for Education Innovation at University ABC. However, the academic process and quality assurance of the process inputs and outputs is supposedly the responsibility of another unit or department in University ABC. This scenario contributes to the challenges of implementing BbGA.

As indicated in Chapter 1, this study originated in 2015 when it was found that the official LMS of University ABC has a built-in feature that can assist lecturers with programme outcomes alignment, implementation and reporting. This feature was already known to a few instructional designers at University ABC who investigated the possible affordances for lecturers. The team who investigated the feature was challenged by the design, the use and functionalities of the feature. They further realised that the roll-out of such a feature, in the absence of a framework for implementation and potential policy for the use of the feature, would have serious time, resource and quality control implications.

Instead of searching for other Information Technology solutions to assist lecturers to report on student performance against programme outcomes, it was decided to collaborate with the Department for Education Innovation at University ABC where the LMS feature is managed, and to investigate the design and possible use of the LMS feature and at the same instance develop a framework where the use of the feature can be incorporated as part of the more significant mandate of the teaching and learning strategy of University ABC.

The development and implementation of IS in higher education should, therefore, aim to change existing systems of functioning into more productive and preferred solutions to achieve institutional goals, through actions that can remove the differences between the present state and desired outcome. Therefore, the task of Design Science Research in IS should be problem-focused: “The representation of design problems and the generation and evaluation of design solutions” (March & Storey, 2008). Design Science Research contribution manifests when innovation and utility of the constructed artefact are present during the Design Science Research process. It implies that the research should demonstrate that existing artefacts are, or are not suitable for the identified problem as well as comparing the utility of existing artefacts within the specific context where the research is conducted. In University ABC where the research was conducted, such an example is the BbGA, a feature in the official Learning Management System called Blackboard Learn®.

This research, therefore, aims to find an innovative solution, through the design of an artefact, with the proposed name PAIR *Framework for Quality Programme Review* to address a significant and unsolved problem in University ABC. The problem identified is the underutilisation of an LMS feature that can be implemented as part of the annual quality programme review process to assist lecturers in their programmes to eventually report on the assurance of learning and programme effectiveness at University ABC, which could be generalised for the broader higher education institution landscape in South Africa.

It further aims to evaluate the final framework through the implementation of a workshop facilitated by an international expert specialising in the field of assessment solutions for programme and institutional effectiveness. This workshop forms part of University ABC’s School of Information Technology’s Improvement Plan for 2018/19. The implementation of BbGA as part of an annual quality programme review process is an expected deliverable for the School.

To conclude this section, the BbGA is an existing Information Technology artefact that is researched for its innovation and utility to be incorporated into a framework of which the elements of the framework are in alignment with the characteristics of an artefact in Design

Science Research as will be discussed in the next Section 2.3.3. Against this introduction to the research plan and design, the next section will report on the artefact that is the product (outcome) of the planned Design Science Research process.

2.3.3 Design and development of an artefact through Design Science Research

According to Hevner and Chatterjee (2010) "Design is the instruction based on the knowledge that turns things into a value that people use". Given the knowledge obtained and communicated in Chapter 1 and Section 2.1 to 2.2 about Design Science and Design Science Research it can be established that Design Science Research is a problem-solving paradigm or approach, with the primary objective to develop and bring an artefact to the end-user that can effectively and efficiently solve the known and identified problems within their social context systems.

Well-known authors in the field of Design Science Research (Simon, 1981; Hevner et al., 2004; Vaishnavi & Kuechler, 2005; Hevner & Chatterjee, 2010) agree that an artefact can include:

- ***Constructs*** which signify the language used to communicate the presented problems and solutions.
- ***Models*** that are obtained when constructs are used to build more structured objects. In this regard, Sangupamba et al. (2016) included in their research to identify and categorise subcategories of Design Science Research artefacts, that a framework as a logical structure for organising complex information can be included under a model as an artefact. It further relates to this study as a model exploring the relationships between the problem and the possible components, as well as the effect of the decisions made during the design process, and how this effect the real-world scenario.
- ***Methods*** are guidelines on how to solve the problem based on defined processes. Sangupamba et al. (2016) refer to the methods category as putting all the powerful artefacts together.

- ***Instantiations*** refer to the representation of the implemented and prototyped artefact. In this regard, one can conclude by saying that instantiations operationalise constructs, models and methods. Sangupamba et al. (2016) explain instantiations as "artefacts that are often proposed to assess the feasibility of other constructs, e.g. system designs or methodologies".

With the application of the typology tool of Sangupamba et al. (2016), the researcher can argue that the proposed artefact for this project can be seen as a dedicated artefact as the outcome of the Design Science Research approach in that it will contain aspects of a construct, model, method and instantiation.

In conclusion to the evaluation of a new artefact, Klein and Myers (1999) argue that:

> "A new artefact in a given organisations context affords the opportunity to apply empirical and qualitative methods. The rich phenomena that emerge from the interaction of people, organisations, and technology may need to be qualitatively assessed to yield an understanding of the phenomena adequate for theory development or problem-solving".

Nunamaker et al. (1990) wrote that the process of constructing and exercising innovative Information Technology artefacts could support the design science researcher, to understand better the problem to be addressed by the artefact and the possible achievability of their approach to the solution. Boland (2002) further indicates that the primary focus usually falls on the technology-based design of an artefact, but acknowledge the recent emphasis on the exploration of organisations, policies, and work practices as designed artefacts.

Concerning Boland's quote, one can argue that the designed artefact for this study is not primarily only technology-based, but that it is included as an element or component of the framework as Boland indicated as a 'work practice'. Following the Design Science Research approach, the requirements and suggestions for the artefact are directed by the need in higher education to report on the assurance of learning through the representation of hard evidence. To evaluate the proposed artefact, a workshop was conducted in the School of Information Technology at University ABC as part of their improvement plan for programme effectiveness. The proposed framework was used as the basis for this workshop. The workshop was facilitated by an international expert and education consultant. The evaluation aimed to benchmark the framework against international alike frameworks and processes for programme review utilising technology, more specifically the BbGA.

Through this final evaluation phase of Design Science Research, the research aims to adhere to the requirements for Design Science Research contribution in that (March & Storey, 2008):

- The organisational problem concerning technology are identified and clearly described
- Through the literature review demonstrate that no adequate solutions are existing in South Africa about the knowledge base.
- An artefact will be developed and presented as a new artefact and innovation that can address the research problem.
- Through the development and rigorous evaluation of the artefact being able to assess the utility of the artefact.
- The final workshop report will serve as the delivery of the value added to the knowledge base and higher education landscape.
- Through the recommendations in the report, an explanation of the implications for institutional management and practice will be made possible.

In the next Section 2.3.4, the focus will be on the outline of the Design Science Research cycles and embedded process phases. Furthermore, the development of the artefact through the two sub Design Science Research cycles (DSRc) within the development process phase of the overall bigger Design Science Research cycle, will be illustrated and discussed as it applies to this study.

2.3.4 Outline of Design Science Research cycles as applied to the study

According to Vaishnavi and Kuechler (2015) design research firstly deals with the process of design; and secondly, with the product of design, which is called the artefact. The design involves iterations which move through five phases as illustrated in Figure 8.

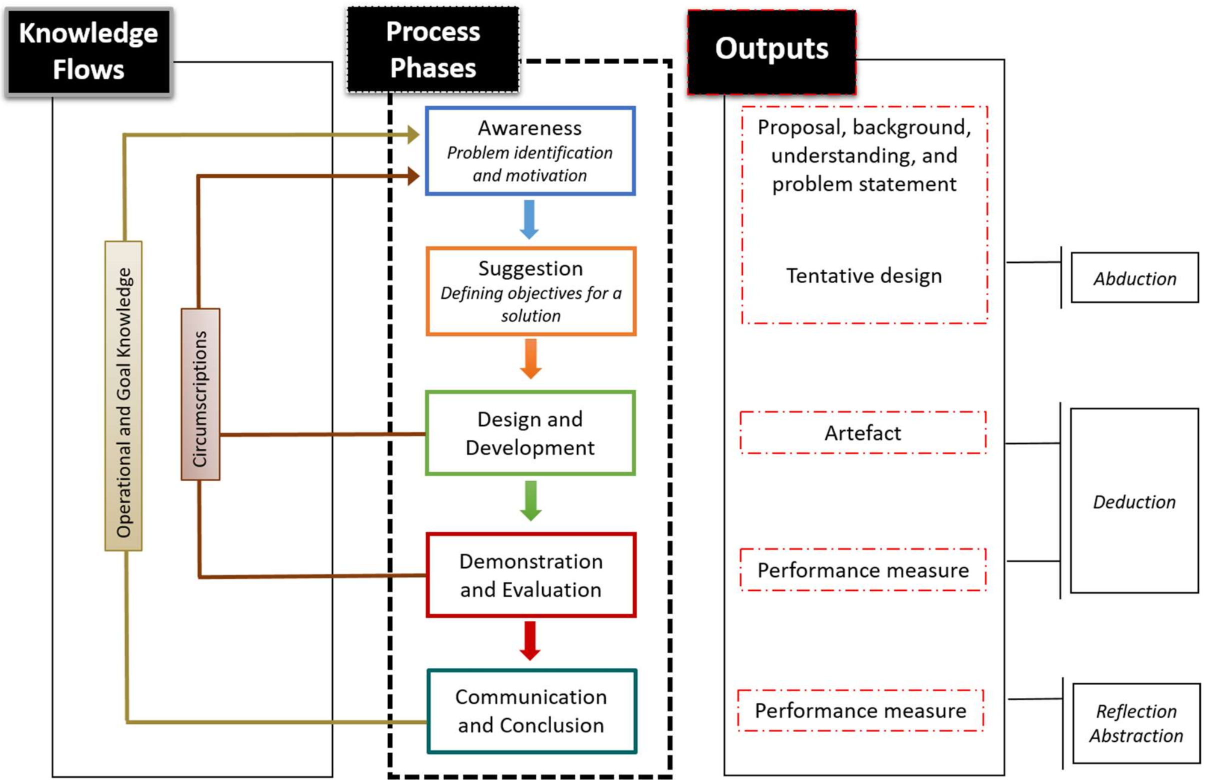


Figure 8: Design Science Research Framework indicating knowledge flows, process phases, outputs and cognitive processes

In addition to the artefact as a product of Design Science Research, the knowledge contribution is an essential focus of Design Science Research. Figure 8 illustrates the Design Science Research Framework with specific reference to the knowledge flows, process phases, anticipated outputs, and cognitive processes involved, which will be described in more detail in the next paragraph. At each phase, the expected **output** is anticipated, which is referred to as the research proposal, the tentative design, the artefact, and the performance measure.

Fischer and Gregor (2011) argue that little academic investigation has been done on the primary forms of reasoning underlying Design Science Research models. However, the authors indicate that there are **three primary forms or types of reasoning processes** embedded and taking place in the research design cycle, that of deductive reasoning, inductive reasoning and abduction (Fischer & Gregor, 2011).

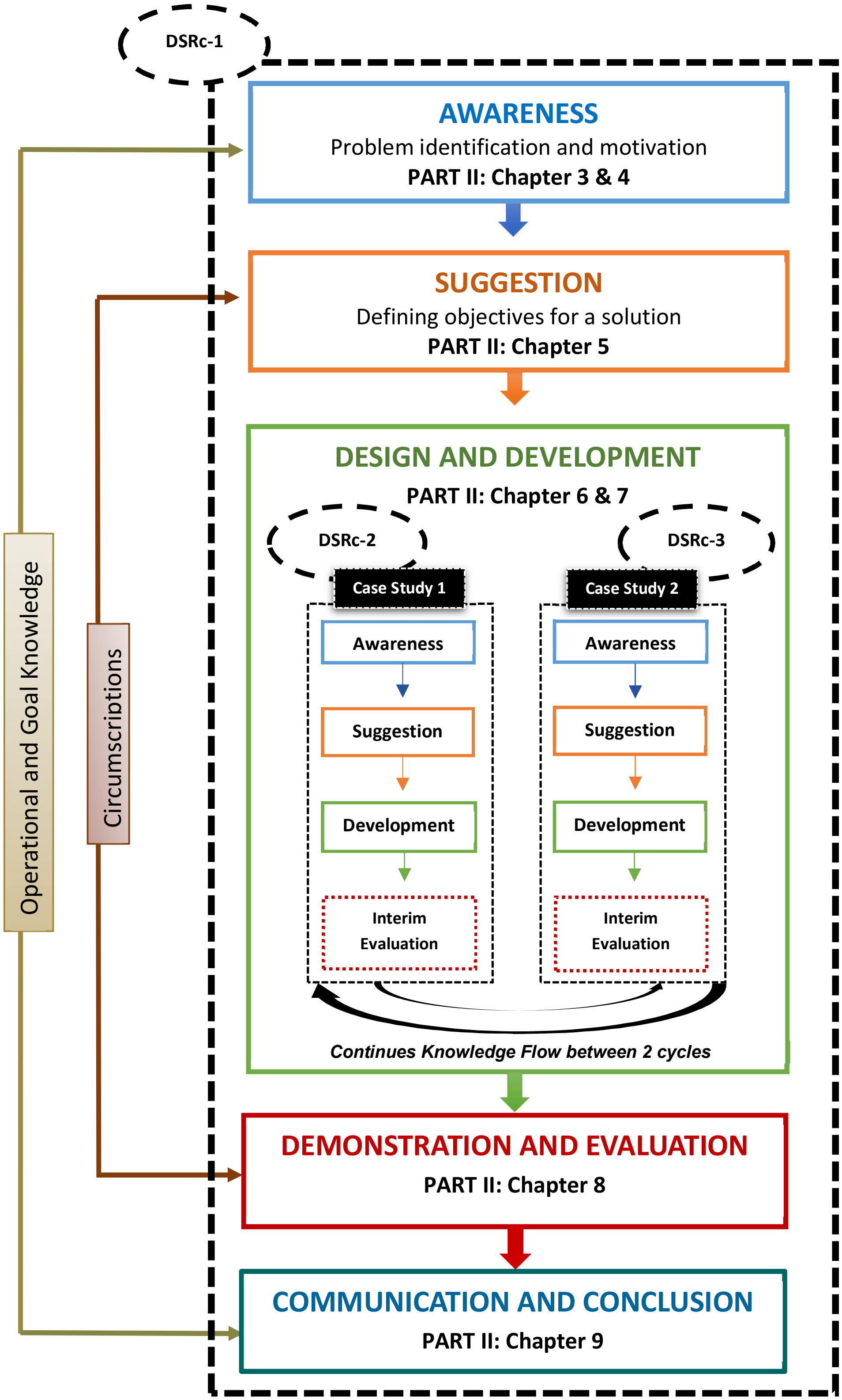


Figure 9: Design Science Research Cycles and Phases as applied in this study

For clarity and relevant to this study, there is a subtle difference between abductive reasoning and inductive reasoning in that both are seeking the truth through evidence that is likely but not necessary guaranteed. Vaishnavi and Kuechler (2005), on the other hand, refer in their output flow to the concepts of **abduction, deduction and abstraction** as illustrated in Figure 9.

The application of abduction, deduction and abstraction, and how these processes contribute to new knowledge, are termed '**cognitive processes in the DSR process',** (Vaishnavi & Kuechler, 2005) and are briefly discussed below as applied to this study:

- The study begins with the awareness of the problem through observation and consultation and try to find through interpretation, logic and simple explanation, solutions (tentative design) to the problem. The suggestions proposed for the problem-solution are then **abductively** drawn from the current body of knowledge, and the theory one brings to the study. This reasoning, as indicated in the previous paragraph, is closely linked to **inductive reasoning** that is the research approach to this study.
- Through the design, development, demonstration and evaluation of the artefact, additional knowledge can **deductively,** through iterations with the suggestion phase, contribute to inadequate suggestions or fill possible gaps in order to solve the problem. Deductive reasoning research refers to as working from the more general to the more specific (Babbie, 2007). The basis of the iterations indicates the flow from the design and evaluation phase back to the awareness phase through circumscription. The process of deductive reasoning was not so prominent in this study, as the design process is characterised by two additional Design Science Research cycles in the form of case studies, of which the outcomes of the evaluation results informed the development of the proposed framework. The evaluation phase of the main outer cycle of the Design Science Research process, was the critical point in this study, as the outcome of the evaluation phase gave direction for the adoption of the framework.

- The action of **reflection and abstraction** happens during the conclusion phase, and towards the end of the research cycle. During this phase, the analysis and conclusion are derived, and knowledge contributions of operational principles are made. It is also in this phase where an indication of the overall contribution of the study is argued and suggested.
- The knowledge contribution as a result of the knowledge production flow in the five phases of Design Science Research is indicated as **operational and goal knowledge** (indicated by the light green arrow in Figure 8) and **circumscriptions** (indicated by the brown arrows in Figure 8). Circumscription is clearly described by Vaishnavi & Kuechler (2015) as follow:

> “The circumscription process is especially important to understanding design science research because it generates understanding that could only be gained from the specific act of construction. The applicability of knowledge can only be determined through the detection and analysis of contradictions – in common language, the design science researcher learns and discovers when things do not work out ‘according to theory’. It happens many times not due to a misunderstanding of the theory, but due to the necessarily incomplete nature of ANY knowledge base. The design science research process, when interrupted and forced back to *awareness of the problem* in this way, contributes valuable *constraint knowledge* to the understanding of the always-incomplete-theories that abductively motivated the original research.”

Fischer and Gregor (2011) make a distinction between descriptive knowledge and prescriptive knowledge. This study contributes prescriptive knowledge back to the knowledge base as it postulates the ‘knowledge of artefacts that are a product of human activity’. Whereas descriptive knowledge refers to knowledge about a ‘naturally occurring phenomena’.

- The **five process phases of Design Science Research** with its associated outputs according to Vaishnavi and Kuechler (2015) that were deployed in this study can be described as follow:

Phase 1: Awareness

The awareness of an ‘interesting’ problem can come from various and different sources. In this research it was established through various consultations with academics, attending teaching and learning meetings, readings on higher education policies and readings from accreditation reports, which universities such as University ABC, with specific reference to professional programmes, have to report on the assurance of learning. More specific, two professional programmes at University ABC had to provide proof of evidence that their programme outcomes are in alignment with assessment, content and student activities. In one of the programmes, a rigorous annual programme review process had to be enhanced in the department. It was further established that University ABC has an LMS feature available that can support these two programmes.

The **output** presented for this phase was the research proposal to indicate the intention of the study through a brief outline of the background to the study, the understanding of the research problem and the research statement.

Phase 2: Suggestion

The suggestion phase, also seen as a creative phase, follows directly the proposal where the problem statement directs the suggestion of which the **output is a tentative design.** For this study, the tentative design will focus on the development of a quality programme review framework, of which the design and development of the components of the framework are informed by the theory of Diffusion of Innovations (Rogers, 2003). The implementation of an LMS feature will form part as one of the components of the design.

Phase 3: Development

The aim and function of the development phase are to develop further and where applicable implement the tentative design in the form of an **artefact that forms the**

output of this phase. In this study it refers to the proposed PAIR *Framework for Quality Programme Review. A partnership toward student success*. Figure 9 illustrates the holistic picture of the development cycles and phases of this study and will be described in more detail in the next paragraph. The different chapters of Part II of this thesis as it relates to this study is indicated under each process flow phase.

In Figure 9, the outer cycle represents the first and main Design Science Research cycle of the development of the framework. The abbreviation for this main cycle is specified as DSRc-1 (Design Science Research Cycle – number 1). In the development phase of DSRc-1, there are two additional Design Science Research cycles namely DSRc-2 (which relates to case study one - Mining Engineering) and DSRc-3 (which relates to case study two - Informatics). Both these two cycles have the same five Design Science Research process phases included.

Case study one (Mining Engineering) initially generated most of the LMS feature knowledge and fundamental knowledge of the components to be included in the framework that was applied to case study two (Informatics). Case study two in return contributed knowledge of the proposed framework to case study one to improve on their programme review practice and the use of the LMS feature that can assist in the reporting of their programmes' assurance of learning.

Phase 4: Evaluation

In the evaluation phase, indicated as the main evaluation of DSRc-1, the artefact is evaluated against the criteria as set out in the proposal that was the output of the awareness phase. The criteria for the design that will inform the decision to adopt the artefact, is based on the characteristics of an innovation, according to Rogers's Diffusion of Innovations Theory (Rogers, 2003). An interim demonstration and evaluation phase was included for DSRc-3 as a proof of concept.

The main evaluation phase in DSRc-1 was conducted through a workshop conducted by an international specialist in the field of this study. The artefact was benchmarked against the international practice on quality programme review utilising an LMS as a **performance measure and output** for the evaluation phase.

Phase 5: Conclusion

The conclusion phase indicates the end of a research cycle or research effort and is often referred to as the ‘result of satisficing’ – meaning, that although the research is finished, there might still be room for improvement, but for the research, it is ‘good enough’. In the concluding phase of DSRc-1, the artefact titled*:* PAIR *Framework for Quality Programme Review Utilising an LMS* was confirmed. The research outcomes were reported in the final chapter of this project. As an outcome of the evaluation phase, possible implementations and contributions of the artefact were proposed as well as future research were suggested to advance the development of the artefact. The results were further communicated through two conference presentations and proceedings, one lecture note as well as a contribution to an online article in an international LMS magazine.

In Section 2.3, an outline was provided for the Design Science Research cycles, and process phases planned as it applies to this study. The complete research cycle, including the main cycle and the two sub-cycles, were described where design science was applied to create an artefact for the research problem based on the theory of Rogers’ Diffusion of Innovations Theory. Every attempt was made to align the IS Design Science Research with real-world problems and real-world production experience as recommended by March and Storey (2008).

2.4 ETHICS

Hennink et al. (2011) indicate that ethical considerations throughout the design cycle can focus on some questions: “Who will benefit from the research? What will the research give back to the community? How does the researcher plan to enter the project community? How will the researcher present herself to the project population?” All researchers are guided by a code of ethics (Creswell, 2014). Every attempt was made to adhere to the following principles while conducting the research, namely: confidentiality, anonymity, informed consent from participants and full disclosure of information about the research. Ethical considerations are limited to:

- Obtaining permission for using two professional programmes from two different departments at University ABC for this project.
- Obtaining permission by participants through semi-structured interviews for taking part in the research and permission to use the data and results for the research.
- Obtaining permission for using data, documents and personal assignments gathered through attending a Curriculum Development Short Course (by Rhodes in 2015) and attending the Assessment Institute Conference in Indianapolis (October 2015)

Due to the nature of applying Design Science Research in real-world scenarios, the researcher took extra care and are cognisance of confidentiality and personal viewpoints. All interviews and workshops conducted were in collaboration with the heads of departments and programme coordinators and with verbal consent, as the workshops presented, interviews held and individual consultations contributed to the academic work and practice and enhanced teaching and learning initiatives at University ABC.

2.5 CONCLUSION

As indicated in the introduction of Chapter 2, the desire for knowledge about the world, the search for answers to complex problems and challenges, and finding solutions for unresolved issues, is at the core of education. Research provides the opportunity to find answers to some of the questions and issues that might be unknown.

In this regard, research provides a structured and systematic process for gathering data and an opportunity to provide answers that are valid and reliable. In Chapter 2, the aim is to create this cognitive map and research pathway, by outlining the research design and methodology and concluded with the ethical consideration in doing this study.

In the chapters to follow the intent is to align the research design and methodology to well-referenced authors and professionals in the field of IS concerning critical recommendations and suggestions of:

- the use of frameworks and guidelines on how to conduct Design Science Research in IS;
- aspects to consider for evaluation of the artefact, and
- the contribution to Design Science Research in the field of IS, with specific reference to the practical and theoretical knowledge base.

These recommendations and suggestions will guide the reporting on the research results and outputs in Chapter 9, which will be the concluding chapter of the study and the final phase of the main Design Science Research Cycle.

The section to follow, **Part II**: **Development of the LMS based Framework for Quality Programme Review in Higher Education (Chapter 3 to Chapter 9)** will deal with the design and development of the framework.

PART II: DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION

PART I

OVERVIEW OF STUDY

Chapter 1: Introduction

Chapter 2: Research Design and Methodology

PART II

DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION

Chapter 3: Quality Programme Review in Higher Education

Chapter 4: Learning Management Systems in Higher Education

Chapter 5: Introduction to the Diffusion of Innovation

Chapter 6: Design and Development of the Framework

Chapter 7: Outline and Components of the PAIR Framework

Chapter 8: Evaluation and contribution of PAIR Framework

Chapter 9: Conclusion

Part I presented a background to the study by introducing in **Chapter 1**, the research approach, purpose of the study, the problem statement followed by one main research question and five research objectives. The first chapter also highlighted the delineations of the study and the underlying assumptions for this study. The chapter concluded with how the research will be addressed and outlined the sections of the thesis. **Chapter 2** outlined the research design and methodology used in this study.

Part II of this study deals with the development of the LMS based framework for quality programme review in higher education and are covered through **Chapter 3 to Chapter 9,** as illustrated above.

For the purpose of the Design Science Research approach followed in this study, **Part II** is further divided into **three Design Science Research cycles,** as depicted in Figure 10 and summarised in the next paragraph.

The Design Science Research approach within IS Research was utilised for this study. Design research is iterative and incremental, and a design study consists of one or more iterative cycles with five phases in each cycle: (1) Awareness (2) Suggestion, (3) Development, (4) Evaluation, followed by a (5) Conclusion. For this study, Part II is divided into three cycles:

- The **first cycle**, forming the main outer layer of the study, speaks to the literature that positions the study within the context of South African higher education (**Chapters 3 to Chapter 5)**, and forms the awareness and suggestion phase of the first cycle. The literature review provides a natural line of thought that leads up to the purpose of this study which focuses on the development of a framework for quality programme review in higher education utilising an LMS. More specifically the Blackboard Learn® Goals Area (BbGA), that affords lecturers to report on the alignment of content, student activities (teaching and learning) and assessment with Professional Programme Outcomes and Professional Board Accreditation Criteria.

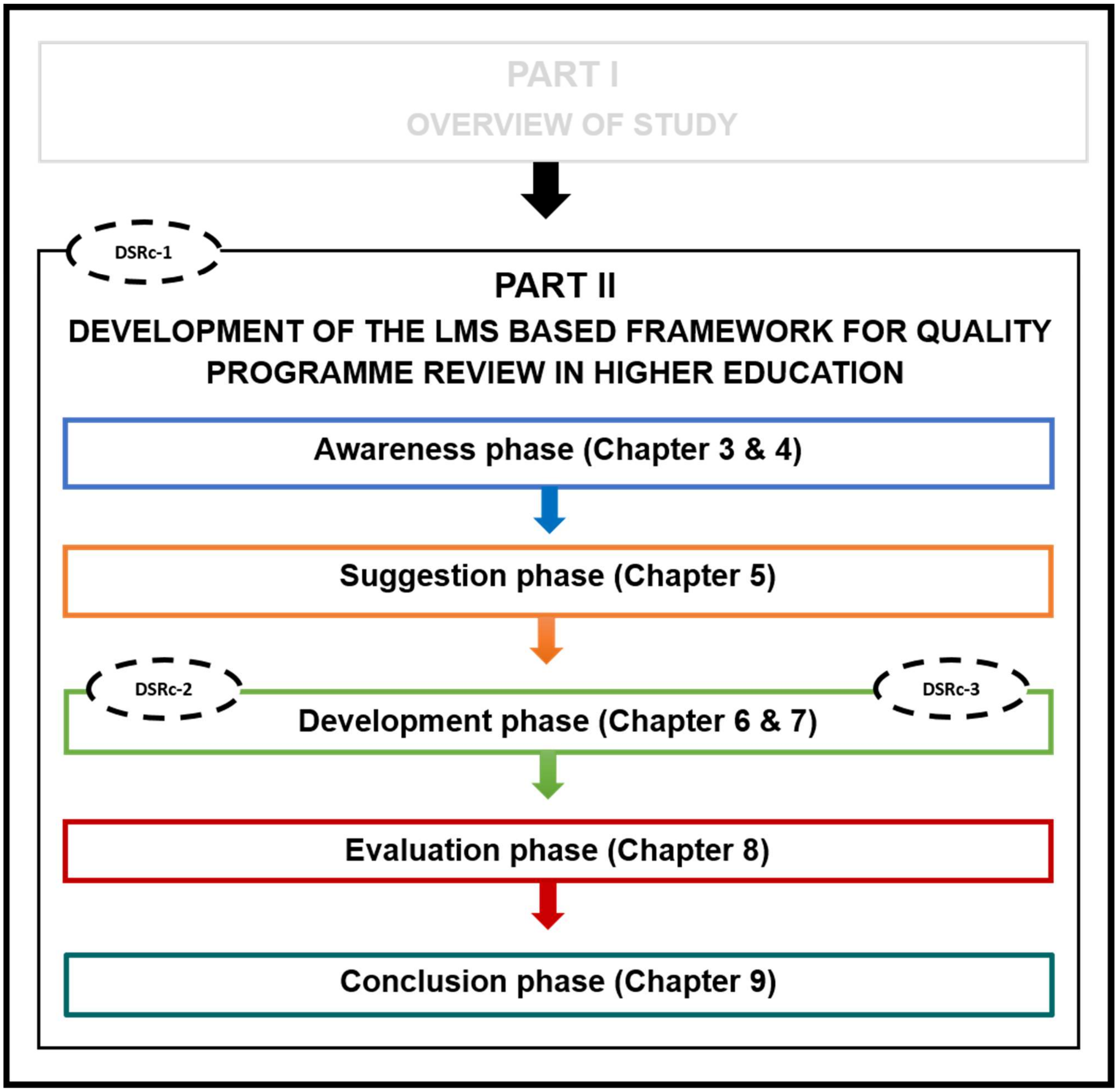
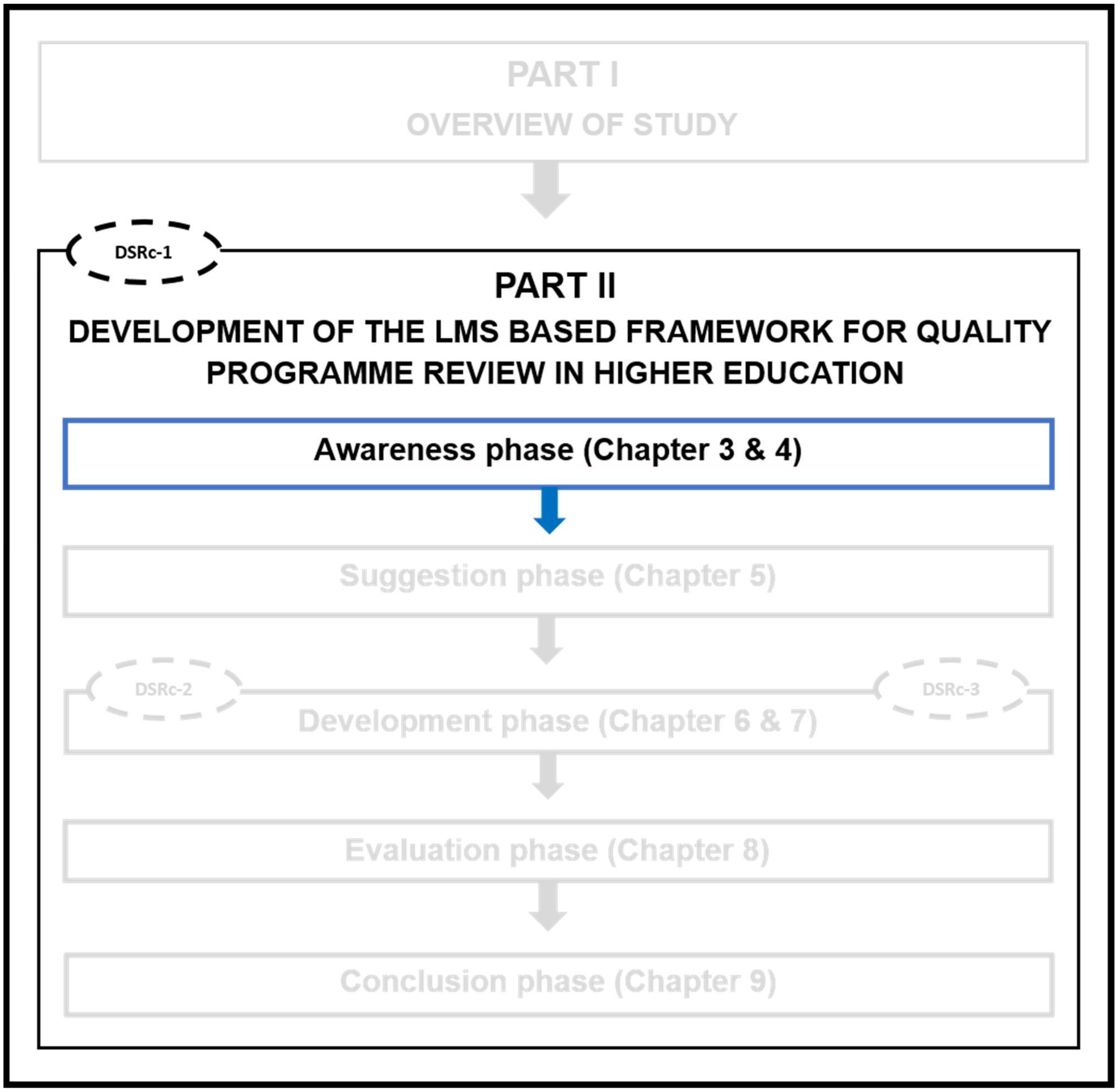


Figure 10: Outline and structure of the study with specific reference to the 3 Design Science Research cycles (DSRc) under Part II

The first cycle is guided by the main research question and the research objectives which help to narrow-down and focus the research in order to come to findings which would be relevant to the knowledge base, as well as to the practice of IS in higher education. It also gives direction to the research approach for the study as a whole, from the awareness phase right through to the conclusion phase. The outline and components of the framework are dealt with in **Chapter 7** (development phase), followed by the evaluation of the framework in **Chapter 8** (evaluation phase). Part II ends with **Chapter 9** as the conclusion to the entire study, which also represents the conclusion phase of the first Design Science Research cycle.

- The **second and third cycle** of the study, which details the development of a framework for quality programme review in higher education utilising an LMS is documented in **Chapter 6**. These two cycles are embedded in the first cycle under the development phase and provide more detailed information about the development of the framework.

The next section is Chapter 3, which is guided by the first research objective, namely: To define a framework for quality programme review.


PART I
OVERVIEW OF STUDY
DSRc-1
PART II
DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION
Awareness phase (Chapter 3 & 4)
Suggestion phase (Chapter 5)
DSRc-2
DSRc-3
Development phase (Chapter 6 & 7)
Evaluation phase (Chapter 8)
Conclusion phase (Chapter 9)

3 QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION

Research Objective 1: To define a framework for quality programme review.

3.1 INTRODUCTION

According to the Council on Higher Education (2015) higher education means "all learning programmes which lead to qualifications which meet the requirements of the Higher Education Qualification Sub-Framework, which is a sub-framework of the National Qualifications Framework as contemplated in the South African Qualifications Authority Act, 1995 (Act No. 58 of 1995)".

In most countries, the quality of higher education is warranted by government agencies (Martin, 2018). In order to define a framework for quality programme review at a higher education institution such as University ABC, it is argued that the higher education landscape for this research, should first be contextualised in terms of the concepts, criteria and requirements of the external bodies that are responsible for approval for the offering of existing and/or new programmes at higher education institutions in South Africa. In this regard, the Department for Higher Education and Training (DHET) is responsible for giving clearance to an institution to offer a learning programme according to the institution's approved Programme Qualification Mix (PQM). The function of the Higher Education Quality Committee (HEQC) under the Council on Higher Education (CHE) is responsible and oversees the process for accreditation of the qualification and programme. It has a disciplinary panel of experts that review qualification and learning programme submissions against the Council on Higher Education's programme criteria. The South African Qualification Authority (SAQA) is responsible for the registration of qualifications and the learning programmes recorded against the qualifications on the National Qualifications Framework (NQF) (HEQC, 2001).

To be able to define, and as indicated in Chapter 6, design and develop, a framework for quality programme review in higher education, this chapter considers five main concepts and focus areas to be interrogated namely, *accreditation* (Section 3.2.1), *quality assurance* (Section 3.2.2), *student success* (Section 3.2.3), *assurance of learning* (Section 3.2.5), and *programme review* (Section 3.2.7). Building on these definitions as it relates to this study, the theory of Constructive Alignment (Biggs, 2003) are discussed in Section 3.3. This theory will inform the concepts to be included in the proposed framework. Chapter 3 will conclude with the definition of a framework (Section 3.4) and confirm why a conceptual framework was chosen for this study.

3.2 QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION

The key concepts often used within the context of the specific countries higher education landscape (Martin, 2018) are *accreditation, quality assurance, external review, programme review, programme assessment, programme evaluation, assurance of learning* and *student success*. To enable the design of a framework for quality programme review as proposed in this study, the concepts mentioned in Section 3.1 are firstly defined and contextualised.: *accreditation; quality assurance*; *student success, assurance of learning,* and *programme review*. Section 3.2.3 gives reference to phase one of the Quality Enhancement Project, which replaced the accreditation cycle process for all public Universities in South Africa of which the project aimed to improve student success (Section 3.2.4). Section 3.2.5 concludes with an overview of the current quality initiative at University ABC.

3.2.1 Defining Accreditation

In South Africa, the concept *accreditation* relates to all the bodies and councils, as mentioned in Section 3.1 in respect of an institution and the qualifications and learning programmes offered by that institution. Accreditation also refers to a recognition status granted to a programme for a specific period once the quality council approved that the programme meets the minimum standards of quality (Council on Higher Education, 2015), by implication protecting students from poor-quality programmes.

In some cases, this context is not much different from other countries, such as the United States of America (Martin, 2018, Suskie, 2015). Although there are perceptions that accreditation can be perceived as insufficiently rigorous; inconsistent and unreliable; not putting enough focus on meeting stakeholders needs; and often perceived as taking too much time. Suskie (2015) argues that "accreditation remains a well-regarded seal of approval on college quality" and can have a high impact where necessary improvements are needed. Already in January 2002 the author of the report titled: *A New Academic Policy for Programmes and Qualifications in Higher Education* (Luckett, 2002) argued that there is a changing context for higher education globally with one of the expectations being that institutions should focus on the employability of its graduates (Bauer, et al., 2014; Boud & Falchikow, 2006; McMurray, et al., 2016; Jackson, 2016). In answer to this global agenda many countries such as Europe, New Zealand, Australia and the United Kingdom, developed formal national qualification frameworks for registration of qualifications in order to identify articulation possibilities with ease within national and international boundaries (Luckett, 2002). One of the critical characteristics that a qualification framework in higher education should demonstrate is that it will guide internal and external quality assurance agencies to enable consistent and reliable evaluation, accreditation and approval of qualification standards and the programmes that deliver these standards (Luckett, 2002).

In South Africa, the Council on Higher Education is an independent statutory body established in May 1998 regarding the Higher Education and National Qualifications Framework Act. Through its permanent committee, the Higher Education Quality Committee (HEQC), it is responsible for quality assurance and promotion in higher education. Four inter-related components conceptualise the Higher Education Quality Committee's role, namely: programme accreditation; national reviews; institutional audits; and quality promotion and capacity development. Also, the Council on Higher Education works in close collaboration with professional bodies such as the Accreditation Board for Engineering and Technology (ABET) and the Engineering Council of South Africa (ECSA) to ensure the synergy and alignment of National Qualifications Framework levels and level descriptors for the accreditation of professional programmes. In this regard, accreditation respects and facilitates the diversity and complexity of higher education institutions (Suskie, 2015; Cross & Adam, 2007).

3.2.2 Defining Quality Assurance

In its simplest form in the industry, Panchal (2019) refers to the concept of *quality assurance* as 'process orientated', which is defined as a set of activities that are performed to provide the best possible product or service to its clients. Meaning, through the development process of a product or service, quality assurance activities start to play an integral role (Panchal, 2019).

Quality assurance can be defined in many ways in higher education (Matei & Iwanska, 2016). These authors referred to Harvey and Green (1993). They argued that instead of finding a specific definition for quality, one should instead 'think' about quality as exceptional, consistent, fit for purpose, value for money, and transformation. Quality as consistency is most relevant to this study in that it refers to an approach that view quality as a process that aims for a consistent outcome. Furthermore, this study wishes to 'think' of quality as a fit for purpose where quality is measured by the level of a stated purpose, goal or outcome to be achieved by a department, faculty or institution.

As this study aims to implement an existing LMS feature at University ABC as part of a quality programme review process, Section 6.5 will report on the return of investment for implementing such a feature. As Matei and Iwanska (2016) argue, quality is accomplished when a better outcome can be achieved at the same cost. In the case of University ABC, the LMS feature being researched is an existing paid feature but not utilised. By implication, this means, that the implementation of the feature, potentially could add value if embedded as part of a quality programme review process within an existing training and support structure at University ABC, without any additional software costs, which supports the 'thinking' that quality should also be seen as value for money. Therefore, by adopting the 'thinking' of quality as transformation, this approach will interpret quality as a value-added and empowerment process. These processes will be realised once the proposed framework is adopted and implemented at University ABC.

Kahveci et al. (2012), refers to quality assurance as an integrated approach that covers all the processes in a higher education institution and should support improvements in these processes. Kahveci et al. (2012) and Matei & Iwanska (2016) wrote that the success of a quality assurance system depends primarily on the support of management as institutions are responsible for their quality assurance processes and systems. Essential for this study, it is further argued that IS should integrate with managerial processes to enhance the overall success and production of assessable information based on a common strategy and cost-effective action plan (Kahveci, et al., 2012). According to Welsh and Dey (2002), most institutions lack effective integration of IS with their quality assurance plans and processes. They argue that quality assurance is not only about the measurement of programme quality, but rather how an institution can organise IS to respond through reporting to internal and external stakeholders the information about the performance of programmes. Kettunen (2008) affirms this notion, and indicates that if quality assurance processes and systems are not integrated with Management Information Systems, these quality assurance processes will remain isolated and fail to produce the desired results for quality improvement. Kahveci et al. (2012) indicate that higher education institutions have a need but also an opportunity for an institution-wide application of technology to support and enhance quality assurance processes and systems. Matei & Iwanska (2016) and Suskie (2015) conclude by indicating that an internal quality assurance approach is considered to have a much higher impact on teaching and learning than an accountability-driven, better known as ‘ticking the box’, external quality assurance mechanism such as accrediting agencies.

The role of quality assurance in higher education today is not without challenges, and higher education systems and institutions are more exposed to constant changes. Due to the growth and expansion of the higher education sector, it is inevitable that institutions and the programmes they offer are becoming more diversified (Martin, 2018). This context created concern about the quality of institutions and the programmes they offer (Martin, 2018). Globally external quality assurance mechanisms were established as indicated at the beginning of this section, with institutions responding to quality matters and concerns through positioning internal quality assurance mechanisms for the monitoring and management of quality matters. Quality assurance recently refers to as “quality enhancement” (Matei & Iwanska, 2016), and are linked among others, to national frameworks and quality assurance councils with specific review processes and procedures on institutional but also on a programme level.

The United Nations Educational, Scientific and Cultural Organization's (UNESCO) International Institute for Educational Planning study (Martin, 2018) identified innovative practices and guidelines to assist institutions with the planning, design and development of their internal quality assurance mechanisms, irrespective of the tools or instruments they are using. However, what they found was that the critical success and impact factor (Matei & Iwanska, 2016) for sufficient internal quality assurance depended on the importance of linking any internal quality assurance tools with other institutional functions and policies. As indicated by Martin (2018) in Kahveci et al. (2012), the authors confirm the importance of leadership commitment and stakeholder participation for sufficient internal quality assurance. In the absence of processes, policies, and a partnership at University ABC for the successful implementation of the LMS feature as part of a quality programme review process on programme level, the prediction of the outcome of this study aim to foster a culture of continuous quality programme review towards improved student learning utilising technology.

3.2.3 The Quality Enhancement Project in South Africa

The Quality Enhancement Project in South Africa was launched in February 2014 and replaced the accreditation cycle process for all public Universities. Phase one focused on enhancing the following areas: academics as teachers; student support and development; the learning environment; and course and programme enrolment management. The project aimed to improve student success, which the council defined as, "enhanced student learning to increase the number of graduates, each with attributes that are personally, professionally and socially valuable" (Council on Higher Education, 2015). The words 'quality enhancement', also mentioned in section 3.2.2, refers to the improvement of levels of quality at higher education institutions such as University ABC, and are progressively being used in favour of "assurance" (CHE, 2017), hence the use of the concept 'quality' only in the title of this thesis.`

The main goal and focus of the second cycle of quality assurance from March 2017 revolved around curriculum intending to improve the quality of teaching and learning at undergraduate level nationally.

The Council on Higher Education and Higher Education Quality Council documentation (HEQC, 2001), in alignment with international practice, indicate a change of name from *institutional audit* to *institutional review.* The objective is to establish an agreement with institutions on quality, accountability and responsibilities of academics, students, stakeholders and institutional leadership, as they argue that "quality is the primary responsibility of institutions" (HEQC, 2001).

These responsibilities entail different levels and forms of accountability. In summary, the main focus of these councils, in partnership with higher education institutions nationally, is to enculturate the quality of institutional teaching and learning for student success, which can broadly and holistically be defined as:

> "Academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational objectives, and post-college performance" (Kuh, et al., 2006).

As mentioned earlier in this thesis, Tinto (2014) argued that "student success does not arise by change." He indicates that success does not happen randomly and that it should be intentional in terms of a structured, systematic, and planned approach that should involve a coordinated effort by many stakeholders across campus. He explains 'intentional' by indicating that programme goals (outcomes) should be clearly defined; decide how the goals are going to be measured and at the end determine whether the goals were successfully achieved or not. He proposes the collection of qualitative and quantitative data that is consistent and reliable that can drive the decision-making process for improvement towards student success.

3.2.4 Student Success

In higher education the term ’student success’ can often lead to questions seeking answers to What constitutes student success?, How do institutions promote it?, and How can student success be measured and assessed (Cuseo, 2007)? Success is being defined by the Merriam-Webster online dictionary (2019) as: “A favourable or desirable outcome”. Cuseo (2007) argues that student success can then be defined as: “A favourable or desirable student outcome”. Cuseo further claims that outcomes related to student retention, educational attainment, academic achievement, student advancement, and holistic development, has been cited as the most frequent and desirable indicators of student success. Based on higher education scholarship of teaching and learning, and grounded in research and theory, Cuseo (2007) conclude by suggesting seven principles of student success namely: personal validation; self-efficacy; a sense of purpose; active involvement; reflective thinking; social integration, and self-awareness. This study will show that the factors and processes affecting and having an impact on student success, should be essential topics on the agenda for discussion during an annual programme review to ensure that teaching, learning and assessment are in alignment with these principles that contribute to student success.

The question, however, for institutions such as University ABC remains: What should be in place, to be able to implement student success promoting processes, during the students’ undergraduate academic journey (Cuseo, 2007)? For this study, the focus is on what should be done from a programme level point of view to ensure the alignment of outcomes to teaching, learning and assessment, to be able to report on the outcomes coverage and the performance of students against these aligned outcomes. The reporting should inform lecturers where improvement is needed and the actions to be taken to improve student learning towards student success.

Finding a simplistic way to utilise technology within a structured and systematic programme review process to monitor, track and report on the attainment of student outcomes are core to this study, hence the design and development of the proposed framework. If University

ABC adopt this framework for continuous implementation, departments are taking the first step towards the assurance of learning, which is briefly discussed in the next section.

3.2.5 Defining assurance of learning

Within the context of this study, the research output cannot prematurely claim that the proposed framework will guarantee a process of assurance of learning. However, the study sought to create an awareness and a culture of attaining assurance of learning through suggesting a structured and systematic quality programme review framework utilising an LMS and more specific the BbGA in the LMS at University ABC. This will also imply that University ABC would adopt a good international practice for their internal quality initiative by making the programme review initiative more transparent, visible and accessible.

Internationally higher education institutions have dedicated sections on their websites for themes associated with, for example graduate attributes, learning outcomes, programme assessment, programme review and in this case, assurance of learning. The University of Sydney Business School's definition and statement for assurance of learning was provided in Section 1.1. Figure 11 gives an illustration of how they communicate their commitment to assurance of learning on their official website.

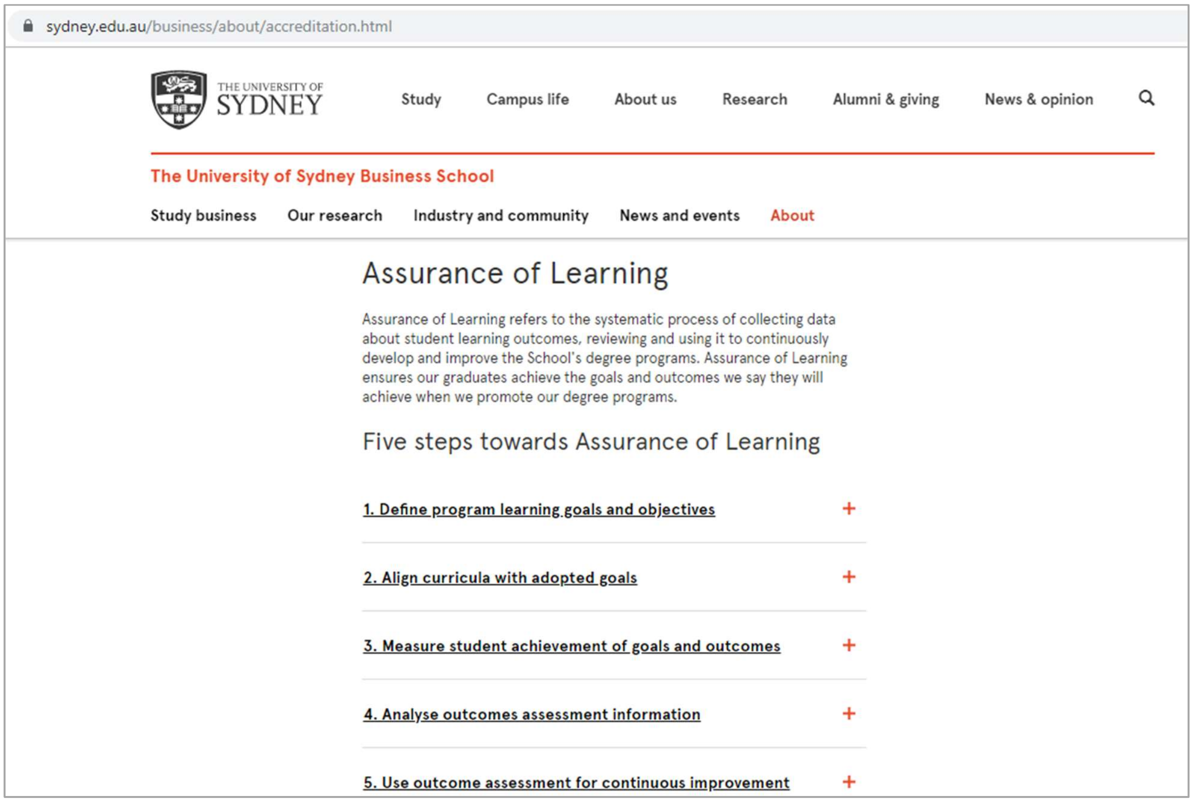


Figure 11: University of Sydney Business School website for assurance of learning

Robins School of Business (2019) is another example (Figure 12) of how the process and execution of assurance of learning are made explicit to internal and external stakeholders. The school envisaged that the assurance of learning structure and process should “serve in guiding its activities to measure and improve intentionally-defined student learning outcomes effectively”.

Figure 12: Robins School of Business website for assurance of learning

In addition to the above-referenced universities and many examples like these, reference is made to two additional websites of international higher institutions that view assurance of learning as their core business and deem it necessary enough to communicate it to all stakeholders online. The first example is that of Florida International University (2019) (Figure 13) and secondly, California State University, East Bay (2019) (Figure 14).

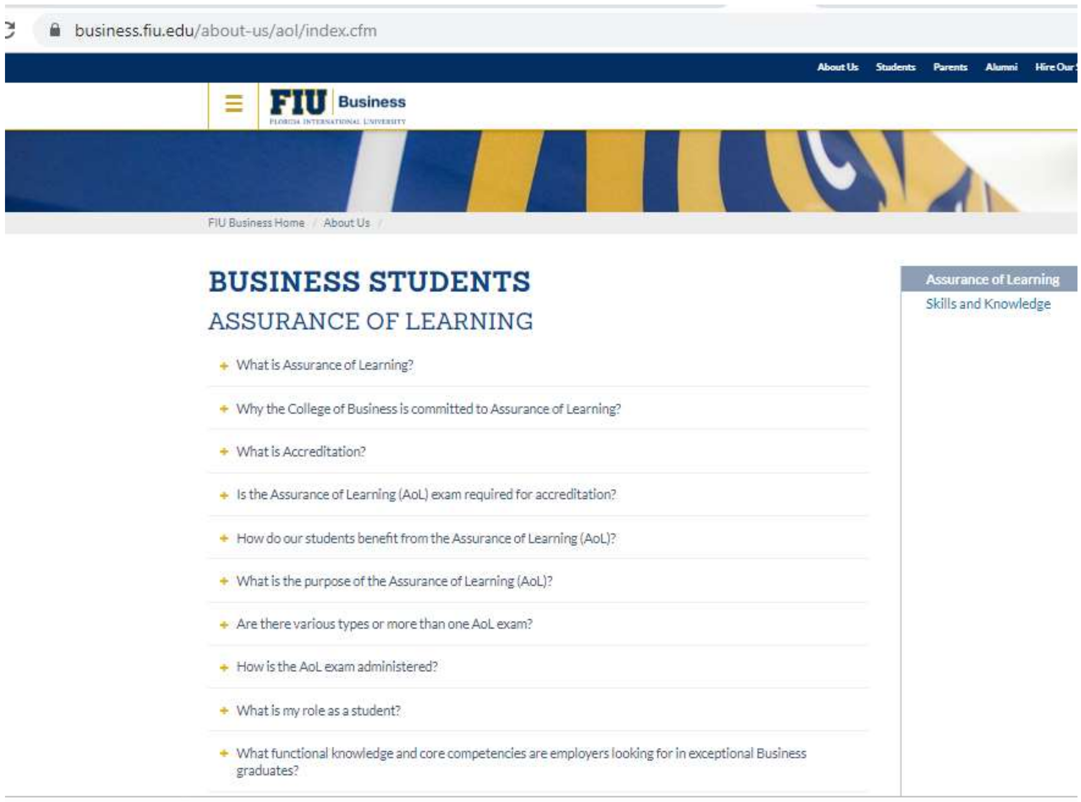


Figure 13: Florida International University website for assurance of learning

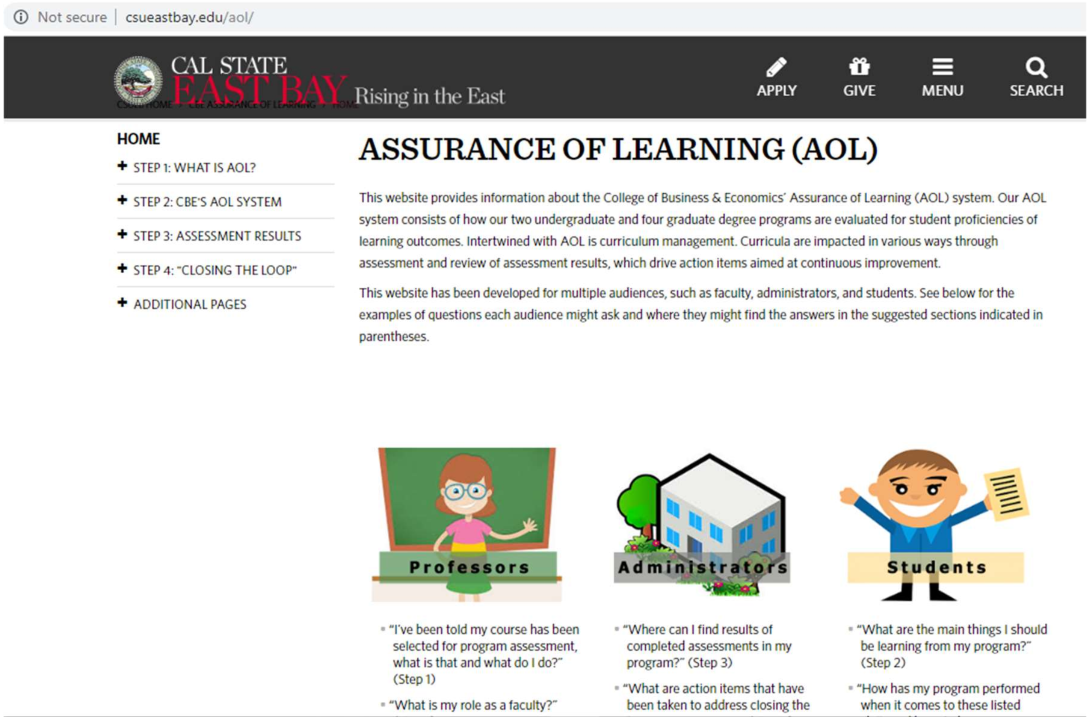


Figure 14: California State University website for assurance of learning

The California State University is of relevance to this study as it serves as an excellent example of how the whole assurance of learning process is managed online in four steps:

Step 1: What is assurance of learning? The subsections focus on a definition of assurance of learning and assessment (Figure 15), as well as a glossary to clarify terms and terminologies.

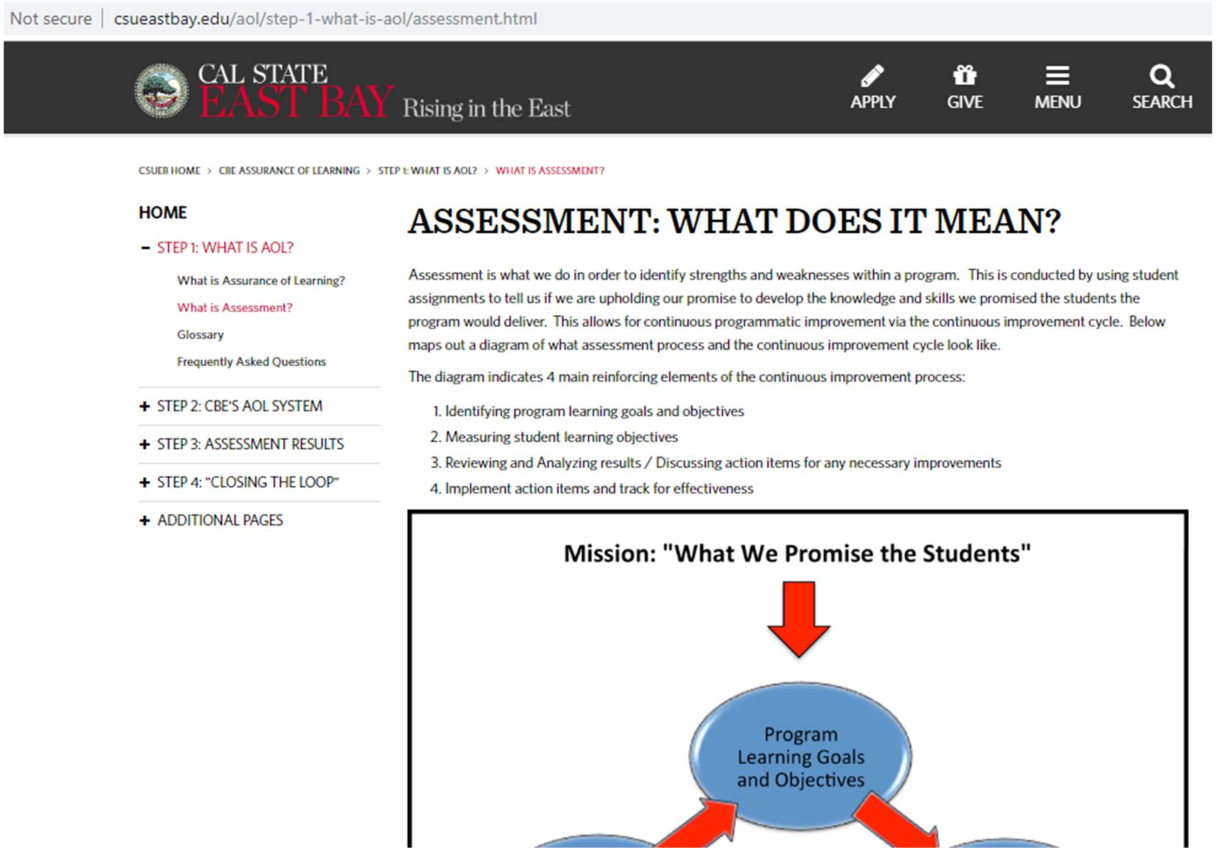
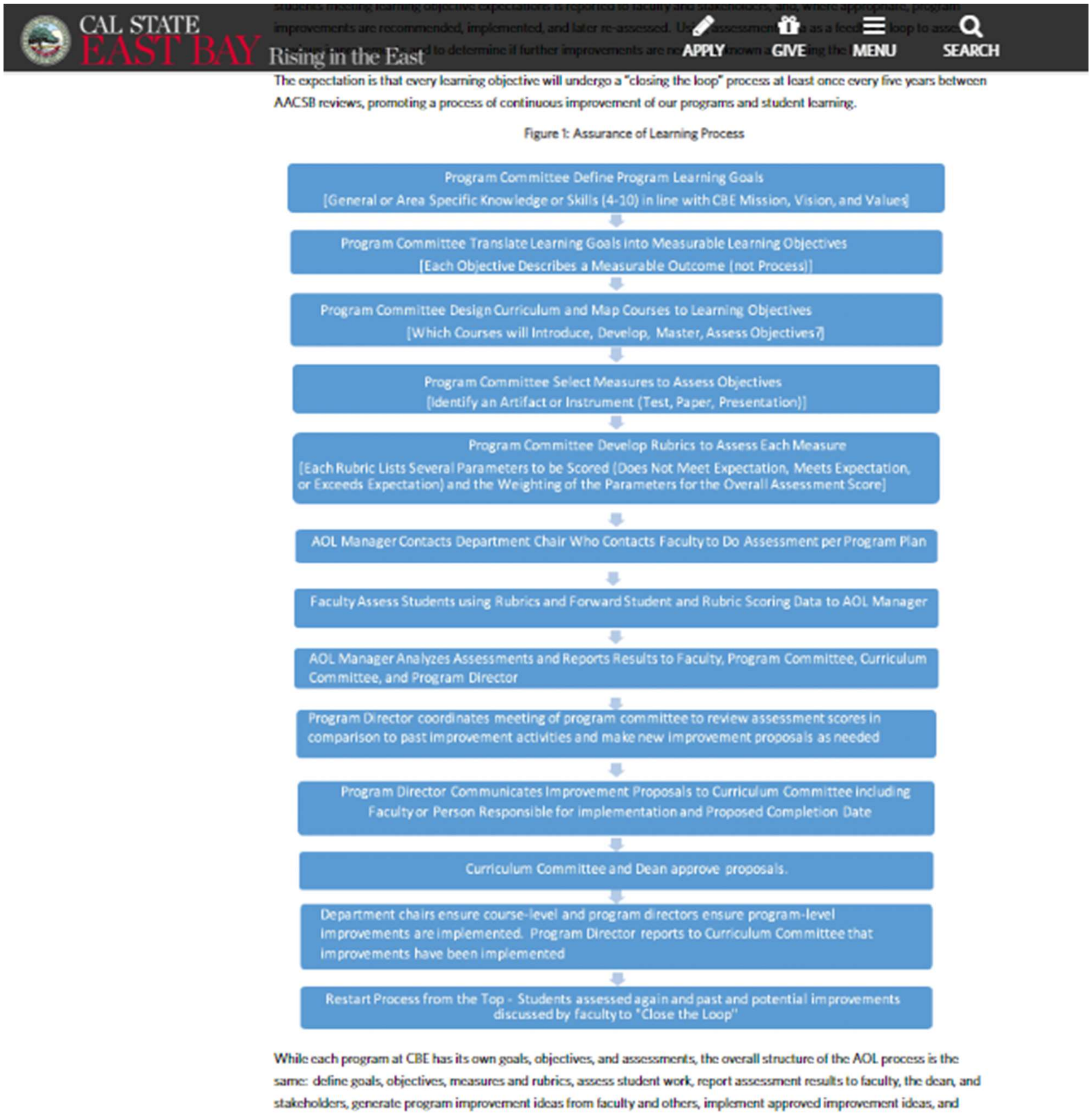


Figure 15: Defining assessment at California State University

Step 2: California State University Assurance of Learning system. The subsections include assessment tools (rubrics); outline of the roles, responsibilities, processes and procedures (Figure 16); institutional goals and objectives; curriculum maps (Figure 17); and assessment plans (Figure 18).



The expectation is that every learning objective will undergo a "closing the loop" process at least once every five years between AACSB reviews, promoting a process of continuous improvement of our programs and student learning.

Figure 1: Assurance of Learning Process

Program Committee Define Program Learning Goals
[General or Area Specific Knowledge or Skills (4-10) in line with CBE Mission, Vision, and Values]

Program Committee Translate Learning Goals into Measurable Learning Objectives
[Each Objective Describes a Measurable Outcome (not Process)]

Program Committee Design Curriculum and Map Courses to Learning Objectives
[Which Courses will Introduce, Develop, Master, Assess Objectives?]

Program Committee Select Measures to Assess Objectives
[Identify an Artifact or Instrument (Test, Paper, Presentation)]

Program Committee Develop Rubrics to Assess Each Measure
[Each Rubric Lists Several Parameters to be Scored (Does Not Meet Expectation, Meets Expectation, or Exceeds Expectation) and the Weighting of the Parameters for the Overall Assessment Score]

AOL Manager Contacts Department Chair Who Contacts Faculty to Do Assessment per Program Plan

Faculty Assess Students using Rubrics and Forward Student and Rubric Scoring Data to AOL Manager

AOL Manager Analyzes Assessments and Reports Results to Faculty, Program Committee, Curriculum Committee, and Program Director

Program Director coordinates meeting of program committee to review assessment scores in comparison to past improvement activities and make new improvement proposals as needed

Program Director Communicates Improvement Proposals to Curriculum Committee including Faculty or Person Responsible for implementation and Proposed Completion Date

Curriculum Committee and Dean approve proposals.

Department chairs ensure course-level and program directors ensure program-level improvements are implemented. Program Director reports to Curriculum Committee that improvements have been implemented

Restart Process from the Top - Students assessed again and past and potential improvements discussed by faculty to "Close the Loop"

While each program at CBE has its own goals, objectives, and assessments, the overall structure of the AOL process is the same: define goals, objectives, measures and rubrics, assess student work, report assessment results to faculty, the dean, and stakeholders, generate program improvement ideas from faculty and others, implement approved improvement ideas, and

Figure 16: Assurance of learning process at California State University

BSBA Program Curriculum Map:

ILOs				**#2 THINKING & REASONING Quant Reasoning**			**#1 COMMUNICATION Written Communication**		
PLOs	**R/E**	**PLO 1 Foundation Knowledge:** Recognize and integrate foundation knowledge across functional areas.	**PLO 2 Critical Thinking:** Apply critical thinking skills to solve business problems.	**PLO 3 Quantitative Analysis:** Understand and apply quantitative methods and tools in evaluating business problems and making effective business decisions.	**PLO 4 Use of Tech:** Apply technology to analyze data and provide solutions to business problems.	**PLO 5 Oral Comm:** Apply effective oral communication skills in a diverse and global environment.	**PLO 6 Written Comm:** Apply effective written communication skills in a diverse and global environment.	**PLO 7 Teamwork:** Apply effective team skills to work in a diverse and global environment.	**PLO 8 Ethics:** Identify and assess ethical issues and properly articulate ethical decisions.
Course number & title									
MATH 180: Mathematics for Business and Social Sciences	R	I	I	I					
STAT 110: Elements of Statistics for Business and Economics	R	I	I	I					
ECON 200: Principals of Microeconomics	R	I,D	I,D	I,D		I,D	I,D		I
ACCT 210: Intro to Financial Accounting	R	I	I	I	I		I	I	I
ACCT 215: Intro to Managerial Accounting	R	I	I	D	D		I,D	I	I
ECON 205: Principles of Macroeconomics	R	I,D	I,D	I		I	I	I	I,D

Figure 17: Example of a curriculum map at California State University

B.S. in Business Administration

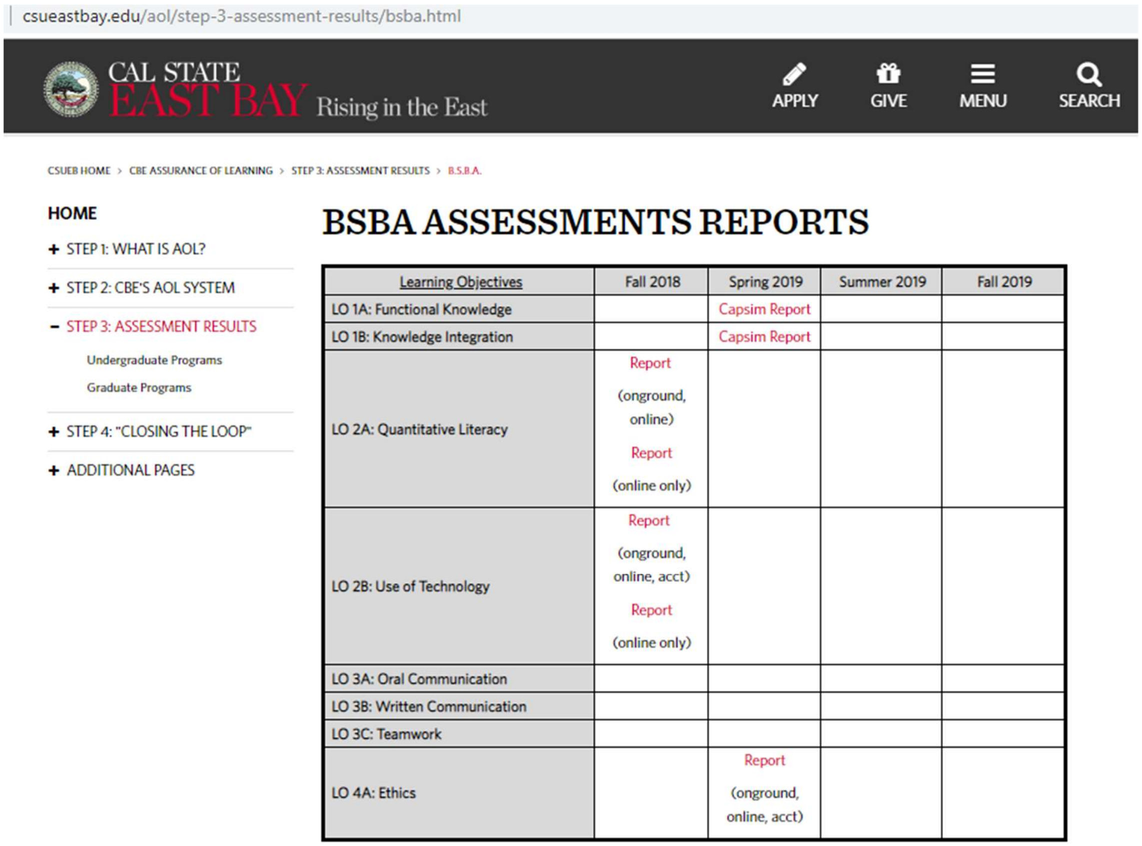
Learning Goal	Learning Objective	F'18	Sp'19	F'19 - Sp'20	F'20	Sp'21	F'21 - Sp'22	F'22	Sp'23
Learning Goal 1	1A) Functional Knowledge	BUS 499 Capsim (+ online)	BUS 499 Capsim (+ online)	BUS 499 Capsim (+ online)	Discuss, Generate & Implement Improvement Actions		BUS 499 Capsim (+ online)	Discuss, Generate & Implement Improvement Actions	
	1B) Integrative Knowledge	BUS 499 Capsim (+ online)	BUS 499 Capsim (+ online)	BUS 499 Capsim (+ online)			BUS 499 Capsim (+ online)		
Learning Goal 2	2A) Quant Methods	ECON 380 or BUS 350 (on-ground & online)					ECON 380 or BUS 350 (on-ground & online)		
	2B) Use of Tech	BUS 340 (on-ground & online)	ACCT 340				BUS/ACCT 340 (on-ground & online)		
Learning Goal 3	3A) Oral Comm		BUS 335 (on-ground complete; online pending)				BUS 335* (on-ground & online)		
	3B) Written Comm		BUS 370 Onground	BUS 370 Online			BUS 370* (on-ground & online)		
	3C) Teamwrk		BUS 335 (on-ground complete; online pending)				BUS 355* (on-ground & online)		
Learning Goal 4	4A) Ethics		BUS 320 & ACCT 342 (on-ground & online)				BUS 320 & ACCT 342* (on-ground & online)		
		Q2S Conversion Y-1		Q2S Conversion Y-2	Q2S Conversion Y-3		CSUEB 5-YEAR CAPR REVIEW	AACSB5-Year Review	
		AACSB Y-2		AACSB Y-3	AACSB Y-4		Q2S Conversion Y-4	Q2S Conversion Y-5	
							AACSB Y-5	AACSB Y-1	

** Frontload spring assessments and move as much as possible to Fall 2021 to allow for more time to report and review results.*

Last edited: 7/31/19

Figure 18: Example of an assessment plan at California State University

Step 3: Assessment results (Figure 19) are available online for undergraduate and postgraduate programs with links to comprehensive programme assessment reports.



csueastbay.edu/aol/step-3-assessment-results/bsba.html

CAL STATE EAST BAY Rising in the East

APPLY GIVE MENU SEARCH

CSUEB HOME > CBE ASSURANCE OF LEARNING > STEP 3: ASSESSMENT RESULTS > B.S.B.A.

HOME
+ STEP 1: WHAT IS AOL?
+ STEP 2: CBE'S AOL SYSTEM
– STEP 3: ASSESSMENT RESULTS
Undergraduate Programs
Graduate Programs
+ STEP 4: "CLOSING THE LOOP"
+ ADDITIONAL PAGES

BSBA ASSESSMENTS REPORTS

Learning Objectives	Fall 2018	Spring 2019	Summer 2019	Fall 2019
LO 1A: Functional Knowledge		Capsim Report		
LO 1B: Knowledge Integration		Capsim Report		
LO 2A: Quantitative Literacy	Report (onground, online) Report (online only)			
LO 2B: Use of Technology	Report (onground, online, acct) Report (online only)			
LO 3A: Oral Communication				
LO 3B: Written Communication				
LO 3C: Teamwork				
LO 4A: Ethics		Report (onground, online, acct)		

Figure 19: Example of an Undergraduate assessment report at California State University

Step 4: "Closing the loop" (Figure 18). The university explains 'closing the loop' as:

> Taking action and understanding that the impact of some actions will take years to manifest in data. Understanding this redirects attention away from meaningless data collection towards useful data collection and intervention that leads to action.
>
> With this understanding, CBE has made significant strides towards effectively managing curricula using an innovative AoL system design and the support of an accepted culture of AoL. A system in place and willing individuals on board, CBE has been able to conduct program reviews, assess key learning objectives, and determine and implement impactful initiatives.

In conclusion, higher education institutions in South Africa can benefit from examples such as the California State University. It should aspire to institutionalise internal quality initiatives, to showcase their accountability on student success. Through the implementation of the framework as the output of this study, this study aims to create that base and platform for University ABC to start discussions on internal quality initiatives geared towards a systematic process of collecting data about student learning outcomes, reviewing and using it to continuously develop and improve University ABC's qualifications and programmes.

3.2.6 Quality at University ABC

The Quality and Academic Planning Unit of the Department of Institutional Planning at University ABC is responsible and manages the external evaluation and professional body accreditation on a national and international level. Both processes involve panel formation, self-evaluation reporting, site visits and formal reporting. Improvement plans and progress reports are expected either from Faculties, Departments or Programmes for the external evaluation process. Depending on the requirements and corrections to be done by Programmes, the professional bodies accreditation cycles can vary between 3-5 years. Institutional audits take place in six-year cycles.

The Quality and Academic Planning unit aligned its vision to that of the Higher Education Quality Council, introducing a *'self-reflective practice on programme effectiveness'*. This vision entails a request to all faculties in University ABC to submit annual improvement plans, approved by Faculty Boards, and progress reports. Currently, if a Faculty, School or Department propose an improvement plan that is explicitly addressing or implementing technology as part of an initiative for programme review, there is no institutional policy, process or framework that can guide academics in their planning and implementation of an annual programme and module review. Due to the decentralised nature of the Faculties regarding the organisational practice of their teaching and learning, departments are using their initiatives to manage and report on programme effectiveness through their programme review processes. In some instances, professional programmes are guided by the accreditation body criteria and requirements. However, the various innovative ways in which departments are approaching this directive at University ABC are acknowledged. However, the gap remains at University ABC for a holistic, structured and systematic approach for quality programme review that can manifest into reporting on programme effectiveness.

Section 3.2.7, briefly define programme review as it relates to this study and how it will inform the proposed framework.

3.2.7 Definition of Programme Review

Programme review in the context of this study, refers to the process a department go through, typically at the end of a year or the end of a semester. The review addresses, but are not limited to, the effectiveness of the programme by reflecting on aspects such as the curriculum map, programme alignment map, assessment map, the assurance of learning and the technology to be implemented as part of the review process.

According to the Macau University of Science and Technology in Taipa, Macau (2019) a programme review enables leaders and staff on an institutional level to formulate and articulate the programmes' vision, mission, goals and objectives in alignment with the intended student learning outcomes and university goals. On a programme and module level, they indicate that programme review enables lecturers to (Macau University of Science and Technology, 2019):

> "Develop a systematic, rigorous mind-set towards, and way of looking at, planning, delivering and evaluating a programme and their own and others' work, and to do this methodically, collaboratively and collegially."

In this study programme review is seen as an opportunity for self-reflection and review on how effectively a programme is doing in pursuit of quality and student success intending to utilise the gathered data for programme improvement and executing planned actions. The Senior Vice President and Provost, Jonathan Wickert of Iowa State University of Science and Technology (2019) defines programme review as a "process that evaluates the status, effectiveness, and progress of academic programs and helps identify the future direction, needs, and priorities of those programs."

Goldsmiths University of London (2019) belief that their annual programme review is the cornerstone of their quality processes, and give departments the opportunity to reflect on their programmes' successes and good practices. The review also provides an opportunity to identify issues for improvement and action. Apart from the annual programme review, this university instituted a periodic review, where the relevance and effectiveness of constructive alignment of their programmes are reviewed periodically to contribute to the assurance and enhancements of quality in their teaching and learning and student learning experience.

Globally, universities such as The University of Auckland in New Zealand (2019), Charles Darwin University in Australia (2019), IOWA State University (2019) and Duquesne University in Pittsburgh (2019), have programme review processes with the necessary process and policy documents available on their official website. The reason why these examples are mentioned, is to illustrate that the knowledge is available for anyone who can access these university websites. Thus, communicating in a transparent mode to internal and external stakeholders, as well as the wider community, the processes and policies in place to ensure that they deliver to students what they promised at the time of enrolment. These universities also utilise technology such as LMS Assessment Tools and Assessment Management Systems as part of their programme review processes.

Another higher education institution in Philadelphia, Drexel University (2019), provides additional clarity to anchor the definition of programme review within the context of this study:

> "Program review is designed to be both reflective and analytical. Its purpose is to promote the continuous quality improvement and alignment of academic programs through a process that is reflective of an institution's mission and is faculty-directed, collegial, data-driven and clear plans of action."

Typical and critical reflection questions that can inform the concepts to be included in the proposed framework as well as guide the development of a framework for quality programme review are presented below (CHE, 2001; Newberry, 2018; Koproske, 2015). These reflection questions will ultimately also be used as discussion points during a typical programme review process:

- Did the original rationale and purpose of the qualification and learning programme(s) recorded against this qualification, change more than 50%, due to changes made over the past few years? If the answer to this question is yes, a programme review process is suggested.
- Are the qualification and programme outcomes and associated assessment criteria still in alignment with, and guided by the National Qualification Framework level descriptors?
- Is there still a constructive alignment between programme outcomes, module outcomes, student activities, content and assessment?
- Does the programme need some review since its original design and development to stay relevant (national and international), as a result of:
  - The directive for the transformation of the curriculum;
  - Student feedback through surveys and focus groups;
  - Throughput rates and the identifying of high-risk modules, informed by big data, quality reporting and learning analytics;
  - Consultation and collaboration with industry on their expectation of graduate attributes in demand for the needs in the industry;
  - Professional body criteria and requirements;
  - The change of student profile based on national and international literature on generation characteristics;
  - Institutional strategic changes, specifically with regards to the institutions teaching and learning and student success goals.
- Does the review process need to take into account any recent developments or innovations in technology implementation that should adhere to teaching and learning policies? Example of technology, such as LMS assessment tools and Assessment Management Systems.
- To what range and how can student retention and progression data inform the programme review process to inform decisions on programme improvement, improved student learning, student success and institutional effectiveness?

The online Merriam-Webster Dictionary (2019) defines review as a "formal assessment of something with the intention of instituting change if necessary". As indicated in Section 3.2.5, it is anticipated that the proposed framework could institute change regarding programme review practices at University ABC. At the same instance, the programme review process should cater for ongoing and systematic data gathering that will be used as evidence for programme improvement (Patton, et al., 2009). Patton et al. (2009) argued that programme review "could be one of the most powerful and effective tools to shape and reshape a college". The authors further conclude that although there are many models available for programme review, and many factors to consider in the development and implementation of a programme review process, it can still contribute to "fair and transparent institutional processes".

Implementing technology such as an LMS and the reporting affordances through the LMS often gets neglected and should also be a standard aspect to reflect upon during a programme review process, to safeguard resource implications for training and support of lecturers and students (Suskie, 2015; Lincoln, 2009; Banta & Palomba, 2015; Suskie, 2018; Maki, 2010). Implementing technology into teaching and learning practices can be argued to be an essential part of the constructive alignment process as well as the curriculum itself. By implication, this requires academic staff and support staff to rethink course design, with a critical focus on design, and review of the curriculum with the implementation of technology in mind. This process should inform how support services can encourage an operational partnership with academic staff (Maki, 2010).

An outstanding example of how a higher education institution in Australia, approached and structured their academic quality and review for their internal accreditation process (Stage 2) is the Charles Darwin University (2017). The reason for referring to this example, is because of the aspects that are included in the design, structure and management of this fully online quality process. The course guide of the online quality process (See figure 20) is available on the university's website (Charles Darwin University, Australia, 2017).

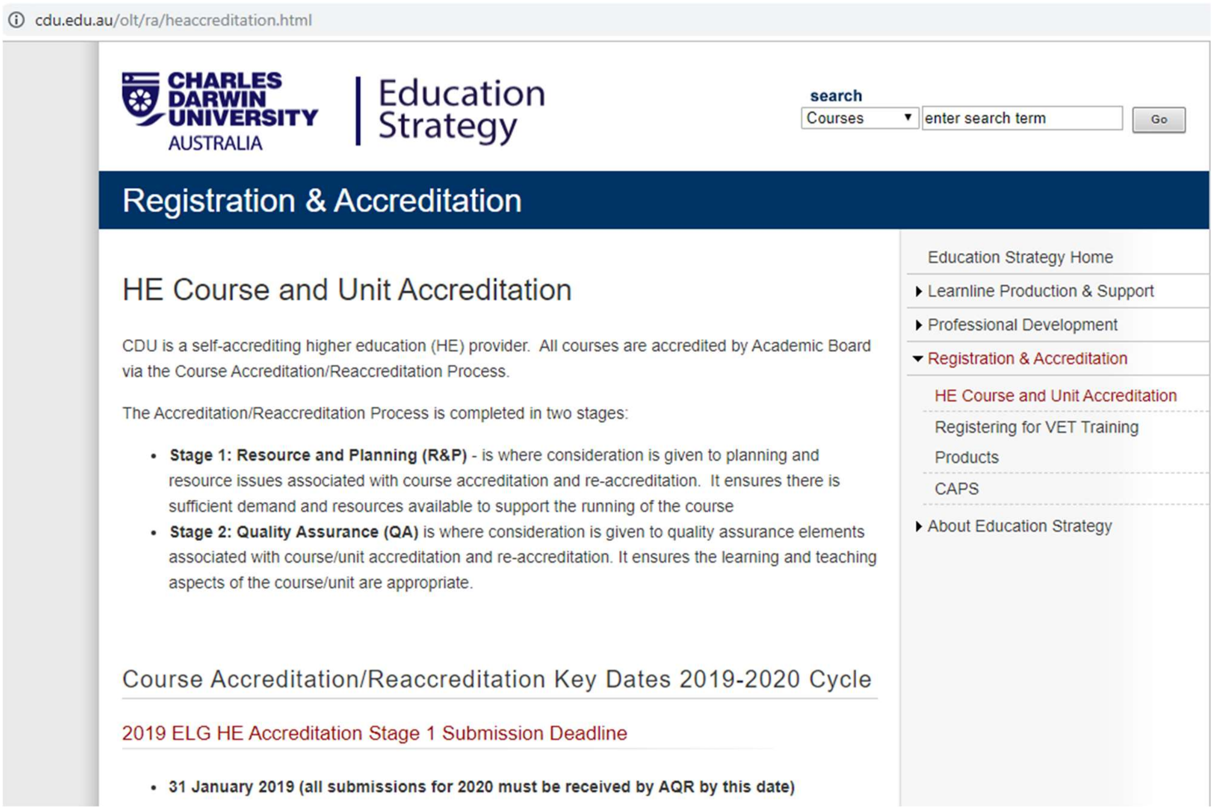


Figure 20: Image of Charles Darwin University Registration and Accreditation Website

What stands out are the two key purposes of this quality process stage (Charles Darwin University, Australia, 2017): (1) The university wants to provide adequate information to their Teaching and Learning Committees as well as the Academic Boards on the quality and pedagogically sound learning experiences of their students; and (2) wants to articulate clear links between assessment, learning outcomes, learning activities, the university's graduate attributes, and meeting the descriptors for the specific qualification level. The execution of this quality process online is characterised by the collaboration of Course Developers, Course Advisory Groups, the Office of Learning and Teaching, and the Library Information Assistants.

The L-Università ta' Malta is another example of how their Academic Programmes Quality and Resources Unit support staff through a programme review process accessed through the university's website (Figure 21).

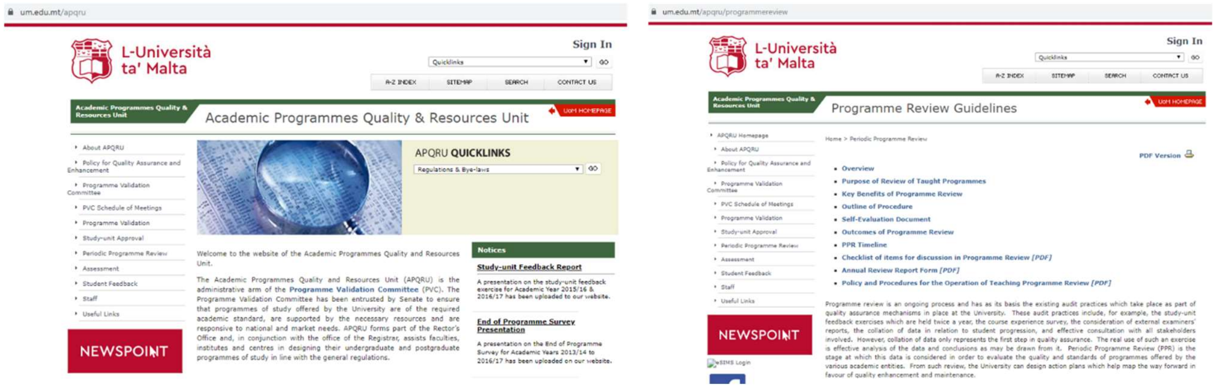


Figure 21: Example of online programme review support at L-Università ta' Malta

The reference to programme review in this study is by no means referring to or replacing the vital role of a full programme assessment or programme evaluation. The Loyola Marymount University (2019) defines programme assessments as:

> "The systematic and ongoing process of gathering and interpreting evidence of student learning to determine if a program is meeting its learning goals and then using that information to improve the program."

The framework for the programme review process proposed for University ABC is viewed as an internal quality initiative for enhancing a culture of improvement and can be one of the aspects to be included in the existing programme assessment and evaluation process at University ABC. The current research focuses on programme outcomes alignment and the implementation of an LMS to enable lecturers and programme coordinators to report and reflect upon the assurance of learning for, course design and programme effectiveness and the actions to be taken to improve student learning. The framework is therefore primarily geared towards institutions such as University ABC, who wants to implement the technology, but more specific, the BbGA. The design of the framework will consider different concepts for inclusion to ensure the successful implementation of the BbGA as part of a quality programme review process anticipated for University ABC.

The proposed framework should be seen as a platform for stakeholders on programme and module level to engage in discourses and practices on programme review to enhance student learning. This framework can further serve as an improvement initiative to enculturate an annual programme review cycle of which the reporting and outcomes of the cycle can accumulate and contribute to the formal institutional programme review cycle and accreditation. This framework is ultimately proposed to be implemented if the LMS assessment tools and BbGA at University ABC want to be utilised.

With the previous brief outline on what quality assurance entails in higher education, the word ‘quality’ in reference to the proposed framework for programme review, builds on the concept and thinking of a ‘quality culture’ where the purpose of implementing such a framework must rather be seen as a support function for existing and official quality assurance processes at University ABC and not trying to replace any of the official processes. Quality in this study does not refer to quality control or management, but rather a process where quality deliverables are produced to ensure that the programme review is a shared and collective responsibility of all the stakeholders involved. These stakeholders, forming a partnership include but are not limited to, the head of departments, programme- and module coordinators, lecturers (academic staff), instructional designers, and educational consultants. This proposed quality programme review framework is thus primarily for the implementation of internal quality review on a departmental and programme level.

Building on the definitions and discussions of the concepts often used in higher education when programme review is discussed (Section 3.2), the theory of Constructive Alignment (Biggs, 2003) will be deliberated as it relates to this study in the next Section 3.3. This theory will inform the concepts to be included in the design and development of the proposed framework.

3.3 CONSTRUCTIVE ALIGNMENT WITHIN THE CONTEXT OF PROGRAMME REVIEW

RO2: To define and identify the critical concepts of constructive alignment.

To be able to grasp the concept and role of constructive alignment within the context of programme review and how it can inform the design of the proposed framework, this study intends in this section to define and identify the critical concepts of constructive alignment.

Core to programme review is the concept of constructive alignment that applies to all levels of the curriculum. The word 'constructive' refers to the notion that students construct their meaning by engaging with the learning activities (Boud & Falchikow, 2006). On the other hand, 'alignment' can refer to the actions a lecturer takes to create a learning environment that will support the planned learning activities to enable the student to achieve the desired learning outcomes. Therefore it is essential to ensure that the curriculum and assessment drives a higher-order learning process for student learning activities (Biggs, 1996). To assist lecturers in this regard taxonomies such as Bloom, SOLO and Miller's hierarchy of learning can be consulted. According to Treleaven and Voola (2008) constructive alignment can be seen as an "approach to curriculum design that optimises the conditions for quality learning". It is, therefore, the role of the lecturer to facilitate a process where the students can engage in these learning activities to achieve the desired or intended (Biggs, 2014) learning outcomes.

The author John Biggs (1996) argues that constructive alignment refers to 'instructional design that has all the aspects of the learning environment aligned'. The author furthermore marked that the instructional design depends on a constructivist theoretical framework which should guide the decision-making processes at all stages (Biggs, 2003) of the instructional design process of the curriculum. The components that form part of the instructional design process are: the formulation and development of curriculum goals and the programme- and module outcomes; the selection of teaching and learning activities for the students; an integrated assessment plan that is in alignment with the programme outcomes; and the construction of a report on student performance. The author further defines constructive alignment as an:

> "Outcomes-based approach to teaching in which the learning outcomes that students are intended to achieve are defined before teaching takes place. Teaching and assessment methods are then designed to best achieve those outcomes and to assess the standard at which they have been achieved" (Biggs, 2014).

Biggs (2014) stated that the concept of constructive alignment is not new, but has recently been implemented more intentionally on a larger scale in education, as institutions needed to review teaching, learning and assessment on "an institution-wide basis with emphasis upon outcomes at institutional, programme and unit levels". Biggs (2014) claims that constructive alignment provides a framework for improving teaching and assessment to be able to report on the attainment of the set learning outcomes and standards to reach.

The author concludes that research indicates that constructive alignment is effective in improving teaching and assessment, but the development of such a framework, as indicated above, will take 'time and effort' to design. Biggs further stresses the importance of supporting institutional policies and procedures to be in place to ensure the effectiveness- and successful execution of such a framework. According to Biggs (2014):

> "Constructive alignment properly implemented enhances teaching and learning quality and thus, as a form of quality enhancement, subsumes forms of quality assurance that can often be counter-productive."

The website named *Open Educational Resources of UCD Teaching and Learning, University College Dublin* (2017) credited John Biggs (Biggs, 1996; Biggs, 2003) for the basic model of an aligned curriculum as illustrated in Figure 22. Under the Creative Commons of attribution and no additional restrictions (UCD Office of the Registrar and Deputy President, 2017). Figure 22 was adapted for this research. The literature, however, indicates that the essential components also referred to as the critical areas of the curriculum, were initially formulated by Ralph Tyler in the early 1940s (1940). His work was expanded in the 1980s by Thomas Shuell (1986). Till today, these critical areas of the curriculum, namely the intended learning outcomes, learning and teaching activities and assessment tasks are centre to any curriculum dialogue.

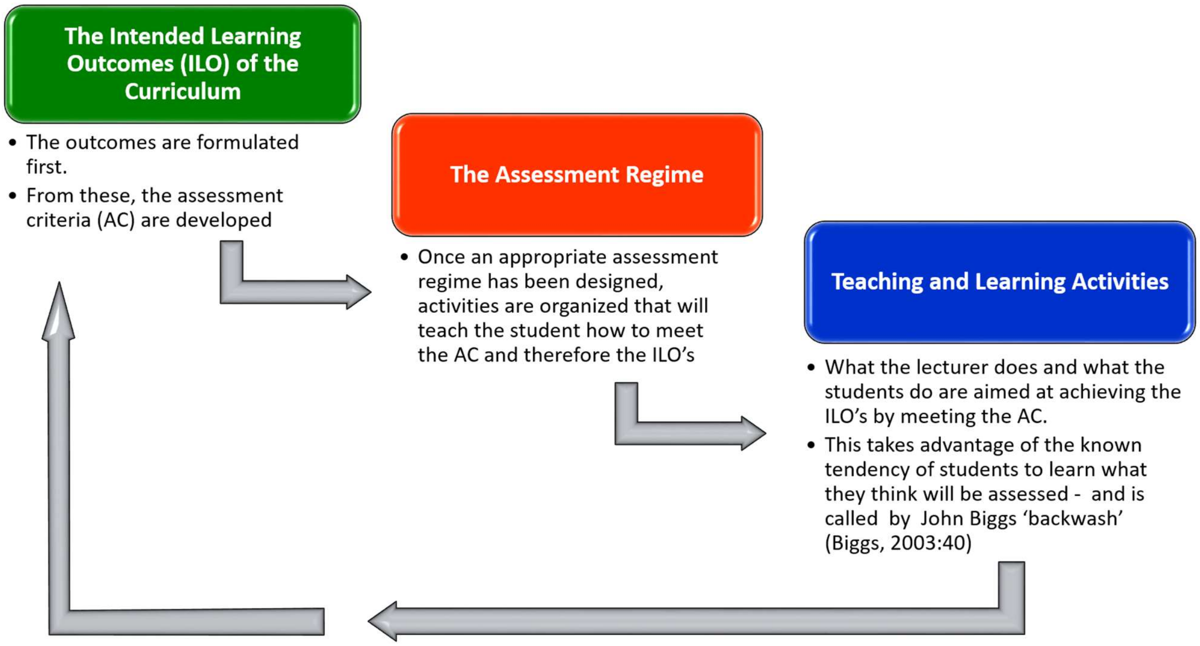


Figure 22: A generally used basic model of an aligned curriculum

For teaching and learning to be effective and for lecturers to be able to report on programme effectiveness, UCD supports their lecturers to understand that these critical areas must be aligned as indicated in Figure 22. They provided a resource for their lecturers to explain the process flow as illustrated in Figure 22 (UCD Office of the Registrar and Deputy President, 2017):

- The rationale and purpose of the Qualification and the learning programmes will inform the goals and learning outcomes (on a programme and module level). In the South African context professional programme outcomes are prescribed by accreditation bodies and councils;
- These formulated learning outcomes are stated and indicate the level of understanding that is needed for the student to succeed. (In the South African context outcomes are pitched against ten National Qualification Framework Level Descriptors.)

- The design of the teaching approaches and learning activities provides a scaffold for the students to attain the outcomes;
- Closing the feedback loop affords the opportunity to reflect on the student's achievement and progress towards the intended learning outcomes.

According to Ruge et al. (2019), who did a study on the conceptual and methodological perspective of constructive alignment, argue that constructive alignment "has become internationally established as an educational approach linking strategic planning and corporate policy to discipline and course teaching and learning practice". In a cross-institutional study from two Australian universities, the authors found a gap at faculty level relating to the "lack of critical review and the linkage to the institutional policy context" and the detailed implementation process of constructive alignment. Ruge et al. (2019) further argued that international research findings on curriculum design and course delivery should place more focus and emphasis on "engaging pedagogies, professional development for instructors, course designers, and administrators". Ruge et al's. (2019) research intended to find answers and solutions to the following question: "How can higher education institutional processes and practices for constructive alignment be captured to better inform the design and decision-making processes?" (Ruge, et al., 2019)

It is against this view that this study came up with a framework that is designed in such manner that the concepts of the framework follow a logical path addressing all the concepts of constructive alignment, but more importantly, positions a 'partnership' as core to the framework. The partnership refers to and includes a collegial relationship (Macau University of Science and Technology, 2019) and collaboration (Drexel University, 2019) with academic staff, education consultants, instructional designers, programme managers, and programme assessment professionals. The latter is not yet an established support role at University ABC, but the study hopes to highlight the importance of the inclusion of such a person as part of a quality programme review and assessment partnership, especially where the use of technology embedded in this process, are considered. Ruge et al. (2019) wrote a significant and insightful comment by saying that constructive alignment moved beyond "a teaching for learning approach to teaching and learning management application in institutional settings". This statement confirms that there is room for the proposed framework as it can support departments in the management of their teaching and learning, within a hybrid environment such as at University ABC.

3.4 DEFINE A FRAMEWORK FOR QUALITY PROGRAMME REVIEW

3.4.1 Introduction

As discussed in Section 3.2.5, assurance of learning means one is using a structured and systematic process to collect student data that will demonstrate how students are performing against the set and intended learning outcomes throughout their academic endeavours. Assurance of learning also calls upon faculty to review programmes and make decisions to improve programmes for improved student learning using informed and meaningful data. More importantly, assurance of learning holds faculty accountable for delivering on the educational offering to students.

The author Vincent Tinto (2014) clarifies the concept ‘structure’ in this context by arguing that it is an action of “establishing a coherent organisational structure to guide actions with clearly defined lines of responsibilities and linkages to other parts of the university”. He further suggests that where institutions have improvement plans, such as at University ABC, internationally institutions often establish an office, position or committee with the responsibility to guide and oversee such an implementation plan – coining it as “bringing structure to action”.

As will be discussed in Chapter 4, lecturers, managers and support staff in higher education institutions are not always aware of the technology available that can support such a structured process. One of the objectives is to document and collect data on what students have learned, and use that information to improve student and institutional performance and ultimately improve higher education (Suskie, 2015).

Against this background (Suskie, 2015), the researcher is convinced that this study conducted at University ABC with the goal to design a framework for quality programme review using an LMS, is relevant and essential and has the potential to contribute to the knowledge base and practices of quality programme review, in higher education in South Africa and elsewhere.

Chapter 3 will conclude with Section 3.4.2 as the researcher will position the choice of a conceptual framework as a research output for this study.

3.4.2 Define a framework

The proposed title of this study refers to the design and development of a framework that can support departments at University ABC who wants to use technology for reporting on constructive alignment and students' performance on programme outcomes. For the collection of actionable data, a quality programme review process is recommended. Embedded in this review process is the construction of evidence that will enable a department to create quality reports that can inform actionable decisions to improve programmes and student learning.

The terms framework and model are often used as synonyms, though they are fundamentally different. In general terms, a framework refers to a conceptual understanding of a workflow, whereas a model refers to the process to run through the workflow using first-hand data (Verbrugge, 2013). Bart Verbrugge (2013) argues further that a framework is "an entity between a model and a method"', where the framework consists of a structure for the understanding of a definite result or goal. A model explains the operation of the framework (Abrahan S. Fischler College of Education, 2017), whereas a framework presents the practical and observed associations, between all the aspects to be reviewed and describes the general direction the flow of the aspects in the framework. Section 3.4.3 will distinguish between a theoretical and a conceptual framework.

3.4.3 Theoretical framework versus Conceptual framework

The authors Sitwala Imenda (2014) and Grant & Osanloo (2014) offer easy to follow readings to help understand the difference between a conceptual and a theoretical framework. In short, the authors refers to a *theoretical framework* as the "blueprint for the entire dissertation inquiry which provides a structure to guide research by relying on a formal theory". In more practical terms, it is the 'researcher's lens' with which to view the world. Examples of theoretical frameworks related to this study are:

- E.M Rogers (2003) - Diffusion of Innovations.
- V. Tinto (2010) - From theory to action: Exploring the institutional conditions for student retention.
- V. Venkatesh, et al. (2003) – User acceptance of information technology: Toward a unified view.

A *conceptual framework* is defined as a "visual or written product of the main concepts to be studied and the relationship between them" (Abrahan S. Fischler College of Education, 2017). In a conceptual framework, classifications of concepts, assumptions, and beliefs support and guide the research (Grant & Osanloo, 2014). In this study a relation is made between the design of the proposed framework to that of a conceptual framework as it suggests that her framework is predominantly a conception of the study of quality programme review that will inform the constructive alignment of programme outcomes, the implementation thereof in teaching, learning and assessment, and eventually the reporting on the student outcomes achieved through the utilisation of technology. An example of a conceptual framework related to this study is that of Constructive Alignment from John Biggs (1996).

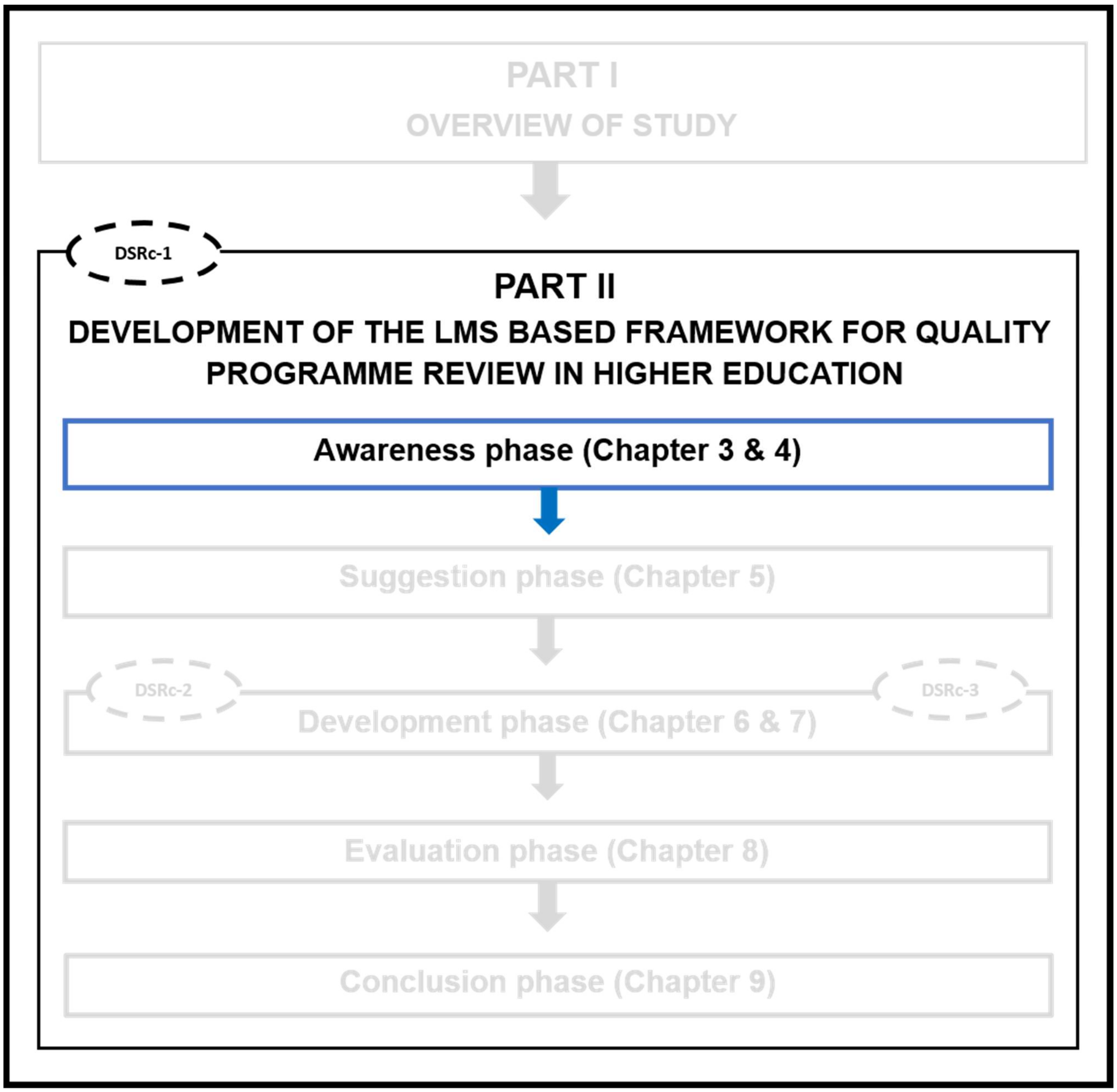
In conclusion, the choice of a conceptual framework for the output of this study is in alignment with Sitwala Imenda's (2014) argument that a qualitative research paradigm with an inductive approach, only is applicable to the specific research problem it was created for. The different concepts of the proposed framework for this study and the relationship between them will be discussed in detail in Chapter 6.

3.5 CONCLUSION

To define a conceptual framework for quality programme review can serve for University ABC as a helpful road map to guide them through all the aspects of programme review within the context of this study. The structure of the framework can provide a shared understanding of the process as well as provide clarity on all the components that should be present within the framework. The components anticipated to be part of the proposed framework structure, are in alignment with the fundamental concepts of Bigg's theory of constructive alignment (Learning Outcomes, Student activities and Assessment) and include additional components to ensure the ease of use and adoption of the framework for continuous implementation:

- Programme Review Partnership Meeting
- Programme Outcomes Alignment
- Quality Assurance Deliverable: Module Study Guide & Programme Outcomes Alignment Map
- LMS Implementation
- Quality Assurance Deliverable: Programme Outcomes Alignment Map
- Reporting for Programme Improvement and Accreditation
- Quality Assurance Deliverable: Blackboard Learn® Goals Area Reports

The next section, Chapter 4, also forms part of the awareness phase of the first DSRc-1 and will report on the use of an LMS in the higher education environment.


PART I
OVERVIEW OF STUDY
DSRc-1
PART II
DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION
Awareness phase (Chapter 3 & 4)
Suggestion phase (Chapter 5)
DSRc-2
DSRc-3
Development phase (Chapter 6 & 7)
Evaluation phase (Chapter 8)
Conclusion phase (Chapter 9)

4 LEARNING MANAGEMENT SYSTEMS IN HIGHER EDUCATION

Research Objective 3: To investigate the use of Learning Management Systems (LMS) in higher education concerning the availability of and reasons for the possible non-utilisation of an LMS feature.

4.1 INTRODUCTION

In the South African context, there is still a central concern on how to make higher education more inclusive. According to Bozalek and Boughey (2012), at the time of writing of their paper there remained a “disjuncture between policy aimed at promoting inclusivity and the experiences of students and staff in the higher education sector”. Using Nancy Fraser's normative framework of Social Justice, the authors interrogated the relationship between quick equity of access and equity of outcomes and expectations that follow from policy imperatives. Specifically, regarding the present research, the authors addressed the critical question of whether the focus of a single institution would facilitate a better understanding of the current South African higher education sector. They came to the conclusion that such a single institute focus is not sufficient “to gain the perspective on a social arrangements required for participatory higher education” (Bozalek & Boughey, 2012), and more importantly for the purpose of this study that such a focus could actually lead to a form of ‘misframing’ and could, therefore, be considered as perhaps a form of injustice.

Though one can argue that Bousalek and Boughey perhaps in 2012 had a point for the need for a multi-institutional approach, this study proceeded with investigating a university such as University ABC with its multi-faceted structures and processes, which perhaps might be a more profitable way of approaching this complex issue.

ICT (until recently referred to as Information Technology (IT) developed rapidly in the 21st century. (See Figure 23 for a snapshot of technology providers for higher education globally). Up to the first decade the application of ICT policies and policies in higher education in South Africa were by and large still in its infant shoes and there was a clear need how ICT policies and strategies in higher education in South Africa could be developed along National and Institutional pathways.

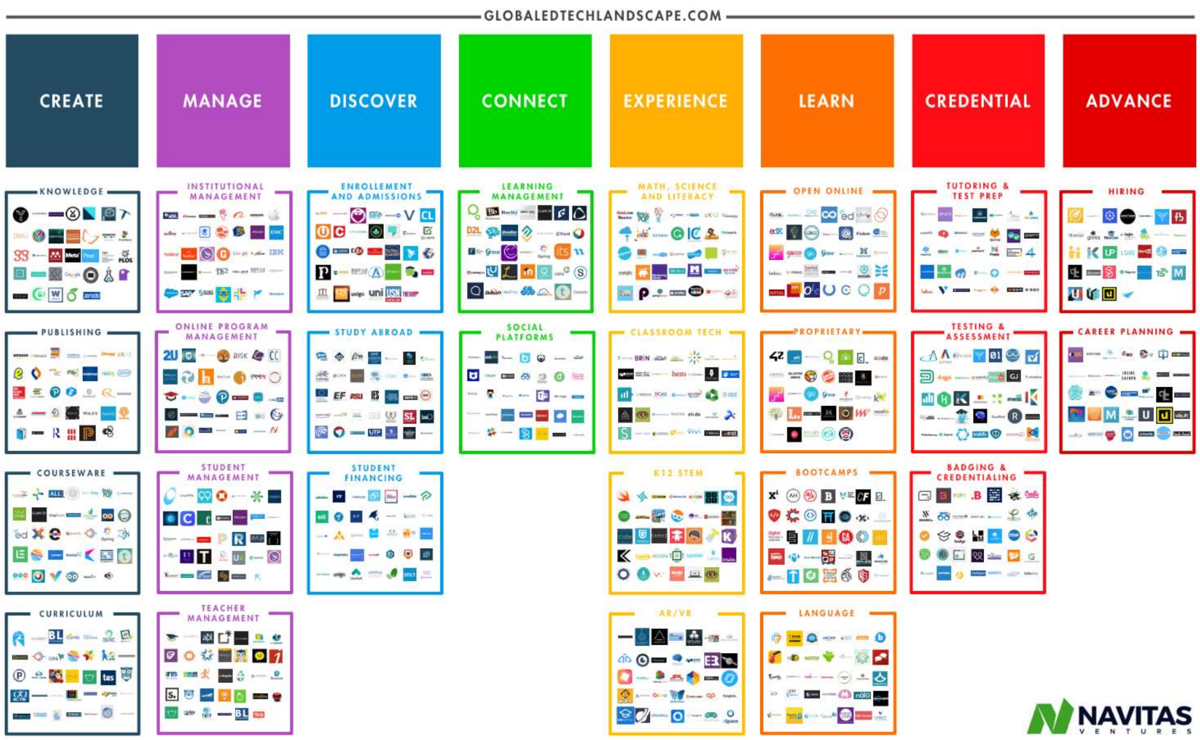


Figure 23: Categorization of technology providers in the higher education landscape (Encoura, 2018)

As Cross and Adam (2007) set out to argue, in the first decade of the 21st century it was necessary to map out “an emerging South Africa perspective concerning the integration of ICT in higher education” (Cross & Adam, 2007). As these policies cannot be developed in isolation, the authors emphasised the need that the development of the use of ICT should be contextualised within the context of what policymakers in South Africa express in their

National policy documents for the integration of ICT in the National Educational System. Cross and Adam (2007) suggests four basic questions to be considered in this regard:

> "What national policy documents tell us about this integration? What role did the government play to promote Information Communication Technology in higher education?; What policies and strategies where indeed developed by Information Communication Technology leaders in the higher education field and lastly?; How do South Africa national priorities and higher education institutional strategies match? Of these research questions, the latter is important because little attention is giving to ascertain how national priorities and higher educational strategies match".

The authors considered the latter as an enormous challenge because there remains at least the first decade of the present century a "lack of a national vision, underpinned by coherence strategies and actions at the national level" (Cross & Adam, 2007). On the face of it, one could argue that the South African case present an enormous challenge because on the one hand South Africa still operated within "a market-orientated neo-liberal discourse emphasizing the role of government in facilitating the development of a networked, multimedia educational community in higher education through several strategies" (Cross & Adam, 2007) including:

- Deregulation of electronic delivery to stimulate competition;
- Removal of barriers for institution operating on national and international scales;
- Increase of information-consumer functions to inform choice and improve programmes;
- Use of the power of competition and choice to inspire organisational change in institutions;
- Promotion of inter-institutional cooperation; and
- Support of public or private partnerships in support of Information Communication Technology needs.

Concerning the last four strategies, this study tries to find answers to research objective three that investigates the use of an LMS in higher education concerning the availability of and reasons for the possible non-utilisation of an LMS feature to report on programme outcomes concerning outcomes coverage and student performance against the set outcomes. The researcher wants to argue that there is not a straightforward and ready answer or explanation for this research objective. The reason being, the perceived absence of the alignment of the mentioned strategies as it relates to the use of a specific LMS feature that can support a process for enabling reporting on student learning at University ABC.

Cross and Adam (2007) argue that institutions where accreditation, accountability and quality assurance are viewed as necessary, for these institutions education cannot "exist without controls, without licensing, or without credentials" (Cross & Adam, 2007). In a developing country like South Africa, all the issues as mentioned above are directly linked and tied up with challenges such as poverty, illiteracy, skills development, unemployment, and an unfairness towards communities. Therefore, higher education institutions such as University ABC are in a prime position to show evidence through the use of technology. With the innovative use of new technology they can be held accountable for their academic offerings, and at the same time ensure that through quality academic processes that they can address and answer to the higher education challenges in the country (Mkhize et al., 2016).

Making use of Hanson and Holmberg's, (2003) analytical framework from a European and Swedish perspective the authors conclude that higher education institutions in South Africa cannot as yet claim "a paradigm shift in the policy choices, strategies and practices that underpin the use of ICTs". In higher education, a paradigm shift would need to include changing the teaching and learning practices in higher education institutions through the application of Information Communication Technologies.

Much more should be done on the level of implementing initiatives that reflect on the "poor relationships between technology and issues of access, quality, production and cooperation. The reason for this is that "existing strategies make no sound assumptions about ICT and access, ICT and production, ICT and cooperation or ICT in quality" (Cross & Adam, 2007).

Higher education can play a decisive role in the protection of "culture and nationhood through reference to issues such as democracy, equity, tolerance, and development of locally relevant solutions and development of African conceptions of knowledge" (Cross & Adam, 2007). The present study consequently wishes to contribute to the unlocking of the "relationship between knowledge, technology and the uniquely South African social and economic development realities that South Africa faces (Cross & Adam, 2007)". (Also, see NRF, 2006, http://www.nrf.ac.za/focusareas/ict).

4.2 DEFINE AN LMS WITHIN THE HIGHER EDUCATION CONTEXT

4.2.1 Introduction

Globally the trend is to utilise LMSs in higher education institutions to improve the teaching and learning experience (Aldiab et al., 2019). According to a study done in Saudi Arabia, the authors of the paper argued that most universities in United States, United Kingdom, Canada, Australia and in twenty-eight universities in Saudi Arabia use different LMS systems or platforms for their academic activities (Aldiab et al., 2019). The authors further argue that all of these platforms are entirely dependent on existing ICT infrastructures and the use of computer technology to be able to use the LMS to its fullest.

The authors Mkhize et al. (2016) indicate in their paper that research around an LMS has been driven by the need to understand the adoption and intended uses of an LMS. Furthermore, the authors refer to different LMS platforms such as Blackboard, Canvas, Desire2Learn (D2L), and Moodle, which in general has many similarities. However, they might differ with detailed features such as learning outcomes alignment, tracking, and assessment features. Most of these known LMSs like Blackboard were already founded in 1997 (Aldiab et al., 2019).

4.2.2 Defining an LMS

The term Learning Management System is one approach of the application of computers to education and often misunderstood or misused, according to Watson and Watson (2007).

The authors use the example of Blackboard, commonly referred to as an LMS, which in the United States of America are referred to as a Course Management System. Watson and Watson (2007), however, define an LMS “as a framework that handles all aspects of the learning process” and according to their research, but not limited to, found twenty-five features and functions for an LMS as installed in higher education institutions.

Szabo and Flesher (2004) argue that an LMS is an infrastructure that delivers and manages: “instructional content, identifies and assess individual and organisational goals, tracks progress toward meeting those goals, and collects and presents data for supervising the learning process of an organisation as a whole”.

An LMS can be defined as a web-based or cloud-based software application “that automates the administration, documentation, tracking, and reporting” (Ellis, 2009), and delivery of e-learning education courses, training programs, or learning and development programs (Angelova et al., 2015; Saha & Krishnamurthy, 2014; Kabassi et al., 2016; Aldiab et al., 2019).

The author Ellis (2009) argue that this definition of an LMS is not that simple, and propose six additional robust characteristics that an LMS should have and be able to do if used in higher education. Apart from support and training, self-guided services, and the rapidly delivering of content, two critical characteristics for the effective use of an LMS stand out, namely that of a “centralised and automated administration and knowledge reuse” (Ellis, 2009). These characteristics are confirmed by Angelova et al. (2015) which indicate that LMSs should be integrated and synchronised with existing systems in an institution and that the evaluation and knowledge management of assignments, tests, and student activities should support the assessment and monitoring of student learning.

One of the challenges faced by University ABC regarding the non-utilisation of the BbGA, might be related to the fact that the department and/or units responsible for guiding quality programme review and the department that manages the BbGA technology (that can support such a review process) have not yet established an internal partnership. This shortcoming is manifested in the decentralised manner in which programme coordinators, heads of department, and lecturers manage their annual programme review processes – each in their unique way. This decentralised position, and to some extent, the absence of an existing partnership between the relevant departments, deprive University ABC of an opportunity to report on programme effectiveness and student success holistically in an institutional context.

4.3 BENEFITS OF AN LMS AND THE 'HUMAN CAPITAL'

4.3.1 The benefits of an LMS

This study does not question the value of the use of an LMS in higher education. Aldiab et al. (2019) argued that an LMS has indeed many benefits and highlight the following benefits that can be applied to University ABC:

- *The concept of discarding the physical location* – meaning for a university like University ABC students can gather over multiple campuses in one virtual place, enhancing all their interactions, discussions and feedback.
- *Accessibility is another feature of applying LMSs* – this is especially true for University ABC as laptops, digital devices and smartphones are allowing the students and lecturers University ABC increased access through various internet browsers and operating systems in support of the educational process at University ABC. Furthermore, students can monitor and track their academic progress and performance in real-time, enabling them to seek help earlier.
- *LMSs can be integrated with missing contents* – for University ABC this mean that all the possible LMS features under the current licence are included to satisfy as many 'customers' and in the process seeking 'new customers'. These 'new customers' can be viewed as those academic- and support staff that have not yet explored all possible features. For University ABC this feature could be the BbGA.

Section 4.3 highlights the importance of the 'human capital perspective' (Khairudin et al., 2016; Aldiab et al., 2019) when higher education institutions decide to invest in an LMS with multiple features and functionalities. The next session deal with the significance of 'human capital'.

4.3.2 The significance of 'human capital'

Khairudin et al. (2016) argue in their paper that research results show substantial support for a "multi-dimensional decision-making model among IT decision-makers at universities". They argue further that the perspectives to be considered in an LMS decision-making process should include (Khairudin et al., 2016): "Direct Payback; Impact on University's Processes, Human Capital, IT Infrastructure, Risks and Uncertainties, and Strategic Alignment". The focus of their paper was on the "human capital measures" that needs to be considered and are essential in an LMS decision making process, and they claim, should be included in a pre-implementation evaluation of an LMS for a higher education institution. They claim much research has been done on the pre-implementation evaluation phase of an LMS, but stress the importance thereof as it potentially can provide insight on the benefits of LMS functionalities, the alignment to institutional processes, future use, institutional training opportunities and support needed for the successful adoption and implementation of the LMS.

Human capital, in short, can be referred to as: "Nothing less than the totality of human experience – as it applies to your job" (Marriam-Webster, 2018). For University ABC, this could mean the skills, knowledge, and experience of their academic- and support staff using their official LMS as viewed in terms of their value or cost to University ABC. Furthermore, it can be argued that the human capital perspective, as it relates to this study, can be empowered for sustainable growth through providing a structured and systematic framework for academic- and support staff to incorporate the BbGA of University ABC LMS in their annual programme review processes and cycles (Khairudin et al., 2016; Naresh & Reddy, 2015).

4.3.3 The use of an LMS in higher education

ICT plays a transformative role in higher education, as was indicated in Section 4.1; also see Dahlstrom et al. (2014). The authors explored faculty and students' perspectives on the use of an LMS within the context of institutional investment and higher education technology experience and expectations. They offer seven findings on the status and future use of an LMS in higher education of which four are recorded below with an indication of relevance to the current study (Dahlstrom et al., 2014):

- *Higher education institutions replace on average their LMS's within eight to eleven years.*
  This study will eventually show the importance of academic processes, procedures, policies, infrastructures, academic and technical support, and leadership, is more maintainable if institutionalised than ever-changing technology. Programme design and delivery should be standard practice irrespective of the technology to be implemented.
- *Faculty and students value the LMS as an enhancement to their teaching and learning experiences, but few use the advanced features, and the use of the systems to its full capacity.*
  In the current LMS at University ABC, the BbGA is such an underutilised feature. The affordances of the BbGA are not known to lecturers at University ABC and the absence of policies, procedures, and a dedicated unit to manage the implementation thereof leaves lecturers and support staff sceptical to the utilisation of the feature and currently perceives the use thereof as an addition to their current academic load.
- *The effective use of an LMS depends on the skills level of the lecturers and students.*
  If an LMS feature such as the BbGA are rolled out for implementation at University ABC, continuous lecture and student training and support will be essential. These support structures are present at University ABC, but in many cases understaffed with limited resources.
- *In addition to existing and accessible LMS features, faculty and students want the LMS to have enhanced features and operational functions, be personalised and use analytics to enhance learning outcomes.* The BbGA, if embedded within the course

design and delivery could potentially provide learning analytics to be interpreted and used to enhance student-learning outcomes.

Watson and Watson (2007) touch on the aspect of LMS features not being used and argue that this might be because the specific feature is unknown, but more so that the people are unaware of the functionalities and outcomes it holds. To this end, Hevner et al. (2004) indicated that: “Information Systems are implemented within an organisation to improve the effectiveness and efficiency of that organisation.” They further argue, “the capabilities of the information system and characteristics of the organisation, its work systems, its people, and its development and implementation methodologies together determine the extent to which that purpose is achieved” Hevner et al. (2004).

The authors Hazen et al. (2012) wrote that during the late 1990s, the Blackboard LMS was released, alongside several other online education systems. The initial intention of these online platforms extended over the years to provide a platform for knowledge transfer from lecturer to student, as oppose to only managing modules and academic functions. The University ABC has been using Blackboard as an LMS since 1998 with recent initiatives involving making learning analytics more accessible to lecturers to improve programme design and delivery and improve student learning. According to Christopher Pappas (2018) some of the top LMS’s platforms to date are Blackboard, Canvas (Open source), Desire to Learn (D2L), Moodle, and Open edX (Open source). Therefore, the next section will briefly report on the literature findings related to the availability and impact of learning analytics drawn from an LMS, in teaching and learning in higher education institutions.

4.3.4 The availability of learning analytics for teaching and learning

Viberg et al. (2018) researched the current landscape of learning analytics in higher education. The authors were concerned with finding an answer to what the current scientific knowledge of the application of learning analytics is in higher education. More specifically, whether learning analytics can improve learning outcomes, support teaching and learning practice, whether it is already employed widely, and whether these systems and student data are used ethically. The necessary conclusion was that though learning analytics can improve the learning practice – it is not yet there.

The concept of 'Learning Analytics' is a much-debated topic in higher education (Lang et al., 2017; IADLearning, 2018; Fritz, 2016; Greer et al., 2016; Viberg et al., 2018; Wong & Li, 2019) and are internationally defined as (IADLearning, 2018):

> "The measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs."

Learning analytics data can be descriptive or predictive and are extracted from different resources, for example, Student Information Systems, e-book platforms and LMSs (IADLearning, 2018). Students activity records and performance information, for example, on learning outcomes achieved, can, therefore, be extracted from an LMS (Greer et al., 2016). The most important outcome of any learning analytics process is "action" (Walvoord, 2010, p. 4) as the results of follow-up actions will determine the "success or failure" of the effort and planning that went into the analysis of the learning analytics. Action is the critical driver for improving student learning (Maki, 2010; Suskie, 2018; Walvoord, 2010). Greer et al. (2016) argue that action goes hand-in-hand with leadership that needs to support the actions informed by the analytics. It is further argued that continuous interventions should follow from an institutional data-driven culture (IADLearning, 2018). Wong and Li (2019, p. 1) conclude by arguing that the development of learning analytics contribute to interventions for the early identification of at-risk students and provide them with "just-in-time" support which is informed by data-driven approaches.

In addition to the discussion in the previous section, the use of learning analytics can benefit the increase of retention and performance, the improvement of module content and quality, proactively drive student success, and ensure efficient cost allocations for effective resource implementation (Greer et al., 2016). However, as Klein et al. (2019) claim, individuals' trust in, and adoption of learning analytics tools depend on organisational context, commitment, individual action, and leadership. The authors further stress the importance of a "comprehensive, inclusive and well-communicated implementation plan" of structures, policies, and processes.

In the next section (4.4) the focus will be on the literature review done to investigate the availability of an LMS feature for learning outcomes reporting and how it can be applied to this study for University ABC.

4.4 THE AVAILABILITY OF LMS FEATURES FOR OUTCOMES REPORTING AT UNIVERSITY ABC

4.4.1 Introduction

The first challenge experienced during the literature search during 2015 and 2016, was that there was no data or documentation found that pointed to a conceptual framework that had been designed specifically for the implementation of the BbGA. Much literature can be found on learning analytics, and the tools implemented to identify students at risk and subsequently, monitor and track their performance (Suskie, 2018). Access to references and a draft document that guided and informed the identification schema (naming convention) of the BbGA for University ABC (Newberry, 2018) were obtained. As part of the evaluation phase of this study, Dr Ruth Newberry, Principal Education Consultant for Blackboard International, hosted University ABC a workshop on the BbGA for the Information Technology School at University ABC. This established international partnership afforded the researcher to collect resources on the implementation of BbGA as part of a more prominent programme assessment solution for future suggestion and consideration by University ABC.

Despite the initially limited literature available on BbGA, literature revealed a few online tools that address the alignment of teaching and learning with programme outcomes. In the next few sections reference are given to vendors of one curriculum mapping tool, two international recognised assessment management systems, and two LMS platforms with outcomes alignment, assessment and reporting features and functionalities.

4.4.2 Examples of a curriculum mapping tool, assessment management systems, and LMS platforms

Atlas Rubicon (Curriculum Mapping Tool)

The *Atlas Rubicon* is a curriculum mapping tool. Through investigation at University ABC, it was realised that University ABC launched a project for the implementation of *Atlas Rubicon* during 2009/2010 after an intensive investigation by the project team. Interviews were conducted with the project leader and education consultant at University ABC who were involved in the project. They reported that the *Atlas Rubicon* project at University ABC ended after two years due to:

- The non-renewal of the licence.
- The University ABC was not able to provide additional resources to support lecturers with the uploading of the curricula on the system.
- Synchronisation of the system with University ABC study guide template was not possible.
- The perception at that stage was that lecturers would find it challenging to come to grips with the official LMS and the *Atlas Rubicon* in one go and that additional training on top of the LMS training would be seen as an additional burden.
- Limited to no infrastructure, as well as a lack of ICT support at University ABC made the task team who was responsible for the rollout of *Atlas Rubicon,* realise that the implementation will not come to fruition.

Watermark (Assessment Management System)

Through online collaborations and additional web-searches, the researcher came to know the two highly valued and respected outcomes and assessment software and platforms in America and used internationally, namely *Watermark* (Watermark, 2018) and *WEAVE* (WEAVE, 2019). These licenced Assessment Management Systems (AMS) as they are referred too, can integrate with most LMSs.

Watermark was launched in 2018 after the merger in 2017 with *Taskstream, Tk20,* and *LiveText*. The latter were the leading providers of assessment management technology at the time. According to the *Watermark* website (Watermark, 2018), *Digital Measures* and *EvaluationKIT* recently joined them. Although *Watermark* is a standalone and licensed system, data integrations are possible with LMSs, Student Information Systems and in-house systems. *Watermark* solutions support institutions with better data and reporting to improve learning. The solutions they offer are (Watermark, 2018): assessment and accreditation planning; learning outcomes measurement; e-portfolio and student assessment; faculty activity reporting; course evaluation and institutional surveys; and curriculum and catalogue management. Due to the specialised focus of *Watermark*, it is noteworthy to include the flyer as a future reference for this study (Figure 24 & 25). Watermark advertise that they have an intentional and meaningful approach to assessment to improve student learning, program quality and institutional effectiveness and provide online webinars and many resources on their website: https://www.watermarkinsights.com/. Although University ABC could benefit from assessment technology such as *Watermark,* the current programme and institutional assessment landscape is not yet ready for such an advanced form of technology.

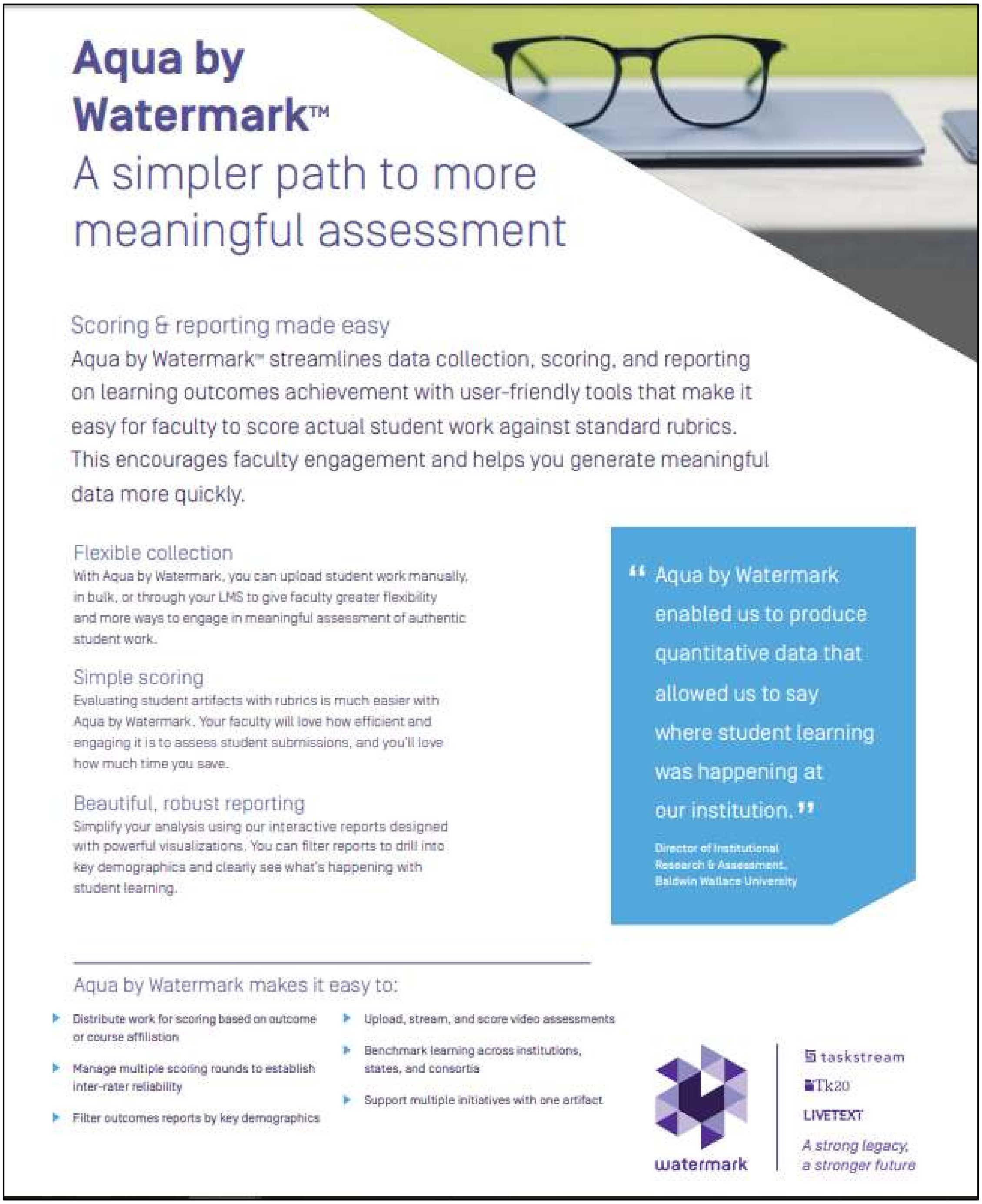


Figure 24: Watermark Outcome and Assessment Tool – An overview

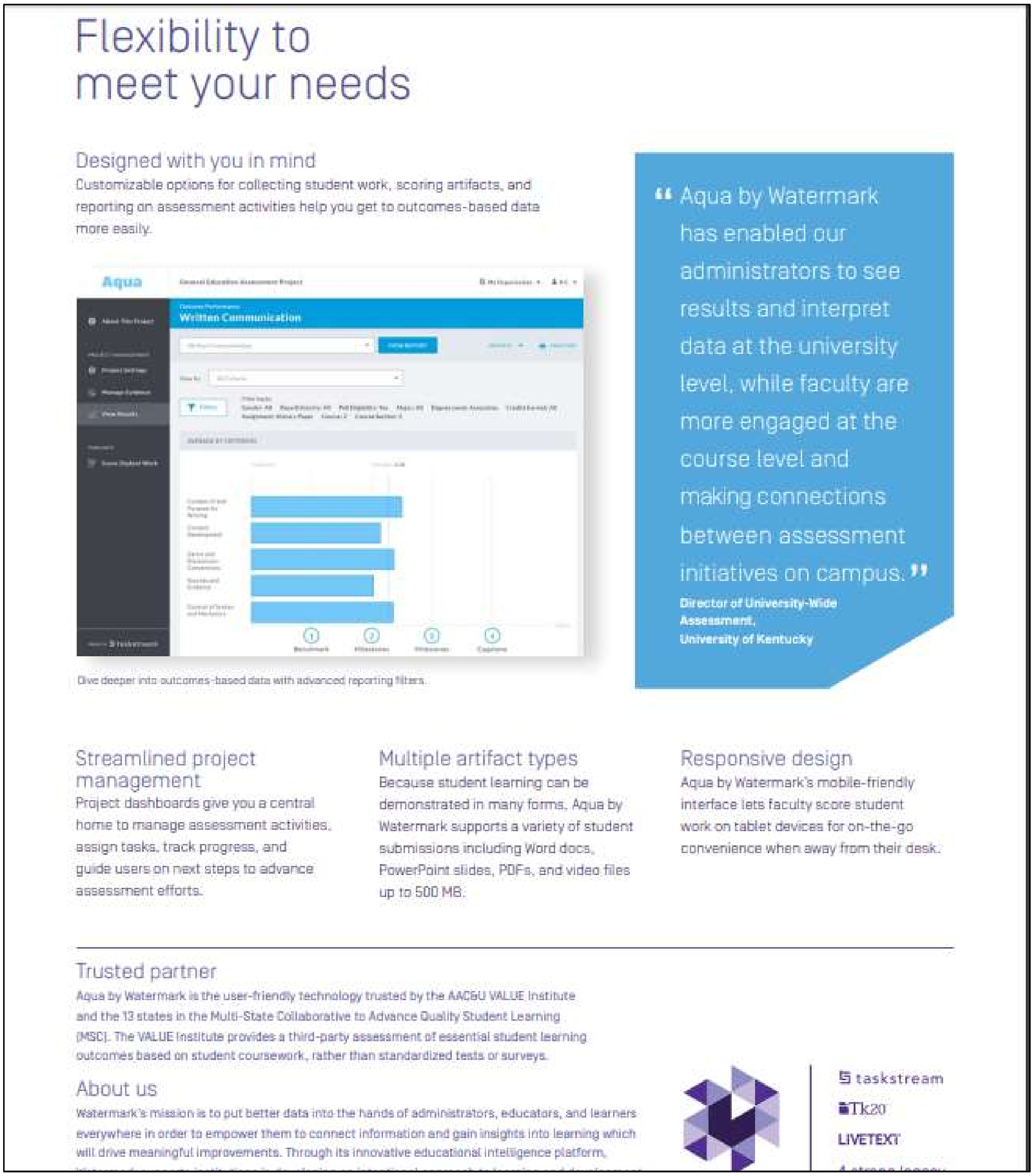


Figure 25: Watermark Outcome and Assessment Tool – Customisable Options

WEAVE (Assessment Management System)

WEAVE is a web-based solution for all institutional activities and provides support through their institutional effectiveness professionals and knowledge centre to streamline accreditation-, assessment-, and credentialing processes. *Weave* offers the following features and services (WEAVE, 2019):

- Assessment on Institutional, Course, and Programme level
- Programme Review
- Ability to streamline processes and eliminate redundancy
- Accreditation (Programme and Institution)
- Strategic Plan Tracking
- Expert training and support for all users
- Faculty credentials management
- Unlimited, customizable templates
- Personalised adoption and rollout strategies

A valuable online resource (WEAVE, 2019) were discovered, that can efficiently serve as a maturity indicator for institutions who wants to purchase and implement assessment management systems at their institutions. The “Institutional Effectiveness Software Buying Guide” by *WEAVE* (See Appendix C) covers in Part 1 aspects such as the identification of institutional challenges and needs; institutional processes; stakeholders involved; budget requirements; timelines; migration strategies and project ownership for product selection; implementation and maintenance. Part 2 of the guidebook provides a rubric if an institution wants to compare different companies that have the same critical features, and that matches their needs. Figure 26 and 27 illustrate two of the functionalities of the accreditation and review features that is accessible in *WEAVE.*

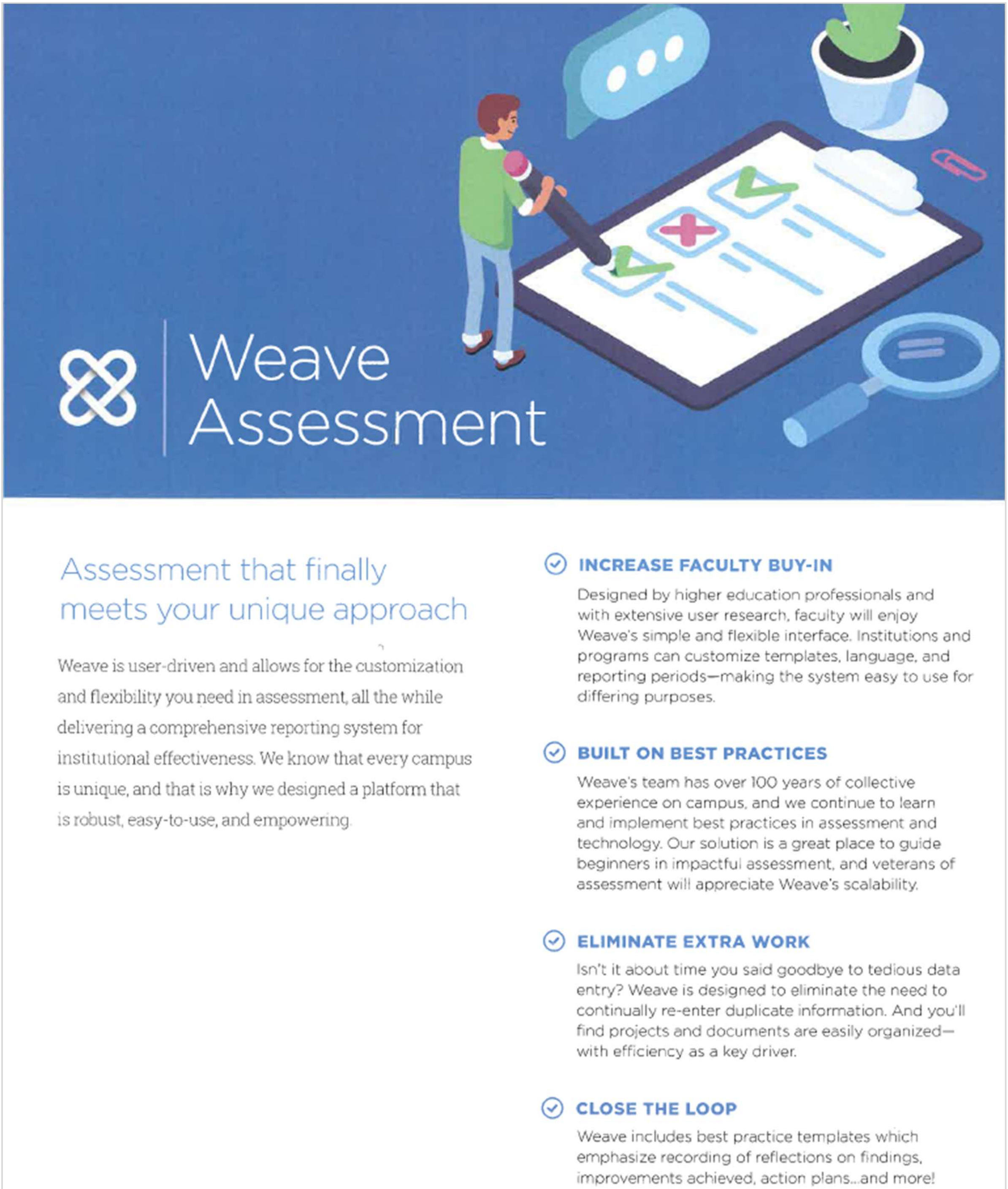


Figure 26: Weave Assessment Feature

Figure 27: Weave Review Feature

Canvas (LMS)

Open-source LMS's such as *Moodle* and *Sakai* do have built-in functions to manage student learning, but no reference is available to a specific tool within these LMS's that can report on the students meeting the programme outcomes that are aligned with teaching and learning as the BbGA intends to do. No literature search come up concerning a specific conceptual framework on how to implement such a tool in a higher education institution environment in South Africa.

The current number one LMS in the world, *Canvas* do have a built-in feature for outcomes alignment and assessment and fulfil in principle the same functions as BbGA. However, the navigation, look and feel, and the interface is very different. Although *Canvas* is free for teachers to create (and host) their online courses, they do not contain all features that are available to users at an institution. Figure 29 & 30 gives a snapshot of the interface of the *Canvas* Outcomes Tool, and Learning Mastery Gradebook navigated from the course link. Figure 31 provides a snapshot of the Outcomes Alignment interface.

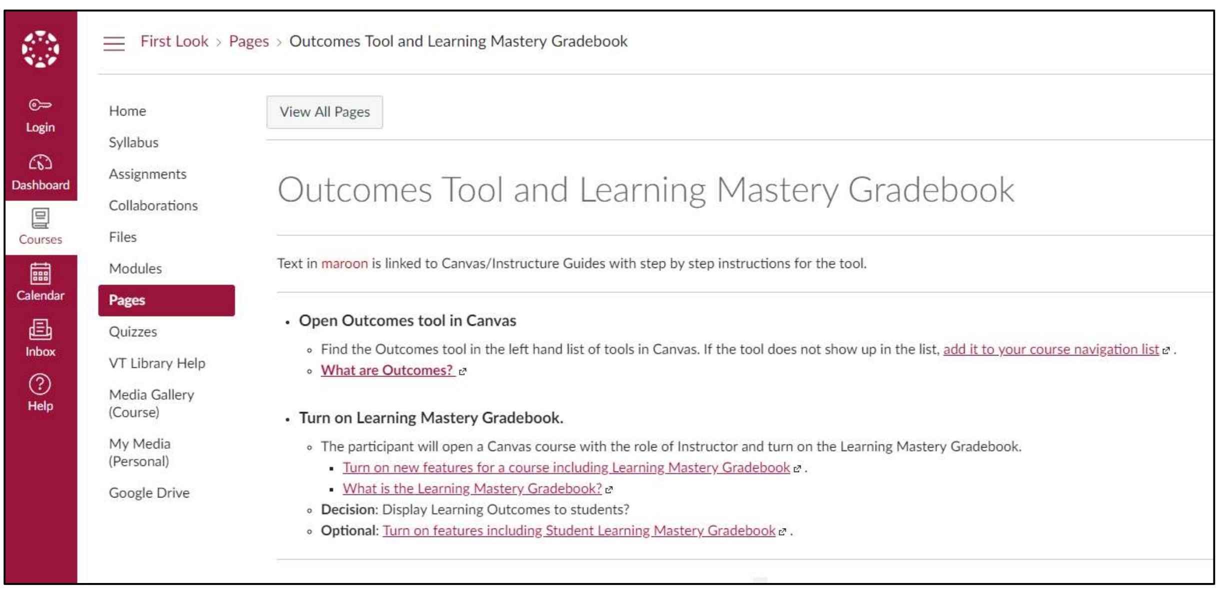


Figure 28: Canvas Outcomes Tool and Learning Mastery Gradebook – Page link view

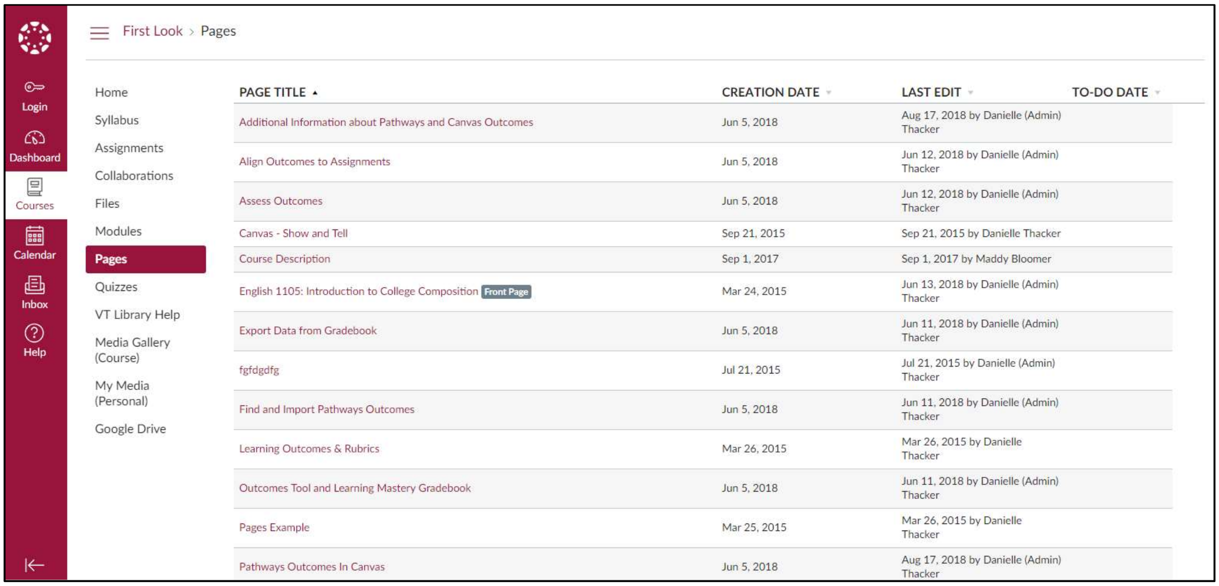


Figure 29: Canvas Outcomes Tool and Learning Mastery Gradebook – Course overview link

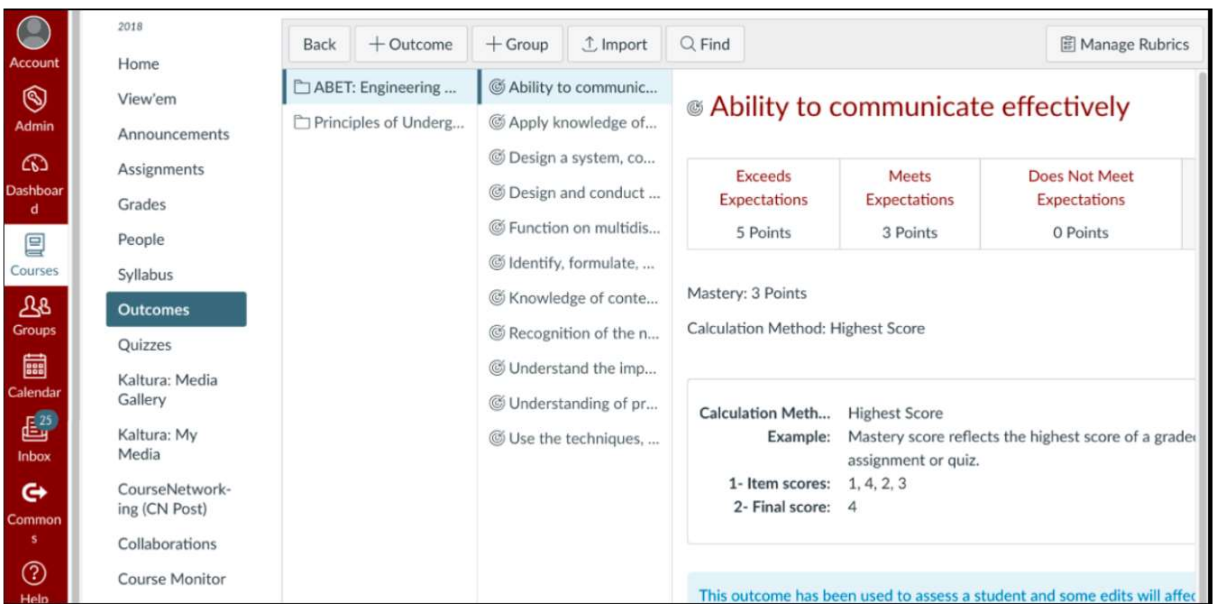


Figure 30: Canvas outcomes alignment interface

Blackboard Learn® (LMS) (Goals Area feature)

The LMS in practice at University ABC has already the Goals Area included in the LMS (Blackboard Learn®) enterprise package. Figure 31 provides a snapshot of the interface of the BbGA as viewed by the BbGA manager. Figure 32 illustrates the interface for the lecturer. Although the BbGA does not have all the features and functions as *Watermark* and *WEAVE*, this study will indicate how the BbGA in University ABC's LMS will provide a return of investment if the current Goals Area feature is being utilised, at no additional cost, within a well-designed framework for quality programme review.

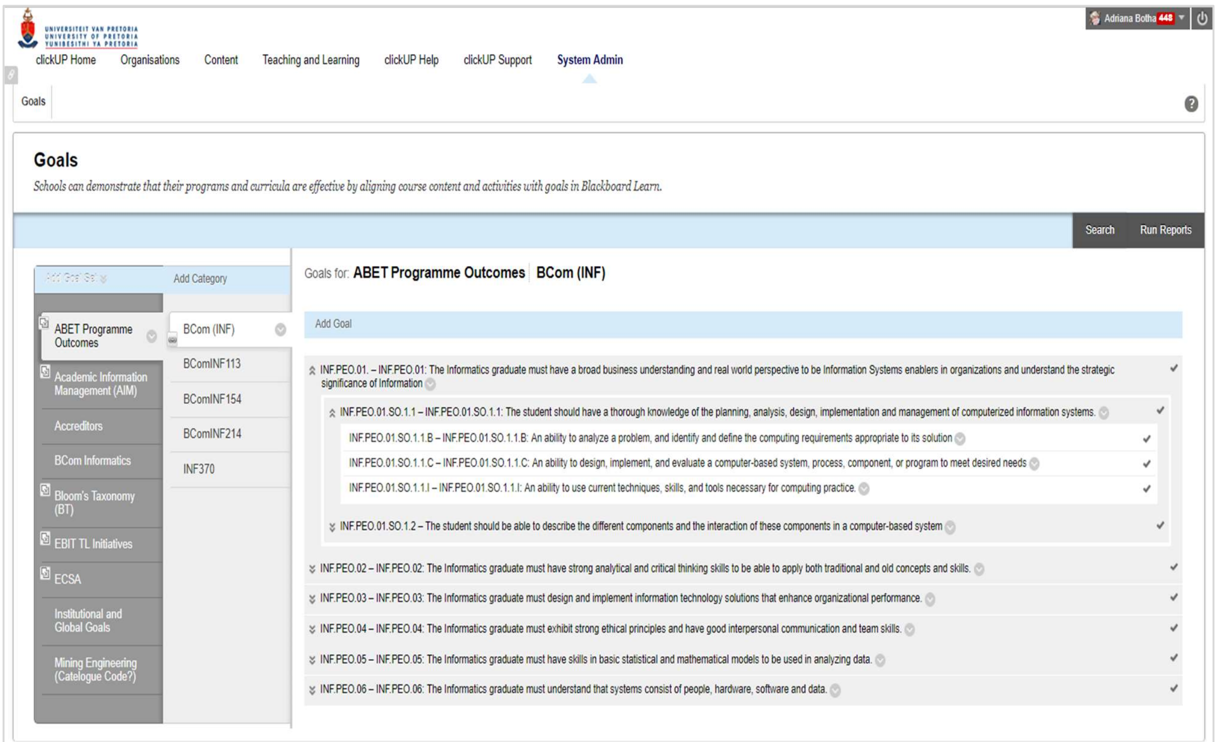


Figure 31: Blackboard Learn® Goals Area interface for outcomes alignment (BbGA Manager view)

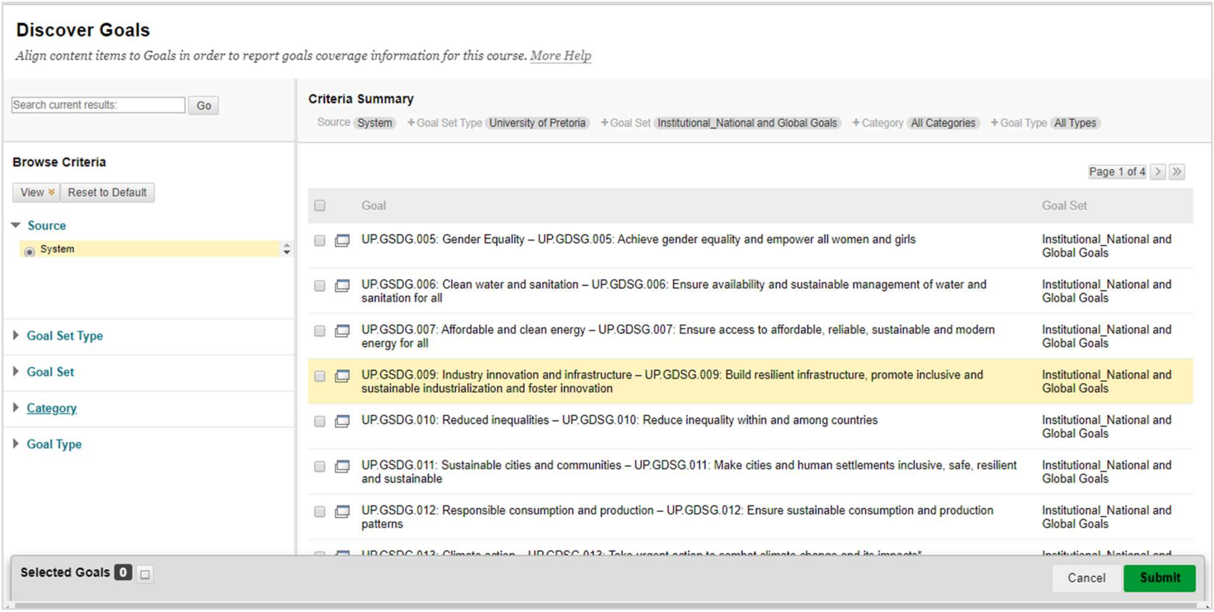


Figure 32: Blackboard Learn® Goals Area interface for adding outcomes alignment (Instructors view)

According to Dr Ruth Newberry, Principal Education Consultant for Blackboard International, (2018) the BbGA "is the explicit and demonstrable connector between the learning expectations of a program and institution and the direct evidence of student performance found in the coursework they submit." She further poses the following assessment questions to support higher education institutions to which the answers can be found through the use of BbGA (Newberry, 2018):

- Where are institutional and academic learning outcomes being evaluated?
- How are students performing on these learning outcomes as they progress to degree completion?
- On which learning outcomes and at what places in students' progression to degree completion are students performing well and where are they still struggling?

In Chapter 8, reference will be given to Dr Newberry's explanation on how the gathering of data can show how well students meet their expected module, programme, and institutional outcomes. Feedback will be provided in Chapter 8 on how through an assessment process and with the incorporation of BbGA, University ABC can gain insight on the effectiveness of curriculum design and delivery. Dr Newberry will argue that the aggregated data can inform institutions such as University ABC where improvements should be made in the curriculum to promote effective student learning, programme quality and institutional effectiveness. The conclusion of Chapter 8 links back to Chapter 4 in that an organised and effective methodology for assessment of student learning should be in place to implement the BbGA and association reporting options. Once this is in place, additional technologies of University ABC's LMS, such as Analytics, and Predict can eventually be implemented to support the learning analytics and assurance of learning drives at University ABC.

4.5 CONCLUSION

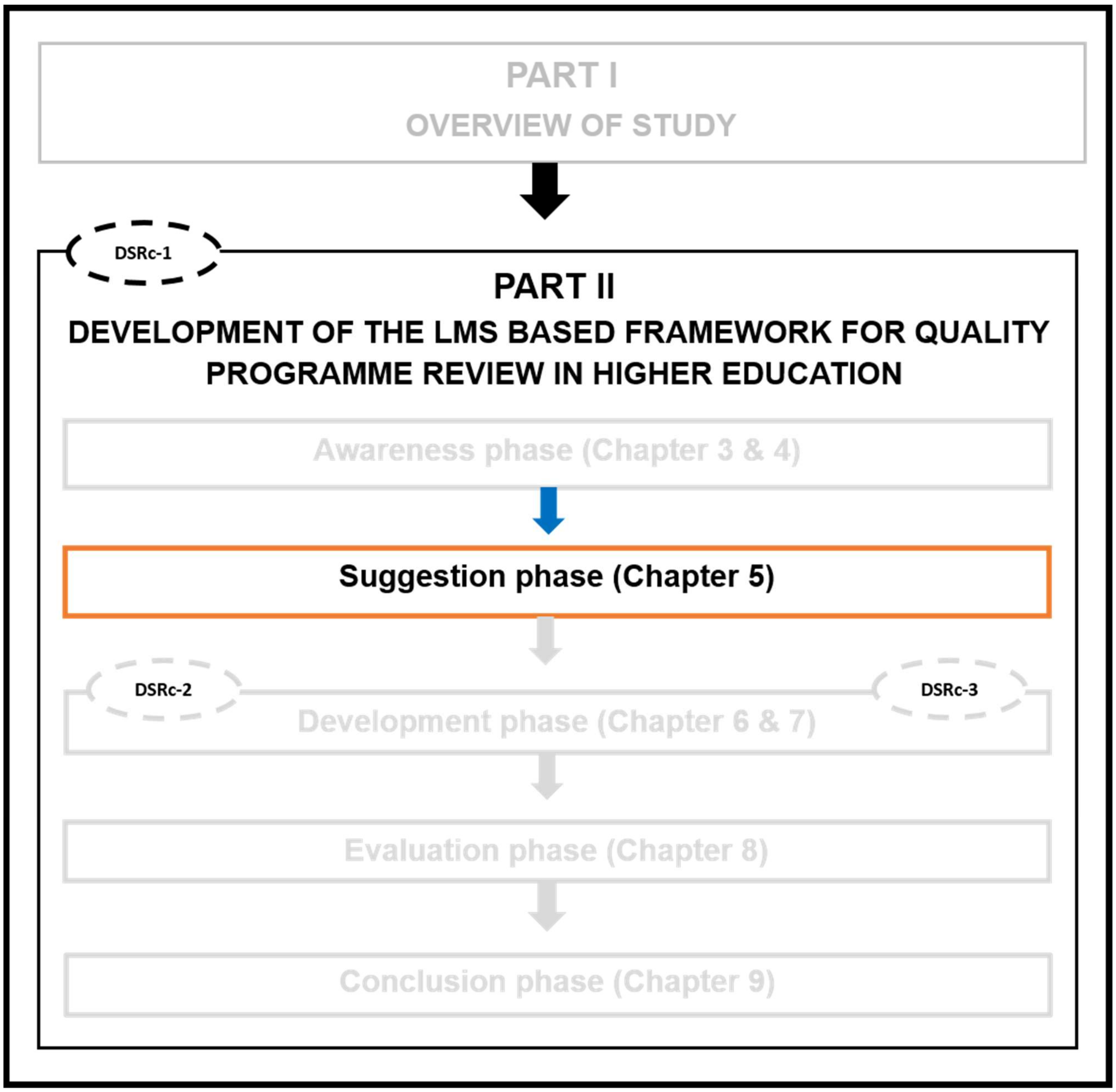
Chapter 4 intended through the readings and interviews, to find answers to research objective three, which was to investigate the use of an LMS in higher education concerning the availability of and reasons for the possible non-utilisation of LMS features that can report on programme outcomes coverage and student performance against the set outcomes.

In an emerging hybrid institution such as University ABC, every effort is made to align the institutional guidelines and policies to the national directive related to Information Communication Technology implementation and use in higher education institutions in South Africa.

There is no doubt that an LMS and all its associated features and functionalities have benefits for academic staff, support staff and students at University ABC. Through a structured and systematic approach in utilising the LMS, University ABC has the opportunity for educational big data (learning analytics) (Klein et al., 2019) collection points in the format of learning analytics. This approach creates an opportunity for programmes to engage in annual review processes to inform actions for improvement of programme offerings as well as actions to improve student learning. For the successful adoption of the BbGA in University ABC, all stakeholders should be informed of the existence of the functionalities of the LMS feature, but more so, be engaged in dialogue on how the technology can support their current improvement initiatives in their programmes.

Chapter 5 to follow, will inform through a published paper that emanated from this study how the principles of the Diffusion of Innovations theory of Rogers (2003) can be applied to the design and development of the framework for quality programme review.

DSRc-1


PART I
OVERVIEW OF STUDY
DSRc-1
PART II
DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION
Awareness phase (Chapter 3 & 4)
Suggestion phase (Chapter 5)
DSRc-2
DSRc-3
Development phase (Chapter 6 & 7)
Evaluation phase (Chapter 8)
Conclusion phase (Chapter 9)

5 INTRODUCTION TO THE DIFFUSION OF INNOVATION

Research Objective 4: To develop a framework for quality programme review applying the principles of Diffusion of Innovations (Rogers, 2003)**.**

5.1 INTRODUCTION

Chapter 5 forms part of the suggestions phase of the DSRc-1. The suggestion phase, as indicated in Section 2.3.2, is seen as the creative phase of the Design Science Research cycle. This phase is followed directly by the proposal where the problem statement directs the suggestion of which the output is a tentative design. For this study, the tentative design will focus on the development of a quality programme review framework, of which the design and development of the components of the framework are, in addition to the constructive alignment theory (Biggs, 2014), informed by the theory of Diffusion of Innovations (Rogers, 2003). The implementation of an LMS feature is only one of the components of the design. The following research objective is proposed: To develop a framework for higher education quality programme review by applying the principles of Diffusion of Innovations (Rogers, 2003)**.**

A problem with new technology acceptance is that those who need to interact with it are often sceptical or for some other reason inclined to embrace it (Al-Busaidi & Al-Shihi, 2010). Higher education institutions' willingness to integrate their teaching with new technology is often also seen as a form of pressure coming from the administration and not so much because of the perceived inherent value of new technology. It is in the same context that this research will utilise the Diffusion of Innovations Theory of Rogers (2003) within an interpretive and design science approach. For this study, it is essential to investigate the relevant literature in order to inform the value of the Diffusion of Innovations Theory as it is implemented and used in higher education. In Section 5.5, the role of diffusion of innovation in the underutilisation of an LMS feature is specifically discussed.

Based on two case illustrations of Mosteller during 1981 titled: *Controlling Scurvy in the British Navy,* and the *Non-diffusion of the Dvorak Keyboard in 1936-1986,* Rogers (2003) wrote the following on the diffusion of an innovation:

> "Many technologists believe that advantageous innovations will sell themselves, that apparent potential adopters will widely realise the apparent benefits of a new idea, and that the innovation will diffuse rapidly. Seldom is this the case. Most innovations diffuse at a disappointingly slow rate, at least in the eyes of the inventors and technologists who create the innovations and promote them to others. The Dvorak keyboard is much more efficient for typists than the QWERTY keyboard, which was designed more than a century ago to slow down typists to prevent the jamming of keys on early type-writers. However, almost no one has adopted the Dvorak Keyboard. *Superior technological innovations do not necessarily diffuse themselves*."

Taking cognisance of the above quote, the researcher was aware of the many different ways departments at University ABC were using technology to report on programme outcomes coverage and student performance measured against these outcomes. However, she averred early on in this study that the Blackboard Goals tools area of University ABC official LMS could enhance these evaluation methods and possibly also be implemented instead of the traditional methods of reporting. Following Rogers (2003) it was realised that the BbGA tool would not diffuse by itself in a functional way; hence the present study was conducted.

Therefore, the researcher had to investigate the most appropriate way of how she could introduce the BbGA at University ABC, but more importantly, how to provide a sustainable plan of action at University ABC that would enable University ABC to decide on the implementation and continuation of this tool in the future. It was, therefore, crucial for her to understand the concept of the diffusion of an innovation in a higher education context in order to be able to propose such a sustainable plan of action to University ABC.

This study suggests a framework where the BbGA is embedded in the framework as part of an extensive quality programme review process. The following Section (5.2) will introduce the Diffusion of Innovations Theory in the higher education context. As this study falls within the discipline of IS, it would be relevant to indicate how Rogers' theory also relates to the IS environment in industry and establish touchpoints to confirm the value of the use of Diffusion of Innovations Theory for this study (Section 5.3).

5.2 DIFFUSION OF INNOVATIONS THEORY IN HIGHER EDUCATION

The Diffusion of Innovations Theory by Rogers (2003) is a well-known framework (Sahin, 2006; Medlin, 2001; Lee et al., 2011; Scott & McGuire, 2017). It is relevant in higher education where new technology is being investigated for adoption into the higher education echo system, and more specific, into the curriculum. This theory has been applied in several academic disciplines, including anthropology, communication, geography, sociology, marketing, political science, public health, economics, and education (Rogers, 2003).

The following references are only a few examples that formed part of the readings in order to position the concept of diffusion of innovation in higher education in this study:

- The factors that may influence a faculty member's decision to adopt electronic technologies in instruction (Medlin, 2001).
- The Impact of High-Stakes Examinations on Classroom Teaching: A case study using insights from testing and innovation theory (Wall, 2005).
- Examining user acceptance of computer technology: an empirical study of student teachers (Ma, 2005).
- Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory (Sahin, 2006).
- Faculty attitude, adoption, and application of technology in higher education (Tabata et al., 2008).
- Diffusion of engineering education innovations: A survey of awareness and adoption rates in U.S Engineering Departments (Borrego, 2010).
- Adding Innovation Diffusion Theory to the Technology Acceptance Model: Supporting employees' intentions to use E-learning Systems (Lee et al., 2011).
- A qualitative analysis of institutional drivers and barriers to blended learning adoption in higher education (Porter, 2016).

- Use and attitude towards Learning Management Systems (LMS) in Saudi Arabian universities (Alghamdi & Bayaga, 2016).
- Using Diffusion of Innovations Theory to promote universally designed college instruction (Scott, 2017).
- From accreditation compliance to improving reporting on learning outcomes: The use of an LMS (Botha & De Villiers, 2017).
- The relationship among pre-service teachers' computer competence, attitude towards computer-assisted education, and intention of technology acceptance (Baturay et al., 2017).
- Application of diffusion of innovations theory to educational accountability: The case of EFL education in Japan (Sasaki, 2018).
- Dawn or dusk of the 5th age of research in educational technology? A literature review on (e-) leadership for technology-enhanced learning in higher education (2013-2017) (Arnold, 2018).
- Modelling students' readiness to adopt mobile learning in higher education: An empirical study (Al-Adwan et al., 2018).
- Factors that influence teachers' adoption and integration of ICT in teaching/learning process (Lawrence & Tar, 2018).

The adoption and diffusion of an innovation within a higher education institution such as University ABC, does not necessarily guarantee its successful integration into the curriculum and the processes related to programme review. From the collective readings for this study related to this topic, the following key themes were identified as prevalent and were utilised (see below) in the design of the present framework:

- The lack and/or resistance of academic staff to adopt educational technology during the early adoptive phase can be linked to:
  - *lack of leadership across the macro-, meso-, and micro level of a higher education institution* (Greenhalgh, 2004; Sultan et al., 1990; Lueddeke, 1999)
  - *lack of support and training for the technology* (Spiering & Erickson, 2006; Kilmon & Fagan, 2007) ;

- *lack of knowledge and information about the technology* (Bates et al., 2007; Chen, 2009; Walter et al., 2010; Abrahams, 2010; Autant-Bernard et al., 2013);
- *the absence of a planned process, model, framework, or approach for the introduction and implementation of the technology* (Storey & Richard, 2013; Fiedler, et al., 2014; Farahat, 2012; Szabo, 2002; Nyirongo, 2009; Hubbard & Sandmann, 2007; Scott & McGuire, 2017).

As Marshall (2010) argues, technology and change are closely related; the term innovation can be seen as synonymous to technology in many contexts, including that of higher education. He contends that the culture and existing capabilities at a higher education institution can constrain innovations and as such, determine the nature and extent of organisational change. He argues that in the absence of a clearly defined innovation programme and strong change agent leadership, technology only becomes a vehicle to enable further change that is already intended and in place. Simply put, the question is: should University ABC change its present policy and practice of evaluation and reporting on student outcomes and student success due to advances in information technology within a framework of diffusion of innovations?

A major obstacle to change in this regard is a lack of hard evidence that technology and innovation can be beneficial to educational student outcomes, more specific, to those qualifications and programmes that are accredited by external bodies and councils. In Section 5.5.1, this question will be addressed.

The increased need for educational technologies is not in question, and it is instead the process of diffusion or dissemination of these innovations (Dooley, 1999) that are experienced as challenging (Hazen et al., 2012). From the readings as indicated above, it can be concluded that the stages of the diffusion process are influenced and informed by the characteristics of the innovation, the people who need to decide to adopt the innovation and the environment where the innovation will be implemented. These environments also refer to the training and resource support that is available for the diffusion and implementation of the innovation.

Because this research is conducted within the field of IS, it was necessary to establish the credibility of the Diffusion of Innovations Theory as it is portrayed in industry. The next section will deal with the diffusion of innovation in IS in industry, and where applicable the connection with Rogers' theory in education will be indicated.

5.3 DIFFUSION OF INNOVATION IN INFORMATION SYSTEMS IN INDUSTRY

The Diffusion of Innovations Theory is also used and established in the IS environment in the industry. Mustonen-Ollila & Lyytinen (2003) identified over a decade, in three organisational environments, factors that affected over two-hundred IS process innovation adoption decisions. These authors used the Diffusion of Innovations Theory of Rogers to conduct their analysis. They indicated that several of the Diffusion of Innovations factors had a strong effect on IS process innovation adoption. Some of the critical factors that are also relevant to this study are, availability of technological infrastructure, past experiences, own trials, ease of use, and learning by doing. Below are some referenced articles that formed part of the readings for this research, more specifically to the use of Rogers Theory in the IS environment in industry:

- Technology diffusion and organisational learning: The case of business computing (Attewell, 1992)
- The organisation vision in IS Innovation (Swanson & Ramiller, 1997)
- The future of diffusion research – Special issue on adoption, diffusion and infusion of IT (Chin & Marcolin, 2001)
- What is wrong with the Diffusion of Innovation Theory? (Lyytinen & Damsgaard, 2001)
- Diffusion and Adoption of IT Products and Processes in a Danish Bank (Pries-Heje & Tryde, 2001)
- The Phenomenon of Diffusion (Larsen, 2001)
- Why organisations adopt information system process innovation: A Longitudinal study using Diffusion of Innovation Theory (Mustonen-Ollila & Lyytinen, 2003)
- Innovation Mindfully with Information Technology (Swanson & Ramiller, 2004)

- Diffusion of selected concepts in IS and Management: 1973-2004 (Harman & Koohang, 2006)
- Modelling innovation, manufacturing, diffusion and adoption/rejection processes (Woodside & Biemans, 2005)
- A Concept Model for Innovation Diffusion in Construction Industry (Gao et al., 2013)
- Acceptance and Intention to Use the iLearn System in an Automotive Semiconductor Company in the Northern Region of Malaysia (Veloo & Masood, 2014)
- Using diffusion of innovation theory to understand the factors impacting patient acceptance and use of consumer e-health innovations: A case study in a primary care clinic (Zhang, et al., 2015)
- Technology adoption in the diffusion of innovations perspective: introduction of an ERP system in a non-profit organisation (Miranda et al., 2016)

Based on the readings above, it is concluded that there is substantial evidence not only for the credible use of the innovation theory as such but also for its application in the educational sphere.

The next section (5.3.1) will briefly outline an introduction to IS innovation and indicate the subtle differences between the Information Systems Innovation framework and the Diffusion of Innovations Theory. This section will also pay attention to critique against the Diffusion of Innovations Theory and will conclude with the rationale for choosing the Diffusion of Innovations Theory and not the Information Systems Innovation framework as basis for the design of the proposed framework for this study.

5.3.1 Information Systems innovation

In their monograph *Information Systems Innovation and Diffusion: Issues and Directions*, Larsen and Eugene (1998) presented case studies of a diverse nature and from a variety of perspectives regarding the influences of variables affecting the innovation and diffusion process; the diffusion of software application packages; facilitation of technology diffusion and the conceptualisation of innovation and diffusion process. The authors and contributors of case studies in this 1998-monograph indicated that IS are prerequisites for business success. They argue that a considerable amount of capital is invested in IS solutions of which some are judged a failure from the start. Hence the need to search for solutions by making use of the diffusion of innovations approach.

Larsen and Eugene (1998) argue that IS require continuous innovation and diffusion processes among employers, information technology staff, internal and external specialists, consultants, vendors and other relevant key role players. Relevant to this study, the authors referred to some of the direct influences that can affect the diffusion of the innovation process. These influences are referred to as “power distribution, accelerated and continuous change, mental workload, and professional resistance and hardware evolution” (Larsen & Eugene, 1998). They further concluded that the more prevalent the decentralisation of organisational power and influence becomes in an organisation, the greater the influence will be on individuals and groups to use IS more innovatively. The authors argue that this approach has more impact than direct drives and actions from management in the same organisation. Therefore, in the absence of a drive or instruction of management at University ABC to implement BbGA, this study follows a bottom-up approach and work with the two departments at University ABC that expressed the need to instantiate a programme review process for reporting on programme outcomes alignment incorporating technology.

Larsen and Eugene (1998) then identified ten success factors for technology diffusion and process improvement initiatives by incorporating Rogers’ (2003) approach to diffusion of innovations:

- **Setting clear, relevant and realistic goals** links to Rogers’ perceived characteristics of an innovation.
- **Providing enhanced understanding** links to Rogers’ prior conditions to the five stages of decision-making which start with a perceived problem or need that is widely experienced or understood by as many people as possible in an organisation. Once an issue or challenge is perceived and recognised as a problem, it is more likely that the people will communicate about the problem and be more tolerable to adopt innovations that can solve the problem.

- **Unfreezing the organisation** where internal resistance is evident is a crucial action to take before significant improvement is achieved. Two critical aspects of this success factor are evident and of relevance to this research – (1) employers need to realise deficiencies in current practices and processes in an organisation and needs to be willing to change - (2) management commitment to engage with improvement initiatives support unfreezing and create an environment for finding solutions and the willingness to adopt new innovations. (This links to Rogers' characteristics of the decision-making unit)
- **Acquiring and transferring knowledge** links to Rogers' five stages of the innovation-decision process.
- **Tailoring improvement initiatives** imply adaption to various specific needs of various individuals and groups within an organisation. This links to Rogers' perceived characteristics of the innovation.
- **Encouraging communication** links to the Diffusion of Innovations Theory and emphasise that technology diffusion is a communication process where people create and share information to agree about the problems and needs and the possible innovations that can ensure improvement.
- **Ensuring staff involvement** – Rogers (2003) refers to four types of innovation-decisions which foster staff involvement and is of the opinion that authority innovation-decision contribute the fastest rate of adoption of innovations:

  Type 1: An optional innovation-decision where an individual can decide to adopt or reject an innovation – independent from other people in their social-system

  Type 2: Collective innovation-decision where members in a system choose by consensus

  Type 3: Authority innovation-decision where few people with power or status positions or technical expertise make choices

  Type 4: The contingent innovation-decision is a combination of 1-3 in sequence.
- **Emphasising teamwork and collaboration** – According to Rogers (2003), communication and the transfer of ideas are more effective between two people who are alike.

- **Management commitment** – Diffusion of Innovations Theory highlights the importance of the social structure for technology innovation. A manager who is actively involved and provides support during the development of the improvement in the process is viewed as an opinion leader. The opinion leaders are usually members of the social system.
- **Change agents and facilitators** ensure that the improvement process runs without any delays. They work externally from the social system in collaboration with the opinion leader.
- **Stabilising changed processes** – the Diffusion of Innovations Theory supports the understanding of how changed processes can be stabilised; for example, some innovations change or get re-invented through the diffusion process.

Larsen and Eugene (1998) wrote a chapter titled: *Information Systems Innovation: A Framework for Research and Practice* where they illustrate the subtle difference between the Information Systems Innovation framework and that of the Diffusion of Innovations Theory:

> "The principal element in the IS innovation framework is the human actors within the organisation. The anchor of the innovation process is the development of peoples' ideas over time and how these ideas attach IS/IT as part of the solution."

Larsen aimed to provide a holistic view of Information Systems Innovation. He identified the following elements of an Information Systems Innovation and argued that equal attention should be given to all the elements, namely (Larsen & Eugene, 1998): "technical issues, human concerns, managerial actions, and knowledge, interactions among line employees and Information Technology experts, strategic, tactical, and operational requirements, organizational elements, and vision." He argues that within this holistic view an innovation cannot only be technology-driven and must take as its foundation the people in the organisational setting, meaning that an "Information Systems Innovation is an artefact and can only be explained as a result of human activity." (Larsen & Eugene, 1998)

The three distinct phases indicated below are the minimum requirement to understand an Information Systems Innovation process at its core as it is needed for the development of an Information Systems innovation. Larsen also wrote that the use of these phases in the innovation process might assist in the development of methods and understanding of the use of Information Systems innovations, but indicated that it could not be a linear process. In this regard, it differs from Rogers' theory that is a linear approach to the diffusion of an innovation, and is one of the critiques against Rogers' theory (Larsen & Eugene, 1998):

- *The idea phase* – An idea is created by people in an organisation until a decision is reached to create a project organisation that involves a structure that facilitates the coordination and implementation of the specific projects' activities.
- *The creation phase* – During this phase, the soundness of the initial idea is tested by the project organisation after which they conduct related activities that are needed to create the new Information Systems solution.
- *The usage phase* – In this phase, the new Information Systems solution is handed over to the leading organisation where the solution is instantiated for use on a daily basis.

Based on a systems thinking view Larsen (Larsen & Eugene, 1998) identified key issues and key structures that are embedded in Information Systems Innovation which formed the basis for his Information Systems Innovation framework and regulated organisational processes, namely: task, structure, technology and people. The present study can be aligned to the five key issues identified, namely:

- Human activity unfolds within an ***organisational*** setting – The structure of University ABC creates both an opportunity and limitation for innovation that is dependent on the levels of the organisation, the group, and the individual that needs to take account for Information Systems Innovation.
- ***Knowledge*** plays a vital part – With reference to this study, the knowledge that exists at University ABC for the successful roll-out of the proposed framework can be identified in the academics and support staff who holds in-depth expertise

within their own job-domain; the knowledge, understanding, and insight they possess of critical issues outside their own job-domain.

- Drawing upon systems thinking principles, the objective of an Information Systems Innovation process is the creation of an ***artefact*** (that is, an information system that satisfies particular needs and are usually an IS) – Within a holistic view as proposed by Larsen, an implemented IS tool is concrete and visible into a broader occurrence. The framework (artefact) designed for University ABC should, therefore, be a blend of the academics' needs for such a framework (which includes the incorporation and implementation of LMS features such as the BbGA).
- The elements of the framework, as well as its purpose, should be clear.
- Since Information Systems Innovations occur on strategic, tactical, and operational levels the ***time horizon*** for the innovation process is an element – The proposed framework for implementation at University ABC have a long-term horizon and are strategic, which involves the institutional, programme and module levels at University ABC.
- The creation of an IS artefact needs an ***innovation process*** – The development of the proposed framework for University ABC needed a process with reiterated phases where each iteration was characterised by unique activities, and people involved that was not involved or included in previous iterations. These iterations are documented in the two case studies involved in this research and will be discussed in Section 6.2 and 6.4.

The researcher's decision to use Rogers' theory is supported by the following reading of Larsen (2001):

- Diffusion should be seen as an umbrella for the development of strategy, innovation, network theory, social structural theory and many other approaches that could help one understand the change in organisational settings.
- Researchers should clearly define the scope and theory base of their research to ensure value for practice as more Information System/Information Technology products, frameworks, and methods will be seen.

- Organisations and researchers are encouraged to embark on multiple change processes and methodological approaches that are well known and in place, but at the same time maintain established and well-understood good practices.

5.4 ROGERS' DIFFUSION OF INNOVATIONS THEORY AS APPLIED TO THIS STUDY

The Diffusion of Innovations Theory framework consists of four main elements in the diffusion of a new idea: The innovation itself; communication channels; time; and the social system or the context.

According to Rogers (2003), an **innovation** can be defined as "an idea, practice or object that is perceived as new by an individual or another unit of adoption". For this study, underutilised or unknown LMS features (object) can also be referred to as an innovation that is perceived by an individual as 'new'. 'Innovation' and 'technology' are two words often used as synonyms. At University ABC, the BbGA feature might not be perceived as new technology due to the existence of likewise products in the market. 'New' or 'newness' does not necessarily mean only new knowledge. People might know about an innovation for quite some time, but have not yet developed an attitude towards the innovation that is favourable or unfavourable. It can also be the case that they have not yet adopted or rejected the innovation and therefore perceive it as new.

However, this research aims to include technology, such as the BbGA feature, as part of a process (practice) in a framework for quality programme review. In this regard, it can be communicated that the framework idea can be perceived as the innovation as long as people will receive answers to the following questions as proposed by Rogers (2003): "What is the innovation? How does it work? Why does it work? What are the consequences of the innovation? Moreover, what will its advantages and disadvantages be in the present situation?"

Therefore, the innovation this study focuses on, is not the technical feature set included in the Blackboard Learn (LMS). The innovation is the way in which this feature set is applied for a specific organizational purpose by the user organisation (University ABC and its units). This dissertation is not about a technology innovation or its development; it is about organisational innovation based on the application of a standard set of technology features.

Diffusion, as referred to in the Diffusion of Innovations Theory of Rogers (2003, p. 6): "… is the process in which an innovation is communicated through certain channels over time among the members of a social system". The concept of **communication** in the broader sense can be described as a process where mutual understanding is reached through participants' creation and sharing of information with one another. Rogers (2003) also refers to diffusion as a message shared about a new idea (planned or spontaneous), and terms this as a 'special type of communication'. He further indicates that diffusion is"a kind of social change, defined as the process by which alteration occurs in the structure and function of a social system" (Rogers, 2003).

The five stages in die decision-making process as illustrated in Figure 33 explain that people first have **(1) knowledge** about the innovation, then forms an attitude towards the innovation, which is called the **(2) persuasion** stage, after which they **(3) decide** if they want to adopt or reject the **(4) implementation** of the innovation. The final stage of **communication** is the **(5) confirmation** stage, where the individual evaluates the results of the innovation-decision made. The **communication takes place within a social system** through particular channels and with specific people who create and share the information to reach a mutual understanding of the adoption of the innovation.

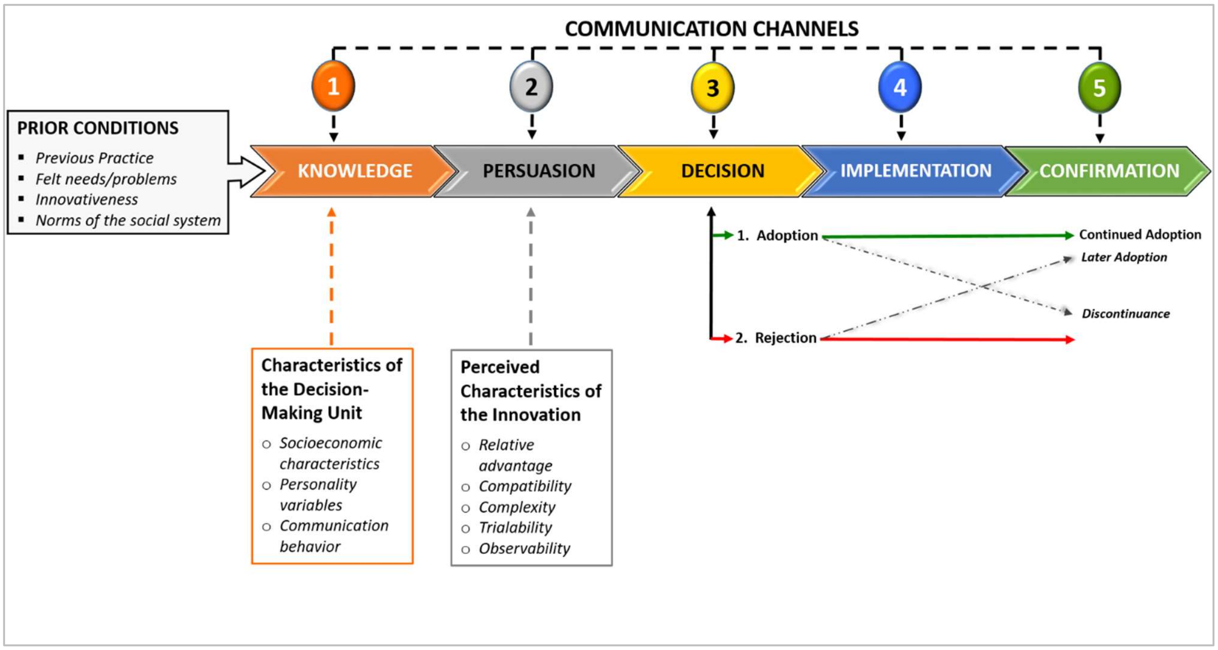


Figure 33: A Model of Five Stages in the Innovation-Decision Process (Rogers, 2003)

The stages through which people move to decide on the acceptance or rejection of an innovation is called the adoption process. The adoption rate of an idea, object or practice is determined by the degree of five perceived characteristics of the innovation (Rogers, 2003):

- the **relative advantage** to be better than the ones it supersedes;
- the **compatibility** to existing needs, values and past experiences;
- the **complexity** about the difficulty and use;
- the **trialability** concerning the limited time permitted for experimentation; and
- the **observability** of results of the innovation to the people within the social system.

The above characteristics of an innovation are used as guiding principles in the design of the framework for this study. The assumption is, that the decision to adopt the framework, and the continuous implementation thereof, should be positive in execution if the framework is designed according to these guidelines.

It is not to say that everyone at University ABC will necessarily adopt the proposed framework. There are five categories of adoption and range from innovators, early adopters and the majority, late majority and laggards. Although these categories of adoption are not the focus of this study, the aim of the research is to design a framework for quality programme review, intended to include the use of technology, in such a manner that it will attract (Larsen & Eugene, 1998) innovators and early adopters and ease their decision to adopt and implement the framework. Therefore, the design of the components of the framework is based on the perceived attributes or characteristics of an innovation as proposed by Rogers (2003) for easy and a conclusive decision to adopt not just the BbGA technology, but to adopt the process which will include the use of BbGA. Chapter 6 deals with the design of the framework.

The decision to use the Diffusion of Innovations Theory (Rogers, 2003) for this research, is not only based on its extensive use and implementation in higher education and industry technology adoption, but also the close relationship it has to the Information Systems Innovation Framework proposed by Larsen from the Norwegian School of Management (Larsen & Eugene, 1998).

5.5 THE ROLE OF DIFFUSION OF INNOVATION IN THE UNDERUTILISING OF AN LMS FEATURE – INTRODUCTORY NOTES

An investigation was done to find clarity and direction for the design of the framework that will support a process of quality programme review utilising an LMS feature namely Blackboard Goals Area® (BbGA) in a higher institution such as University ABC.

The third research objective of this study focuses on the use of an LMS in higher education, and the availability of and reasons for the possible non-utilisation of an LMS feature that potentially can report on programme learning outcomes coverage and student performance against the set learning outcomes.

A collaboration was established with a lecturer in the Department of Informatics at University ABC. The lecturer's contribution was invaluable as she came with an array of industry knowledge where an investigation was explicitly rolled out for technology feature application across different capability areas such as data management in a mobile company. This study was presented as a lecture note at the International Symposium for Emerging Technologies in Education (Botha, et al., 2018) (Thailand, 2018) titled: *Applying Diffusion of Innovations Theory to Learning Management Feature Implementation in Higher Education: Lessons Learned.*

In the lecture note to follow (Section 5.5.1) two real-world examples, illustrate how the application of the Diffusion of Innovations Theory enabled technology feature implementation in higher education and industry. The first example is shared from higher education and illustrated in Figure 34.

For successful implementation of an innovation such as the BbGA feature on an institutional level, an established partnership is indispensable. The following stakeholders should be part of this partnership: the institutions quality assurance office, institutional planning office, offices of the vice-chancellors for academic matters, offices of the deputy deans for teaching and learning, the academic departments and finally the support departments who are responsible for the institutional LMS and the learning developers and teaching and learning advisors. The researcher also shows the importance of the perceived characteristics of an innovation to persuade people to decide to adopt an innovation.

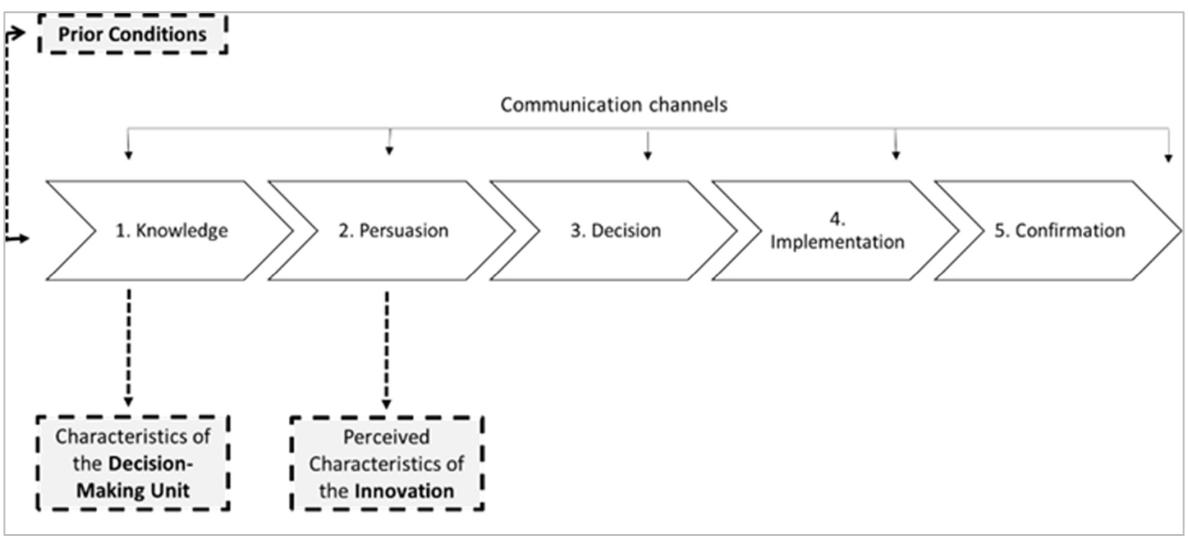


Figure 34: Higher education example - Areas for lessons learned through the Diffusion of Innovations Theory are indicated in the dotted lines

The second example is drawn from industry and illustrated in Figure 35 how the innovation-decision process followed enabled the definition of an agile and innovative process by identifying the components that should be addressed first during their diffusion of innovations process.

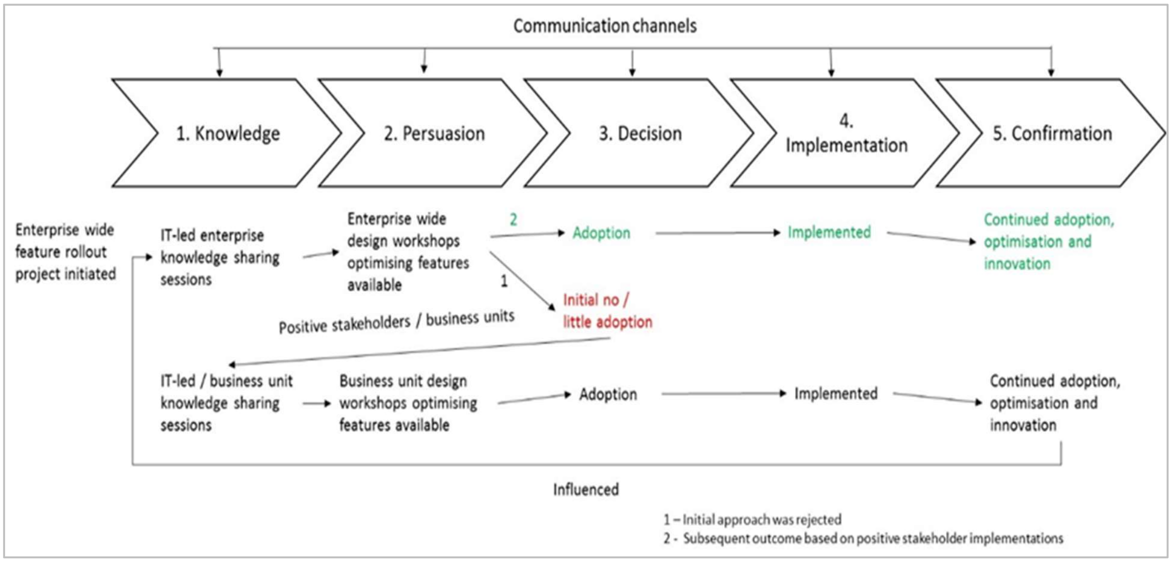


Figure 35: Industry Process followed for feature implementation

Due to the limited number of pages allowed for the publication of the lecturer note presented at the SETE 2018 conference, the description of a critical tool, called ‘a heat map’, was omitted from the lecture note and are explained in this introductory note.

The industry example will demonstrate how a ‘heat-map’ was incorporated during a business owner/technology optimisation and collaboration drive. One of the enterprise architects highlighted additional technology features of the purchased software that were not utilised at all, either because business owners were not aware of it or that the business owners did not realise what value a particular system feature would add. This realisation triggered an assessment process where technology capability was mapped to technology usage to identify a gap example what system features are available, but not utilised. The additional technology features identified in this analysis were represented visually in a heat-map format, as shown in Figure 36.

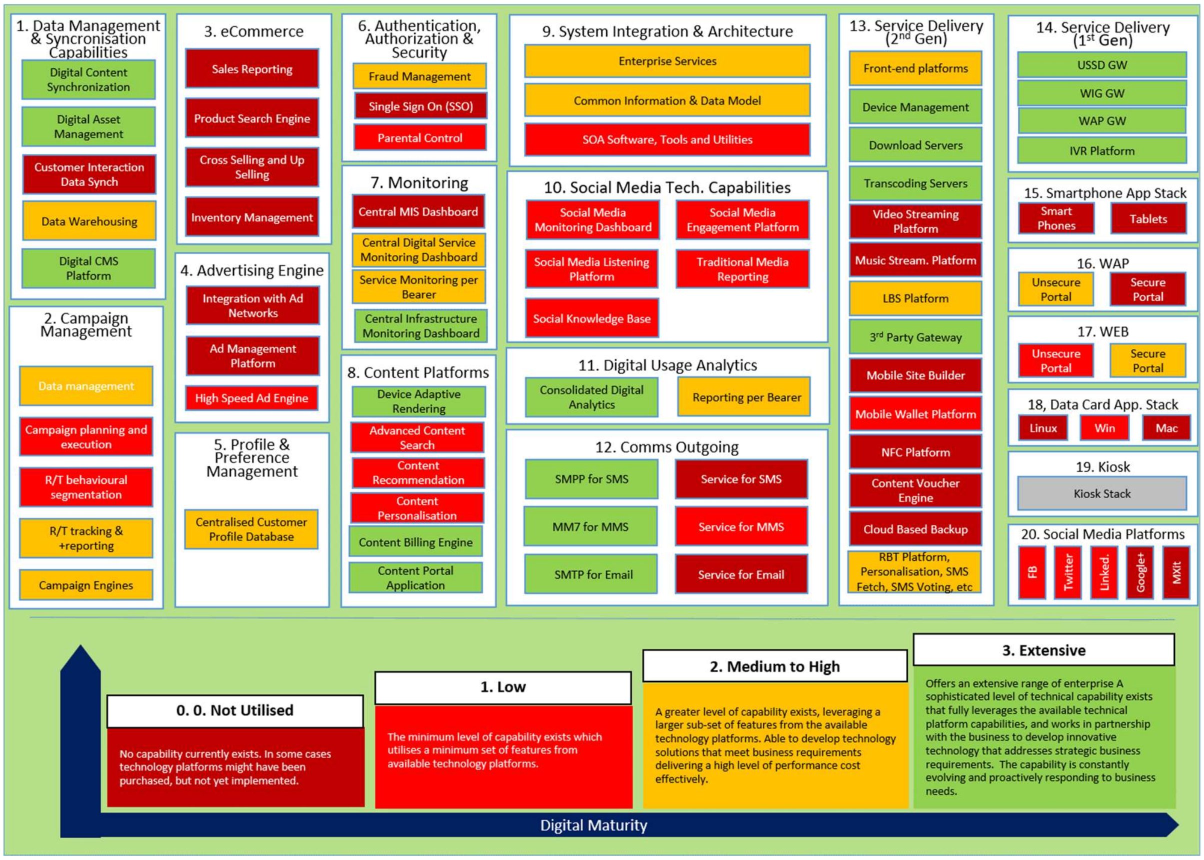


Figure 36: A technology feature usage heat map

As depicted in Figure 36, the organisation's technology feature application across different capability areas such as data management, campaign management and e-commerce was assessed based on whether it was used (applied) in the organisation or not (Gap analysis). Such application was noted by a colour code where the dark red colour implied technology feature not utilised at all: red indicated utilisation was low, amber showed medium to the high application and green implied extensive utilisation of technology features.

Underutilisation of technology features is not unique to higher education, and in this instance, higher education can learn from the approach and steps followed by industry as indicated in Figure 37 (see Section 5.5.1). The social system and change agents (opinion leaders) as depicted in the Diffusion of Innovations theory, play a vital role in the successful implementation of technology features. Also, both examples used a workshop approach, show-and-tell and a pilot to inform and train potential users on the technology features.

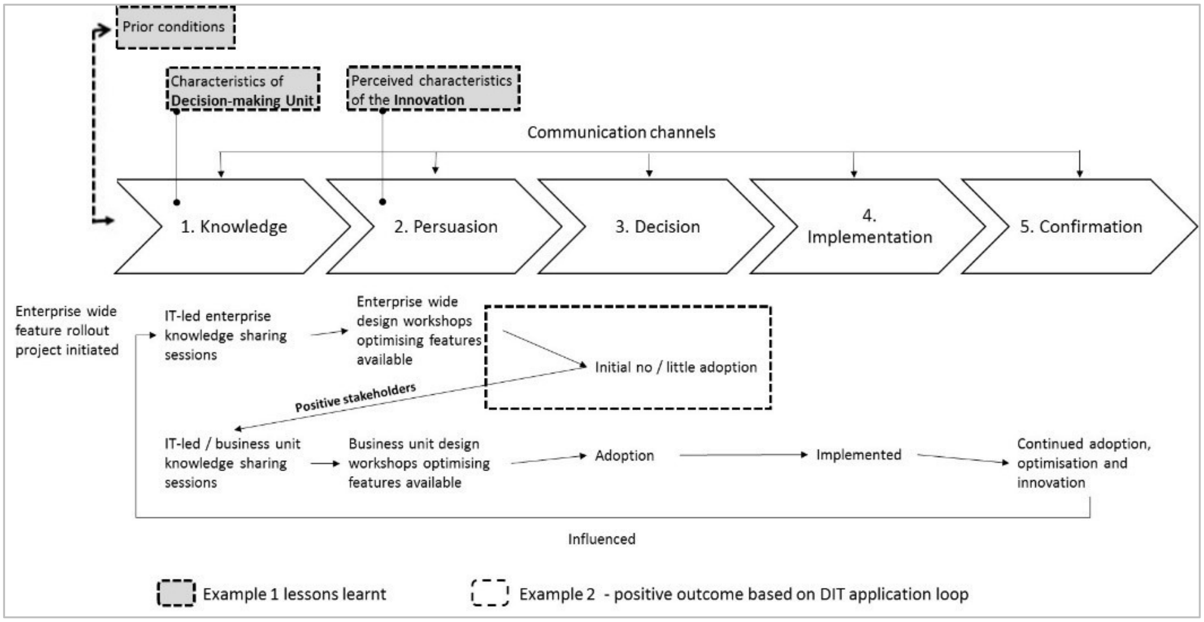


Figure 37: Example 1 (Higher Education) and example 2 (Industry) – Lessons learned during technology feature implementation

A key realisation documented in the lecture note that could add future value is the fact that the diffusion of innovation steps was not followed linearly but viewed holistically and also 'looping back' where necessary (indicated by the arrows in Figure 37). Through this action, industry gained successful adoption of their process that can in future add value towards successful adoption of example LMS features in higher education.

In this regard, synergies were established between the lessons learned for higher education and industry. Higher education could capitalise on the experiences and findings from industry concerning successful implementation of technology features.

5.5.1 Lecture Note

Botha A., Smuts H., de Villiers C. (2018) Applying Diffusion of Innovations Theory to Learning Management System Feature Implementation in Higher Education: Lessons Learned. In: Hao T., Chen W., Xie H., Nadee W., Lau R. (eds) Emerging Technologies for Education. SETE 2018. Lecture Notes in Computer Science, vol 11284. Springer, Cham

Applying Diffusion of Innovations Theory to Learning Management Feature Implementation in Higher Education: Lessons Learned

ABSTRACT

In today's rapidly changing world, Information Technology is transforming the higher education domain through an increase in accessibility of fast, multimedia-capable computers and broadband access. Higher education institutions are adopting new ways of enhancing their traditional ways of teaching, resulting in the emergence of seamless learning scenarios with a consequential need for flexible tools able to support experiences across various dimensions in such seamless learning environments. Learning Management Systems (LMS) in turn, have fulfilled this requirement for enablement. Technology alone is not sufficient as the potential it offers in order to be able to use it effectively in redesigning their educational scenarios, are often not understood, or implemented. In order to achieve seamless learning while optimizing capital investment in learning management systems, this paper focuses on LMS feature implementation by applying the diffusion of innovations theory as a guideline. This paper presents two real-world examples that illustrate the proposed steps taken for LMS feature implementation and presents a number of lessons learned in doing so. It was established that there was synergy between the lessons learned for higher education and industry and that higher education could draw on the findings from industry.

Keywords: Learning Management System, Diffusion of Innovation, Higher Education

1 INTRODUCTION

The workplace of today is dramatically different from the workplace of the past and what people produce together is what counts [1, 2]. The most common capabilities demanded of graduate job entrants include communication, teamwork, integrity, intellectual ability, and confidence [3]. The employability of graduates is an increasingly important topic within higher education, and it is essential for universities to better understand employer capability (human capital) and skills requirements so that their graduates can better meet those requirements as well as the broader educational objectives of a higher education qualification [3]. In this regard, the higher education authorities require institutions to conduct an annual programme review of programmes offered at the institution to improve learning for student success. External professional boards also require proof of evidence that students achieved the desired learning outcomes before they can enter the workplace. The Engineering Council of South Africa (ECSA) for example, expect proof of evidence that all engineering programmes adhere to eleven exit level outcomes concerning where these outcomes were implemented, practised and integrated assessed. This is also the case with programmes in the Informatics and Information Technology disciplines which need to comply with the Accreditation Board for Engineering and Technology (ABET) [7].

Update and optimisation of higher education qualification programmes involve a continued emphasis on preparing students for highly skilled employment as well as for future challenges. While in many cases it will be impossible to predict what this specific practice will be, it is anticipated that students will go out to practice in even more complex social, ethical and economic worlds [1]. Making graduates aware of the concept and importance of skill transfer is the responsibility of higher education. Helping students understand and appreciate those factors, which influence skill transfer, is critical and will assist their career progression, lifelong learning, and productivity [4].

An outside observer might conclude that higher education possesses all there is to know about learning and that with a few digital enhancements, its knowledge was complete [1]. However, persistent industry criticism of higher education efforts in producing work-ready graduates and evidence of poor performance in specific employability skills are still evident

[4, 6]. There has been far less attention to the transition of graduate skills and knowledge from university to the workplace [4]. The use of LMS features not only supports reporting on assurance of learning and graduate readiness over the past few years but also enabled institutions to use data analytics to inform the actions for improvement of programmes to be in alignment with inter alia industry expectations [5].

Therefore, the purpose of this paper is to share lessons learned from the implementation of LMS features in higher education through the application of the diffusion of innovations theory as a guideline. This is achieved by considering two real-world examples – one related to higher education and the other to industry. The next section presents the background to the study, where after technology adoption based on the diffusion of innovations theory will be explored in Sect. 3. Section 4 concludes the paper.

2 BACKGROUND

In the next sections, a brief overview of the expectation of industry concerning providing evidence that institutions are complying with higher education standards and industry requirements are presented. The affordances of LMS features in higher education to address the current student in order to meet industry expectations are highlighted. In the final section, reference will be provided on how the diffusion of innovations theory can inform the decision to adopt technology and more specifically, the implementation of LMS features successfully.

2.1 Learning Management Systems in Higher Education

An LMS is a software application for the administration and reporting through analytics of educational programmes and modules. It affords the creation and uploading of various forms of content, provides assessment opportunities online and a platform for collaboration. Various types of LMS's are available such as Blackboard Learn, which is a licensed enterprise package. Other open source LMS's are for example Canvas and Moodle. Various tools within the LMS are available for early identification of challenged students and means to monitor and track these students' performance. Some LMS's have features to align outcomes with content and assessment through reports, for example, the Goals Tool in Blackboard.

Dahlstrom et al. [8] reported on an Information Technology practices survey with nearly 800 institutions and explored the perspectives of faculty and students on the LMS in the context of institutional investments. It was found that “faculty and students value the use of the LMS as an enhancement to their teaching and learning experiences, but relatively few use the advanced features and even fewer use these systems to their fullest capacity” [8]. The faculty and students also indicated that they wanted to use analytics to enhance learning outcomes.

Although academics and learning developers highly value the learning and teaching features within the LMS [9], one often hears that the decision for academics to adopt and accept the use and implementation of the LMS into educational practice still remains a challenge, and they often are sceptical of the successful implementation of underutilized features in the LMS. The next generation LMS should have specific attributes to meet user needs and expectations: for seamless learning it should be mobile friendly; to enculturate self-regulated learning it should allow personalization and be customizable; for successful implementation as part of a move to hybrid learning the LMS should be adaptive, intuitive and integrated; the design should enhance student learning and be able to report on the assurance of learning easily.

However, it was questioned if a lecturer’s intention level for using an LMS are influenced by the combination of the LMS in use, the specific instructional task that needs to be performed and the specific user interface [10]. Dahlstrom et al. [8] found that lecturers are more willing to receive training to make better use of the LMS if they have evidence that it will improve student outcomes. Furthermore, a clear vision towards next generation learning environments was depicted, and summarize the use of an LMS and underutilisation thereof as follows [8]: “Faculty and students perceive today’s LMS as augmenting their teaching and learning experiences. However, relatively few students or faculty uses the more advanced features, and even fewer use these systems to their fullest capacity. Tomorrow’s digital learning environment will find ways to bridge these gaps, through making users aware of system features, providing integrated training and support, setting expectations or standards for use, prioritising one or both of the user-friendliness or system interfaces. These systems (or ecosystems) will be optimised to enhance the teaching and learning experience."

2.2 The Profile of the "Current" Student

Students are increasingly crossing back and forth between higher education and the working world. It is common for undergraduates to have significant work experience before enrolment, with many also maintaining concurrent part-time work alongside full-time study [1]. Self-management encompasses the ability to multi-task, work autonomously, achieve work-life balance, self-regulate emotions and tolerate stress; all vital to employability [4]. The consensus amongst employers is that graduates that make themselves as 'work ready' as possible are in a much stronger position [3].

Higher education institutions are faced with a new generation of students, often referred to as the millennials and more recently, Generation Z [11]. These students are characterised as determined, driven achievers, express a need for immediate feedback, and have a sense of entitlement and are often experienced as a generation with unrealistic expectations. They expect a "how-to" guide to succeed in the lecture environment and depend on technology for achieving their educational goals, as expected by higher education and industry. Howe and Strauss [12] further characterise millennials as "special, sheltered, team orientated, confident, pressured, achieving, and conventional."

The Millennials want to spend less time on tasks and reach success with little effort [13]. To ensure that students can experience the connection between what they learn and the real-world application thereof, change on the lecturer side is inevitable. This changing educational environment calls for lecturers to reflect and revisit their teaching practices. It also asks of lecturers to 're-purpose' and change their adaption behaviour to their use of technology to support this new generation who are also in some instance working full- and part-time jobs while taking lectures.

2.3 Diffusion of Innovations Theory (DIT)

The DIT by Rogers [14] is a well-known framework and still relevant in higher education where new technology isbeing investigated for adoption [15]. The framework consists of 4 main elements in the diffusion of a new idea: (1) The innovation itself, (2) Communication channels, (3) Time and (4) Social system or the context. For this paper, underutilised or unknown LMS, features can also be referred to as an innovation if an individual perceives it as ‘new’. Diffusion, as referred to in the DIT, is the process where an innovation is communicated over a period. People first have knowledge about the innovation, then forms an attitude towards the innovation after which they decide if they want to adopt or reject the implementation of the innovation. The final stage of communication is the confirmation stage, where the individual evaluates the results of the innovation-decision that has been made. The communication takes place within a social system through certain channels and with specific people who create and share the information to reach a mutual understanding of the adoption of the innovation. The stages through which people move to decide on the acceptance or rejection of an innovation is called the adoption process.

The adoption rate of an idea, object or practice is determined by five characteristics, namely: (1) Relative advantage of the innovation to the ones it supersedes; (2) Compatibility to existing needs and past experiences, (3) Complexity in relation to the difficulty and use; (4) Trialability with respect to the limited experimentation and the (5) Observability of results of the innovation to the people within the social system. There are five categories of adoption and range from innovators, early adopters and majority, late majority and laggards.

3 EXPLORATION OF TECHNOLOGY ADOPTION BASED ON DIFFUSION

In this section, two real-world examples illustrate how the application of the DIT enabled the technology feature implementation. The first example is shared from higher education, while the second example is drawn from industry.

3.1 Example 1 – Higher Education

The first example is related to an ABET accredited BCom Informatics programme offered at an emerging hybrid higher education institution in South Africa (SA) [15]. This programme needs to provide proof of evidence of assurance of learning compliance.

Head of departments, programme coordinators, and module lecturers often fail to provide hard coherent evidence to report on the assurance of learning. According to the Sydney Business School [16] assurance of learning (AOL) refers to: “The systematic process of collecting data about student learning outcomes, reviewing and using it to develop and improve the School’s degree programs continuously. Assurance of learning ensures our graduates achieve the goals and outcomes we say they will achieve when we advertise our degree programs. It is a means of holding ourselves accountable for delivering what we say we will deliver to students and other stakeholders, as well as a way of supporting the continuous improvement of our degree programs.” Management and lecturers are not always aware of technology already available to them to assist with the collection of data for assurance of learning and the reporting opportunities already available within these licensed enterprise packages. There can be a few reasons for this such as that not all features of the LMS are visible or advertised for use, the unknown educational value of these features or no policies for ensuring quality assured process in place for the potential roll-out of these features.

The head of the department (HOD) and education consultant investigated alternative methods of collecting data and reporting on the assurance of learning utilising the institutions official LMS Blackboard Learn (Bb). They discovered that the Goals Tool feature and Goals Performance Dashboard feature within Blackboard Learn could address the need for reporting to ABET as well as their annual programme review. The automated reports generated by Blackboard can inform the direction for programme and module improvement as well as actions to be taken for effective student learning.

Another affordance discovered was the Goals Performance dashboard feature that informs students how they are progressing with their outcomes covered and achieved. Through this automated function, students can daily, monitor their performance against the aligned graduate attributes and industry expectation, enhancing their self-regulated and metacognition skills.

Another key objective was to introduce the Goals Tool to lecturers and at the same time, motivate the lecturers to use the feature. In order for lecturers to adopt the Goals Tool successfully as part of their education practice, the DIT (Sect. 2.3) directed the design of the framework concerning the innovation element and the persuasion communication resource (channel). The education consultant conducted a workshop, attended by all lecturers in the department, to introduce the perceived characteristics of the Goals Tool were after they completed an online proof of concept survey. The questions designed were informed by the five characteristics of the decision to adopt an innovation. Although the overall feedback was decisive in the potential use of the feature, there remain resistance and concern with the additional administration load this feature could hold.

Lessons Learned

The “diffusion of innovation-decision-process” enabled the researcher to introduce the Goals Tool feature of the official LMS to lecturers at University ABC. Reflection on the lessons learned provided the opportunity for a follow-up workshop with the aim to fully implement Goals Tool as a feature for reporting on the assurance of learning to ABET and programme improvement. The following discussion highlights some of the critical lessons learned during the implementation process:

- Get to know your LMS and all the possible features included in the licensed enterprise package.
- Do not hesitate to take the risk to experiment with unknown and undiscovered features within your LMS, especially if continuation of the feature is a threat. These challenges can be addressed once the actual discontinuation eventually happens – lessons would have been learned, and productive and proven recommendations can be offered at that stage to the institution to motivate for the continuation or alternative to the LMS feature.

- Communicate through 'show and tell' the educational value of the LMS features and potential advantages it holds for lecturers and students.
- Engage with lecturers to experience the features in a 'sandpit' environment where it is safe for them to make mistakes. See this as opportunities for learning and getting 'buy-in'. Do not ignore the 'receiver variable' component of Rogers' [14] DIT.
- Know your audience, especially regarding their attitude toward change and their perceived need for the innovation (Fig. 1 grey boxes).
- The knowledge phase of the diffusion process, where a lecturer becomes aware of an innovation and how it functions, cannot be underestimated. The lecturer is part of a social system, which Rogers [14] defines as: "a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal."
- The social system institutes borders within which an innovation such as the Goals Tool feature diffuses. Norms manifest in the behaviour patterns of the social system, the department in this instance, which influence the diffusion process.
- Recognize the role of change agents and influence of opinion leadership (who are usually the early adopters) within this social system to ensure a positive direction towards successful adoption of an innovation (Fig. 1 grey boxes).
- For successful implementation of an innovation such as the Goals Tool feature on an institutional level, an established partnership is indispensable.
- The following stakeholders should be part of this partnership: the institutions quality assurance office, institutional planning office, offices of the vice-chancellors for academic matters, offices of the deputy deans for teaching and learning, the departments and finally the support departments who is responsible for the institutional LMS and the learning developers and teaching and learning advisors.

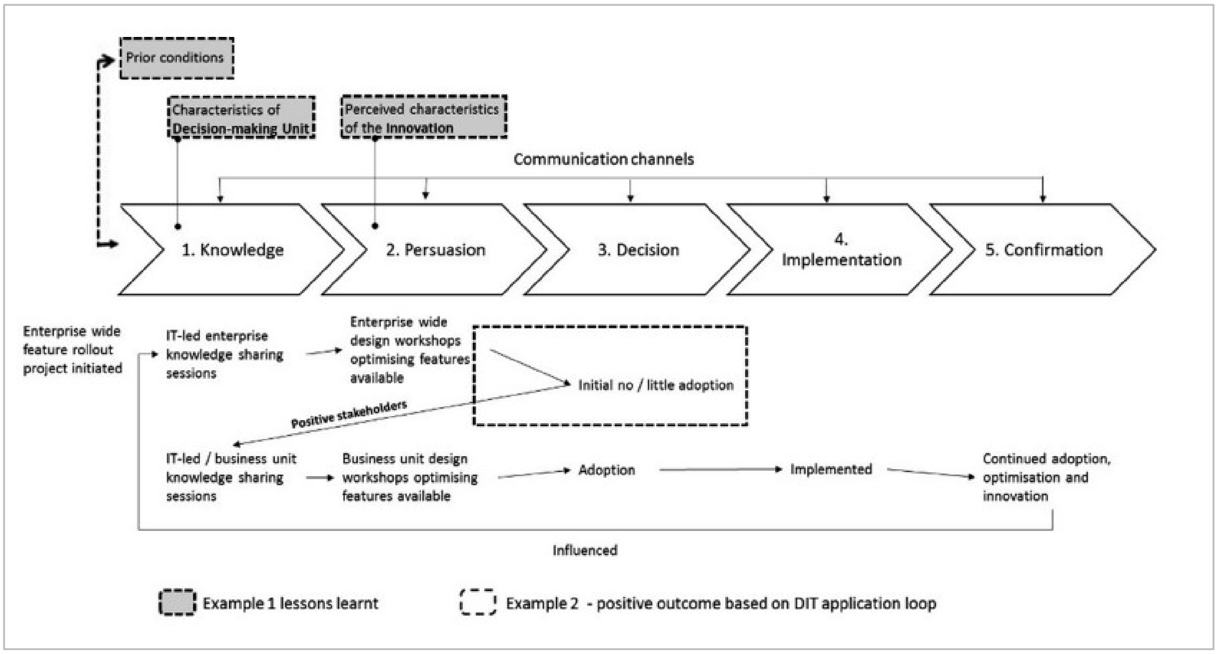


Figure 1: Example 1 and 2 feature implementation lessons learned

3.2 Example 2 - Industry

As industry places significant emphasis on industry-ready graduates, our second example and lessons learned are drawn from this domain. This example stems from one of the telecommunication companies in South Africa that operate in a competitive market and in an advanced technology environment. Product and services are vital differentiators, and technology enablement plays a significant and critical role within this company in order to achieve strategic objectives and customer experience imperatives. The processes utilised for system development and implementation of technology solutions follow standard system development lifecycle steps, traditionally initiated by a business owner. Business owners utilise them – in many instances – limited knowledge of the enablement technologies to design, develop, and innovate new products and services.

During a business owner/technology optimisation and collaboration drive, one of the enterprise architects highlighted additional technology features of purchased software that were not utilised at all, either because business owners were not aware of it or that the business owners did not realise what value a particular system feature would add. This realisation triggered an assessment process where technology capability was mapped to the technology used to identify a gap, i.e. what system features are available, but not utilised.

From the gap analysis concluded, it was clear that the capital investment into multiple platforms and systems at an enterprise level was not utilized fully as not all available features were exploited and in some instances, sub-optimal product design was considered as minor tweaks using the system features might have resulted in a much better, innovative outcome. A management decision was then taken to, under the Fig. 1. Example 1 and 2 feature implementation lessons learned leadership of the Head of Information Technology (IT), kick off a programme in order to address the implementation and roll-out of the already present technology features.

The reason this initiative was IT lead was that the knowledge of the technology features were held in IT. The programme was defined according to the organisation's project methodology with particular pillars such as stakeholder identification and communication, scope definition, risk and issue management, and behavioural change management. Specific scope steps were defined guided by the innovation-decision process consisting of knowledge, persuasion, decision, implementation, and confirmation.

The programme team initiated an enterprise-wide multiple-step process in order to achieve the objective of enabling under-utilised or not used system features. Firstly, multiple sessions were scheduled for IT to share knowledge with business stakeholders and owner about the multiple system features available. Secondly, workshops were then scheduled in order to consider product design using the prior knowledge of the entire feature set that is available. As most of these workshops were led by IT, business owners started to share their discomfort, and in some instances, business stakeholders stopped to attend the workshops. A robust debate followed about whether the company is product-led, customer-led, or technology-led. The outcome-based on lack of consensus was to place the programme on hold – irrespective of pockets of business support for the initiative.

The programme team assessed the project, and it was agreed that the approach and process followed to achieve the programme outcomes, were revised. Instead of following a "big bang" approach, the steps were updated to continue with the programme, but with the stakeholders willing to follow the process as defined and by executing pilot projects. This revised approach resulted in a positive outcome and in the end, created a critical mass that "naturally" placed pressure on the rest of the enterprise to follow suit.

Lessons Learned

The innovation-decision process followed enabled the definition of an agile and innovative process by identifying the components that should be addressed first. The following highlights some of the lessons learned during the innovation-decision process and is summarized in Fig.1:

- Diffusion is a social process that involves interpersonal communication relationships. In this instance, it was found that the interpersonal channels were powerful to change healthy attitudes held by individuals, which became pertinent at the decision stage. By looping back and by changing this element, the second decision stage was navigated successfully.
- The initial focus was on sharing how-to knowledge, while the success of deciding to adopt was based on focusing on awareness-knowledge. The focus on awareness knowledge ensured that individuals in departments learned more about the features and, eventually, adopted it.
- The degree of uncertainty about the feature's functioning and "peer" pressure from colleagues, etc. must not be underestimated as it affects opinions and beliefs. The focus on pilots addressed this concern as it enabled the feature experience so decisions, and in particular adoption decisions, could be taken knowingly. Also, by linking the feature (innovation) outcome to the department's key performance indicators ensuring that the link was understood, took the element of uncertainty out of the discussion, and ensured a better holistic understanding.
- Do not assume that rejection is only present in the decision step. Rejection is possible in every stage of the innovation-decision process. By pro-actively monitoring this may be addressed at the core in order to enable progression to the next step. The innovation diffusion steps could not merely be applied in a linearly fashion as the initial decision pointed to "no adoption" and the project would end if the steps were not considered again and updates made by looping back.

4 CONCLUSION

The strain between industry requirements of graduates and higher educations' delivery of work-ready graduates are acknowledged. In order to enable higher education to deliver on its mandate, technology enablement such as LMS features is utilised. However, not all LMS features are implemented or used, often because there is no awareness of the presences of these features. Therefore, the purpose of this paper was to consider two real-world examples where the diffusion of innovations theory was applied in order to establish lessons learned in feature implementation.

This paper presented two examples from two very different enterprise domains: to guide the implementation of additional features in an LMS in a higher education institution and the technology feature implementation process prevalent in a telecommunication company in South Africa.

The lessons learned during the two initiatives are complementary, but in both cases highlighted that the social system and change agents (opinion leaders) as depicted in diffusion of innovations theory, play a crucial role for successful implementation of technology features. Also, both examples used a workshop approach, show-and tell and a pilot to inform and train potential users on the technology features.

Underutilisation of technology features is not unique to higher education, and in this instance, higher education can learn from the approach and steps followed by industry as indicated in Fig. 1. Valuable contribution from industry which can seamlessly be integrated into higher education include the consultation with major stakeholders and owners of the technology, as well as conducting workshops to determine entire feature sets, e.g. the institutions LMS.

Lastly, one of the vital-critical realisations of the paper pointed to the fact that value was extant in not following the diffusion of innovations steps in a linear fashion, but that holistic consideration in each step as well as looping back where necessary, added value towards successful adoption of features. It was established that there were synergies between the lessons learned for higher education and industry and that higher education could draw on the findings from industry for the successful implementation of technology features, in this instance specifically about LMS features.

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5.6 CONCLUSION

Greenhalgh (2004) examined the processes by which 'innovations' are diffused across organisations and is closely related to that of Rogers' theory. In their systematic review, they defined innovation as 'a novel set of behaviors, routines, and ways of working'. These authors further distinguished between (Greenhalgh, 2004):

> **"Diffusion** (as seen as a passive spread); **dissemination** (active and planned efforts to persuade target groups to adopt an innovation), **implementation** (active and planned efforts to mainstream an innovation within an organisation), and **sustainability** (making an innovation routine until it reaches obsolescence)."

From the review and decision to use Rogers' theory for this study, Greenhalgh (2004) add additional value and an essential view to the design of the framework which is perceived as a 'whole-systems' approach that needs to be present to understand the implementation of a new practice. In this regard, such a new practice (innovation) for University ABC would be to implement an LMS based quality programme review framework – A partnership towards student success.

However, not all LMS features are implemented or used by University ABC, often because there is no awareness of the presence of these features. Therefore, the purpose of the lecture note included in this chapter was to consider two real-world examples, one in higher education, and one in industry, where the diffusion of innovations theory was applied in order to establish lessons learned in feature implementation, concerning the under-utilisation of LMS features.

The Diffusion of Innovations theory is not without its limitations. Criticism of diffusion research, according to Storey and Richard (2013), is that "critical analysis of the theory did not begin until thirty years after its inception in the 1940s." According to Lundblad (2003) Rogers' theory focuses more on "how individual, rather than how an organisation, adopt or reject new ideas." The researcher, however agrees with authors of the readings in the research and application field of Rogers' theory, that the application of this theory, primarily has been used for many years, to understand and provide guidance on how innovations are diffused in organisations across all disciplines as indicated in the first part of this chapter.

This chapter concludes with the insight as put forward by Bates et al. (2007):

> "Influential institutional factors, critical characteristics of individuals, the innovation and the organisation, affect the diffusion of an innovation. Together these features create the environment in which further are explored."

In conclusion, Chapter 5 forms part of the suggestions phase of the DSRc-1. , During this phase, the researcher came to realise, in order to introduce the innovation of this study to University ABC, it will have to lead to the formulation and design of an LMS based framework for adoption to improve current quality programme review processes and practices. Chapters 6 and Chapter 7 deals with the design and development of the framework as part of the development phase of DSRc-1, and consequently as the second (DSRc[6]-2) and third (DSRc-3) iterations of DSRc-1.

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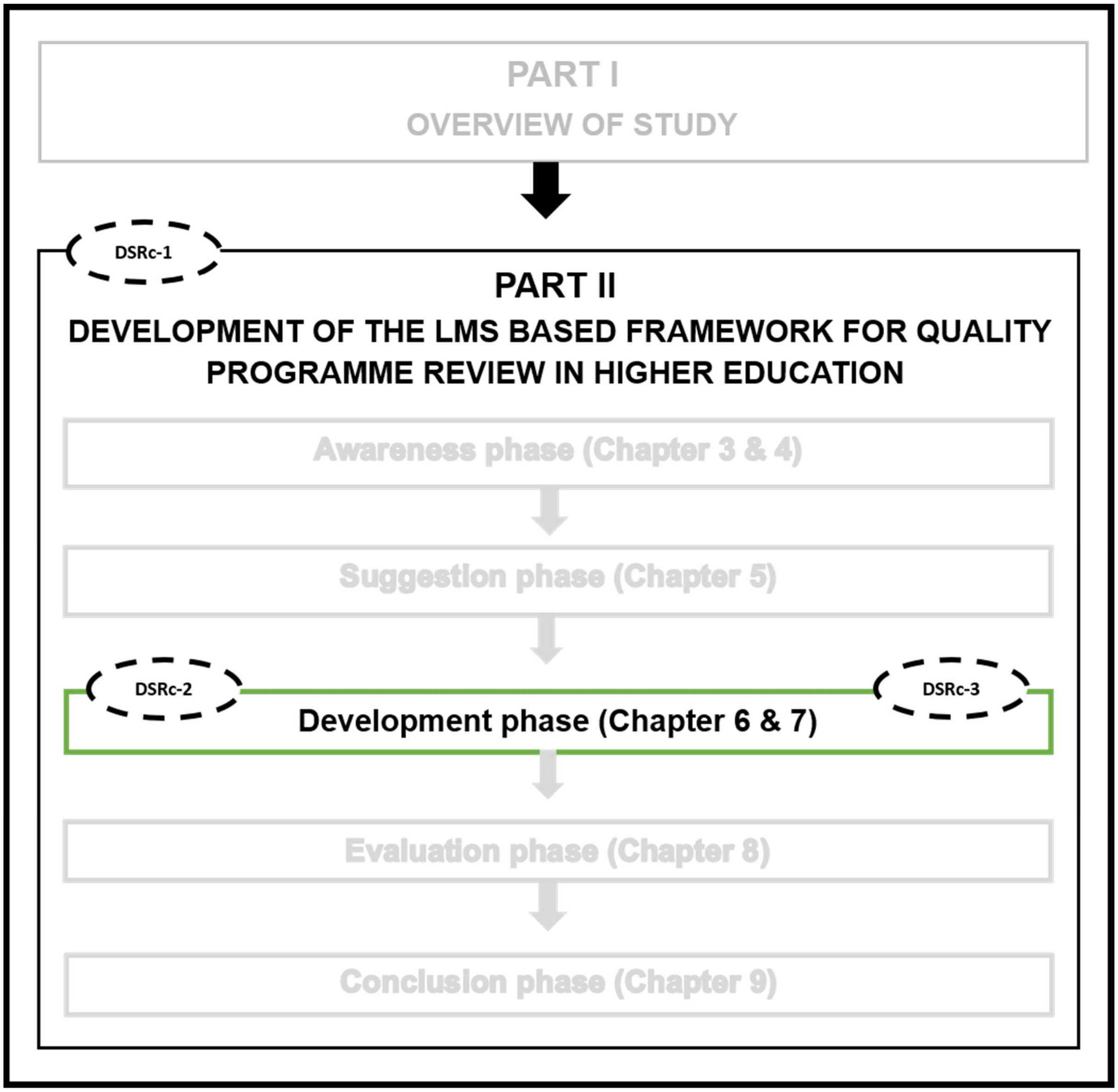
[6] DSRc is the abbreviation for Design Science Research cycle


PART I
OVERVIEW OF STUDY
DSRc-1
PART II
DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION
Awareness phase (Chapter 3 & 4)
Suggestion phase (Chapter 5)
DSRc-2
DSRc-3
Development phase (Chapter 6 & 7)
Evaluation phase (Chapter 8)
Conclusion phase (Chapter 9)

6 DESIGN AND DEVELOPMENT OF THE FRAMEWORK

Research Objective 4: To develop a framework for quality programme review applying the principles of Diffusion of Innovations Theory

6.1 INTRODUCTION

The purpose of this study is to develop a framework for quality programme review at a higher education institution by applying the principles of the Diffusion of Innovations as explicated by Rogers (2003). The key stages in the framework should focus on the review of the constructive alignment and implementation of programme outcomes aligned to teaching, learning and assessment opportunities, and reporting, through the use and support of an LMS.

Apart from the literature review on LMSs in the higher education landscape, additional literature outside of the direct field of the focus of the study was also investigated. In this regard, the work of Tinto (2014) provided direction when he stated: “Improvement in rates of student success does not arise by chance. It requires intentional, structured, and proactive action that is systematic and coordinated in application".

Following on the previous sections, Chapter 6 fully introduces the framework PAIR (Programme Alignment Implementation and Reporting – A partnership towards student success) designed for this research project. The researcher then applies PAIR in two academic departments of University ABC to demonstrate its assumed value for the departments and institutions quality programme review.

The researcher did not set out, in a positivistic way, to ‘’ discover the truth’’, nor to develop quantitative hypotheses. The research purpose was to find ideas, theories, as well as ways and means in Design Science that could play an essential role in the innovative use of technology to design and develop (through understanding, development and application) a framework as a specific artefact (Davey & Parker, 2010, Vaishnavi & Kuechler, 2005). In education, this often comes through a champion exploring new possibilities (Davey & Parker, 2010). This exploration is often informal, and the assessment of the effectiveness, therefore, are often overlooked, especially if there is not a rigorous framework in place. As Davy and Parker (2010) argue, in order to find an effective way for measuring teaching and learning outcomes as well as the alignment of student learning, a so-called champion (a person who can spearhead the process) could address this research question.

With the latter in mind, the current study is then an attempt to provide an artefact (the "Framework") that can contribute to student success and support programme review for accreditation, which in principle is an intentional, structured and proactive action (Newberry, 2018, Robinson, 2019, Maki, 2010, Suskie, 2018, Tinto, 2014). As indicated earlier the perceived outcome is to present University ABC with a functional framework for the systematic and coordinated implementation of the BbGA[7].

It is important to note that the acceptance of a framework such as PAIR would not pose an obstacle for University ABC's Strategic Plan for 2025[8]. On the contrary, the PAIR framework could facilitate and direct University ABC's teaching and learning strategy in order to become a more fully blended and hybrid higher education institution of teaching and learning within a resource-rich environment. As University ABC already states:

> "Information and communication technology (ICT) is an essential strategic resource for the University's scientific work, its management of knowledge, in interacting with students, staff and members of other institutions, and for the efficient administration of the University. Accordingly, we aim to keep the University's systems abreast of

[7] Blackboard Goals Area

[8] The researcher will, in Chapter 8 and 9 discuss the potential value of BbGA in the current teaching and learning situation at University ABC. It will be argued that the implementation of BbGA through its inclusion in the Framework could be measured qualitatively (Rubin et al., 2010) against the relevance it can have for students within University ABC environment, as well as for the potential acceptance of academic staff and students thereof.

international developments in the field and to deploy ICT as a strategic resource" (University of Pretoria, 2018).

As will be demonstrated in this chapter, Blackboard Learn® has already been introduced as an LMS as part of University ABC's Strategic Plan for 2025. However, full use of the BbGA functionality was still not in use in 2019, because of its relevant unknown value and the absence of an institutional implementation plan. In this regard, Lopes & Dion (2015) have successfully argued that the mere presence of technology at an institution will not necessarily enhance its academic functionality, or as Tinto (2014) indicated, will not automatically ensure student engagement, retention and success. Much thought and planning should go into the effective integration of technology with teaching and learning. As such, "technology should be implemented not for (its) own sake, but with a specific goal or learning outcome in mind" (Lopes & Dion, 2015).

Chapter 8 and 9 will indicate the value BbGA can add to the current teaching and learning experiences at University ABC. Therefore the outcome of the implementation of BbGA through its inclusion in the framework could be measured against the relevance to students within the University ABC environment, as well as the acceptance of academic staff and students (Rubin et al., 2010).

Several researchers, e.g. Ogude et al. (2012), approached their studies on higher education review in much the same fashion as that of the present researcher: they identified a specific problem in an educational setting. They then used information technology in a Design Science context to address the problem. For instance, Woods et al. (2004) illustrate how faculty members perceive web-based courseware to supplement face-to-face instruction, while Yin et al. (2010) show the connection between learning and virtual groups and teamwork.

On the specific issue of accreditation, previously discussed in Chapter 3, Beno (2004) discusses student learning outcomes regarding accreditation and quality review explicitly and shows why it is essential for educational institutions to align their learning outcomes with key accreditation indicators. However, as Yi and Hwang (2003) show, accreditation quality reviews can only become a reality once there is full user acceptance of the ICT to do so.

It is clear from the research that the development and application of a framework need to be approached from a holistic point of view (see Chapter 3), also Hayes (2014). For this purpose, an extensive literature review was undertaken in order to create a conceptual map of what a common framework for programme review could consist of. Two examples of such frameworks are discussed in the following section.

A relevant framework that resonates with the one that the researcher envisaged is in operation at Griffith University in Australia (Williams, 2017) as it consists of similar components proposed in the present study as indicated below:

- **Course Design** – with the focus on the continued relevance and fit for purpose; appropriateness of programme content and structure and annual monitoring.
- **Quality of academic staff** in terms of engagement in continuous professional development activities.
- **Learning resources** and **educational support** such as educational consultancy services, workshops for teaching, learning, assessment, instructional design, and the use of educational technology.
- **Research training** – with the focus on viability, sustainability, and the learning environment.
- **Admission** – student participation and achievement including aspects such as enrolments, progression, retention, outcomes and employment.
- **Learning outcomes and assessment** – dealing with student achievement, quality of assessment, programme leadership, staff quality and characteristics and quality of teaching.
- **Monitoring, Review and Improvement** – addressing aspects such as relevance and effectiveness of the programme for stakeholders and results of internal and external benchmarking activities.

Dr Jude Williams (2017), advisor for program and teaching quality and learning futures at the Griffith University defines the purpose of the design of a framework for programme review as a “support to the review panel and stakeholders as they discuss their experiences of the programme and gather and analyse data to inform their decision about its future” (Williams, 2017). Highlighting aspects relevant to this study, their framework is further considered to have a list for terms of reference with associated aspects of a programme to be considered when reviewed, to see how well a programme is performing in meeting the accreditation standards. Their process is being perceived as a reflective, and dynamic practice as the nature of the review will depend on the criteria to be reflected upon. For example, a professional program will have specific accreditation requirements from a professional body in addition to higher education authorities and councils.

Figure 38 gives a snapshot of the documentation used at Griffith University for its online programme review process (Appendix C) (Williams, 2017). The first column indicates the terms of reference with guided questions (not seen as tick boxes). An area is provided for evidence that can be useful when discussing programmes’ performance. The last column indicates the responsible person for providing the information and where the information can be located.

Scope of the Program Review What are the Terms of Reference?	**Questions** What might be useful to know?	**Evidence** What evidence could be used?	**Source/ Responsibility** Where is the evidence available?
Program design is appropriate and consistent with relevant external professional accreditation bodies and the Australian Qualifications Framework			
1. Assess the program's continued relevance and fit for purpose	**History of the program History of the program**		
	What was the program rationale? What was the market need and fit to Group Program Profile?	The original program proposal (Part 1 and Part 2, section 1).	This is available in Records Services- contact your Academic Services Consultant (ASC)
	Brief program description		
	What AQF level does the program fit? What are the program level outcomes? What are the core and elective courses? What are the capstone courses? Is there an academic plan? What is the research component of the program? What are the possible pathways that students can take to progress to the qualification?	Australian Qualifications Framework (AQF) Programs Committee approved Program Learning Outcomes From courses and program website Course profiles	Program Director

Figure 38: Griffith University's framework for programme review

In Figure 39, the data entered in the last column (light green area) will automatically be generated by Griffith University information system (Williams, 2017). The entered data is then available as pre-populated data in a programme review portfolio format.

Assessment is effective and expected student learning outcomes are achieved			
Learning outcomes - student achievement			
3. Assess the program's performance in terms of student participation and achievement	What is the GPA and failure rate of students in each year of the program (current and for the past 5 years)?		OPS/BI
	How does the program ensure equivalent student learning outcomes regardless of a student's place or mode of study? (as applicable)		Review Team to consider
	Are program level learning outcomes achieved and the standard of achievement moderated?	Innovative Research Universities (IRU) Calibration project data	Review Team to decide
	Are students obtaining generic employability skills as a consequence of their studies? How do the Program Learning Outcomes align with the Griffith Graduate Attributes?	Generic Skills	OPS/BI
	What level of employment (FT/PT/Seeking FT) are students gaining after graduating?	Graduate Destination Survey (GDS) - Graduate Success Griffith Destination graph Graduate Experience	OPS/BI

Figure 39: Area indicated in light grey pre-populated data generated by Griffith University's information system

The Griffith University's documentation used for its programme review process is not incorporated in its totality into this study, but rather serve as an example and good practice of which some of the concepts can be borrowed when considering the design of the current framework.

A second example of a university where technology, more specifically the BbGA, has recently been incorporated in a higher education's programme assessment and accreditation process, is that of the Framingham University (FU) in Massachusetts, USA.

The researcher obtained through collaboration with Dr Robin Robinson, Director Education Technology and Instructional Design at Framingham University (Robinson, 2019), an "Assessment Project Intake Form" (See Appendix B) that academic staff needs to complete if they want to use the BbGA for accreditation, internal programme review or other needs related to assessment. The researcher proposed that an adapted version of the Framingham University intake form be used if academic staff wants to use the BbGA as part of their programme review cycle. The intake form can be used as a guiding and discussion document during the initial discussions with all the stakeholders involved in the programme review process.

In both of the examples the researcher could link the universities frameworks and documentation to that of University ABC as Blackboard are the official Learning Management System in both the universities mentioned. In the case of Framingham, the implementation of the BbGA took them almost six years.

Section 6.2 introduces the Diffusion of Innovations theory (Rogers, 2003) as a vital building block in the development of the proposed Framework. Consequently, this section also builds on the previous discussion as part of the holistic approach to the research problem.

6.2 THE DESIGN OF A FRAMEWORK FOR QUALITY PROGRAMME REVIEW INFORMED BY THE DIFFUSION OF INNOVATIONS THEORY

The introduction to the research and the research design and methodology (Part I: Chapter 1 and 2), followed by the literature review (Part II: Chapters 3 – 5), provided research objectives to the research question as presented at the beginning of each chapter and provided the foundation for the design and development of the Framework in this chapter.

In **Chapter 5**, reference was made to the Diffusion of Innovations theory and how it applies to higher education, primarily where new technology is being implemented or introduced. As indicated in the introduction paragraph of **Chapter 5**, an innovation is something perceived as 'new'. The BbGA is not a new concept or tool or new in the implementation thereof. However, within University ABC and in the South African context, the use of BbGA can be perceived as 'new' or being an "innovation", as it has not yet been implemented as a tool that forms part of an institutional programme review process.

From the literature, it can also be concluded that the unknown or non-use of technology often appears due to the unknown or existence of the technology or the lack of policies and processes that are not in place for the successful role out thereof. A framework where the BbGA forms an integral part of the whole process does not exist at University ABC and therefore, the framework can also be perceived as 'new' and seen as an innovation.

The lessons learned by way of an industry example (Section 5.5.1) supported the conceptualisation of a framework for the present study based on an innovative approach, such as developing an artefact (the framework).

In order to adopt or reject a framework as an innovative artefact, it is essential to consider the following three aspects during the development process (Rogers et al., 2003):

- The pre-conditions prior to the adoption of the innovation (which was dealt with in chapter 1);
- the characteristics of the decision-making unit (this was dealt with in Chapter 2 to 4) and
- the perceived characteristics of the innovation.

These aspects form part of the knowledge and persuasion phase of the innovation-decision process. Table 4 outlines in more detail how the perceived characteristics of the innovation, according to Rogers (2003), are guiding the design of the framework for this study.

Furthermore, it is envisaged that the proposed framework will be adopted and become part of University ABC annual programme review practice. However, the components and process flow of the framework should be designed in such a manner that the decision to adopt and implement the framework should be without hesitance and concern.

Table 4: Description of the five attributes or characteristics of an innovation that can influence the adoption thereof and its application to the framework designed for this study

CHARACTERISTICS	DESCRIPTION
Relative advantage	How the innovation(s) in this study, the technology (BbGA) and the idea of a framework for quality programme review, fits within the adopter's needs, values, and past experiences.
Compatibility	The perceived improvement over previous or existing technology and quality programme review frameworks, such as the Atlas Rubicon tool that was introduced as a pilot project at University ABC. This tool was not instantiated.
Complexity/Simplicity	The degree of assumed difficulty of the innovation(s). In this regard management, lecturers and students will receive training on both the framework and the BbGA accessing existing support at University ABC
Trialability	The ability to experiment with the innovation(s) before adoption. This opportunity is available during official training sessions.
Observability	The ability to observe the technology/idea before adoption. Through the research timeline, this opportunity will present itself. Management and lecturers will also have the opportunity to observe the idea of the framework and the BbGA through demonstrations at scheduled sessions and will have access to the staff of programmes which have piloted the framework.

It is against this background that it is decided to design a framework that can support the use of technology as part of a quality programme review process applying the principles of the Diffusion of Innovations theory (Rogers, 2003) with the focus on the mentioned five aspects, and more specific, the perceived characteristics of the innovation. The Design Science Research cycles (See section 2) guided the researcher to be able to refine the framework by ultimately being able to move back and forth between the case studies that are presented in the next section of this chapter.

For this research, an interim phase (*Proof of concept demonstration and feedback survey*) was added to the second case study before the demonstration and evaluation phase was executed (Figure 40). The feedback will be presented as part of the interim evaluation phase (Section 6.3). The interim demonstration and evaluation phase consisted of the following:

- A verbal and printed presentation (Appendix C) of the implementation of the BbGA in one of the modules of the BCom (Informatics) programme at University ABC was presented to the instructional designers, education consultants, management of the Department for Education Innovation and staff of the Department of Informatics at University ABC. All were key role players in the potential implementation of the framework.
- A prototype of the proposed framework with its components was also presented.
- A survey for evaluating the proof of concept of PAIR and the BbGA, were administered voluntarily. The survey consisted of two Likert scales and two open-ended questions for general comments. The Likert scale was created based on the five perceived essential criteria of an innovation.
- The first part of the survey was to evaluate the framework in its totality, and the second part was to evaluate the BbGA as an LMS feature. There were also two open-ended questions for general comments. The results obtained from the survey are discussed in section 6.8 (See Appendix C).

As indicated in Chapter 5, the design of a new and innovative artefact, such as the framework is seen as the primary concern of the Design Science Research in IS where the focus of research lies in “learning through the act of building” (Kuechler & Vaishnavi, 2008). Hevner et al. (2004) are clear that the artefact in this regard should address the primary research problem. They also argue that the design should be well described to ensure the successful implementation of the artefact within its intended area, in this instance, University

ABC. However, in developing the Framework, it is envisaged that it might be considered by other higher education institutions in South Africa.

The researcher proposed the following title for the framework: ***PAIR - A Framework for Quality Programme Review – A partnership towards student success*** - (the PAIR Acronym stands for Programme Alignment, Implementation, and Reporting)

The first part of this chapter introduced the concept of a framework for programme review using an example of Griffith University and an example of a resource provided for the use of BbGA by Framingham University. In the sections to follow the researcher will describe and illustrate how the two sub-cycles (DSRc-2 and DSRc-3) are embedded in the main DSRc-1 development phase (Vaishnavi & Kuechler, 2015) and how these two cycles informed the design and development of PAIR. Separate case studies informed the two sub-cycles. The DSRc-2 is a case study of the Department of Mining Engineering (Section 6.3), and DSRc-3 is a case study of the Department of Informatics (Section 6.5), both at University ABC. This chapter will conclude with a summary of the findings which will inform the framework presentation of PAIR*,* which will be offered in Chapter 7.

6.3 DSRC-2: CASE STUDY 1 - DEPARTMENT OF MINING ENGINEERING

The Engineering Council of South Africa (ECSA) brought an accreditation visit in 2017 to the Department of Mining Engineering at University ABC. In preparation for the visit, the Department decided, in collaboration with the researcher, to create a curriculum map (visually and in Excel) to indicate how the Department's different modules are aligned across the four academic years of the Mining Engineering programme to the ECSA Exit level Outcomes. Figure 40 illustrates the outline of the DSRc-2, which is a cycle within the design phase of the main or outer design cycle. The DSRc-2 presents the Department of Mining Engineering as a case study. The different phases of PAIR as an innovative artefact will be discussed in the following sections.

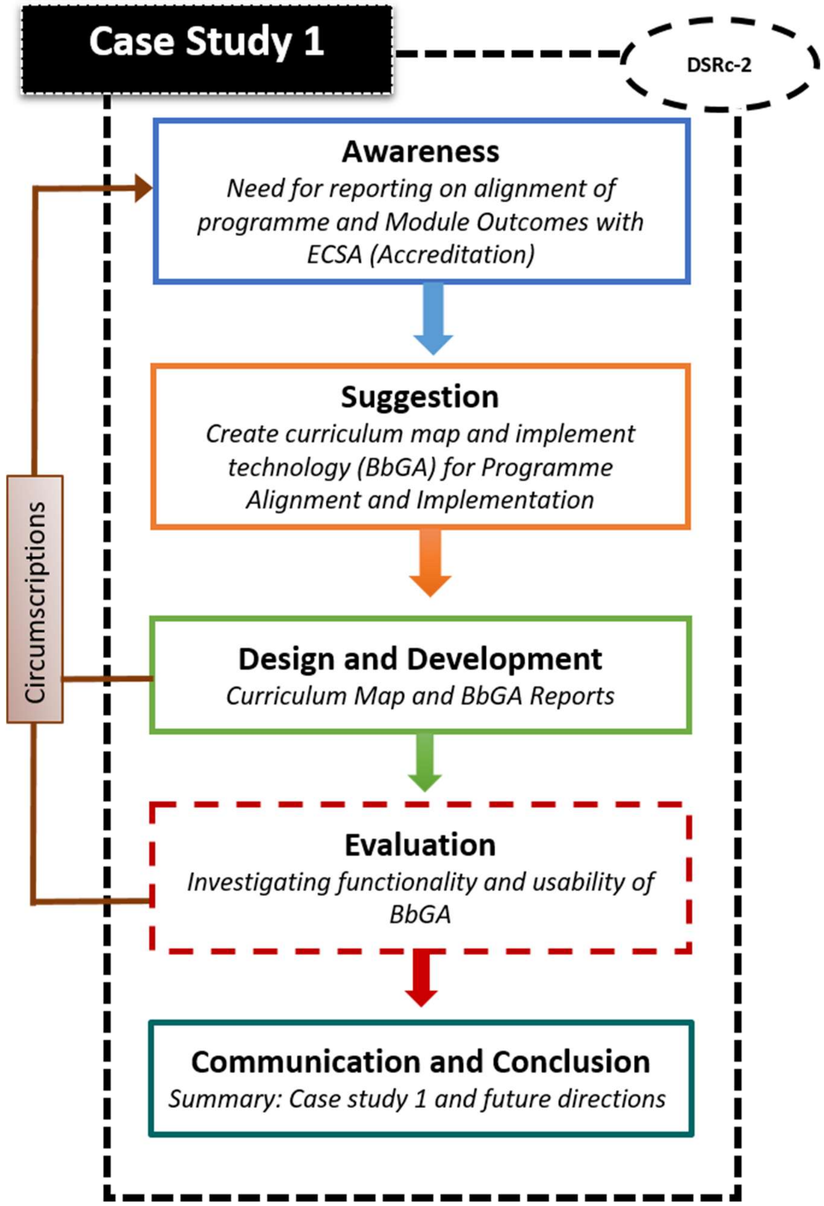


Figure 40: Case Study 1 - Department of Mining Engineering

6.3.1 Awareness phase

The researcher got involved with the department as part of the process for implementing an introduction to mining engineering module in the curriculum on the second-year level because the department only sees their students the first time in the third year.

Subsequently, through the design and development of the module and the module study guide, the process manifested in the review of all study guides in the department. During the quality review of the study guides, a need was identified that lecturers need to be informed of the curriculum concepts they are using and they expressed the need to engage in 2015-2018 with the researcher to support them in this process. It was decided that a 'partnership' will be formed where every lecturer in the department will take part in this process and take responsibility for their modules as part of and in alignment with the programme.

A need was identified for a visual curriculum map for accreditation purposes to indicate how the modules and module outcomes are aligned to the Engineering Council of South Africa's exit level outcomes of the Mining Engineering Programme. Concern was raised that the council needs proof of evidence that the students mastered the required outcomes and the department was investigating alternatives to monitor and document these results. It was established that the department is in need of an annual programme review structure to enable the head of the department to report on the professional outcomes and make suggestions for improvement for student learning based on data collected.

6.3.2 Suggestion phase

The researcher, who is also University ABC education consultant for the department, suggested that the department investigates the BbGA as a part of PAIR in order to ascertain whether it would suffice their need for outcome review. It was also decided that the researcher would conduct a curriculum workshop (Appendix C) in 2016 with the department according to the PAIR Framework. The workshop was titled: ***A constructive aligned approach to teaching and assessment practices: Department of Mining Engineering*** and aimed to:

- Support lecturers on how to construct a mental framework of the curriculum landscape for Mining Engineering
- Create an awareness of the use of national qualification level descriptors in guiding teaching and assessment practices

- Provide guidelines for using Bloom's Taxonomy as a classification tool for compiling learning outcomes and assessment criteria.

The Department's programme coordinator (Coordinator) for the final year engineering project and the researcher then collaborated from 2015-2018 to put PAIR in place[9] along the following phases:

Since the beginning of 2015, the researcher worked alongside the lecturer of a final year project module in the engineering programme. The lecturer is also the programme coordinator and responsible for the visualisations of the curriculum maps (Maritz, 2015-2018). The importance and relevance of curriculum mapping as part of ELO alignment became paramount (Liu et al., 2010; Harden, 2001; Plaza et al., 2007; Britton et al., 2008; Banta & Charles, 2011)

6.3.3 Design and Development phase

Curriculum Map

Regular weekly meetings were scheduled from 2015 to 2018 to develop and apply a conceptual map for the Mining Engineering curriculum according to PAIR. An Excel Spreadsheet (Figure 41) was first created by the Coordinator indicating how all the modules in die curriculum are aligned to the Education Council of South Africa exit level outcomes, indicating which modules are addressing the developmental level outcomes and which modules are addressing exit levels outcomes.

[9] The importance and relevance of curriculum mapping as part of ELO alignment became paramount (Liu et al., 2010; Harden, 2001; Plaza et al., 2007; Britton et al., 2008; Banta & Charles, 2011)

DSRc-2

	Code	Course/module Name	Role of course/module in developing student toward Exit Level Outcomes										
			ELO 1	ELO 2	ELO 3	ELO 4	ELO 5	ELO 6	ELO 7	ELO 8	ELO 9	ELO 10	ELO 11
Y1-S1	CHM 171	General Chemistry		D1									
	Has 110	Humaties and Social Sciences						D1	D1		D1		
	MGC 110	Graphical communication					D1	D1					
	NMC 113	Material Science	D1	D1									
	WTW 158	Calculus		D1									
Y1-S2	EBN 122	Electricity and Electronics	D1	D1		D1							
	FSK 176	Physics		D1		D1							
	HAS 120	Humanities and Social Sciences						D1	D1		D1		
	SWK 122	Mechanics	D1	D1							D1		
	WTW 164	Mathematics		D1									
	PWP 121	Workshop practice					D1						
Y2-S1	JCP 203	Community-based project							D2				
	MPR 213	Programming					D2						
	MSD 210	Dynamics	D1	D1									
	SWK 210	Strength of Materials									D1		
	WTW 258	Calculus		D1									
	WTW 256	Differential equations		D1									
	PJJ 210	Professional and technical communication						D2			D1		
Y2-S2	BES 220	Engineering Statisctics		D1									
	MTX 221	Thermodynamics	D1	D1									
	SUR 220	Surveying					D1						
	PMY 210	Virtual Reality introduction to mining									D1		
	WTW 263	Numerical Methods	D1	D1									
	WTW 238	Mathematics		D1									
	PPY 220	Experiential training							D1		D1		
Y3-S1	GLY 151	Introductory Geology		D1									
	MTV 310	Thermoflow		ELO		P							
	PMY 311	Surface mining and geotechnics		ELO									
	NMP 310	Mineral Processing		ELO									
	BSS 310	Engineering Management						D1					ELO
	PNB 300	Industrial excursions									ELO		
Y3-S2	GLY 161	Historical Geology		D1									
	PRX 321	Explosive engineering		ELO									
	PMY 320	Mining				ELO				ELO			
	PME 320	Mineral Economics	ELO						ELO				
	PSC 321	Introduction to Projects	ELO			ELO		ELO					
	MIA 320	Engineering activity and Group work							ELO	ELO			
	PPY 320	Experiential training							D2		D1		
Y4-S1	GLY 254	Structural Geology		D1									
	IPI 410	Engineering Professionalism										ELO	
	PEE 410	Mine Ventilation Engineering	ELO	ELO		ELO				ELO			
	PMY 410	Mining		ELO	ELO								
	PSZ 410	Strata control	ELO	ELO									
	PMY 423	Mine operational risk management	ELO										
Y4-S2	GLY 352	Geodynamics and Ore Formation		D1									
	PMZ 422	Mine design and research			ELO		ELO						ELO
	PSC 411	Project						ELO			ELO		
	PNB 400	Industrial excursions									ELO		

Figure 41: An Excel Spreadsheet indicating programme alignment of modules with the Engineering Council of South Africa exit level outcomes

To advance the map as presented in Figure 41, it was envisaged that the curriculum map would have been designed as an interactive map where students could roam through a visual presentation of a mining site online and discover to which areas of the mine the exit level outcomes apply (Maritz, 2015-2018). By clicking on the Council's exit level outcomes, a description of the outcome would appear. The interactive curriculum map enabled the students to drill down from the outcome to find the associated modules for the outcome with its description. As part of the design, the department aspired to link the interactive curriculum map and the outcomes and assessment results of each student. This interactive curriculum map aims to give students a 'big picture' with the 'individual parts' demarcated and to enable them to monitor and track their professional outcomes and performances against these outcomes. For this study, reference is only provided to the proposed paper presentation of the interactive map, as it will only be finalised in 2020.

Figure 42: Interactive Mining Engineering curriculum map (2-Dimensional Prototype)

BbGA Identification Schema

An internet research was conducted to locate the developer of the BbGA. The researcher was able to communicate online with two Blackboard International project managers that were familiar with BbGA in the USA, to assist the researcher with an understanding of the 'architecture' and backend operations of BbGA. These project managers directed the researcher to the international specialist on assessment solutions for the LMS University ABC is using. Although it was reasonably easy to operate in the backend of BbGA, the researcher was not able to establish a proper identification schema that is in alignment with the input of the data and the reports that were generated. She also realised that an institutional approach needed to be followed for the development of an identification schema in BbGA. The LMS instructional designer appointed by the Mining Engineering Department and the programme coordinator worked together with the researcher through 'trial and error' throughout 2015-2018, to find the best possible solution for an institutional approved identification schema to be implemented for the BbGA. The identification schema is critical for reporting creation and purposes. Towards the beginning of 2018 the researcher obtained from the LMS vendor educational specialist for University ABC, a document entitled ***Goal Framework in Blackboard Learn***® (Appendix A) (Newberry, 2018) to assist the researcher in her understanding and development of the BbGA identification schema. The interim approved identification schema suggested to University ABC was accepted for implementation for the two case studies of this study. The final identification schema for University ABC will only be implemented in 2020, post finalisation of this study.

6.3.4 Evaluation phase

The investigation into the functionality and usability of the BbGA made the researcher, and the Mining Engineering programme coordinator realise that in order to be able to implement an LMS feature such as the BbGA, a proper framework for the process and use of the BbGA should be in place for the department. Therefore, all departmental academic and support staff would need to participate actively under leadership of the head of department in such a process.

The literature review (Chapter 3, 4, and 5), discussions and feedback from the semi-structured interviews with lecturers in the faculty during 2015-2016, as well as with University ABC Department of Education Innovation's educational consultants and instructional designers, on the implementation of the BbGA, let to the first few drafts of the proposed Framework (Figure 43 and Figure 44). During this design and development phase the process to be followed through the Framework was referred to as 'programme evaluation'. Through the literature review and consultation with academic staff in the Department of Engineering, as well as in the Department of Informatics, it was changed to 'programme review' as the process of evaluation are more extensive in its reviews and actions, and also covers for example aspects outside of the direct curriculum review. Figure 45 (Design 1 and 2) and Figure 46 (Design 3) outline the four key aspects and actions identified by the researcher to be present if one wishes to use the BbGA for reporting on exit level outcomes: (1) the team involved in the programme review; (2) the curriculum component of constructive alignment which includes a study guide as an output; (3) the online learning environment and (4) implementation and training on BbGA.

The researcher turned her hand drawn notes and ''pictures'' into a formal schema, which serves as a technical representation of a programme review process outlining the different components of the framework.

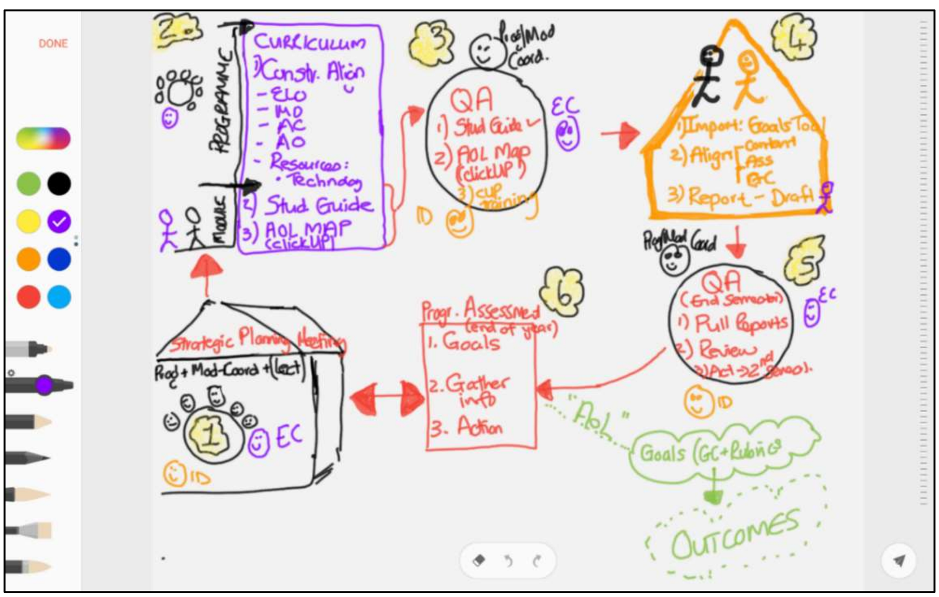


Figure 43: First drafts of the proposed framework – an indication of the different components

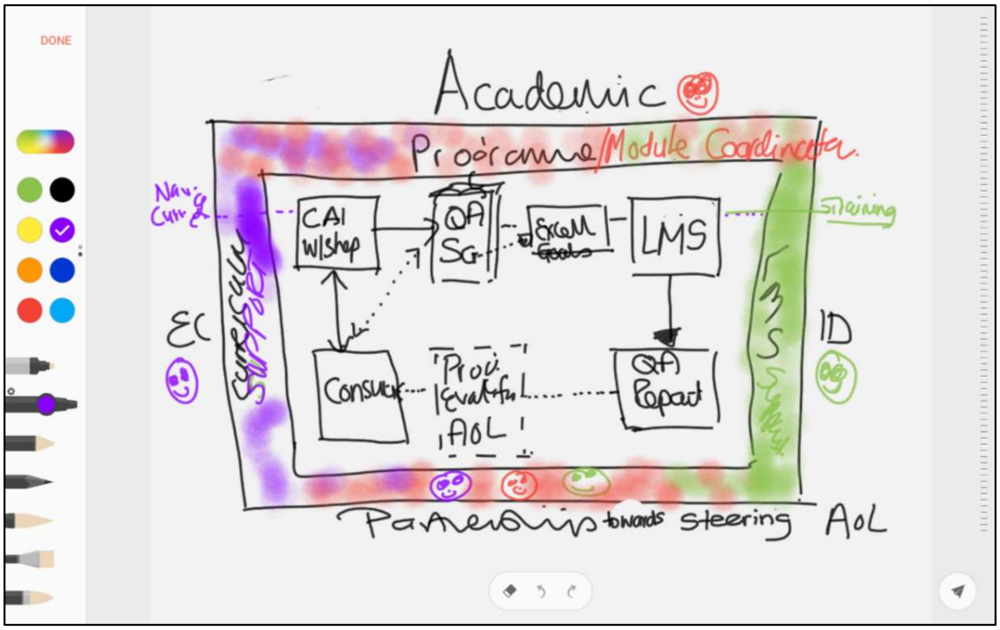


Figure 44: Second draft of the proposed framework – A conceptual Framework for programme evaluation

The hand-drawn images were given to University ABC's Department for Education Innovation's Creative Studios to design a digital image of the prototype (Figure 46).

The digital image design went through three cycles of development. Figure 46 indicates the proposed components to be included in the final framework. What can already be demonstrated is the partnership between the academic staff and academic support staff that is critical for the implementation of such a framework. The design of the framework made provision to incorporate existing structures and training available at University ABC. At this stage, the design and development of the framework aim to establish a process flow for assurance of learning and in the process allow for a quality programme review for improvement of the learning programme.

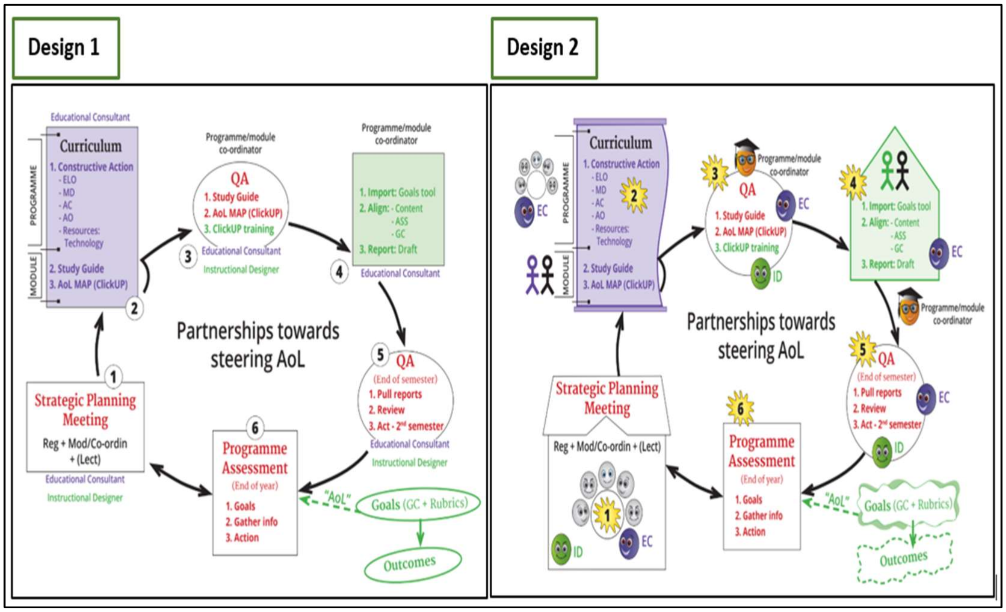


Figure 45: Key aspects and actions identified to be present in the Framework if one wishes to use the BbGA for reporting on programme exit level outcomes

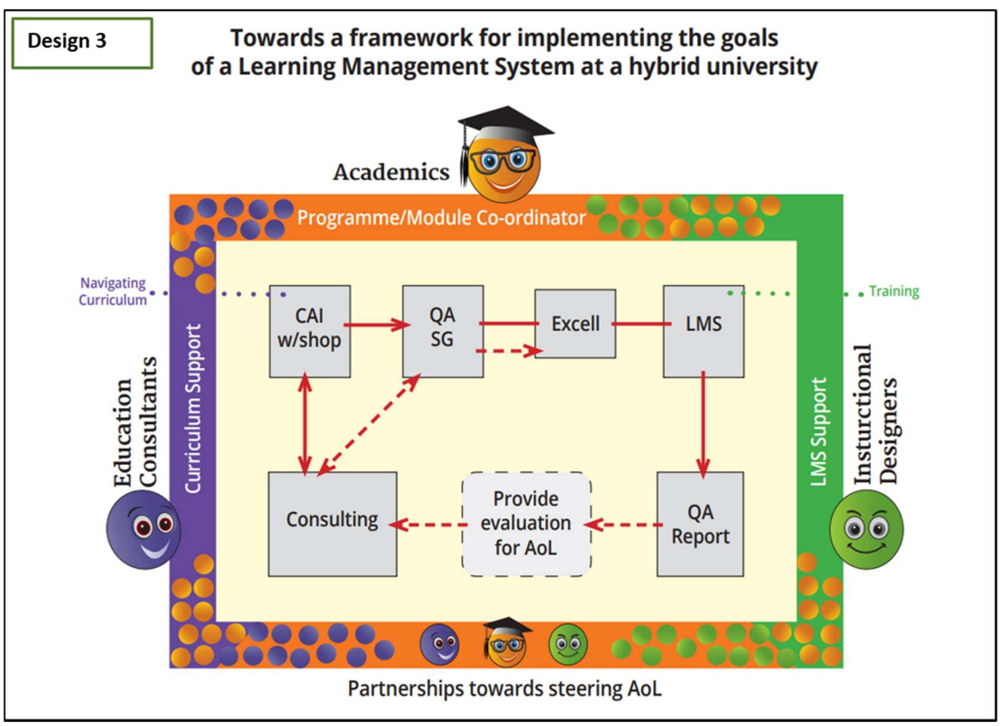


Figure 46: The first artefact indicating the components of the Framework and the process flow

6.3.5 Conclusion phase

The interaction with the programme coordinator of the Mining Engineering Programme and the department is longitudinal. This research serves as the baseline for further and future developments of the interactive curriculum map. This case study will initially inform, through its design, the case study to be presented in Section 6.4.

In addition to the curriculum mapping and investigation of the implementation of BbGA in the Mining Engineering programme, the Department decided to revisit the semester test questions for the final year module PMZ422 (Mine design and research). An intensive review was undertaken to quality assure the multiple-choice questions in order to align it with the levels of Bloom's Taxonomy and the National Qualification Framework level descriptors. Furthermore, each question was aligned with the Engineering Council of South Africa's exit level outcome using the BbGA. The PMZ422 lecturer was able to create BbGA reports to provide evidence of where the accreditation outcomes were aligned to each individual question. An example of the outcomes course coverage report is illustrated in Figure 47. The lecturer was also able to create a report of evidence that indicated the individual students' performance against each outcome for each question. Figure 48 illustrates the reports for course performance, as well as individual student performance.

Course Coverage Report

Course Name	PMZ 422 S2 2017
Goal/Goal Set	ECSA
Selected Goal Types	All Goal Types

	Goals				Content				
Category	Total	Not Used	Covered	Not Covered	Tests	Surveys	Questions	Graded	Not Graded
Mining Engineering	11	0 0%	0 0%	11 100%	0 0%	0 0%	0 0%	0 0%	0 0%
PMZ422	3	0 0%	3 100%	0 0%	0 0%	0 0%	38 100%	0 0%	0 0%

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Course Coverage Report

PMZ422

ME.PO.03.MO.PI ME.PO.03.MO.PMZ422.02: To communicate concepts, ideas and theories with the aid of mathematics, reasoning about and conceptualising engineering components, systems or processes.

Item Name	Type	Description	Place
Multiple Choice	Question	For listing of Cowboy mining Pty Ltd at JSE the most appropriate output a financial economi...	Technical
Multiple Choice	Question	During financial optimization, which ONE of the following input parameters is not considered?	Technical
Multiple Choice	Question	During a project progress meeting synergy is obtained through the magic force that _______ .	Technical
Multiple Choice	Question	Knowing the influence of the discount rate on your cashflow, what is more valuable?	Technical
Multiple Choice	Question	What is not a benefit of synergies?	Technical

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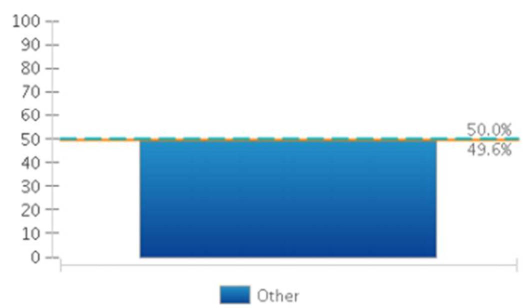
Figure 47: The BbGA course coverage report created after test administration

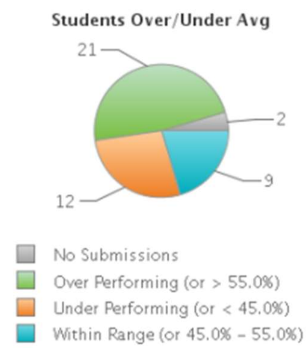
Course Performance

Course Name	PMZ 422 S2 2017 (GOALS)
Number of Students	44
Goal/Goal Set	ECSA
Included Categories	Mining Engineering
	PMZ422
	Buy321
Report Description	This report displays information showing how a single Blackboard Learn Course performs against a selected set of goals. Performance targets and a range of acceptable performance for the course can be determined when running the report. Data includes averages for the entire course as well as break downs for individual students and goals.

Course Overview

Performance Target	Performance Range	Course Average	Median	Mode	Standard Deviation
50.0%	+/- 5% (or 45% - 55%)	49.6%	54.9%	62.7%	20.7%





	Average Score (in %)	Performance Offset	Count of Items
Other	49.6%	-0.4%	1

Detail by Goal

! Performance Average Below 45.0%

		Overall Average	Other
ECSA Mining Engineering			
ME.PO.03: Perform creative, procedural and non-procedural design and synthesis of components, systems, engineering works, products or processes.	!	37.3%	37.3% (1)
ME.PO.11: Demonstrate knowledge and understanding of engineering management principles and economic decision making.	!	37.3%	37.3% (1)
ECSA Buy321			
ME.PO.11: Demonstrate knowledge and understanding of engineering management principles and economic decision making.	!	37.3%	37.3% (1)
ME.PO.03: Perform creative, procedural and non-procedural design and synthesis of components, systems, engineering works, products or processes.	!	37.3%	37.3% (1)

Figure 48: BbGA course performance report

Figure 48 illustrates the reports for course performance as well as individual student performance. The reports have a drill-down function (Figure 49 and Figure 50) where a single student's performance against the set outcomes are measured.

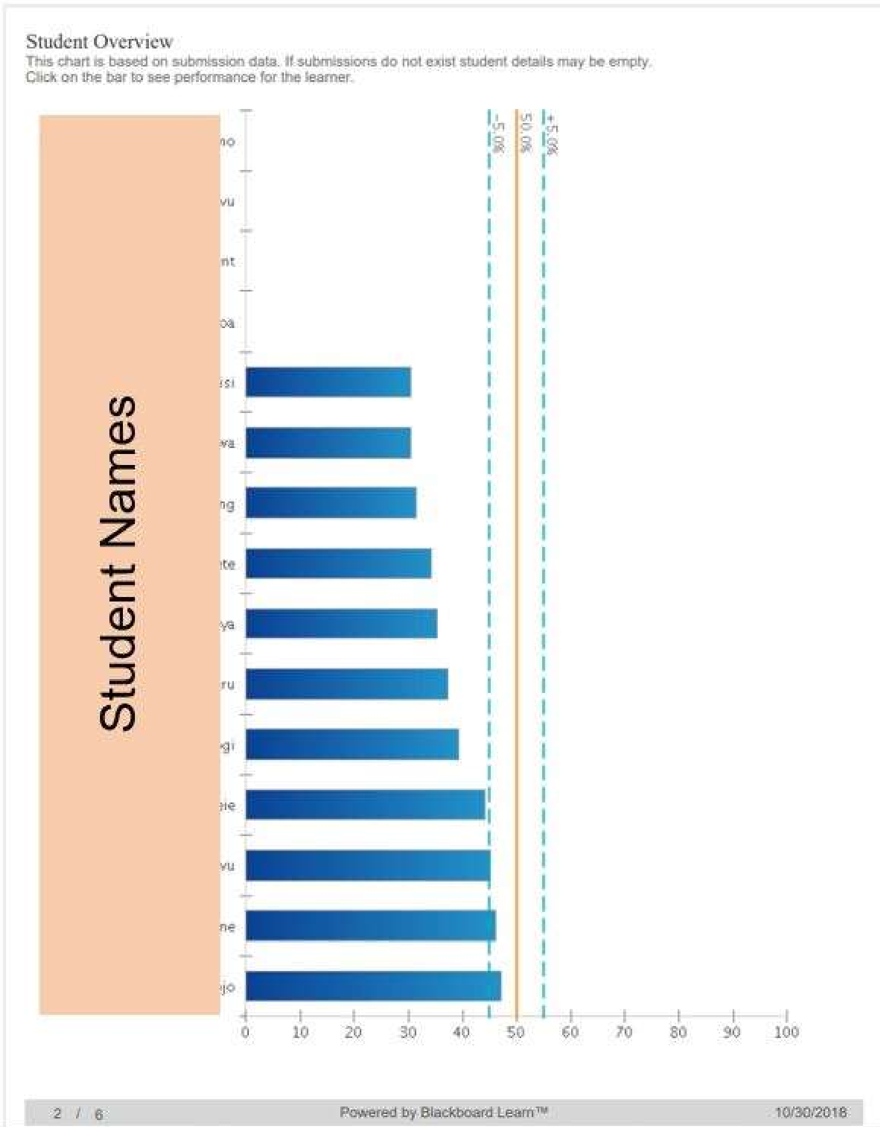


Figure 49: BbGA course performance report – Student overview

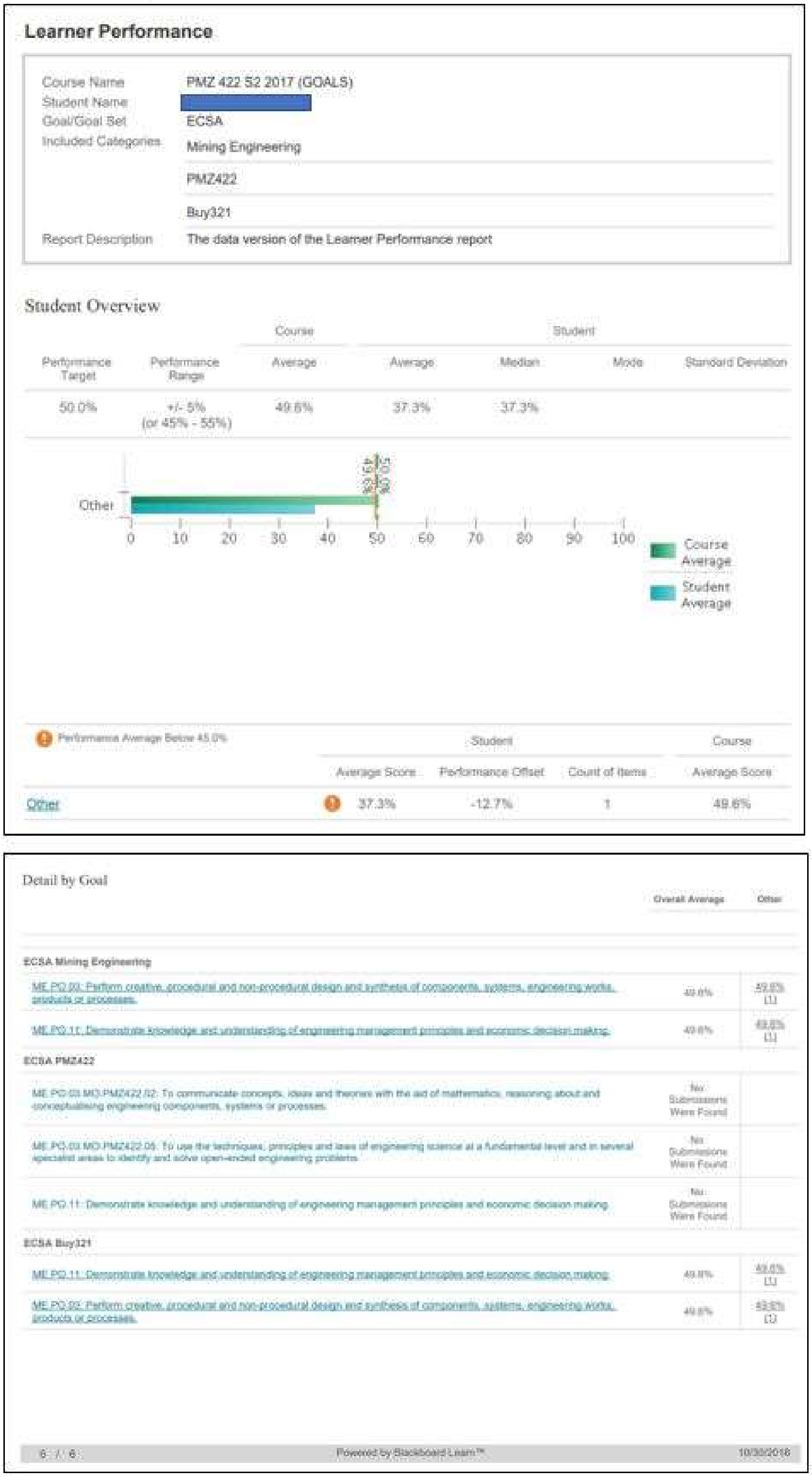


Figure 50: Single students' performance against the set outcomes

6.3.6 End Note

The figures presented in section 6.3 is an example of what is possible in the form of reporting if the BbGA identification schema is correctly implemented. The reporting needs to serve as evidence for assurance of learning. It is, therefore, critical that the data collection process proved to be quality assured so that decisions made for improved learning are based on clean data. This study suggests a programme review framework where the presentation of quality assured deliverables at critical points in the process affords opportunities for the reporting on the assurance of learning.

During the development iteration of DSRc-2 the focus fell on the use of BbGA, as well as on the creation of reports. The team confirmed that it had very little knowledge of how the identification schema in BbGA is related to the output reports. Consequently, only limited justifications and conclusions could be derived at this time from the data to improve on the module, its exit level outcome performance and the assessment practice.

The Department decided during a strategic meeting in 2019 to revisit the programme assessment map and strategise around the future use the BbGA in the School of Engineering at University ABC. The Mining Programme will serve as an example of how such a programme review could be applied in the Engineering School and the wider University ABC.

The knowledge gained from this Case Study (DSRc-2) created a foundation for Case Study 2 (DSRc-3). The discussion follows in the next section (6.4) of Chapter 6.

6.4 DSRC-3: CASE STUDY 2 - DEPARTMENT OF INFORMATICS

6.4.1 Introductory notes

The following case study, as illustrated in Figure 51 and discussed below, reports on the design of a framework for programme review and the use of the BbGA to create evidence for accreditation compliance. The framework (PAIR), informed by the theory of Diffusion of Innovations by Rogers (2003), was applied in the BCom (Informatics: Information Systems) programme offered by the Department of Informatics at University ABC.

The researcher presented the case study together with her supervisor and co-author, at the 11th International Conference of Education, Research and Innovation (Botha & De Villiers, 2017)) as part of her PhD output. The case study describes the five steps of the third Design Science Research cycle (DSRc-3) (Figure 51):

- During the initial awareness phase a need was identified to establish an improved programme review process utilising technology to be able to report on accreditation compliance.
- A framework was suggested to facilitate a process of programme outcomes alignment, implementation and reporting thereof, through the use of technology.
- The design and development phase of DSRc-3 produced an artefact, namely the PAIR Framework.
- The Framework was presented to key role players and users to evaluate the proof of concept
- The output of DSRc-3 was communicated and disseminated by means of a conference paper.

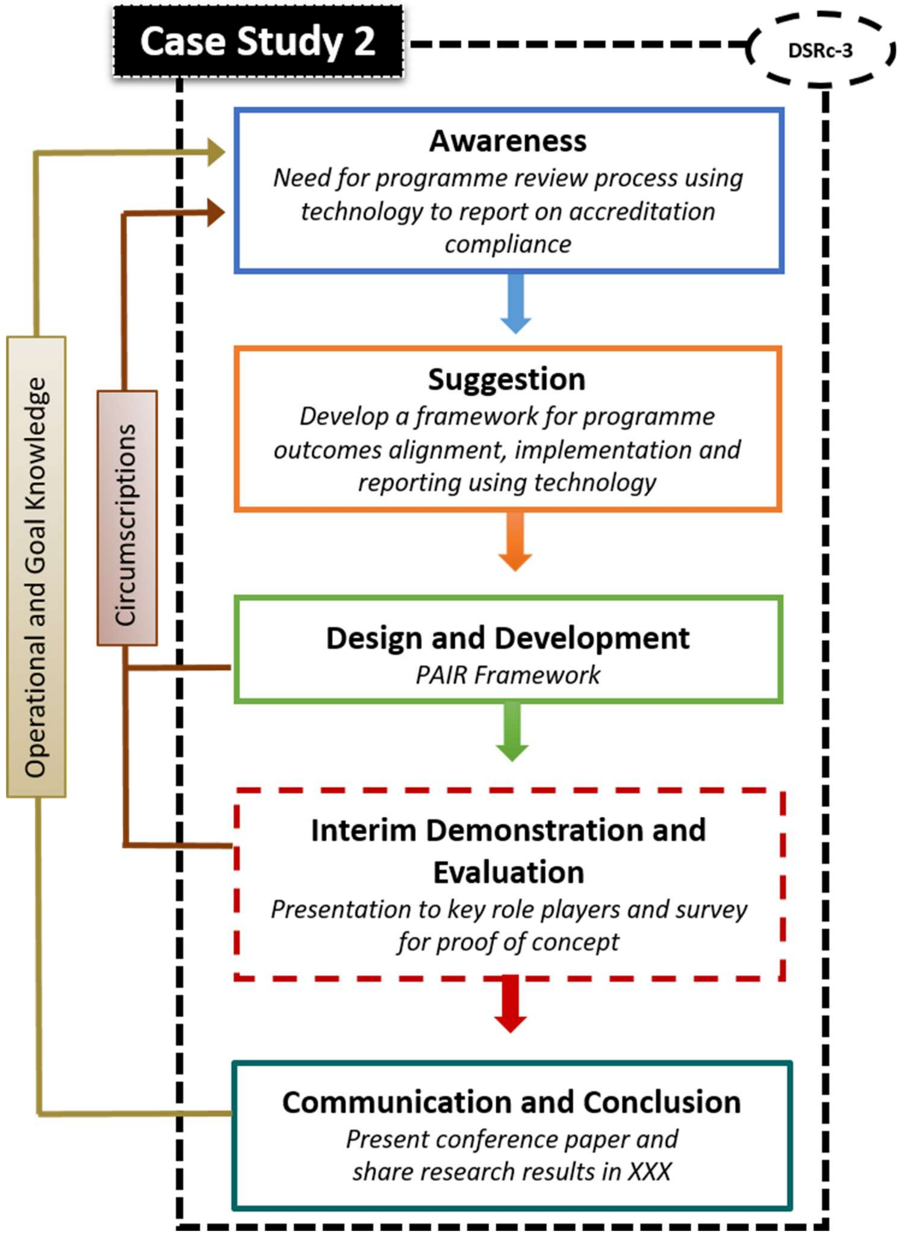


Figure 51: Case Study 2 - Department of Informatics

6.4.2 Conference Proceedings

A. Botha & C. De Villiers (2017). From Accreditation Compliance to Improving Reporting on Learning Outcomes: The Use of an LMS, ICERI2017 Proceedings, pp. 4707-4714.
https://library.iated.org/view/BOTHA2017FRO

"From Accreditation Compliance to Improving Reporting on Learning Outcomes: The Use of an LMS"

1 INTRODUCTION

Across the world quality assurance and accreditation systems in higher education are either developed and monitored by a country or by the higher education sector of that relevant country. In South Africa (SA) the Council on Higher Education (CHE) manages this process. The Higher Education Qualifications Sub-Framework (HESQF) provides an accreditation policy framework for all qualifications and learning programmes in higher institutions in SA.

In complying to the HEQSF, the South African Qualifications Authority (SAQA), has the overall responsibility for overseeing standard-setting and quality assurance and provide institutions with National Qualification Framework (NQF) level descriptors to guide and advise when writing learning outcomes and assessment criteria [2].

The Higher Education Qualification Council (HEQC) recognises that professional bodies, such as the International Accreditation Board for Engineering and Technology (ABET), institute the criteria of programme exit level outcomes (PELO), in order to ensure that the programme complies to international standards.

Programme accreditation is practised in many countries and can be defined as: "A recognition status granted to a programme for a stipulated period after a HEQC evaluation

indicates that it meets minimum standards of quality" [2]. Related to accreditation is the purposes of accountability and improving the quality of learning programmes.
As accreditation becomes more critical in higher education in South Africa, higher education institutions are re-thinking their educational and reporting approach towards the assurance of learning. The University of Sydney Business School gives a concise explanation of what is meant by AoL [3]:

> Assurance of Learning (AoL) refers to the systematic process of collecting data about student learning outcomes, reviewing and using it to continuously develop and improve the School's degree programs. AoL ensures our graduates achieve the goals and outcomes we say they will achieve when we advertise our degree programs. It is a means of holding ourselves accountable to delivering what we say we deliver to students and other stakeholders, as well as a way of supporting the continuous improvement of our degree programs.

The University ABC adopted a hybrid approach towards teaching, learning and assessment. This approach affords, especially professional programmes, to shift from only complying with accreditation requirements based on assessment results, to providing hard evidence that student-learning outcomes are covered and that students are achieving the learning outcomes as the basis of their curriculum. Designing a framework in support of programme review and enhanced reporting, utilising the current LMS at University ABC, was considered an innovation for further research.

The Department of Informatics at University ABC offers the BCom(Informatics: Information Systems) programme, which is the only one in Africa that is internationally accredited by ABET [4] The department takes pride in preparing their students to seek employment overseas through offering their students a curriculum that is well in alignment with curricula of overseas higher institutions.

The undertaking of a programme review for accreditation, with the aim of reporting on programme outcomes, takes time and planning and requires buy-in and collaboration from all stakeholders involved. The department established mechanisms for periodic review and assessment of programme outcomes for accreditation purposes over the last decade as seen in Figure 1.

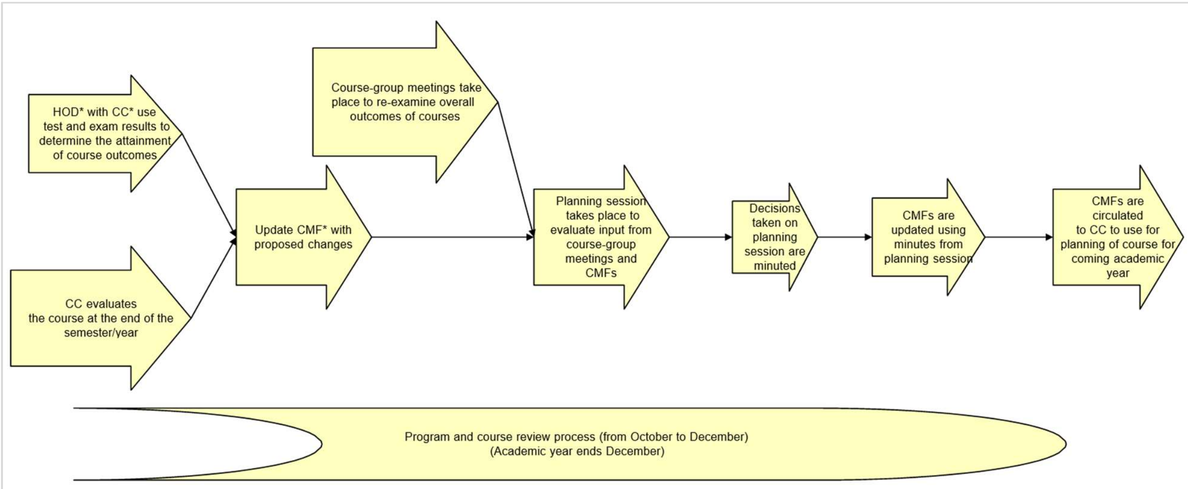


Figure 1: Programme and course review process for BCom(Informatics: Information Systems)

Embedded in the department's self-evaluation report of 2013, a visual representation of the attainment of PELO for module INF154 as seen in Figure 2 was generated from a demo version of the *AssessMyProgramme Tool* (Wright University).

Question No.	Question title	Student Outcome	201030INF154	201130INF154	201230INF154
1	2011S.1 Programming	2.1 (A,B,C,I)		76.00	
2	2011S.2 Programming	2.1 (A,B,C,I)		72.00	
3	2011S.3 Programming	2.1 (A,B,C,I)		74.00	
4	2011S.4 Programming Array	2.1 (A,B,C,I)		56.00	
5	2011S.5 Programming	2.1 (A,B,C,I)		56.00	
6	2010S.1 Programming	2.1 (A,B,C,I)	52.00		
7	2010S.2 Programming	2.1 (A,B,C,I)	44.00		
8	2010S.3 Programming	2.1 (A,B,C,I)	35.00		
9	2010S.4 Programming	2.1 (A,B,C,I)	33.00		
10	2012.1 Programming	2.1 (A,B,C,I)			88.00
11	2012.2 Programming	2.1 (A,B,C,I)			72.00
12	2012.3 Programming	2.1 (A,B,C,I)			74.00
13	2012.4 Programming	2.1 (A,B,C,I)			86.00
14	2012.5 Programming	2.1 (A,B,C,I)			68.00
Weighted Average across questions:			**41.00**	**66.80**	**77.60**

Figure 2: Report for assessment on course INF154 (Programming)

This paper and section explain the process which was followed since November 2016 when the head of the department decided that she want to improve on the current programme review process and reporting, by utilising the BbGA and existing tools within the LMS. The BbGA potentially allows higher education institutions to provide proof of evidence that their programme outcomes are constructively aligned with course content, course instruction, course assessment and student activities. Lecturers have access to two reports:

- The course coverage report, where the data indicates how the content of a course covers outcomes and identify where potential gaps exist [5]
- The course performance report, indicating how the work of students, aligned to outcomes, measures up to a set target value [5]

- Both of these reports have additional drill-down options that can generate further detailed reports. In addition to the two reports available to lecturers, LMS administrators can run a full coverage report that displays detailed aggregated information across courses for all outcomes within selected outcomes types, for example, programme outcomes, accreditation outcomes and module outcomes.

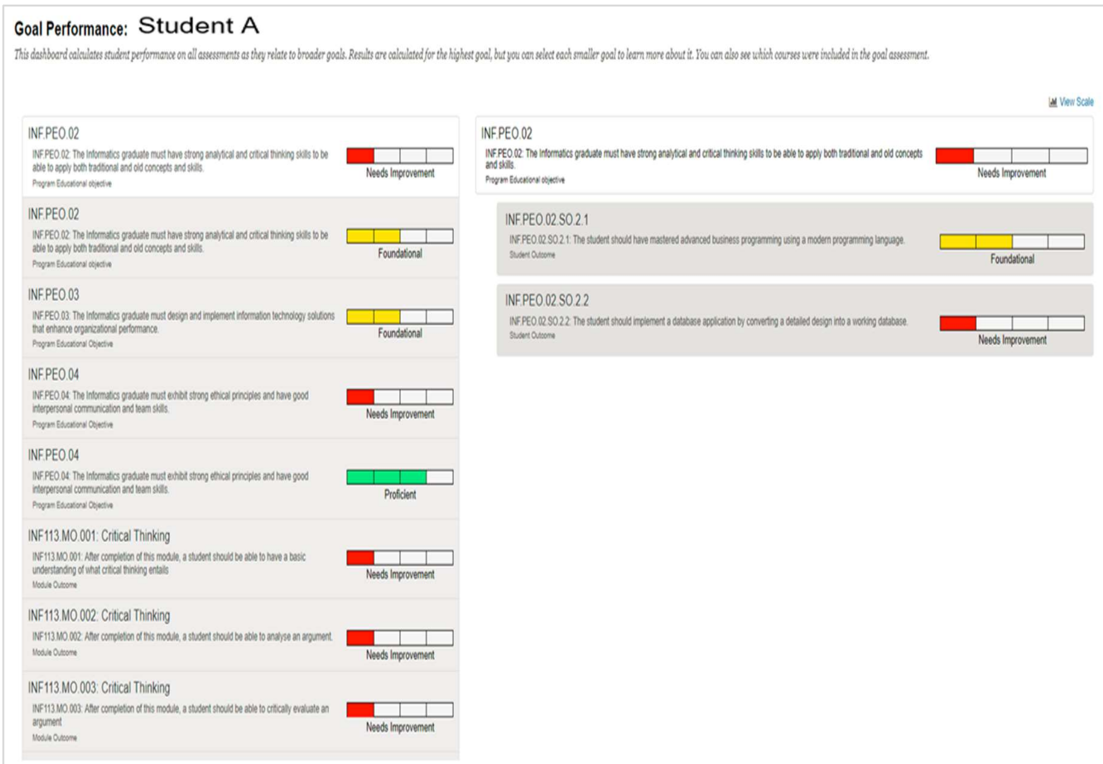


Figure 3: Student Performance Dashboard in LMS

Advancement to the LMS since 2016 is the student performance dashboard, where students can monitor their outcomes alignment performance as presented in Figure 3. This functionality is also available to lecturers.

2 METHODOLOGY

The research philosophy followed for this research was through the interpretive lens with an inductive research approach. The design of the framework for programme review, titled

PAIR (Programme Alignment, Implementation and Reporting: A Partnership towards Student Success), was conducted using the Design Science Research approach in IS research [6] Figure 4 presents an outline of the key components of the PAIR framework.

Figure 4: PAIR Programme Review Framework: A Partnership towards Student Success

The design of the critical components of the PAIR framework were informed by the theory of Diffusion of Innovations by Rogers [1]. The framework addresses the five attributes of an innovation (new idea) namely: relative advantage, compatibility, complexity, trialability and observability as indicated in Table 1. These attributes form part of the persuasion stage for the decision process of adoption of PAIR.

Table 1: The attributes of an innovation informing the key components of the PAIR Framework

Attributes of an innovation	**Key components of PAIR**
Relative advantage	The Atlas curriculum mapping tool was introduced as a pilot at UP during 2013 but was not further perused. There is currently no official framework for programme review through utilising the current LMS Goals Area that can report on programme outcomes alignment.

Compatibility	The current focus of the research for PAIR, as the first phase for adoption, is to focus on professional programmes, such as BCom (Informatics: Information Systems), who expressed the need to provide a rigorous process of annual programme review. As part of this process for accreditation purposes, evidence through reporting on programme outcomes coverage and performance against these outcomes is essential.
Complexity	Programme review cannot be assumed to be in place for all programmes offered at the university. The difficulty to implement PAIR was anticipated. Therefore the design of the components of the PAIR was aligned to existing structures of support within the university.
Trialability	The BbGA is not officially in use at the university. Through piloting PAIR and the implementation of BbGA to programmes voluntarily, creates an opportunity to review and improve the PAIR framework. It further gives lecturers the prospect to experiment with BbGA and evaluate the different reporting options.
Observability	A “show-and-tell” workshop will create a dialogue for the adoption of PAIR at the university.

We offered a two-day curriculum navigation workshop to all lecturing staff in November 2016. The focus were on exposing the lecturers to a practical experience of a constructively aligned approach to their teaching and assessment practices. It also assisted lecturers to ‘demystify’ curriculum concepts and construct module outcomes according to accreditation and higher education standards. It further provided them with a brief overview of the institutional, programme and module levels of their curriculum. The intended purpose of the workshop were:

- To construct a mental map of the curriculum landscape;
- To create an awareness of the use of the HEQSF standards and NQF level descriptors;

- To provide guidelines for using Bloom's Taxonomy as a classification tool for compiling learning outcomes.

Following the workshop, a rigorous review and quality assurance process of the module study guides were conducted according to university guidelines. We documented all the activities using photos, online participation data and afterwards, we surveyed the attendees.

In 2017 the ABET Accreditation Outcomes (Goals) Set and module outcomes map of one module, INF113 (to provide visuals for this paper), were created in the BbGA. The module content and assessment of the first semester in 2017 for this module were retrospectively aligned with the created outcomes set.

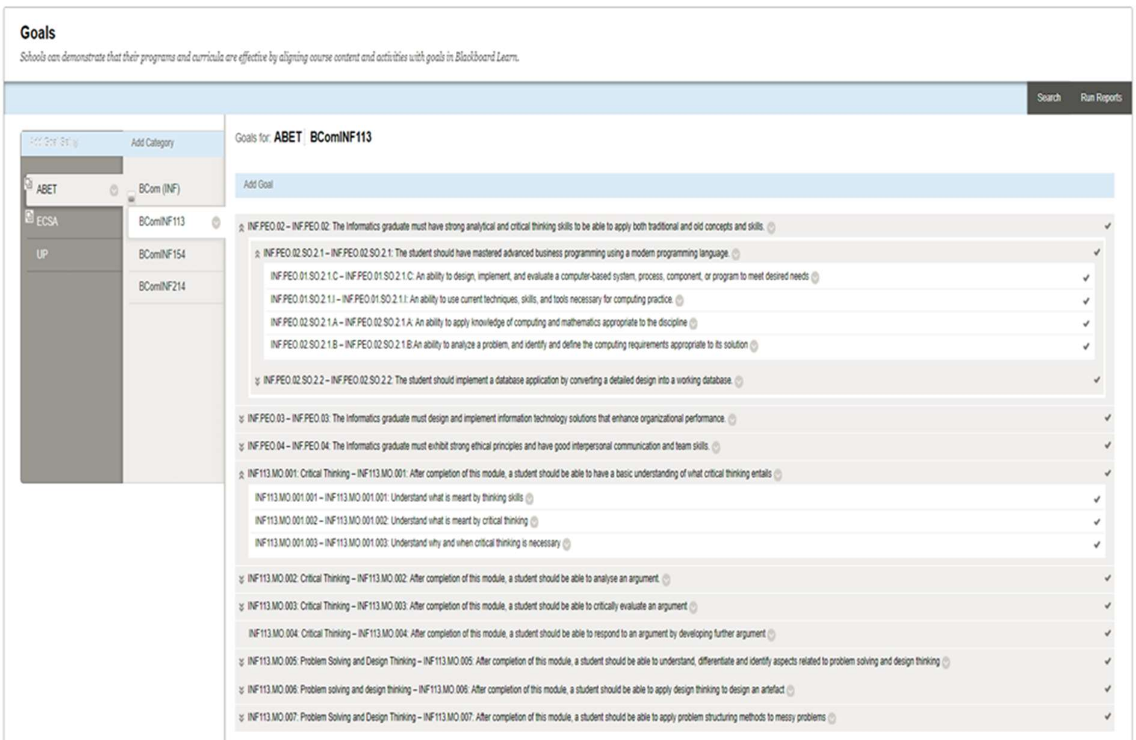


Figure 5: Programme and module outcomes alignment map for INF113. This version is the administrator view. Two reports can be created for this map in PDF, Excel, HTML and MSWord: Category Coverage Details and Review Related Goals

The alignment, implementation and reporting of the rest of the modules of the programme will only be finalised towards the end of 2017 once the PAIR framework and quality assured deliverables for implementing BbGA were reviewed and improvements documented.

The LMS created four reports for the module INF113, with additional drill-down options for more detailed reporting which can be viewed under Figure 5 to Figure 8.

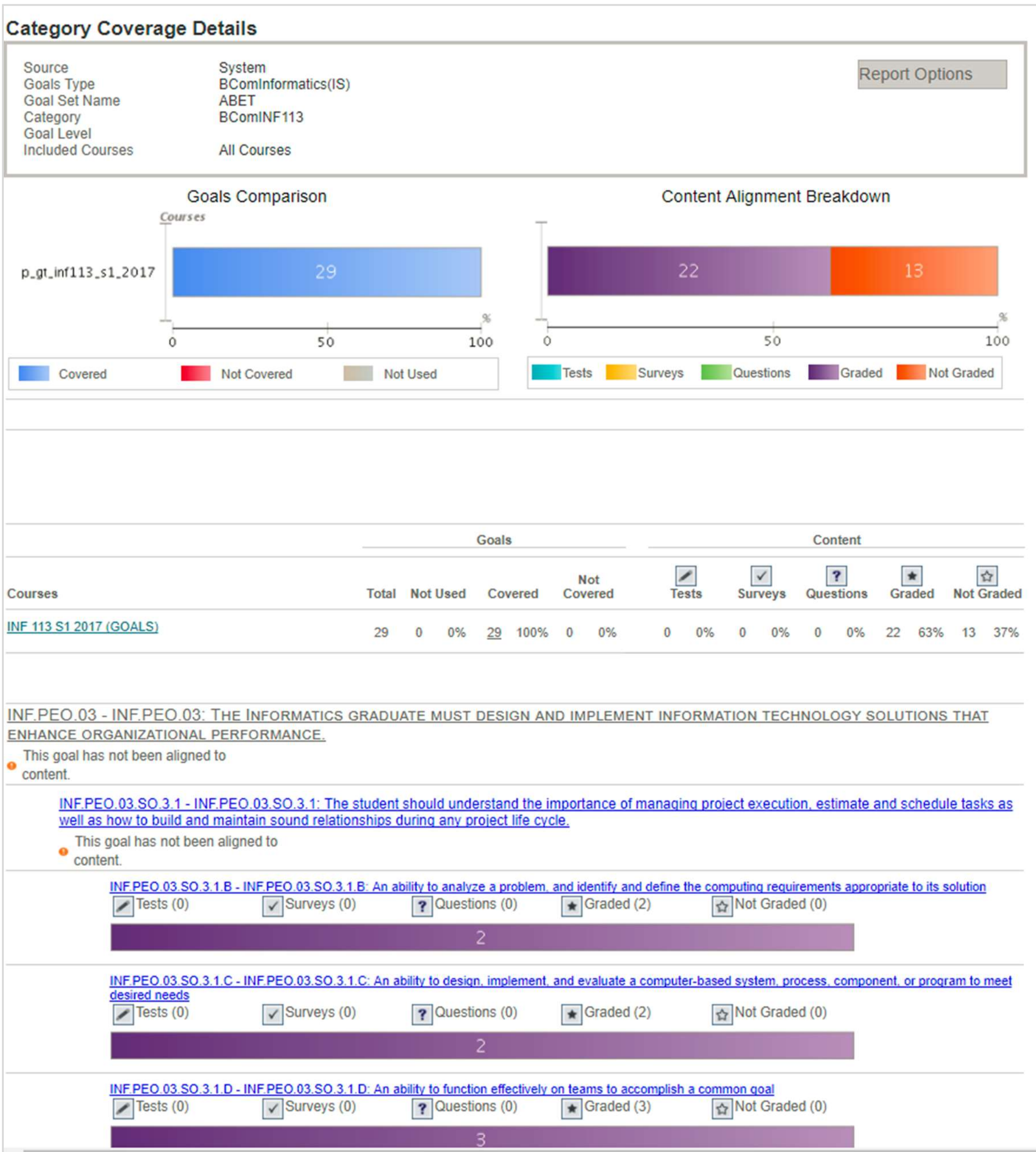


Figure 6: Programme and module outcomes alignment map for INF113 – Category coverage detail report

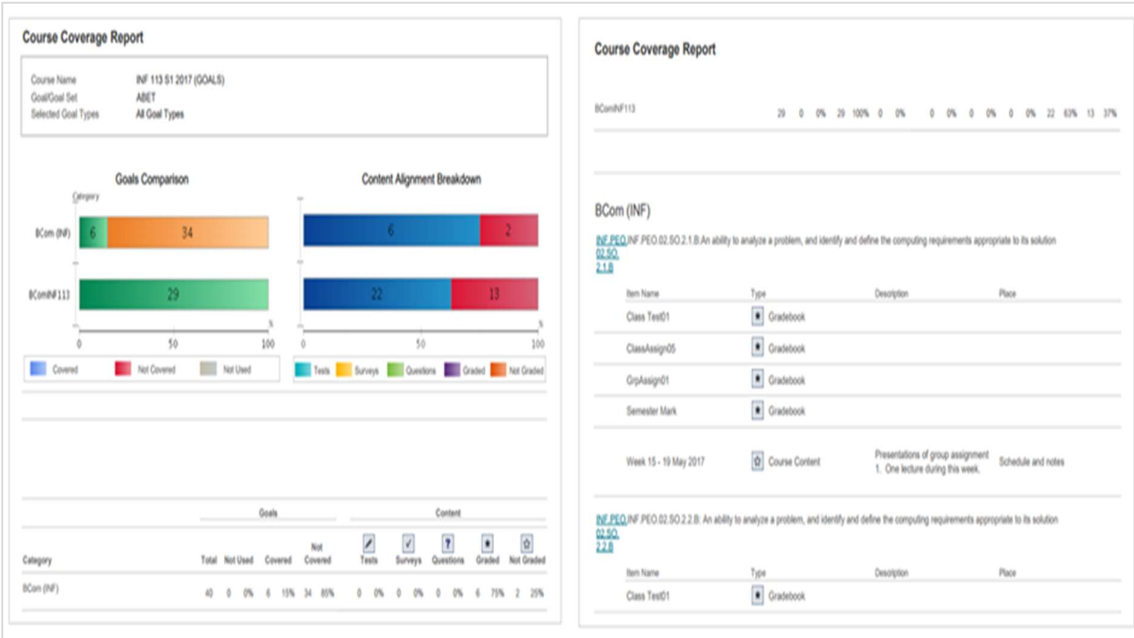


Figure 7: Course coverage report and related goals

Figure 8: Course performance report

The LMS reports were analysed and presented by the head of the department during an initial pre-programmed and module review planning meeting. From the data gathered, lecturers were able to identify gaps in the curriculum and start discussions around strategies for module improvement and action plans for ensuring assurance of learning for 2018.

3 RESULTS

The pilot of the PAIR framework resulted in some critical requirements that need to be in place for successful programme review, namely continuous consultation and collaboration, the naming convention used in the BbGA and ownership of the process.

In the design and implementation of the framework, it became clear that there must be continuous consultation and collaboration between curriculum support, LMS support and the lecturers. Joint workshops and training opportunities related to curriculum matters and LMS implementation are essential (https://library.iated.org/view/BOTHA2017FRO).

Another critical aspect for successfully connecting the curriculum landscape with the online learning environment are working sheets/documents that are in alignment with programme review requirements. Depending if PAIR is implemented for a whole programme or only a few modules, the head of the department should take ownership of the PAIR framework towards complying to accreditation requirements with hard evidence.

In order to fully analyse and understand the reports, more time needs to be spent on the structure of the outcomes in the BbGA. The naming convention for the different levels of the BbGA is of cardinal importance for reporting purposes. The outcomes of the programme review need to be clearly defined in alignment with the different reports available.

Comparing the results of the use of the PAIR framework and BbGA with the previous demo model (Figure 2), it is clear that the reports are more detailed:

- Students can now monitor their progress through the student performance dashboard (Figure 3)

- The reports are more user-friendly (for example outcomes are worded (Figure 5 and Figure 6) and not only indicated by numbers; graphs are provided; can be in PDF or Excel format)
- To ease the creation of outcomes in BbGA a series of XML files can be imported.

The head of the department was satisfied with the usability of the reports and planned to implement PAIR during the annual departmental programme review meeting.

4 CONCLUSIONS

The findings of the study indicate that a process of constructive alignment of a curriculum on institutional, programme and module level (programme and module outcomes; assessment criteria, and assessment- and learning opportunities) is indispensable. Preceding going hybrid with a programme with the aim of implementing the BbGA for reporting for purpose of accreditation reporting and programme improvement, the PAIR framework is necessary. As far as could be ascertained, this proposed PAIR framework approach for programme review using BbGA has not yet been introduced in the South African higher education context, and might, therefore, if successful, be considered to become a prototype for such.

ACKNOWLEDGEMENTS

We wish to thank Elmien van Amerom as co-author and facilitator of the workshop in 2016 as well as the lecturers of the Department for Informatics for their participation in the workshop. In particular, Prof Machdel Matthee for her assistance in providing the information that was needed to align assessment to ABET Accreditation Outcomes (Goals) in order to produce the report examples displayed in this paper.

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[1] E. M. Rogers, Diffusion of Innovations, New York: Free Press, 2003.

[2] Council on Higher Education, Higher Education Quality Committee, "Council on Higher Education South Africa," [Online]. Available: http://www.che.ac.za/media_and_publications/frameworks-criteria/criteria-programme-accreditation. [Accessed 12 February 2017].

[3] "The University of Sydney," 3 May 2013. [Online]. Available: http://sydney.edu.au/business/about/accreditations/AoL. [Accessed 25 August 2017].

[4] R. Bachbak and A. Shafaye, "A Look at ABET Accreditation - Understanding the Basics," in *ASEE American Society for Engineering Education*, Baltimore, Maryland, 2017.

[5] "Blackboard Help," New York, 2017.

[6] V. Vaishnavi and B. Kuechler, "Association for Information Systems," 2005.

6.4.3 End Note

The conference proceeding paper in section 6.4 reported on the case study that was used to design a framework for quality programme review. Included in the process of programme review was the incorporation of the BbGA that afford lecturers and management to create reports to demonstrate to accreditation bodies that the programmes comply with accreditation standards. It can be concluded that the PAIR framework should be in place before the BbGA can be used for accreditation purposes.

What was not indicated pertinently in the proceeding paper is the 'interim demonstration and evaluation phase for the DSRc-3 cycle prior to the evaluation phase in the main DSRc-1.

An interim demonstration and evaluation of PAIR were conducted during the department's annual year-end strategic planning session. A PowerPoint (Appendix C) was presented to report on the research done in the design and development of PAIR. A proof of concept survey was given to the lecturers to complete. The survey completion was not compulsory. Results from the survey (Appendix C) were taken into account during the further development of the components of PAIR.

6.5 INTERIM DEMONSTRATION AND EVALUATION

An interim demonstration and evaluation for the proof of concept for the PAIR Framework were conducted to inform the researcher if any additional iterations were needed before the final evaluation phase in DSRc-1 of PAIR and the study. A voluntary Qualtrics survey was presented on two occasions as part of the presentation: (1) In the Department for Education Innovation, and (2) with the academic staff of the Department of Informatics. A total of twenty-six staff members participated. Section 6.5.1 provides a summary of the Qualtrics survey results of the data collected.

6.5.1 Qualtrics survey for proof of concept for the PAIR framework

In order to engage the participants in completing the survey, a presentation (Appendix C-2) was delivered to explain the study and demonstrate PAIR. The following instruction was presented for the completion of the survey (Figure 52):

Dear Respondent,

This ***proof of concept evaluation survey*** (based on the five perceived attributes of an innovation) is designed for the research titled: ***From accreditation compliance to improving reporting on learning outcomes: The use of an LMS***

Kindly fill out your responses as frankly as possible within your current context at the University of Pretoria. The data you provide will be used to inform further refinement and development of the PAIRS Framework as well as recommendations on the implementation of BbGA as part of PAIRS.

Thank you for your time and anticipated cooperation.

Figure 52: Instruction for completion of Qualtrics survey

Figure 53 illustrates the participants of the surveys current job descriptions, of which the lecturers are the most presented (55,56%).

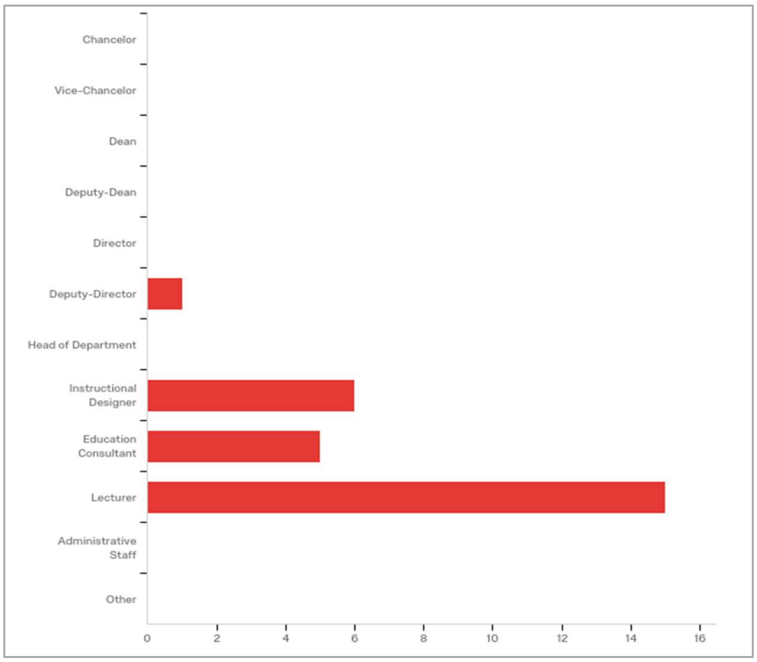


Figure 53: Description of the participants' current job

The following four closed and open-ended questions were presented to the participants in the survey:

Question 1:

Please read the description for each perceived attribute of an innovation on your handout.

Click the box that best describes your view on the proof of concept for Blackboard Goals Tool (evidence that the concept is feasible) for each of the attributes.

Results

The results for question 1 are illustrated in Figure 54 and Table 5 for each of the attributes: Relative Advantage, Compatibility, Complexity/Simplicity, Trialability, and Observability (Rogers, 2003).

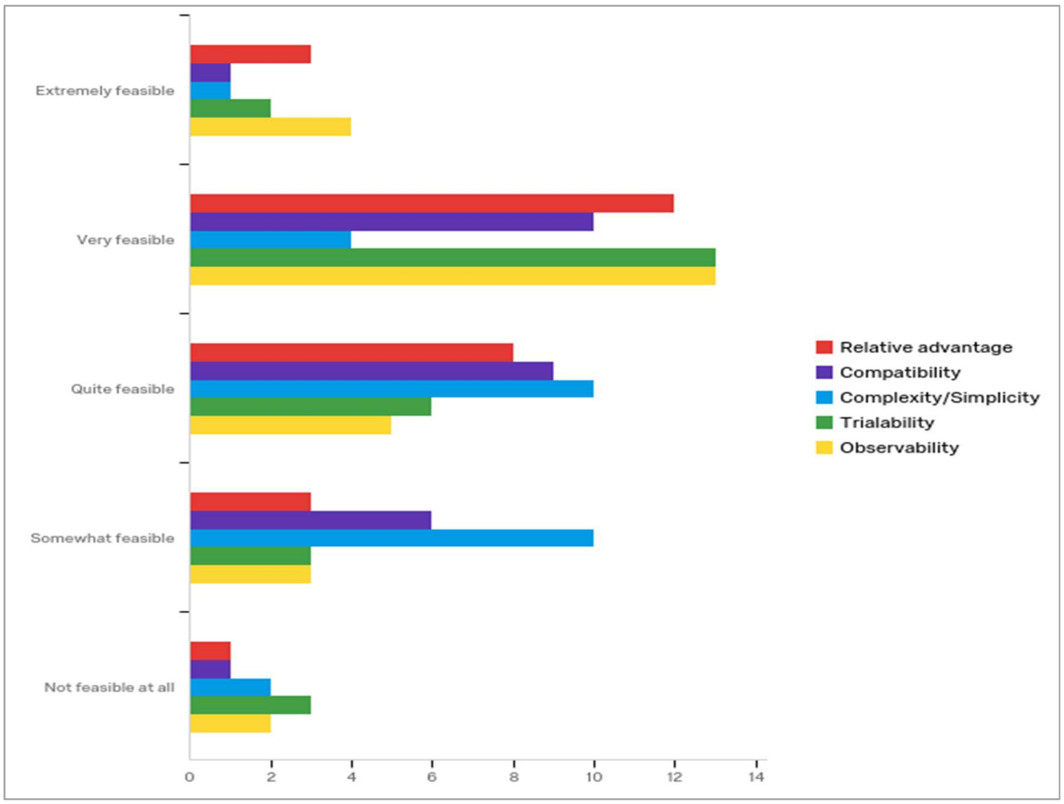


Figure 54: Proof of concept for Blackboard Goals Tool (evidence that the concept is feasible) for each of the attributes

The results show (Figure 54) that more than 85% of the respondents thought that the application of PAIR was extremely, very or quite feasible, whilst less than 15% of the respondents were of the opinion that PAIR was only somewhat or not feasible at all. The results of the qualitative review of PAIR was an indication to the researcher that this framework has merits that could be developed further. Quantitative testing could be considered in the next cycle of development.

Table 5: Statistical breakdown of the results obtained for the proof of concept for the feasibility of the Blackboard Goals Tool

#	Question	Extremely feasible		Very feasible		Quite feasible		Somewhat feasible		Not feasible at all		Total
1	Relative advantage	11.11%	3	44.44%	12	29.63%	8	11.11%	3	3.70%	1	27
2	Compatibility	3.70%	1	37.04%	10	33.33%	9	22.22%	6	3.70%	1	27
3	Complexity/Simplicity	3.70%	1	14.81%	4	37.04%	10	37.04%	10	7.41%	2	27
4	Trialability	7.41%	2	48.15%	13	22.22%	6	11.11%	3	11.11%	3	27
5	Observability	14.81%	4	48.15%	13	18.52%	5	11.11%	3	7.41%	2	27

QUESTION 2: The participants were presented with the following question:

Kindly provide any feedback related to Blackboard Goals Tool that can contribute to this research

Apart from the participants (P) feedback on the value of the BbGA tool the following vital themes where identified and need further investigation:

- Participants expressed a need for guidance, an implementation plan, a teamwork and centralized approach, an institutional strategy, and buy-in in the use of the tool. Curriculum matters such as the alignment of learning outcomes were mentioned. (P1, P2, P3, P5, P6, P27)
- Although the tool seems to have value, staff might experience the use thereof as causing ''extra'' administration work with time constraints. (P2, P7, P14, P25)
- To be able to comment on the complexity and feasibility of the tool lecturers need more context and time to experience the tool. (P2, P4, P13, P21, P22, P27)
- The tool might not have compatible value for any programmes that do not have to adhere to for example accreditation bodies. (P7)

- The present kind of research can add value to the lecturer's work output, the impact and quality of course design, as well as student success and therefore the success of the institution at large. (P3, P4)

The researcher wants to conclude this section under the results obtained from Question 2 with a quote from one of participants (P2), who provided valuable feedback to this study and are in alignment with what has been found in the literature and the recommendation in the evaluation phase (Chapter 8) of this study:

> "The successful implementation will depend on an institutional strategy and alignment with student success strategies as indicated. It also implies that online teaching and learning needs to be centralised in the LMS and not decentralised. The obvious implication is that will impact course design or the quality of course design."

QUESTION 3: The participants were also presented with the following question:

Please read the description for each perceived attribute of an innovation on your handout. Click the box that best describes your view on the proof of concept for PAIRS Framework for Programme Review (evidence that the concept is feasible) for each of the attributes.

Results

The results for question 3 are illustrated in Figure 55 and Table 6 for each of the attributes: Relative Advantage, Compatibility, Complexity/Simplicity, Trialability, and Observability (Rogers, 2003).

From the results, it appears that the participants think that the *PAIRS Framework for Programme Review* is to some extent very to somewhat feasible concerning its relative advantage, compatibility, complexity/simplicity, trialability, and observability. Only four out of twenty-five participants indicated that the *PAIRS Framework for Programme Review* is not feasible at all with relation to the complexity/simplicity and trialability attributes of an innovation.

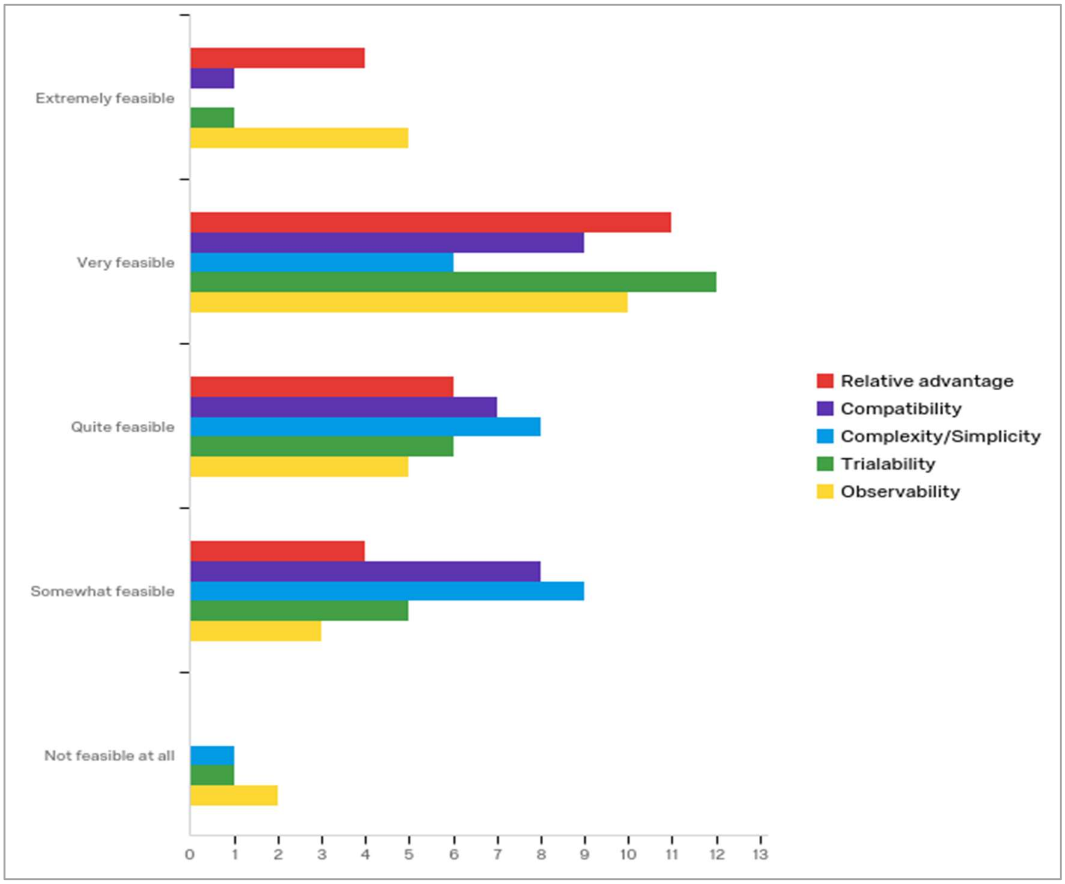


Figure 55: Proof of concept for PAIRS Framework for Programme Review (evidence that the concept is feasible) for each of the attributes.

Table 6: Statistical breakdown of the results obtained for the proof of concept for the feasibility of the PAIRS Framework for Programme Review

#	Question	Extremely feasible		Very feasible		Quite feasible		Somewhat feasible		Not feasible at all		Total
1	Relative advantage	16.00%	4	44.00%	11	24.00%	6	16.00%	4	0.00%	0	25
2	Compatibility	4.00%	1	36.00%	9	28.00%	7	32.00%	8	0.00%	0	25

3	Complexity/Simplicity	0.00%	0	25.00%	6	33.33%	8	37.50%	9	4.17%	1	24
4	Trialability	4.00%	1	48.00%	12	24.00%	6	20.00%	5	4.00%	1	25
5	Observability	20.00%	5	40.00%	10	20.00%	5	12.00%	3	8.00%	2	25

Question 4: The participants were also presented with the following question:

Kindly provide any feedback related to PAIRS Framework for Programme Review that can contribute to this research:

Apart from the participants (P) feedback on the value and perceived success for the implementation of the *PAIRS Framework for Programme Review* the following key themes were identified and need to be investigated further:

- A need for a common understanding of the alignment of programme- and module outcomes. (P7, P26)

- Where there is vested interest for programme and departments the framework and BbGA can be useful. (P7)

- Leadership, the involvement of the Quality Assurance unit at University ABC, and collaboration of instructional designers and education consultants, are viewed as critical aspects for the successful implementation of the framework and BbGA as this process might also be experienced as over-complex and not familiar. (P2, P3, P4, P5, P7, P25)

- One participant indicated that there are flaws in the framework and questioned the claim that the framework with the embedded BbGA cannot be seen as an innovation. (P3)

Regarding the last comment and response of the participant (P3): Although the concept of an 'innovation' of the framework and inclusion of the BbGA in the framework is in question, the researcher wants to argue, that in the absence of such a framework where the use of BbGA can be incorporated as part of a quality programme review, this framework indeed can be seen as an innovation at University ABC, as it is not existing in University ABC or in the wider higher education landscape in South Africa. Rogers argued (2003), that an **innovation** can be defined as "an idea, practice or object that is perceived as new by an individual or another unit of adoption".

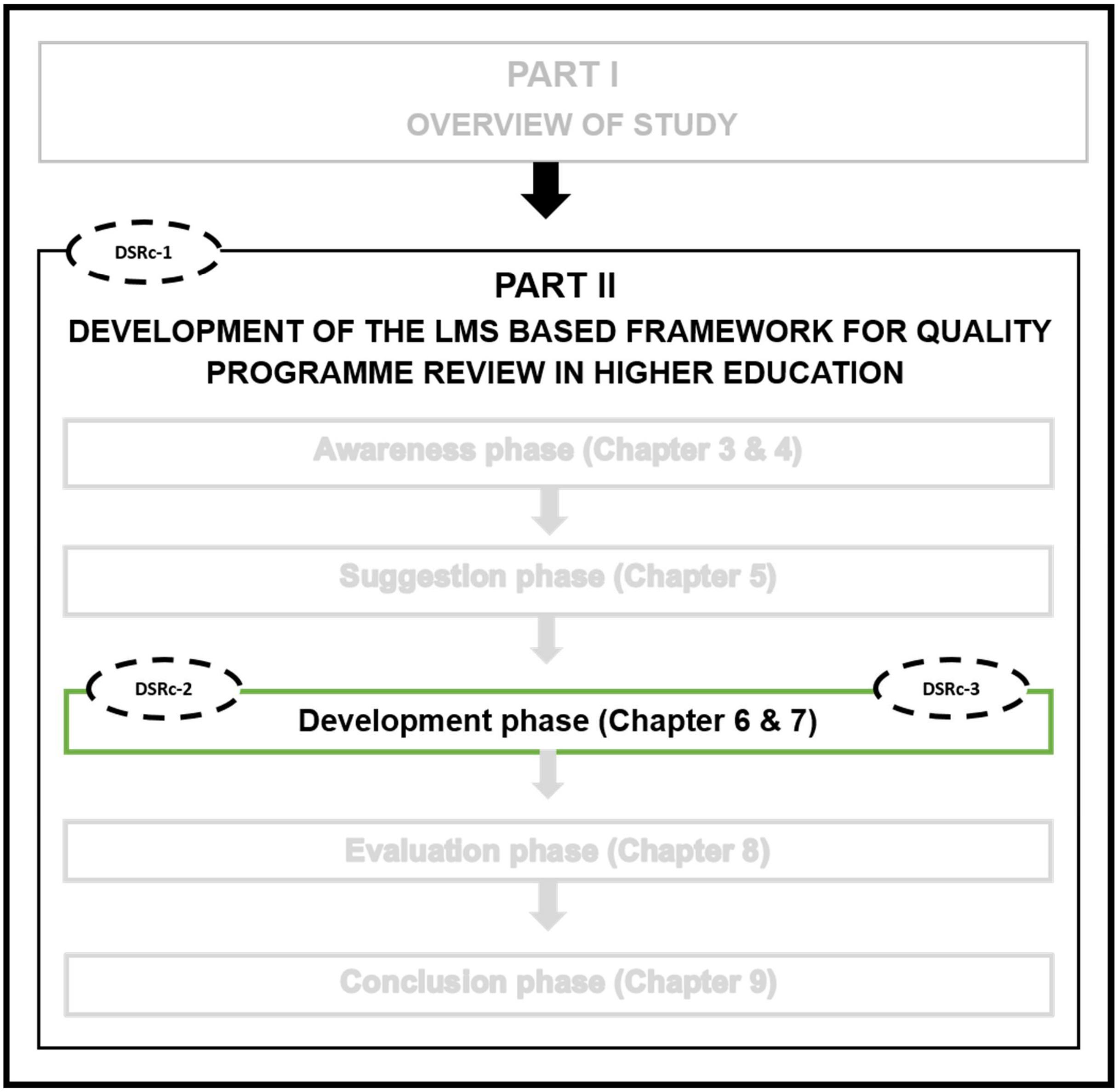
6.6 CONCLUSION

To develop a framework for quality programme review, and to be confident that such a framework be considered for adoption and implementation at University ABC is not an easy task as one of the participants (P2) rightly remarked:

> "Framework not visible at this stage. You have not included Quality Unit in your framework. A BbGA in the UP culture may be the biggest obstacle to implementation. We need serious leadership to get this going."

Throughout the readings for this study, and after discussions with experts in the field of this study, the researcher is aware of the challenges she faces with the proposed framework like PAIR with the BbGA embedded in the framework, at University ABC, and therefore value the honest feedback from the participants and colleagues in this regard.

However, the researcher is confident that through the establishing of a partnership with the key stakeholders at University ABC, and with a shared understanding of the value that PAIR can bring to the enhancement of existing internal quality initiatives, the outcomes of this study can contribute to programme improvement processes toward student success.


PART I
OVERVIEW OF STUDY
DSRc-1
PART II
DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION
Awareness phase (Chapter 3 & 4)
Suggestion phase (Chapter 5)
DSRc-2
DSRc-3
Development phase (Chapter 6 & 7)
Evaluation phase (Chapter 8)
Conclusion phase (Chapter 9)

7 OUTLINE AND COMPONENTS OF THE PAIR FRAMEWORK

Research Objective 4: To develop a framework for quality programme review applying the principles of Diffusion of Innovations.

7.1 INTRODUCTION

The preceding chapter laid out the process through which the researcher developed the PAIR Framework. The researcher argued in earlier chapters that such a Framework must contain specific critical components when an LMS is used with a tool such as BbGA in a higher education programme review (see the discussion below). It was further argued that the PAIR Framework could be utilised to serve as a mechanism to facilitate a culture of programme review at an institution such as University ABC. It was also envisaged that PAIR could be adopted by other higher education institutions, especially universities using the same LMS as University ABC with access to a BbGA tool.

For the purpose of this study, the critical elements of the framework are identified and embedded in the theory of constructive alignment. In Section 3.3, it is indicated that programmes are designed and developed according to constructive alignment principles, and therefore, should the flow of a quality programme review process support and follow the same alignment. Two additional elements that are brought into the design of the framework is that of a 'partnership' and the use of technology that forms an integral part of the teaching, learning and assessment drive at University ABC. The design of the framework is therefore based, and should be grounded and informed by theoretical underpinnings such as constructive alignment theory of Biggs (1996).

The purpose of this study was to focus on the development of a framework for quality programme review, implementing an LMS feature. The rationale for doing this research was to support University ABC lecturers in need of a means to align their programme outcomes and professional board accreditation criteria with course content, assessment and student activities. A second rationale for developing this framework was to empower lecturers to demonstrate and provide proof of evidence through reporting to the relevant professional bodies that their programmes and curricula are effectively aligned with their professional board requirements. It further envisaged that through the implementation of the proposed framework, departments would introduce an annual quality programme review process to improve student learning and ultimately report on programme effectiveness.

Chapter 7 presents a detailed discussion of the PAIR framework for quality programme review utilising an LMS as the final research output (DSRc-1). Section 7.2 introduces each of the main components presented in PAIR, and 7.3 describes the flow process in PAIR. The chapter concludes with section 7.4 showing the present (2019) resources available at University ABC for potential support in the implementation of PAIR.

7.2 COMPONENTS AND QUALITY ASSURED DELIVERABLES OF PAIR

PAIR[10] (Programme Alignment, Implementation and Reporting) (Figure 56) comprises of the four main components to deliver quality assured deliverables, namely the programme outcomes alignment; the LMS implementation; the Quality Review Programme partnership meeting and reporting. Figure 56 also shows the essential parts of the quality programme review process should information technology such as the BbGA (an LMS feature) be incorporated into the process.

The fundamental components proposed for PAIR are (Figure 56):

- Programme Review Partnership Meeting
- Programme Outcomes Alignment
- Quality Assured Deliverable: Module Study Guide & Programme Outcomes Alignment Map
- LMS Implementation
- Quality Assured Deliverable: Programme Outcomes Alignment Map
- Reporting for Programme Improvement and Accreditation

[10] As proposed by the present researcher

- Quality Assurance Deliverable: Blackboard Learn® Goals Area Reports

Figure 56: Illustration of the components and quality assured deliverables applicable to the PAIR Framework

7.2.1 Programme Review Partnership Meeting

The first step to take before BbGA can be used for reporting on assurance of learning and used as indicator for possible improvements for effective student learning, a partnership should be established between the head of the department, the programme coordinator, lecturers involved in the modules for the programme to be reviewed, instructional designers and education consultants (Figure 57). A partnership in education can refer to where two or more people share ownership of the programme and the process of programme review. It will include the responsibility for managing the programme review process and being held accountable for the outcome of the quality programme review.

The aspects as indicated in Figure 57 guide the first partnership meeting (that can be on a programme or module level) but is not limited to these alone.

Figure 57: Programme Review Partnership Meeting

Additional agenda points or actions or agreements can be included depending on the outcome to be achieved.

Aspects to consider for the first and initial partnership meeting can include the drafting of a plan or project for the outcomes to be achieved once the review process is in motion. Members should discuss and agree on the expected quality assured (QA) deliverables

(Figure 59). In principle, there should be consensus and commitment by all members to adhere to the set timeline for these QA deliverables. They should decide who and how the submission and QA of these deliverables are going to be managed.

At this initial meeting at the beginning of each review cycle, it should be discussed and decided upon what the nature of the training needs are and support that is needed for example programme outcomes alignment throughout the year of review. Additional training sessions regarding any aspect of the curriculum and assessment could be defined. Any training needs for the use of an LMS and the BbGA need to be determined at this meeting, and the necessary training should be booked in advance.

Training and support can differ from year to year, for example, it can be concluded that for the first round when the framework will be implemented for the first time, everyone involved in a specific programme's modules needs to go for training in each component of the framework. Preferably, the first training should be set up for the department as a whole to achieve synergy within the process and to provide an opportunity and an environment for curriculum and technology implementation dialogue. Following the first round of review, it could be decided to only send new staff for training or if applicable, request refresher training for the department as a whole. The establishing of a curriculum committee to deal with PAIR should at least at this stage be considered.

7.2.2 Programme Outcomes Alignment

The second element of the framework focuses on programme outcomes alignment (Figure 58) that is typically supported by a team of education consultants, also known internationally as learning developers/learning designers/teaching and learning advisors.

The members of the partnership can identify in advance at the partnership meeting what support, services or training would be required before the first quality assured deliverable.

A compulsory curriculum workshop is advised if a programme wants to incorporate an LMS and its features for curriculum alignment and reporting, specifically in the case where the use of BbGA are considered.

The following aspects of this component of the framework are considered essential: Study Guide training (quality assured deliverable) and administration of a study guide quality checklist by the module coordinator, programme coordinator and head of the department.

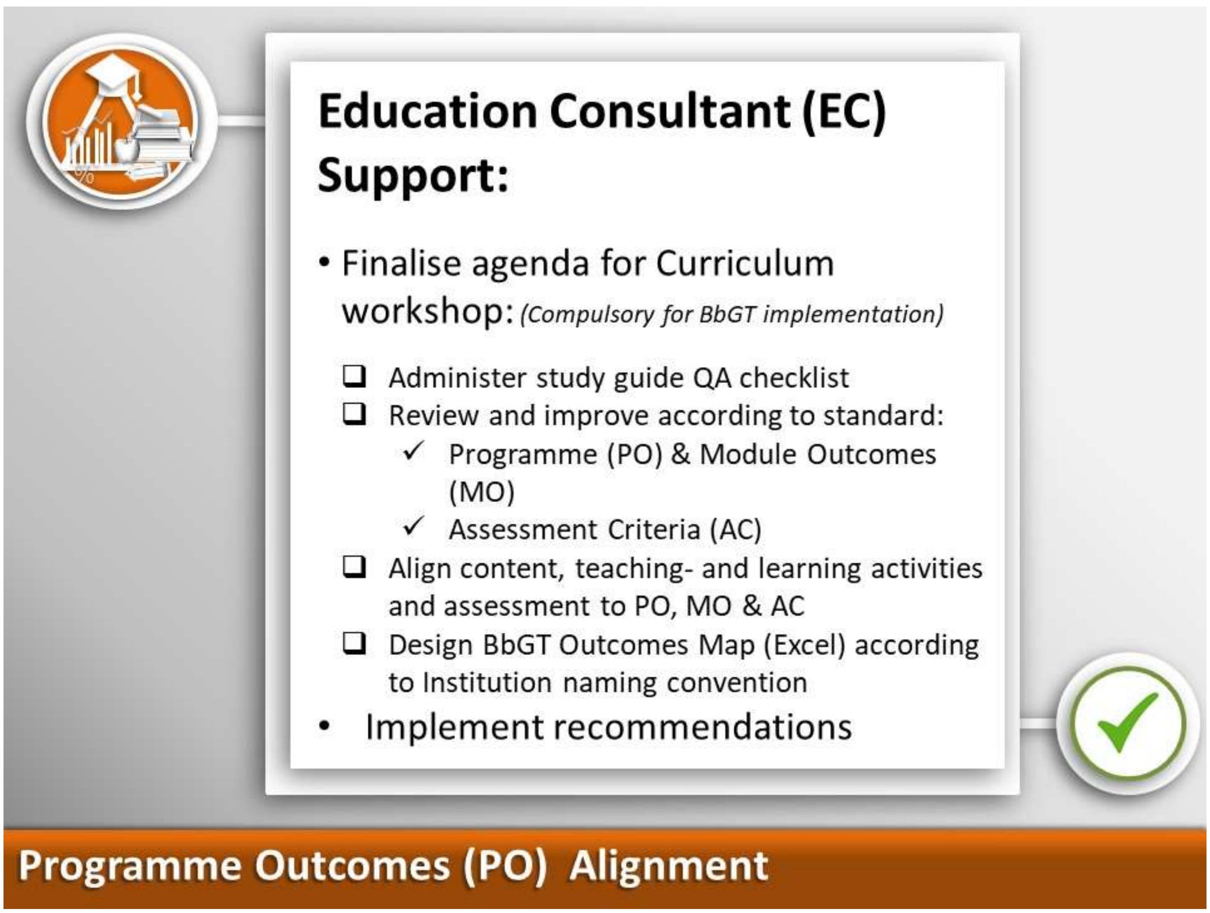


Figure 58: Programme Outcomes Alignment

The support of the education consultant (EC) for constructive alignment of outcomes to teaching, learning, and assessment can be included; especially if a departmental workshop on study guides are envisaged. Quality assurance of study guides should be an annual activity. Working alongside the education consultant a review and improvement of module outcomes and associated assessment criteria alignment against the programme exit level outcomes can be considered to at least be introduced once during a five to six-year accreditation cycle for the programme.

An essential activity at this early stage of the process is to draw up the 'programme outcomes alignment map' to be populated according to the institutional identification schema and naming convention if BbGA is considered. Appendix B provides guidelines for the completion of the required form to ensure uniformity at the back-end of the institution's BbGA system. At the end of all the training session/s, the suggestions and outcomes need to be implemented. The quality assured deliverables would be managed at this stage before lecturers move on to the LMS environment.

7.2.3 Quality Assured Deliverable: Module Study Guide & Programme Outcomes Alignment Map

The quality assured (QA) deliverable (Figure 59) component is built into the PAIR framework to ensure the 'quality' of input and output during the process of programme review. It further ensure that the data obtained from the BbGA is constructively aligned with the programme exit level outcomes. At the same time it safeguards that the data is 'clean', i.e. that the data can be used with confidence for informing suggestions for improvement and actions to be taken for the modules as well as the programmes as a whole; to warrant programme effectiveness through the assurance of learning; improved student learning and student success.

Although this might seem to be tedious, it is to believe that these quality assured 'pauses' in the PAIR process and the deliverables to be provided as evidence as agreed upon during the programme review partnership meeting, will as a first step adhere to the directive of providing a rigorous process for an annual programme review. In the case of University ABC, this could be a framework that can add value to the current programme and module review practices. More so where lecturers in modules and programmes embraced the hybrid mode of facilitating learning at University ABC – as the BbGA will be most operational for modules where lecturers and students are active on University ABC's LMS, particularly for assessment and the use of the Grade Centre.

The first quality assured deliverable is a module study guide that will adhere to the standards as set by a higher education institution. At University ABC study guides in modules are compulsory, and an institutional study guide template is available to all departments. For quality assurance of the study guide, a checklist is available in hard copy or available online in the form of a Qualtrics Survey. The template contains the minimum number of aspects that University ABC deem a study guide should have. There is a team of education consultants at University ABC that support lecturers to ensure the study guides adhere to the principle of constructive alignment for the learning component and for keeping abreast with the development thereof through research. These education consultants also offer workshops in the design and development of study guides.

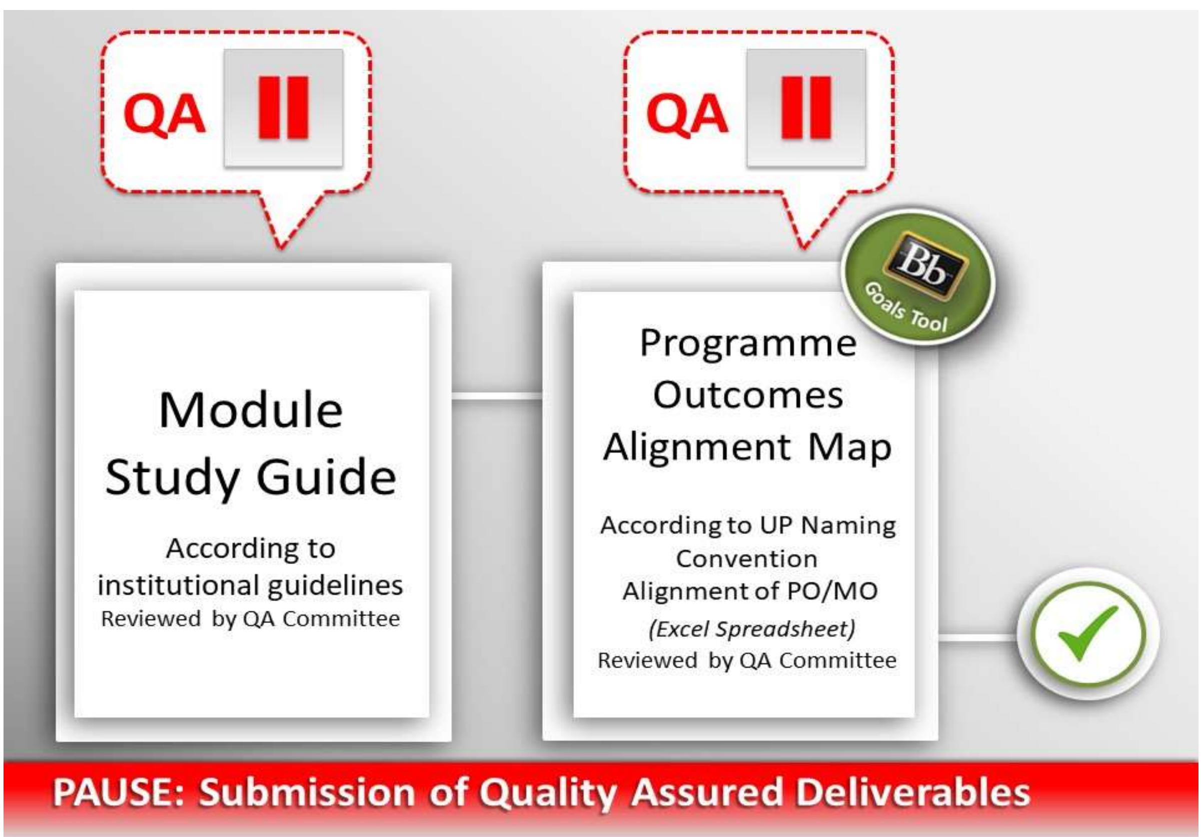


Figure 59: First and second quality assured deliverable

The second deliverable is the outcomes alignment map that needs to be completed for every programme according to the institutions naming convention and identification schema. The map will indicate the constructive alignment of the intended learning outcomes, student activities (teaching and learning) and assessment. It is proposed that this map will be managed by the programme coordinators in collaboration with the module coordinators and lecturers.

It is anticipated that the outcome of the evaluation phase (DSRc-1) of this study would provide direction and guidelines on the design of the format of this template to be piloted and tested for instantiation. It is further suggested that this quality assured deliverable be managed by an established curriculum committee, as the quality assured QA of these deliverables will be compulsory where the BbGA are to be implemented as part of an annual programme review process.

7.2.4 LMS Implementation

The instructional designers, for example, will typically support the component of the PAIR framework that deals with the LMS implementation (Figure 60) at University ABC. It is suggested that a programme as a whole and the separate modules in the programme review their eLearning strategy and approach. This action will be compulsory if BbGA where to be implemented as part of the hybrid approach for reporting on teaching, learning, and assessment.

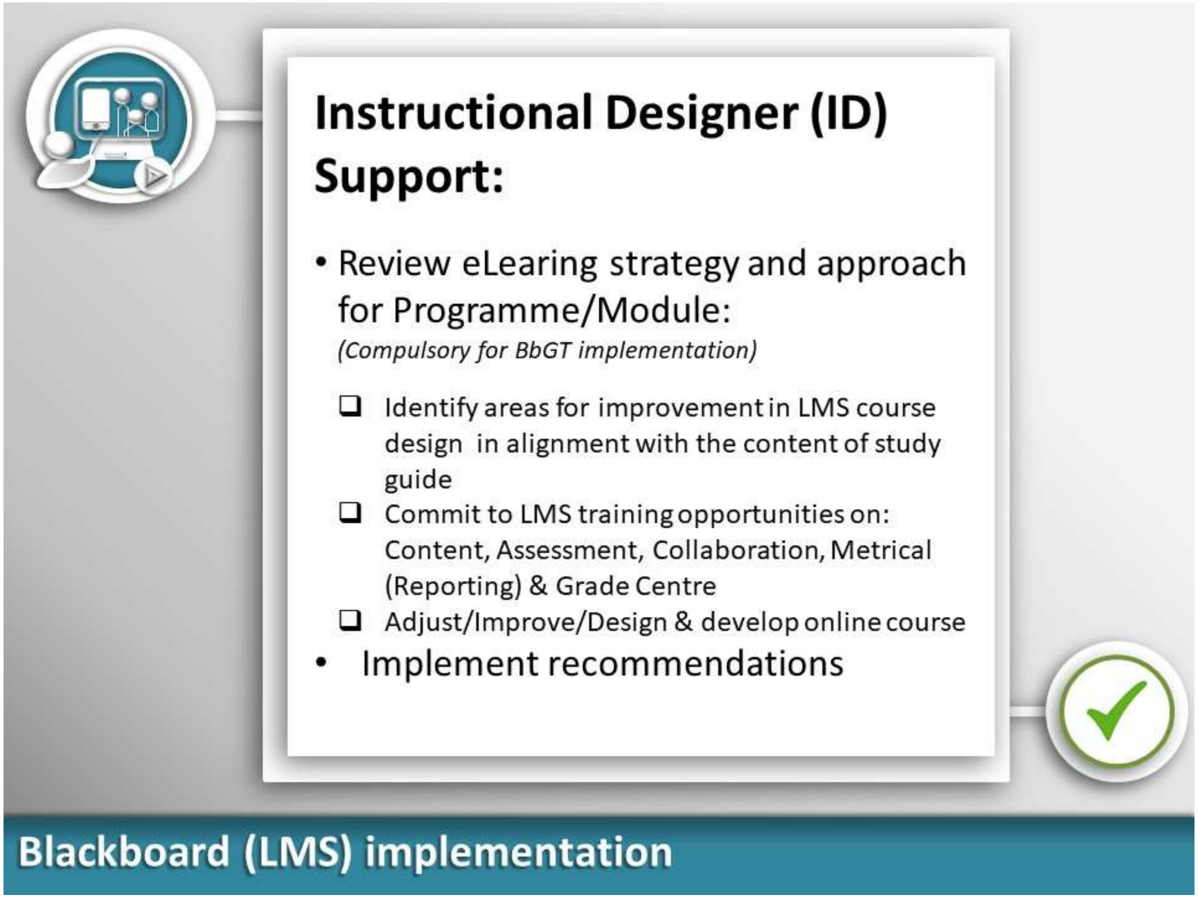


Figure 60: Learning Management Systems implementation

The review process will include, but is not limited to:

- The identification of areas for improvement of the LMS course design that should be in alignment with the module study guide. In this regard, an LMS course rubric can be considered (See Appendix C for an example of a course rubric) (Blackboard, 2018)
- Lecturers should commit to LMS training opportunities that can support them on the design and management of content, assessment events, collaboration, reporting the use of the grade centre and eLearning training; and
- Lecturers will in the final stage adjust, or improve or continue with the design and development of their modules in the LMS.

As a final step during this component of the framework, any recommendations or outcomes of the above review process should be implemented.

7.2.5 Quality Assurance Deliverable: Programme Outcomes Alignment Map

The QA deliverable after the LMS Implementation is the programme outcomes alignment map. This map will be the continuation of the second QA deliverable (Figure 61).

During this step of the framework, lecturers will align course content, student activities and assessment opportunities to the programme exit level outcomes and module outcomes. The alignment to the outcomes will depend on the identification schema in BbGA concerning the goal set, the goal category and the 'parent' goals.

At this stage, the education consultant and the instructional designer can assist the lecturers with this action if it was not already done during LMS implementation training. As indicated in Figure 61 it is proposed that this map will be managed by the programme coordinators in collaboration with the module coordinators and lecturers.

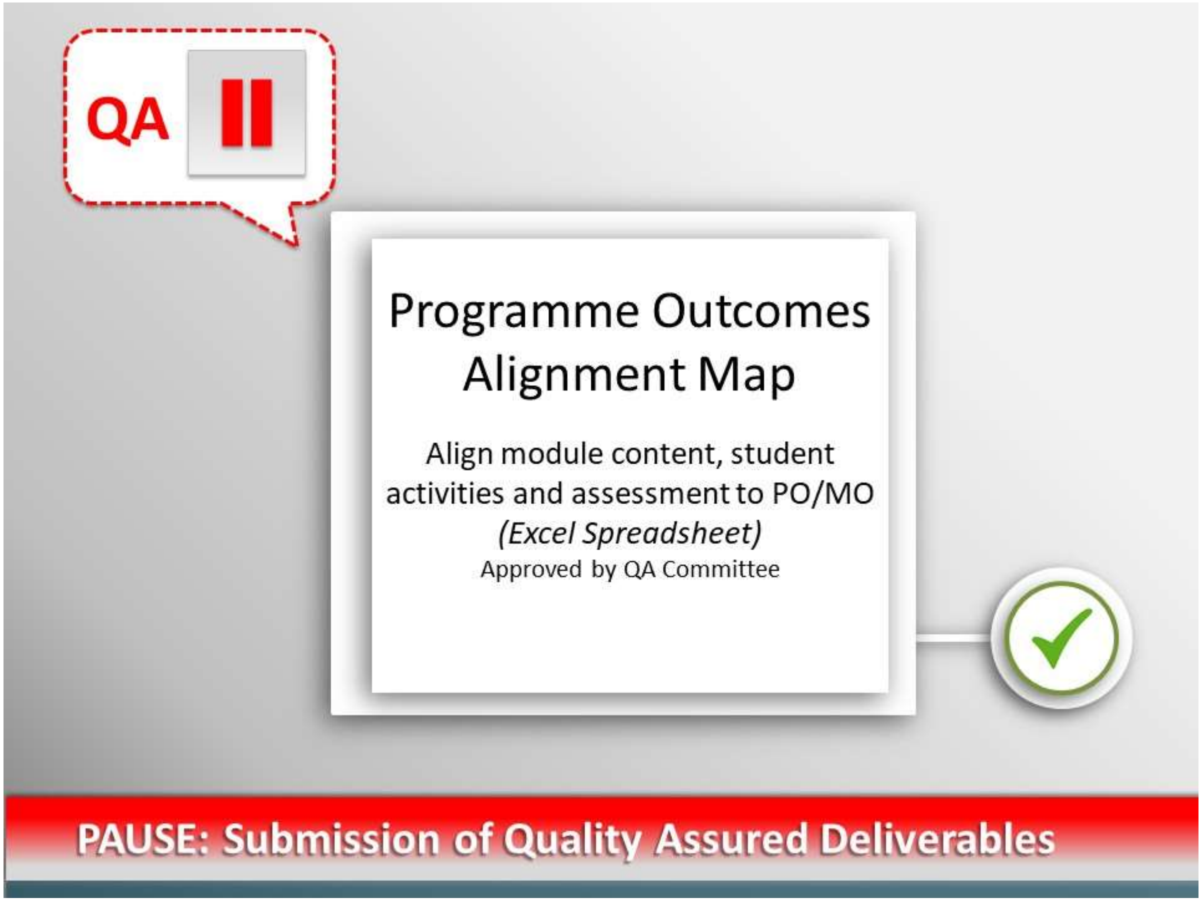


Figure 61: Third quality assurance deliverable – Programme outcomes alignment map

7.2.6 Reporting for Programme Improvement and Accreditation

The first step in this component is to create an outcomes alignment map in BbGA. There will be a close working relationship between the goals manager (GM) (for the purpose of this study the person that will be managing the BbGA), as seen in Figure 62, the curriculum committees, and the established partnerships.

This working relationship can be at any stage or time where the BbGA is concerned during the process of the PAIR framework. One essential working relationship at this point of the process of PAIR is with the instructional designer involved in the programme review process.

The goals manager creates from the programme outcomes alignment map, received from the curriculum committee, in the BbGA a Goal Set, a Goal Category and Goals (also referred to as Outcomes) that can be on the level of a 'parent' with associated 'children' level goals.

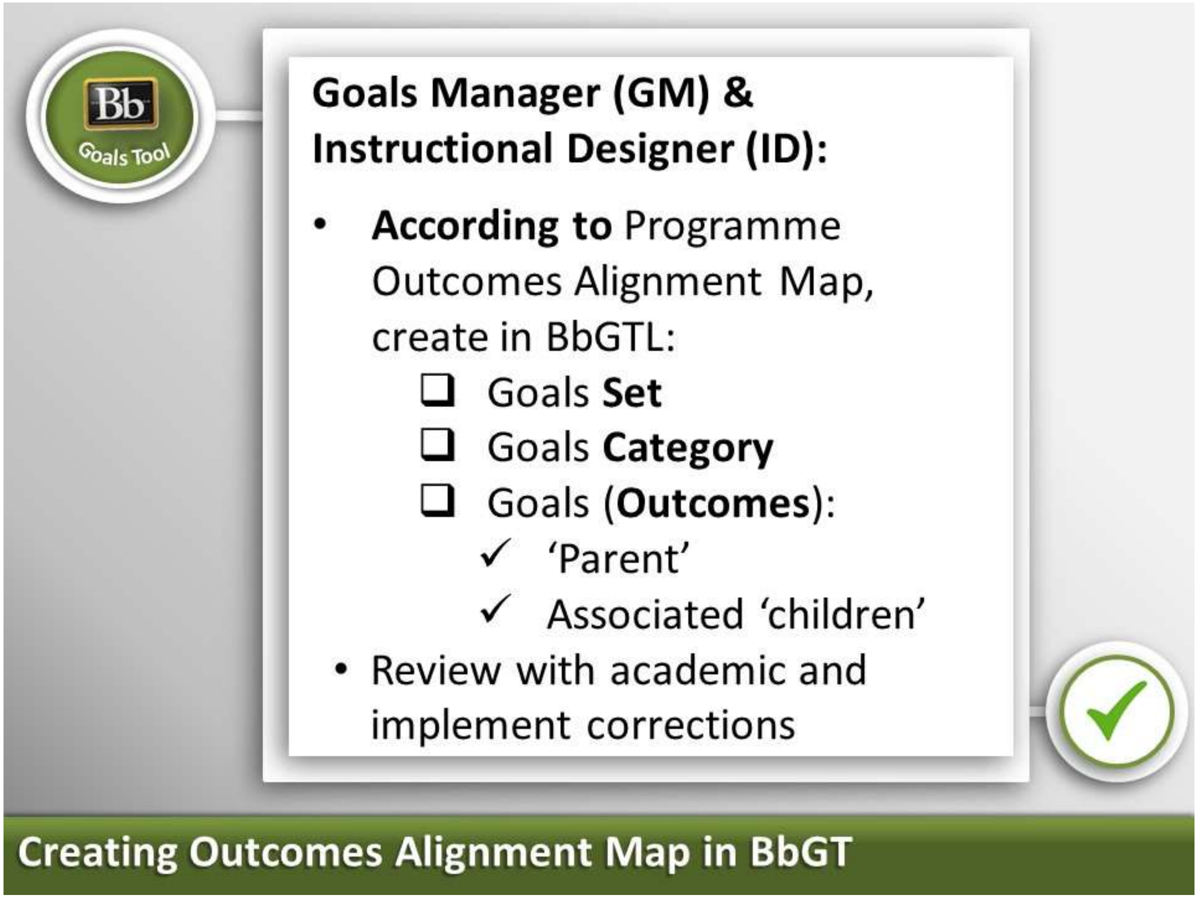


Figure 62: Creating Outcomes Alignment Map in BbGA

The goals manager review with the lecturer the correctness of the identification structure and do a test run on the alignments and the reporting. The curriculum committee gives its approval for the correctness of the alignment in BbGA.

The second step in this component is the reporting for programme improvement and accreditation (Figure 63). Lecturers will be supported by the goals manager and instructional designer in training sessions to:

- Align the goals created in BbGA with module content, student activities, assessment and grade centre columns;
- Discover the various reporting options available and assist with the analysing thereof to empower lecturers to use the reporting data to make informed decisions for actions on module improvement and to present to accreditation bodies proof of evidence of assurance of learning; and
- Any challenges or complex issues should be communicated to the goals manager and instructional designer for finding solutions to improve the implementation of BbGA as part of the PAIR framework.

Figure 63: Reporting for programme improvement and accreditation

Apart from many universities worldwide who have Blackboard Learn® as their official LMS, the Northern Illinois University appears to be an excellent example of implementing the BbGA. They have created a fifty-minute long YouTube video on the use of BbGA and alignments https://niu.edu/academics/departments.shtml that was found useful because it provides a step-by-step visual that can be used for BbGA training at University ABC.

7.2.7 Quality Assured Deliverable: Blackboard Learn® Goals Area Reports

Once the curriculum committee, heads of department, programme- and module coordinators and lecturers reach this point of the PAIR framework, they need to 'pause' for the last quality assured deliverable in the Framework namely the BbGA reports (Figure 64). The word 'pause' means that the lecturer needs to stop at this point in time and first work and deliverable to be presented. Guided by the initial partnership meeting, BbGA reports will be generated according to the outcomes set out for the programme review and the type of reports that were anticipated.

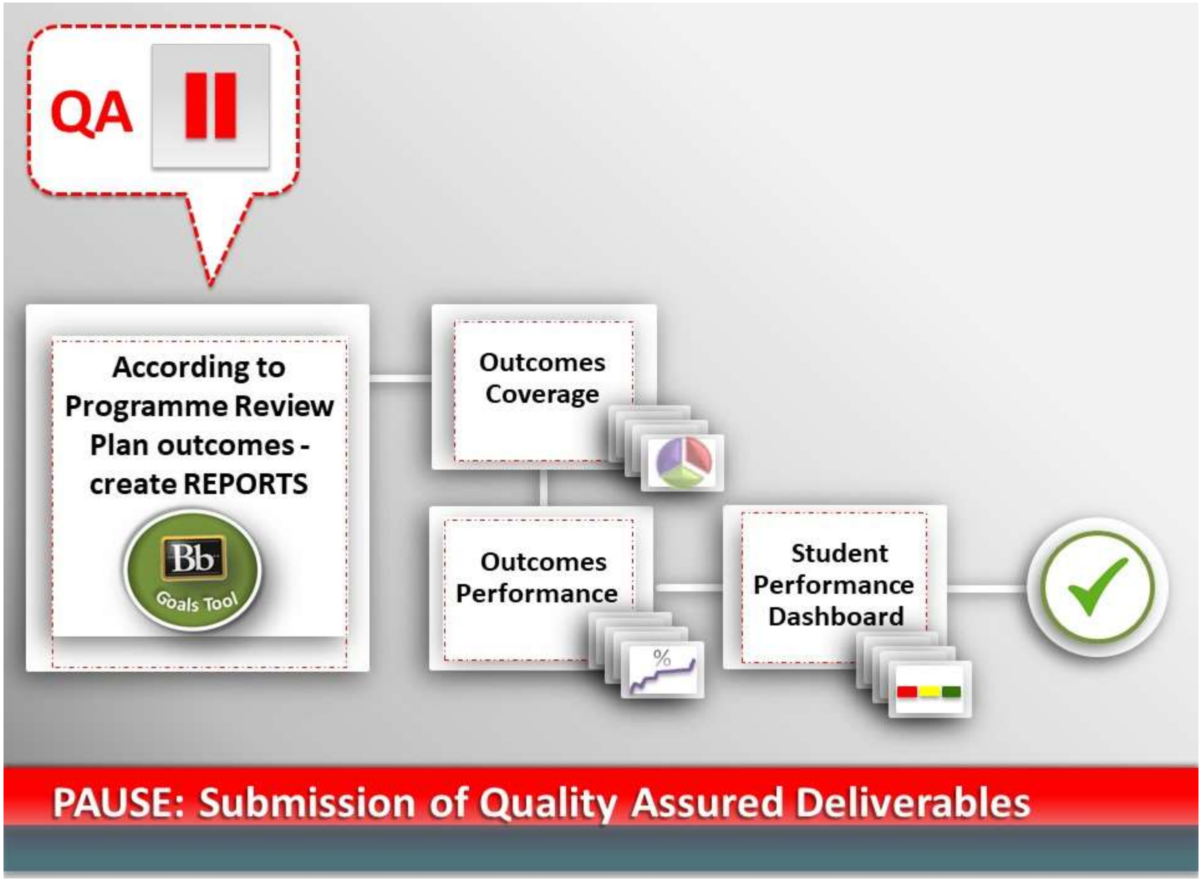


Figure 64: Fourth quality assurance deliverable – Blackboard Learn® Goals Area Reports

At this stage, lecturers can create two types of course reports and access dashboards directly from their LMS modules (Blackboard, 2018), namely:

- **Course Coverage Report**: This report displays the data on course(module) items that have been aligned to 'parent' and 'child' goals
- **Course Performance Report**: This report displays how a single course (module) performs against a selected set of 'parent' and 'child' goals.
- Student performance **dashboards** (Lecturers view and students' view)

In addition to the course reports available to lecturers, the goals manager and instructional designer can run **additional goals report on goals coverage across all the modules in the LMS**. Linked to these reports, on the next level of reporting, are the Analytics for Learn reports that the goals manager and instructional designers with administrator rights can access.

7.2.8 Programme Review Partnership Meeting (End of year)

At any stage of the process of the delivery of the framework, the education consultants and instructional designers can work collaboratively to support lecturers. At certain stages of the process, they will take the lead with the lecturers on their area of speciality, but PAIR aims to achieve a 'partnership' amongst lecturing staff and their support structures. The researcher argues that through such an approach University ABC will be able to provide a coherent curriculum that uses technology effectively to report on the assurance of learning and student success.

The PAIR framework closes the loop with a programme review partnership meeting (Figure 65). This meeting will typically be at the end of an academic year and will involve the review of the whole programme and modules linked to the programme. Depending on the need, this meeting can also take place after a semester for specific modules. At this meeting, the reports of the modules and programme as a whole must be reviewed and discussions will be around identifying gaps in the curriculum and assessment; duplications and challenges in the curriculum that affects the assurance of learning and student success.

During this meeting plans for improving the curriculum, teaching and learning and assessment will be discussed to guide the plan of actions to be taken for implementation for the next year. It is not necessary to review all the aspects of a programme every year. In the first year of a five year accreditation cycle, the department could for instance review programme and module outcomes; the following year, the assessment criteria; and assessment strategies and activities aligned to the intended outcomes; the third year review the teaching and learning strategies and activities aligned to the outcomes and assessment; in the fourth year review curriculum content and the final year conduct an overview of the whole programme.

Departments could consider applying the PAIR framework each year as this will indicate that a rigorous programme review programme is in place.

Figure 65: Programme Review Partnership Meeting (End of year/semester)

7.3 DESCRIPTION OF PAIR PROCESS

PAIR (**P**rogramme Outcomes **A**lignment and **I**mplementation through **R**eporting) framework is characterised by discussions and dialogue on curriculum and technology matters. It holds lecturers, programme- and module coordinators accountable for and reporting on the assurance of learning. The centre component of PAIR (Fig. 66) is connected to each of the four components of the framework indicating the movement between the components to the centre which exemplifies ‘student successes.

Preferably the programme review process would start with the ’partnership meeting’ chaired by the head of department and programme coordinator together with an education consultant and instructional designer, who will collectively discuss and decide what the first steps of actions should be in preparation for the planning for quality programme review for the anticipated review cycle. The analogy presented indicates that whatever is needed to improve programme and module effectiveness and student learning towards student success, can dynamically move between the different support structures ensuring the quality assured deliverables to be in place.

It is envisaged that the whole programme review process will be done online through the incorporation of a workflow that can ease the ‘quality assured deliverable checkpoints’. This will also include the generating of an online programme outcomes alignment map that will save time for the import of goals alignment into BbGA.

Figure 66: The element in the centre of the PAIR presents the ‘partnership through student success.’

7.4 RESOURCES AVAILABLE AT UNIVERSITY ABC FOR POTENTIAL IMPLEMENTATION OF PAIR FRAMEWORK

Research Objective 5: To identify the current support structures in place at University ABC where the research is accepted to ease the decision of adopting a framework for quality programme review using the BbGA.

Faculty should be cognisant, in its consideration of adopting technology, of institutional support as well as faculty support (Watson, 2007). These two aspects fit tightly into Rogers' (2003) characteristics of relative advantage and compatibility of an innovation.

At University ABC, the implementation of PAIR can capitalise on the existing support structures and training opportunities available. It can further enhance an active and vital synergy between the academics, the educational consultants and instructional designers. Some examples of support that are available to lecturers:

7.4.1 Curriculum Support (Education Consultants)

The following training development opportunities are offered in-house at no cost by the education consultants (UP, 2018):

- Curriculum design and development workshops and support (Faculty-based training)
- Academic induction for all new staff (including class visits; SoTL's, Teaching excellence awards and Teaching portfolios)
- Induction for novice lecturers
- Tutor training
- Marking skills training
- Assessment Workshops
- Study Guide workshop

7.4.2 E-Learning Support (Instructional Designers)

The following training development opportunities are offered in-house at no cost by the instructional designers (UP, 2018):

- LMS training on an overview of the LMS; Assessment; Collaboration; Content management; Metrical (among other things course reporting and analytics); Tailor-made training for assistants
- Grade centre training
- Creating digital lectures
- Turnitin training (Tool, plagiarism and grading)
- ELA (E-Learning for Academics course)
- Trendy tools for cool lecturers workshop
- QUESTUP (Respondus & Questionmark training)

It is anticipated that the decision to adopt PAIR for quality programme review utilising an LMS by lecturers and management, will be more encouraging if they do not feel that their current teaching, learning and assessment practices are disrupted and that the support structures to implement PAIR are readily available. PAIR was designed and developed with this basic assumption in mind.

In addition to the academic support offered by educational consultants and instructional designers, the immediate key stakeholders who should provide direction to lecturers, management and support staff at University ABC on the potential implementation of the PAIR framework, would be the offices of the Deputy Vice Chancellor for Academic and Institutional Planning (Quality Assurance and Academic Planning).

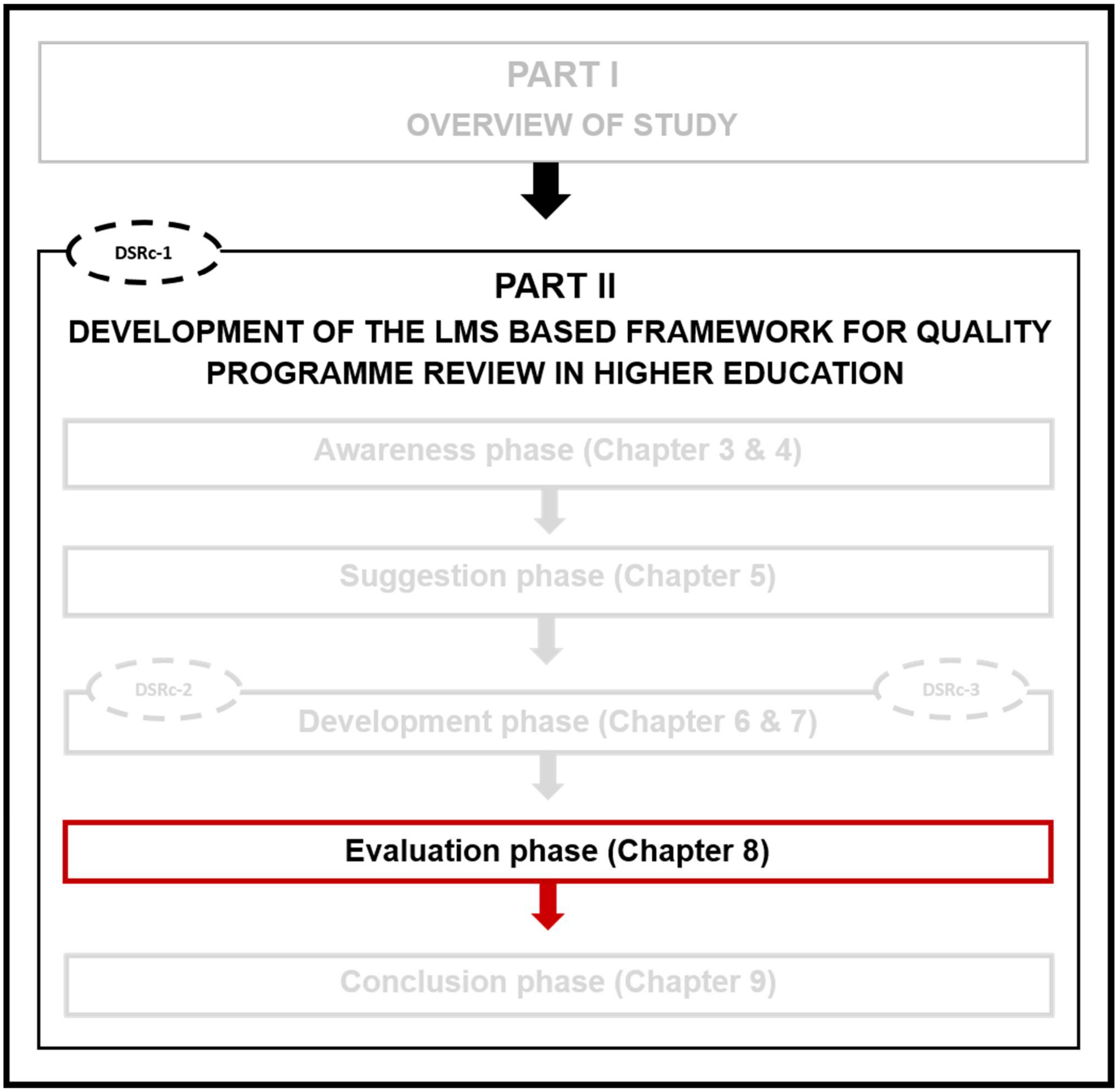
Feedback from participants (Appendix C-5) on the proof of concept of PAIR and BbGA voiced that senior management needs to seriously buy into this concept and needs to be onboard for successful implementation. They further communicated their concern that programmes without accreditation bodies will not be interested at all to get engaged with this process and once again mentioned that they perceive limited uptake due to the decentralisation of faculties in University ABC. The mentioned concerns and challenges voiced by the participants concur by authors previously referenced in this thesis. (Dagada & Mungai, 2013; Gray, 2016; Oakleaf, et al., 2013; Verhoeven, 2007; Watermark, 2019).

In the next section of Part II (Chapter 8), the second last phase in the main Design Science Research cycle (DSRc-1), the focus is on the final evaluation of the PAIR framework following the conclusion of the research and project in Chapter 9.

7.5 CONCLUSION

Chapter 7 reported on the introduction of PAIR with specific reference to its different components. These components are not unique concepts related to the field and aspects of curriculum design, curriculum development, assessment, and implementation of educational technologies and concur with authors of research in this field. (Biggs, 2014; Botha, et al., 2019; Banta & Palomba, 2015; Hundley & Kahn, 2019; Maki, 2010; Suskie, 2015; Walvoord, 2010). Each component was separately discussed, and the alignment of the components was identified. The process flow was outlined, and the importance of the forming of a partnership with key stakeholders was highlighted. Also, the current support to lecturers and academic support staff were positioned should PAIR be considered for implementation at University ABC as part of a bigger Quality Assurance directive. The chapter concluded about the existing support and training infrastructure at University ABC.

Chapter 8 builds on the previous seven chapters and offers a detailed evaluation of PAIR.


PART I
OVERVIEW OF STUDY
DSRc-1
PART II
DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION
Awareness phase (Chapter 3 & 4)
Suggestion phase (Chapter 5)
DSRc-2
DSRc-3
Development phase (Chapter 6 & 7)
Evaluation phase (Chapter 8)
Conclusion phase (Chapter 9)

8 EVALUATION OF PAIR FRAMEWORK AT UNIVERSITY ABC

8.1 INTRODUCTION

Chapter 8 provides the opportunity to demonstrate the final PAIR framework and to conduct a summative evaluation of the study. The chapter also offers the opportunity to discuss the possible contribution PAIR could bring to University ABC, as well as to higher education in South Africa.

In August 2018, the researcher undertook the final evaluation phase of the Design Science Research Cycle (DSRc-1), as well as that of the PAIR framework. She executed the evaluation as part of University ABC's School of Information Technology's (SIT) Improvement Plan. A Blackboard Goals Area (BbGA) workshop, organised by the researcher, formed part of the evaluation.

8.2 BACKGROUND TO THE WORKSHOP

Following a School of Information Technology head of department meeting, an invitation was emailed to all the programme and module coordinators in the School of Information Technology, as well as education consultants, selected instructional designers related to support for the School of Information Technology and the staff of the institutional office of University ABC, also attended this compulsory workshop.

An international expert in the field of higher education assessment and competency-based education, Dr Ruth Newberry, conducted the workshop. Dr Newberry is a principal education consultant and practice as a teaching and learning strategist for the international LMS company, Blackboard. She provided a full report (Newberry, 2018) as the output of the workshop. The report is titled: *Implementing a Program and Institutional Assessment Initiative at the School of Information Technology within the Faculty of Engineering, Built Environment, and Information Technology at the University of Pretoria Using Blackboard's Assessment and Learning Analytics*

Technologies.[11] Chapter 8 deals with an edited version of the Newberry (2018) report as part of the present research study.

8.3 SUMMARY OF DISCUSSION

Following on a directive from the Director of the Institutional Planning Office at University ABC, the School of Information Technology and the Department of Mining Engineering decided in 2018 to initiate steps for the improvement of its annual review programme by developing a systematic process for program-level accreditation review. It was considered to be an essential step to successfully demonstrate to the external accreditors, ABET (Accreditation Board for Engineering and Technology for Informatics) and ECSA (Engineering Council for South Africa), that the School was working on a process for a comprehensive assessment of student learning outcomes.

The researcher was consequently offered the opportunity to present and implement PAIR in collaboration with the Department of Mining Engineering, as well as with the Department of Informatics. In terms of the PAIR process, a workshop was then organised to deal with the matter.

At the workshop, it was decided to implement an ‘’Assessment Praxis’’ (Newberry, 2018) which would provide a systematic process for assessing programme and institutional student learning outcomes through a consistent and programmatic collection of data on student performance utilising University ABC Blackboard Technologies (clickUP course sites, Goals Area, and Analytics). This assessment process could provide a solid base of information on student learning to support University ABC in the use of Blackboard Predict (Newberry, 2018).

[11] The full report is available on request from the researcher. It deals *inter alia* with the credibility and heuristic value of the research and the outputs produced.

The introduction to programme-level assessment practices and methodologies discussed above provided a foundation for a workshop with small group discussions on the possibilities for reporting on assessment and student performance at a module level. A meeting was held on the last day with the technical and consulting team of the Department for Education Innovation at University ABC. The workshop engagement concluded with a wrap-up session with the core project team (Heads of eLearning, Information Technology Departments, Instructional Designer for the School and the LMS Administrator) involved in the BbGA workshop and study.

8.4 KEY FINDINGS, SUGGESTIONS AND RECOMMENDATIONS OF THE INTERNATIONAL PRINCIPAL EDUCATION CONSULTANT

This section will outline the key findings, suggestions and recommendations of day one and two by the principal education consultant for the best practices in the assurance of learning at a program level at University ABC:

- A suggestion is made that School of Information Technology and the Faculty of Engineering, Built Environment and Information Technology should build upon and leverage on the existing effective processes, internal relationships with key stakeholders, and available resource and support that is already in place.
- The consultant recommends an integration and operationalisation of University ABC's Blackboard technologies to support the School of Information Technology, the Faculty of Engineering, Built Environment and Technology and University ABC's institution-wide drive for teaching, learning and assurance of learning.
- Concern was raised on University ABC educational model with reference to lecturer and student ratio. The effectiveness of the reporting of individual student performance was questioned. The development of a comprehensive 'Assessment Praxis' that will include curriculum maps and assessment plans are recommended.
- The study guide for students was identified as a valuable contract with students and a tool to communicate their academic pathway within individual modules.

A concern was raised that study guides are not necessarily always aligned to the online environment and instructional activities in contact sessions. It is recommended that study guide improvement should be an immediate initiative to improve support for student learning. To support this process, a master module plan is suggested that can serve as a roadmap for the online LMS modules. The master module plan will include programme and module outcomes alignment and act as a repository for changes to the module. The repository and reporting can serve as evidence and demonstrate to accreditors how programme and module outcomes are assessed and on what bases decisions were made to improve the student learning.

- A further recommendation was made that the LMS of University ABC should move from being a document repository to that of the collector of student performance evidence. To be able to achieve this goal, the LMS's grade centre needs to be used consistently across the institution to capture student marks on assessment and all student activities, inside and outside of the online environment. The inclusion of rubrics for students to have better insight into their performance is crucial.
- In addition to the above, it is also recommended that one or more of University ABC graduate attributes should be embedded and tracked in all required courses across faculties in the institution as these skills are perceived as transdisciplinary skills of University ABC which students need to be competent in at the time of graduation.
- The immediate relevance of the Analytics and Predict tools of the LMS at University ABC was questioned at the workshop. The consultant indicated that University ABCs' LMS is the primary source of input for these tools. Due to the inconsistent use of the LMS across the modules, she indicated that the 'usefulness' of these tools are not at this stage apparent to lecturers. She concludes her recommendation by highlighting the adoption of the Assessment Praxis model to be phased in by School of Information Technology, then the Faculty, and then the wider University ABC. The adoption will ensure more consistent use of the LMS for teaching and learning and will afford lecturers and management to create Analytic reports that will assist academia to have a

better understanding of student performance on the programme and institutional learning outcomes. Once the LMS grade centre, due date functionality and retention centre are used consistently, the Blackboard Predict tools' functionalities and capabilities will become apparent.

- The willingness of the participants at the workshop were observed to improve on their curriculum, module design and instruction to enhance their students' learning. The consultant acknowledged the participants' recognition of the significant challenge they are facing at University ABC and that these challenges need to be discussed at a broader institutional platform. As a way forward she applauds the participants who were positive about the programme assessment approach as it supports them to have a more focused approach to assessing programme quality, student learning and their teaching philosophy and model.

This next section will outline the principal education consultant's key findings, suggestions and recommendations of the day two with the core team in the Department for Education Innovation and responsible for technical and resource support at University ABC:

- Key challenges and opportunities were shared around technical aspects, related resources, and support structures that could have an effect on the successful implementation of the suggested Assessment Praxis and further use of the Blackboard Learn® technologies.
- Challenges were identified with: programme identification in PeopleSoft (higher education software); the impact thereof on the BbGA Goal Identification (ID) schema (naming convention); as well as on the structure on institutional level, faculty or programme level, and departmental or module level. The Goal codes are unique identifiers that distinguish the different programmes at University ABC from one another. It also captures several types of goals that can range from accreditors standards, institutional outcomes and programme outcomes. A decision was made to investigate University ABC course catalogue coding system to find the most relevant Goals identification schema for each of

University ABC's programme outcomes as the use of the PeopleSoft identification code is cumbersome. This is perhaps one of the most critical contributions made to practice through this study. In this regard, a well thought through identification schema will create applicable descriptions or labels that can be aligned to specific student activities and assessment opportunities. This will enable the School of Information Technology and University ABC to create and pull reports from within the LMS (course performance and course analytics reports) right through Analytics and Predict and potential other LMS assessment and reporting tools example Outcomes Assessment Tool.

- The different roles and responsibilities were outlined for the education consultants and instructional designers that need to support academics on the topic of programme and institutional assessment. A review of the ration of education consultant and instructional designer to the School of Information Technology, Faculty and University ABC may need consideration as the workload will crease once the assessment and BbGA initiative starts to phase-in. Collaboration is essential and training for these professionals should be phased in together with the training for academic staff in order to manage resources to its full capacity.
- The School of Information Technology and University ABC are facing a challenge to ensure quality student learning activities and associated effective rubrics for assessment to measure student's level of performance. It is recommended that programme reports will be developed according to accreditation standards and specific programme needs to ensure informative and 'actionable' data.

8.5 CONCLUSION AND THE WAY FORWARD

As from October 2018, the focus is to develop the 'Assessment Praxis Model' for the School of Information Technology to be extended as a model to the Faculty and the wider University ABC. Step one from the long- and short term strategy as provided by the principal education consultant (Newberry, 2018) is indicated in more detail below because of the direct link to the DSRc-1 (evaluation phase PAIR Framework) of this study:

8.5.1 Step 1 - Construct an Assessment Praxis Framework that considers the Design (International practice and recommendation after the workshop) as well as the Delivery (PAIR Framework) of a Program (Newberry, 2018)

Prior to the study and the School of Information Technology workshop, a school-wide process for assessment did not exist. As part of this study, the PAIR Framework (Figure 67) was proposed for a quality programme review. During the evaluation phase (DSRc-1) of the Design Science Research cycle, the researcher came to realise that the PAIR Framework has limitations in that its focus on the review of the programme and module-level that is, in essence, a delivery process only. Through the evaluation phase (DSRc-1) there was an opportunity to review the PAIR framework and elevate it to a programme and institutional level of assessment.

Figure 67: PAIR Framework for Quality Programme Review utilising an LMS

During the workshop, the principal education consultant described the benefits of the PAIR Framework for building and maintaining strong and important synergy between faculty, education consultants and instructional designers.

The diagram below (Figure 68) illustrates the cyclical process of continuous improvement which represents the best practice in assessment at the programme level and is described in full in the evaluation report and is available on request (Newberry, 2018).

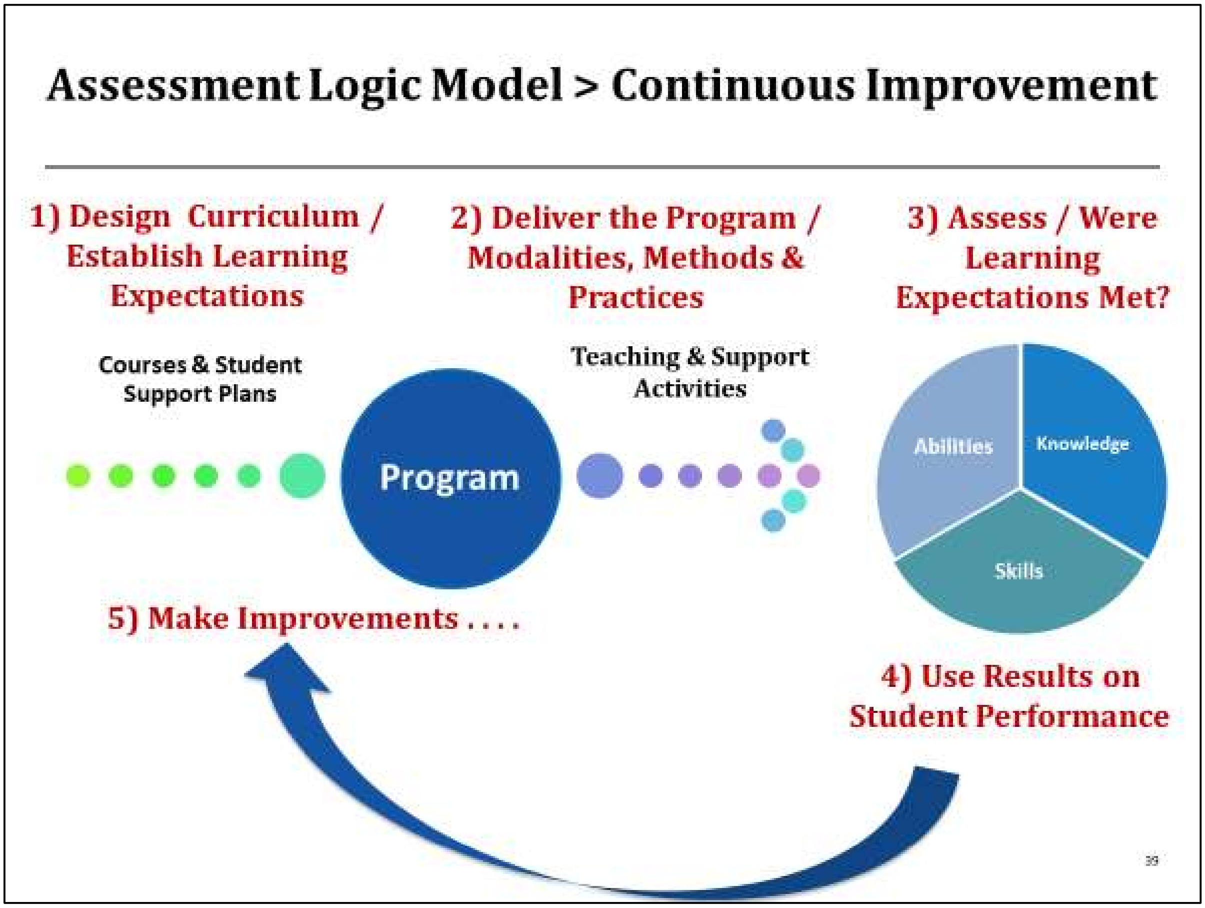


Figure 68: The cyclical process for assessment at programme level

Education consultants of University ABC, with demonstrated expertise in the theory and practice of teaching and learning, will guide the School of Information Technology in the design phase (Figure 69). The programme document requirements are outlined in the evaluation report (Newberry, 2018):

> "The DESIGN model is flexible and extensible enough that any accredited or non-accredited academic program at University ABC could use it. Furthermore, it can be adapted to accommodate special institutional level initiatives, such as University ABC Graduate Attributes, First-year Student Academic Support and Orientation, and co-curricular activities that support institutional or academic program learning outcomes. With assistance and guidance of the Educational Consultants, programs would very clearly document each of the above steps

and register them with the Office of Institutional Planning for due process review. ”

Figure 69 shows the outputs of the design phase: programme level learning outcomes, curriculum map, assessment plan and module plan. Documentation of all these aspects are necessary documentation needed to enable Blackboard’s technology to facilitate the School of Information Technology, the Faculty, and University ABC in their assessment process.

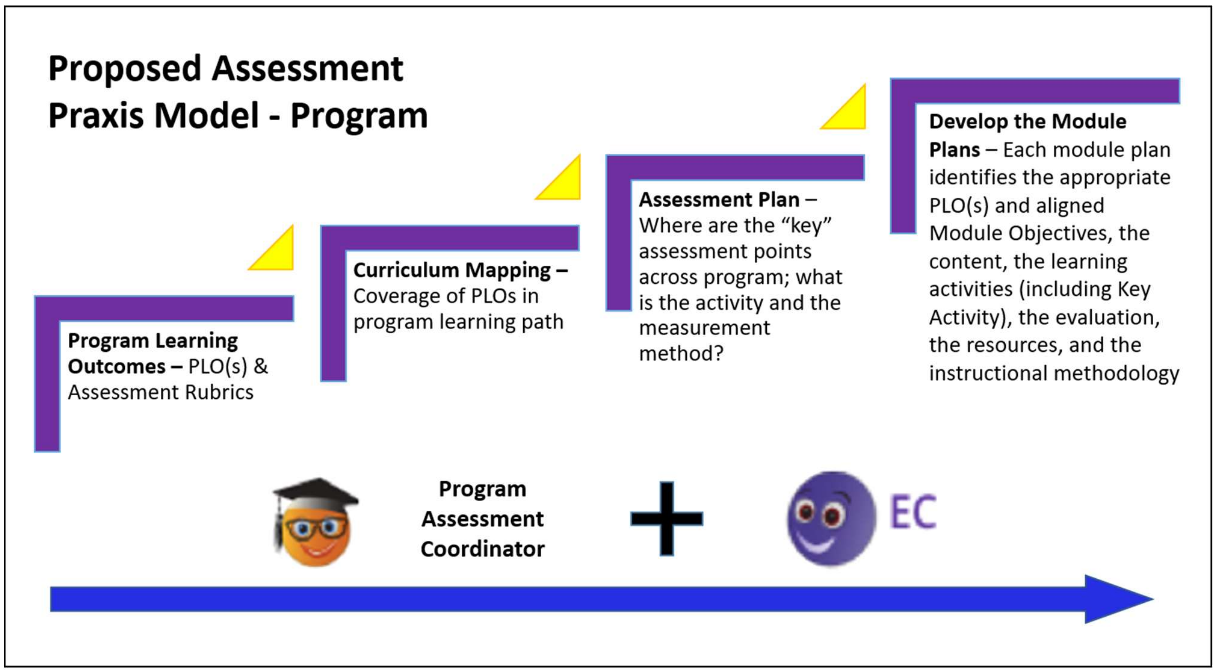


Figure 69: Steps in the design of a program assessment praxis

To improve on the PAIR Framework and enabling development for the elevation of the PAIR framework to an institutional level it is proposed that the PAIR Framework as a delivery phase of a programme consider making the design phase more explicit to ensure that appropriate and meaningful data can be collected. The comprehensive assessment praxis framework as presented in Figure 67 describes the necessary steps in the design of a program that will proceed with the development of individual modules in a programme delivery phase.

The comprehensive Assessment Praxis Framework (Figure 70) will allow education consultants, instructional designers and programme coordinators, to move through the design and delivery phases of their programmes as illustrated in Figure 70. Therefore, this partnership and collaboration is to “establish a process for developing the necessary mechanisms to standardise and systematise assessment data capture and reporting” (Newberry, 2018).

The comprehensive Assessment Praxis Framework (Figure 70) will allow education consultants, instructional designers and programme coordinators, to move through the design and delivery phases of their programmes. Therefore, this partnership and collaboration are to “establish a process for developing the necessary mechanisms to standardise and systematise assessment data capture and reporting” (Newberry, 2018).

During the first semester of 2019, the Graduate Student Attributes of University ABC will be clarified by the present researcher to demonstrate the associations between University ABC and program student learning outcomes. Towards the end of 2019, the implementation of a phased approach will commence to leverage Blackboard Technologies for Assessment within the School of Information Technology to extend to the Faculty and the wider University ABC.

8.5.2 Step 2: Implement a Phased Approach to Goals and Assessment Reporting

A phased approach was recommended for integrating academic assessment processes with BbGA and LMS technologies and Reporting because of the inclusion of technology that needs to be considered as well as the academic processes and policies that will be involved.

- **Phase 1** (October 2018) will be considered for preparation, testing, and proof of concept.

- **Phase 2** (January 2019 – December 2019) will focus on the development of the assessment praxis for the School of Information Technology and implementation of BbGA for the Departments of Informatics, Information Science, and Mining Engineering.

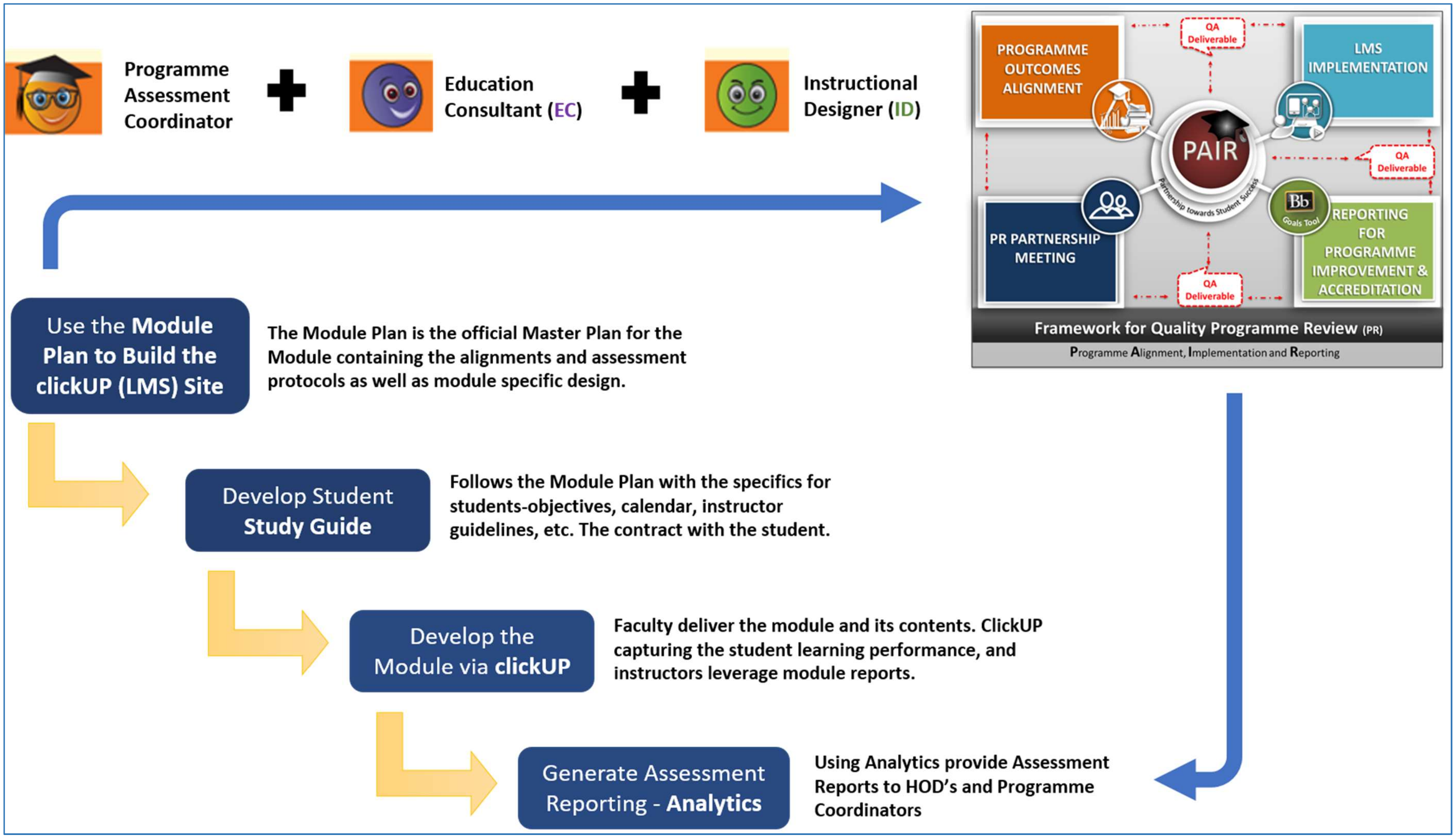


Figure 70: Comprehensive Assessment Praxis Framework

- **Phase 3** (January 2020-December 2020) will happen in parallel with phase 2 and will focus on the expansion of the assessment praxis across the EBIT faculty. The aim is to move the developing assessment praxis model through all of EBIT programmes in preparation for adoption by other faculties at University ABC and elsewhere in the higher education landscape in South Africa.

8.5.3 Step 3: Recommendation

It is recommended that University ABC considers parting with the stand-alone Blackboard® tool to ensure successful implementation of initiatives that involve an *integrated* and *all-inclusive* use of the fully-fledged Blackboard® technology. (Assessment technologies)

It is recommended that University ABC considers partnering with Blackboard® to ensure successful implementation of initiatives that involve an *integrated* and *all-inclusive* use of the fully-fledged Blackboard® technology.

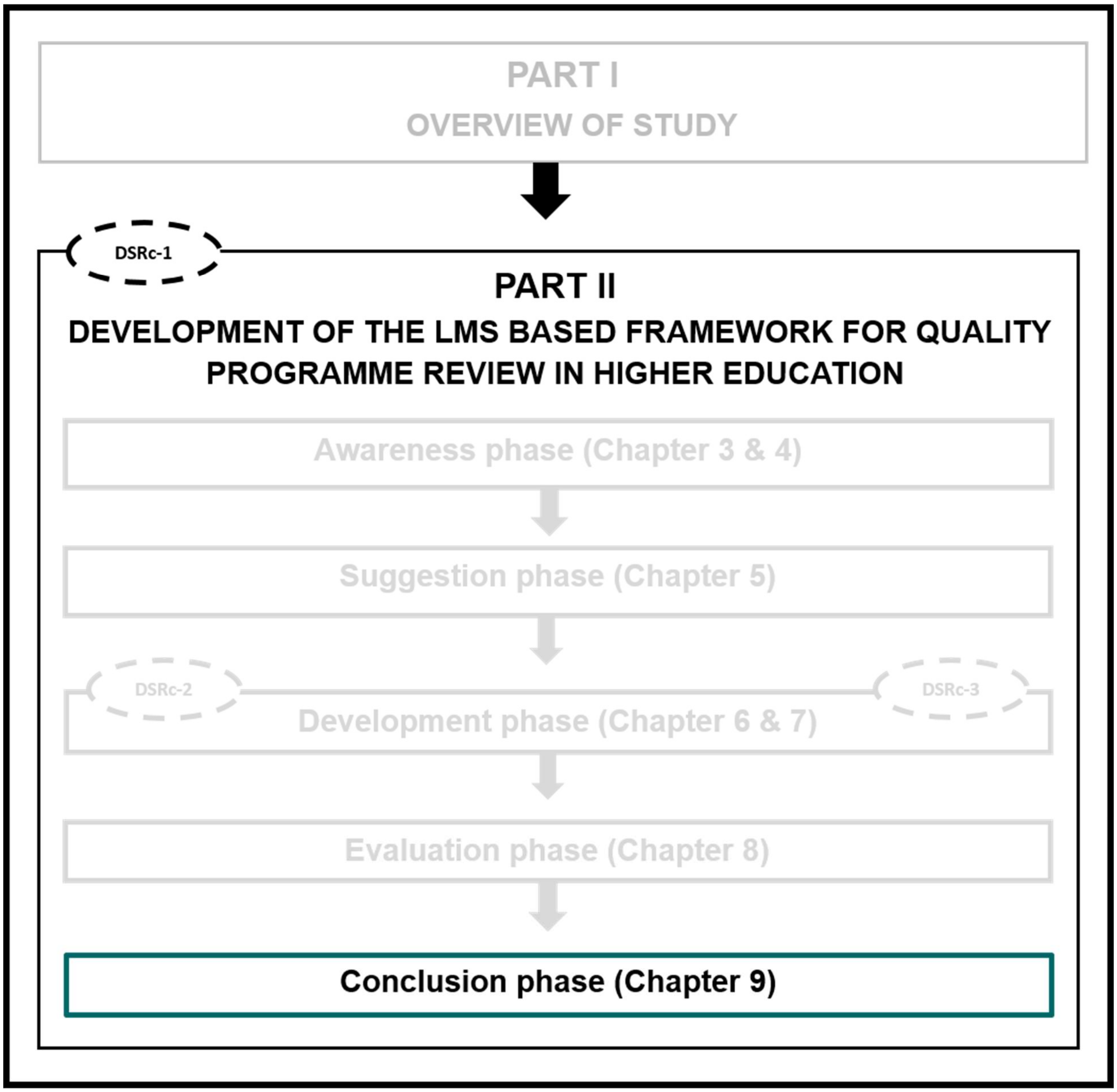
8.6 EVALUATION RESULT

The report outlined a multi-phased and multi-year approach to support the School of Information Technology and the Department of Mining Engineering, as well as University ABC on this assessment journey through the utilisation of the BbGA and related LMS features and tools. The output of this workshop report and the final framework for the study suggested a merging between the current proposed PAIR Framework and international practice that demonstrates comprehensive accountability for programme effectiveness. Institutional adoption of PAIR could then possibly start with the School of Information Technology as a pilot study for University ABC.

8.7 CONCLUSION

The researcher contends that Chapter 8 provides qualitative proof (see the final phase of DSRc-1, as executed in August 2018) that the overall study successfully addressed the purpose and goals of the project as indicated in Chapter 1.

Chapter 9 deals with conclusion phase of the DSRc-1 and forms the conclusion of this study and project report.


PART I
OVERVIEW OF STUDY
DSRc-1
PART II
DEVELOPMENT OF THE LMS BASED FRAMEWORK FOR QUALITY PROGRAMME REVIEW IN HIGHER EDUCATION
Awareness phase (Chapter 3 & 4)
Suggestion phase (Chapter 5)
DSRc-2
DSRc-3
Development phase (Chapter 6 & 7)
Evaluation phase (Chapter 8)
Conclusion phase (Chapter 9)

9 CONCLUSION

9.1 INTRODUCTION

Chapter 9, is the conclusion phase of DSRc-1, and gives a summary of the findings of the research relating it to the respective chapters, the research question and the research objectives. The implication of this research for the higher education landscape in South Africa will be shown and a summary given of the contribution this research is making to the IS discipline. **Chapter 9** will conclude with Section 9.5 where future research will be emphasised.

This study, indicated the expectations higher education authorities and accreditation bodies and councils have of Higher Education Institutions within the South African context, to align their teaching, learning and assessment with programme outcomes, and in so doing, to also align their applicable professional accreditation requirements.

It was further indicated that the introduction of innovative Information Technology at higher education level to facilitate such an alignment and reporting process in this context is often problematic, although advances in learning technologies afford innovative ways to implement and report on programme outcomes. In this regard, a relative unknown or perceived new technology (or technology not yet discovered or in use) such as the Goals Area (BbGA) in the LMS of University ABC, was identified as a possible tool to implement to assist professional programmes with this directive.

However, the implementation or instantiation might get delayed due to the 'unknown' affordances or awareness of the BbGA. The fact that there is not currently a formalised framework or process in place at University ABC for the use of the BbGA or the process where BbGA is embedded in can complicate matters further. In this regard, it is often challenging to introduce or evaluate the effectiveness of a tool such as the BbGA feature if the ownership of such a framework or process is not institutionalised or more so, not yet identified. During this research pathway an opportunity was created to follow a ‘bottom-up’ approach to collaborate with lecturers in programmes and modules where a need existed for such an innovation, as well as for a solution for conducting a programme review that is being requested specifically by their respective accreditation bodies.

The **purpose and aim of the study** were articulated through the study by focusing on the development of a framework for quality programme review, implementing an LMS feature, in this regard the BbGA, to align, implement and report on programme outcomes at a higher education institution in South Africa. It can be argued that a framework for quality programme review can direct and assist academic staff through a structured and systematic process to constructively align professional criteria and programme outcomes with course content, course assessment and student activities (teaching and learning) within a hybrid learning environment.

The purpose of the project led to the formulation of the **problem statement** showing that there is a national and international growing awareness of the importance of aligning teaching, learning and assessment with programme outcomes to ensure effective student learning. This will involve a quality process for programme review to enable reporting on the performance of these outcomes to improve programme- and institutional effectiveness. At University ABC where the research was conducted, such a process is not institutionalised. Information systems, more specific the LMS and its associated features, can assist for example University ABC in the management of alignment, implementation and reporting of programme outcomes alignment and the student performance against these outcomes.

The following **research question** was formed against the background of the purpose of the project and the problem statement:

How should a framework be developed for quality programme review implementing the BbGA in order to constructively align, implement, and report on content, student activities, and assessment against programme outcomes?

In order to answer this research question, five research objectives were formulated to guide the researcher in finding solutions to the research question and will be summarised under Section 9.2.

9.2 SUMMARY OF FINDINGS

The summary of the findings are emanating from Part 1 and Part 2 of the study and link to the different chapters in this thesis as indicated in Figure 71.

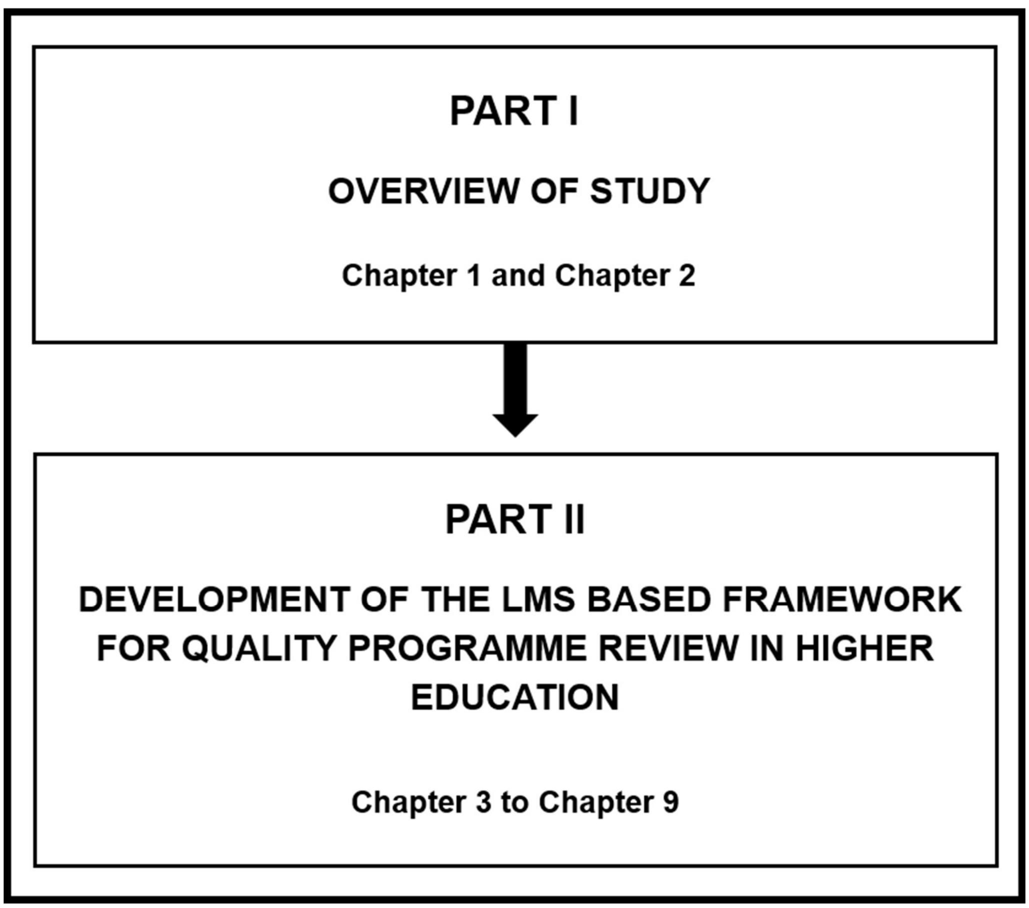


Figure 71: Thesis structure

9.2.1 PART I (Chapter 1 and Chapter 2)

Chapter 1 of this study was concerned with the **introduction and the awareness of the research problem** and the **research design and methodology.** The **delineations and limitations** of this project were highlighted in that only two rogrammes at University ABC were used as case studies during the developmental phase as the second and third design cycles (DSRc-2 and DSRc-3). However, the artefact *(*PAIR*)* is designed in such a manner that the possibility of applying it elsewhere is confirmed as it is more about the constructive alignment of the curriculum and quality programme review process and the solution it provides than the actual technology to be used during the process.

The **limitations** recorded with regards to the use of the BbGA at University ABC are:

- The absence of institutional policy or directive available for the implementation of technology to ease a programme review process and cycle.
- The ownership for using the framework and appropriate technology is not established for quality programme review.
- The BbGA is available for use by lecturers which is active on the LMS, but there is not yet an official institutional policy or structure for the use and support of BbGA in place.
- The researcher's knowledge of BbGA is limited to the immediate functionalities available.

Chapter 2 addressed the research design and methodology that guided the study and the design and development of the PAIR framework (artefact). As an initial source, the Department of Informatics research perspectives, where this study is registered, guided the choices made to construct the research pathway. This pathway enabled the research question and objectives to be addressed within the field of IS. A qualitative approach to inquiry was adopted as a research strategy. Informing this was based on the philosophical assumptions of the interpretive view the researcher brought to the project. The procedure of inquiry was based on three Design Science Research cycles (Vaishnavi & Kuechler, 2015) utilised in the IS discipline. The specific research methods for collecting, analysing and interpreting data was through the use of semi-structured interviews, documentation and two case studies. Knowledge gained through the DSRc-2 and DSRc-3 informed the development and interim demonstration and evaluation of the PAIR Framework that is considered to be the output of DSRc-1.

Design Science Research in IS only really started to emerge in 2004 and a pool of sound referenced publications saw the light over the past fourteen years (Hevner, 2007; Peffers et al., 2006; Kuechler & Vaishnavi, 2008; Weber, 2010; Hevner & Chatterjee, 2010; Rossi et al., 2013; Weber, 2012; Gregor & Hevner, 2013; Iivari, 2015; Drechsler, 2014; Kotze et al., 2015; Baskerville et al., 2018). To fully understand the magnitude of the journey Design Science Research in IS travelled to date, one needs to grasp a full understanding of how Design Science Research evolved throughout the years. It was during this literature search, review and readings that the researcher discovered that there is not often references made to 'artefacts' such as a 'framework in higher education'. The readings referred to Information Technology-artefacts. In most cases the authors and professionals in the field, especially in the field of Design Science Research for IS, build on each other's contributions, but also provided, with substantiated evidence, their points of view by referring to gaps and limitations in Design Science Research as well as areas for further research. To some extent the authors interrogated aspects of Design Science Research such as: the impact of Design Science Research in IS; the status of Design Science Research as a paradigm or as an approach; types of artefacts as an output and practical contribution to Design Science Research, not just in the field of Information Systems with reference to ICT and Information Technology, but also IS within the higher education landscape.

In order to indicate that this research is relevant the researcher aligned the research process, output and the communication of the results to the suggestions and recommendations made in the literature. Adhering to these guidelines the researcher had the opportunity towards the end of the study to prove the validity of the research process and outputs. To report on the usefulness and relevance of the Design Science Research cycles output, the researcher made a clear reference and contribution to the knowledge base. Iivari (2015) provides three main classes of knowledge, namely: conceptual knowledge (for this project implying the framework and the concepts presented by the components integrated in the framework); descriptive knowledge (that is not directly relevant to this project) and prescriptive knowledge (this is relevant to this project as the researcher can argue that it is the 'design process knowledge').

March et al. 's. (2008) first knowledge dimension for research in IS, refers to research output that is based on artefacts which can include constructs, models, methods and instantiations and confirmed by authors in the field of IS research (Kotze et al., 2015; Hevner et al., 2004; Simon, 1996; Vaishnavi & Kuechler, 2005; Hevner & Chatterjee, 2010). Although Hevner (2004) tends to be more inclined towards instantiations, his referral to 'technology-based- solutions' can also be seen as a knowledge contribution. In this regard, the PAIR Framework enables the use of the technology (BbGA) in a structured and effective manner.

Reflecting on the research pathway and journey made, the researcher realised that her intuition, experiences and expertise contributes to an extent to the process of knowledge gathering (Newell & Simon, 1976). The knowledge gained during this research can be classified as effective and relevant and enabled the researcher to improve on the artefact development. Newell and Simon (1976) wrote:

> "A constructed artefact embodies the designer's knowledge of the problem and solution. In new and emerging applications of technology, the artefact itself represents an experiment. In its execution, we learn about the nature of the problem, the environment, and the possible solutions. Hence, the importance of developing and implementing prototype artefacts."

The prototypes of the PAIR framework are considered to be the different representations of the framework as illustrated in the two case studies under Section 6.2 and 6.3 and the presentation to the academic support staff in the Department for Education Innovation at University ABC.

PAIR is designed and developed with a sound underlying theory of the Diffusion of Innovations (Rogers, 2003) and Constructive Alignment theory (Biggs, 1996; Biggs, 99; Biggs, 2003; Biggs 2014) and being researched in a “real world” scenario/environment (March & Storey, 2008) to be instantiated. The Information Technology-artefact (BbGA) was incorporated into the PAIR framework. In addition to the incorporated Information Technology - artefact into PAIR, the outcome achieved from the DSR cycle 1-3 was a PAIR framework that is immediately applicable.

As indicated in the introduction of Chapter 2, the desire for knowledge about the world, the search for answers to complex problems and challenges, and finding solutions for unresolved issues, is at the core of education. Research provides the opportunity to find answers to some of the questions and issues that might be unknown. The researcher created in Chapter 2 a cognitive map and research pathway, to outline the research design and methodology and concluded with the ethical consideration in doing this study.

9.2.2 PART II (Chapter 3 to Chapter 9)

PART II of this study dealt with the development of the LMS based framework for quality programme review in higher education and are covered through **Chapter 3 to Chapter 9**. The literature review positioned the study in the context of higher education guided by a well-defined main research question and research objectives and will be discussed in Section 9.2.3.

9.2.3 Research objectives as they relate to the chapters of the study

The research objectives guided the study to narrow-down and focused the research to enable findings that can contribute to the relevance of the knowledge base and practice in the field of IS in higher education.

Chapter 3 - RO1: To define a framework for quality programme review

In order to define a framework for quality programme review at an higher education institution such as University ABC, the expectations of the higher education landscape was established regarding the criteria and requirements of the external bodies that are responsible for approval for the offering of existing and new programmes at higher education institutions in South Africa. The literature review guided and contributed to the understanding and application of the researcher's knowledge of all the relevant concepts of this study to assist her in the development of a framework for quality programme review utilising an LMS. More specifically the BbGA that affords lecturers to align content, student activities (teaching and learning) and assessment with professional programme outcomes and professional board accreditation criteria. The inclusion and application process of the components included in the PAIR framework, were informed by the insight and knowledge gained in the literature review presented in Chapters 3 to 5.

Chapter 3 - RO2: To define and identify the critical concepts of constructive alignment

For teaching and learning to be effective and for lecturers to be able to report on the assurance of learning and programme effectiveness one need to understand the key areas that need to be constructively aligned, namely that of the intended learning outcomes of the curriculum, the assessment regime and the teaching and learning activities for the students.

Core to programme review is the concept of constructive alignment that applies to all levels of the curriculum, being the institutional, programme and module level. The element of programme outcomes alignment and the process followed in PAIR were also derived from the knowledge gained in Chapters 2 to 4.

Chapter 4 - RO3: To investigate the use of Learning Management Systems (LMS) in higher education concerning the availability of and reasons for the possible non-utilisation of LMS features.

There was limited literature available that pointed to a conceptual framework that had been designed specifically for the implementation of the BbGA in the South African higher education landscape. Through the establishment of a collegial relationship with the principal education consultant of an international LMS company, one had access to references and a draft document that informed the identification schema of the BbGA that is critical for the effective use of BbGA. Through this connection, an introduction headed to the project manager on the BbGA which University ABC was fortunate to host as a guest to offer a workshop on BbGA. This collaboration was part of the research process to gain a better understanding of the 'architecture' behind BbGA and share good practice of international institutions that already adopted the LMS's assessment and accreditation solution using BbGA. This international collegial partnership afforded the researcher to collect resources on the implementation of BbGA as part of a bigger assessment solution for University ABC and higher education in South Africa.

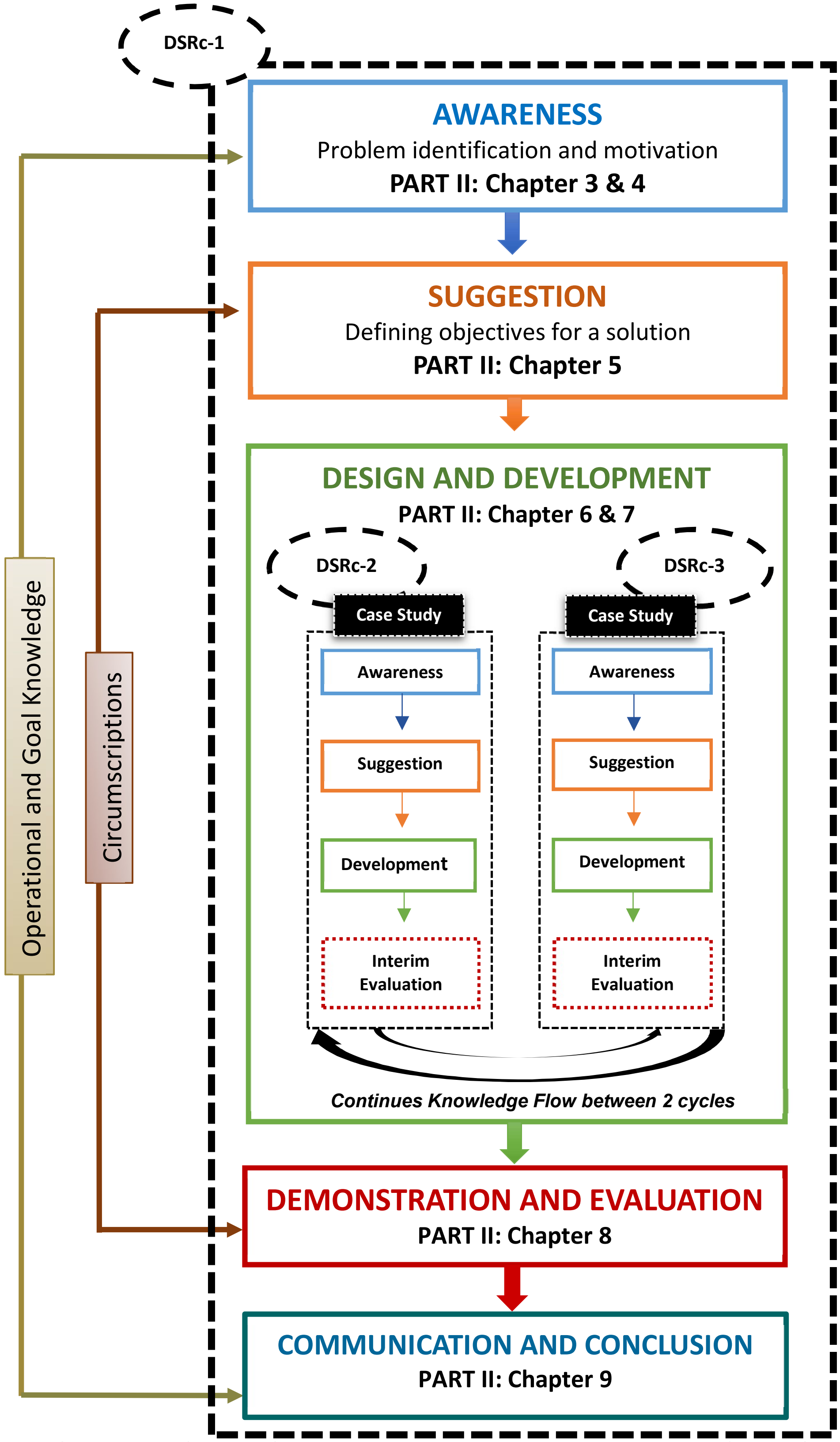


Figure 72: Summary of study Chapters as they relate to the 5 phases of the DSR cycle

Chapters 3 and 5 - RO4: To develop a framework for quality programme review applying the principles of Diffusion of Innovations (Rogers, 2003)

A problem with new technology acceptance is that those who need to interact with it, are often sceptical or for some other reason vulnerable to embrace it (Al-Busaidi & Al-Shihi, 2010). An investigation was done to find clarity and direction for the design of the framework guided by the fourth research objective. The research objective is concerned with the use of an LMS in higher education with reference to the availability of and reasons for the possible non-utilisation of an LMS feature that can report on programme outcomes coverage and student performance. Two scenarios where presented, one for higher education and one for industry. This study presented two real-world examples from two very different enterprise domains: to guide the implementation of additional features in an LMS in a higher education institution and the technology feature implementation process prevalent in a telecommunication (mobile) company in South Africa. Therefore, the purpose of this part of the research was to consider these two real-world examples where the Diffusion of Innovations theory was applied in order to establish lessons learnt in feature implementation of technology, especially for this research, in higher education.

The lessons learned during the two initiatives are complementary, but in both cases highlighted that the social system and change agents (opinion leaders) as depicted in the Diffusion of Innovations theory play a key role for the successful implementation of technology features. Also, both examples used a workshop approach, show-and-tell and a pilot to inform and train potential users on the technology features.

Underutilisation of technology features is not unique to higher education, and in this instance, higher education can learn from the approach and steps followed by industry. Valuable contributions from industry which can seamlessly be integrated into higher education include the consultation with major stakeholders and owners of the technology, as well as conducting workshops to determine entire feature sets for example the institution's LMS.

One of the key realisations was to not follow the Diffusion of Innovations steps in a linear fashion, but that holistic consideration in each step as well as looping back where necessary, added value towards successful adoption of features. It was established that there were synergies between the lessons learnt for higher education and industry and that higher education could draw on the findings from industry for the successful implementation of technology features, in this instance specifically about LMS features.

Through the illustration of the industry example (Section 5.5.1), the lessons learned supported the conceptualisation of the framework. From the readings on Diffusion of Innovations theory in the higher education context in South Africa, it can be concluded that to make a decision to adopt or reject an innovation such as the framework, it is important to consider during the design of the framework, as suggested by Rogers et al. (2003), three key aspects of the Diffusion of Innovations that were dealt with in Chapter 5, namely: (1) the pre-conditions prior to the adoption of the innovation; (2) the characteristics of the decision-making, and (3) the perceived characteristics of the innovation. These aspects form part of the knowledge and persuasion phase of the innovation-decision process. The perceived characteristics of the innovation according to Rogers guided the design of the framework for this research. The researcher is of the opinion that, the proposed framework be adopted and become part of University ABC annual programme review practice. Therefore, it is crucial that the components and process of the framework be designed in such a manner that the decision to adopt the framework and continue with its implementation and use, be trivial.

Chapter 6 covered the development phase of DSRc-2 and DSRc-3 (Figure 72) (Vaishnavi & Kuechler, 2005). **Chapter 7** outlined the main components that are included in the PAIR framework for quality programme review utilising an LMS. The PAIR framework for quality programme review consists of 4 main components, and four quality assured deliverables. The component in the centre of the PAIR presents the 'partnership through student successes'. Preferably the programme review process would start with the 'partnership meeting' chaired by the head of department and programme coordinator together with an education consultant and instructional designer, who will collectively discuss and decide what the first steps of actions should be in preparation for the planning for quality programme review for the anticipated review cycle.

Matei and Iwanska (2016) argue that the focus of quality review is on the internal quality assurance system of an institution and not on checking the actual quality. A framework such as PAIR can serve several functions in this regard at University ABC:

- Consider if there are internal processes and procedures for assuring student learning and programme effectiveness;
- Consider whether these processes are actually implemented, at least on programme level;
- Consider whether these internal processes are effective, and if not, what action plans are in place to improve them; and
- Investigate whether the set outcomes are being achieved.

Chapter 7 - RO5: To identify the current support structures in place at University ABC where the research is accepted to ease the decision of adopting a framework for quality programme review using the BbGA.

Chapter 7 concludes with the nature of support that is available to academics at University ABC that potentially can contribute positively to the acceptance of PAIR. An indication of the support services available to academic staff at University ABC was given in Section 7.4**.** The centre element of PAIR is connected to each of the four components of the framework indicating the dynamic movement between the components to the centre which represents 'student successes'. The analogy presented indicates that whatever is needed to improve student learning and needed to be able to report on and being held accountable for assurance of learning, can dynamically move between the different support structures ensuring the quality assured deliverables to be in place.

Chapter 8 dealt with the formal **evaluation phase** in **DSRc-1** of the study and the final artefact developed in DSRc-3. Before the formal demonstration and evaluation of PAIR, an interim demonstration and evaluation was built in as part of DSRc-3 to be able to report on the proof of concept of the artefact as it was developed and presented at that stage (Section 6.4.4).

To proof that the overall study addresses the fulfilment of its purpose as indicated in Chapter 1, a proper evaluation of the overall project and the artefact as it is presented in the final phase of DSRc-1 was executed in August 2018. **Chapter 8** reported on the project of the **School of Information Technology's Improvement Plan and BbGA workshop** as the final evaluation phase of the PAIR Framework and this project and suggested an Assessment Praxis Model on programme level for the School of Information Technology and the wider University ABC (Figure 73).

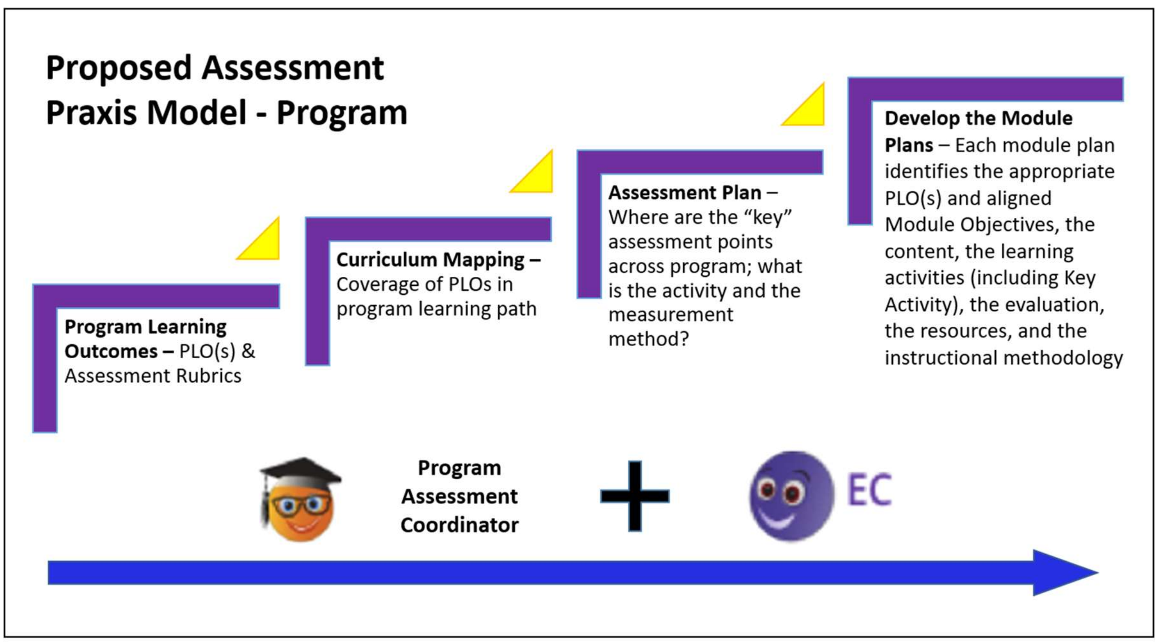


Figure 73: Proposed Assessment Praxis Model - Program

9.3 IMPLICATIONS OF RESEARCH FOR UNIVERSITY ABC AND THE HIGHER EDUCATION LANDSCAPE IN SOUTH AFRICA

Chapter 9 is the current chapter that focuses on the concluding aspects of the research. Section 9.3 will report on the implications of this research study as it pertains to University ABC and the higher education landscape in South Africa.

The focus of the PAIR is to provide a framework for quality programme review on a institutional, programme and module level utilising an LMS. To elevate this innovation at University ABC to integrate PAIR into the assessment and accreditation solution of University ABC would need serious and key stakeholder buy-in. The report on the final evaluation of PAIR suggest that PAIR fits into the new proposed framework as the design component and that the suggested steps in the framework be considered as the development component for programme assessment at University ABC.

While this proposed process emphasises the **DELIVERY phase of a program**, it needs to consider the **DESIGN phase of a program more explicitly in order to ensure that the data collected is appropriate and meaningful.** Coming before the Delivery phase, or the development of the individual modules in the program would be the DESIGN of the program. Figure 74 described the necessary steps in the DESIGN of a program.

The Goals Area as embedded in the PAIR Framework is therefore the explicit and demonstrable connector between the learning expectations of a program and institution and the direct evidence of student performance found in the coursework they submit to their clickUP modules.

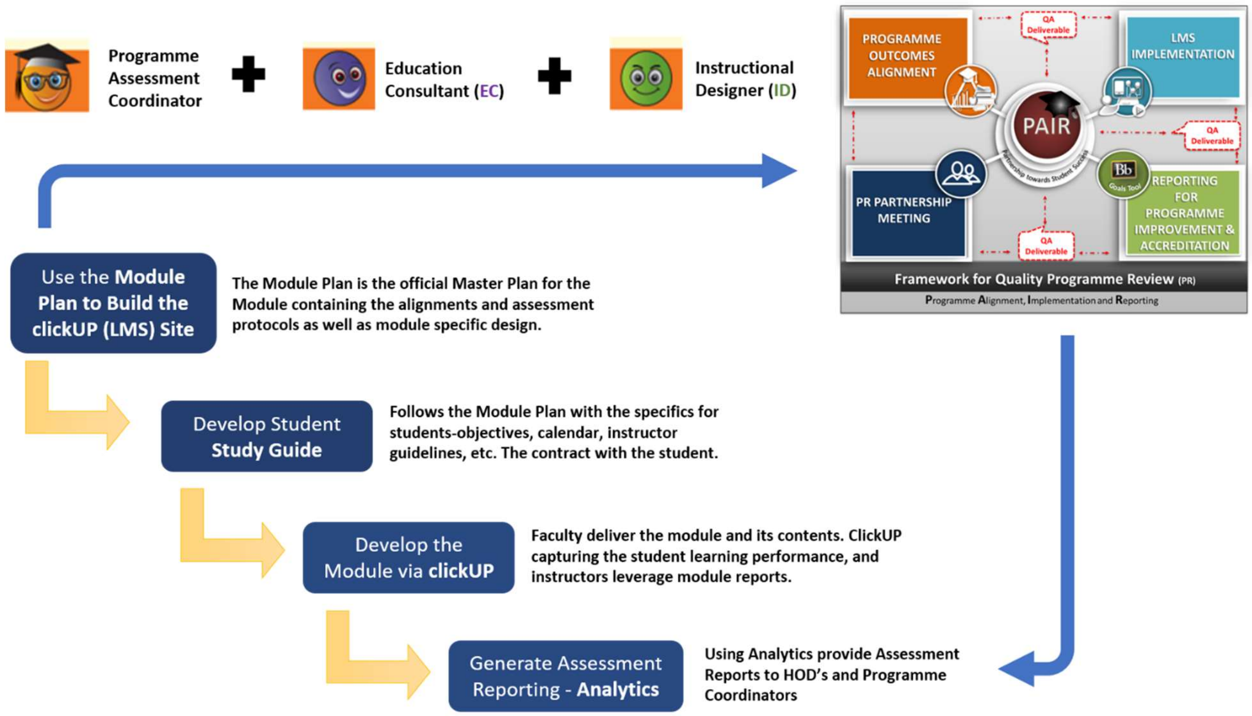


Figure 74: Steps to be taken in the design of a program

9.4 SUMMARY OF CONTRIBUTIONS

The research contributions can be summarised as follow:

- The research done on the literature guided by the research question and research objectives confirmed that the quality assurance drive from Council on Higher Education in South Africa is made compulsory with the expectation that there will be reporting evidence on the assurance of learning on a national level for all higher education institutions in South Africa. This drive is in alignment with international practices of whom the majority of higher education institutions already implemented some form of technology to monitor and track the above processes through student data and analytics.
- The contribution to the theory and knowledge base can firstly reference to the fact that the Design Science Research approach in IS can be used, and is as relevant

and applicable to the higher education landscape as much as it is relevant to the Information Technology ecosystem.

- With reference to the choice of using the Diffusion of Innovations theory of Rogers (2013) and Constructive Alignment (Biggs, 2003) as theory base for the design of PAIR the researcher is confident that the decision at University ABC to adopt PAIR as a solution for annual quality programme review using the BbGA in the official LMS, will be favourable. This is already evident where BbGA is already being implemented in various modules as pilots during the research time. The reason for this statement is because of the effort made through various iterations to ensure that the framework adheres to the Diffusion of Innovations characteristics for an innovation and that the components of the framework follow a logic pathway in alignment with that of Biggs' (2003) proposed constructive alignment theory.
- With an Information Technology-artefact such as BbGA, embedded in a framework which supports the implementation and use of such artefact as part of a process such as the quality programme review process, one can conclude to say that the reference to an 'Information Technology-artefact' *in isolation* can include frameworks used in higher education institutions such as the proposed PAIR framework.
- Although BbGA is not unknown technology internationally, at University ABC and the wider higher education community in South Africa, it can be perceived as 'new' because it is unknown to the staff and therefore also be referred to as an innovation.
- The research further contributes to the knowledge that technology can be used to ease the process to report on assurance of learning, programme effectiveness as well as institutional effectiveness at University ABC but also in the wider higher education landscape in South Africa, especially those institutions who use the same LMS as University ABC and can now capitalise on these research outputs.
- The greatest contribution to this research and the practice of programme review is the PAIR framework.
- In addition to the PAIR framework, as the output of the Design Science Research in IS, the formal evaluation phase of the over-arching Design Science Research

cycle enabled the improvement of the application of the PAIR framework to include PAIR as a delivery phase in a bigger programme development and assessment framework proposed by the international principal education consultant and specialist on the BbGA and assessment solutions in higher education. The workshop as part of the evaluation phase elevated this research to an institutional level.

- In this regard, it can conclude that the Framework for quality programme review utilising an LMS to be relevant and useful in the School of Information Technology at University ABC as part of their improvement plan for 2018/2019.
- This study unlocked a multitude of opportunities of which presenting research papers is but one. Additional and practical contributions were made towards the field of IS research and referenced in the preface.

In conclusion, the following three contributions to this study are highlighted:

- Methodological contribution: The Design Science Research methodology was adapted for this study. There were two research cycles (presented by two case studies) within (embedded) the main research cycle
- Theoretical contribution: Rogers' theory are mostly seen as a linear process. In this study it was used as a cyclical approach, and therefore used differently than most people in general will apply his theory. Roger's Theory was also used within the Design Science Research cycles, which supported the cyclical and iterative manner the research was conducted.
- Practical contribution: PAIR Framework was initially designed for quality programme review where the use of technology (BbGA) was considered as part of the review process. In 2019, PAIR led to a more mature model – A Comprehensive Programme Assessment Praxis Framework (CPAP) that now incorporates PAIR. PAIR and CPAP contributed to the design of ATAF (Assessment Technology Adoption Framework) *(Newberry, R., Robinson, R and Botha, A. (Forthcoming). Adoption and integration of learning technologies across the institution - Enabling*

a solution for assessment and technology. Transforming Digital Learning and Assessment. Eds. Maki, P.L and Shea, P. Sterling, VA: Stylus Publishing, LLC.

In this chapter, the authors focus on the assessment of learner performance at the programme and institutional level and the intersection with Assessment Technology (AT), and propose an Assessment Technology Adoption Framework (ATAF) which consists of four quadrants, Assessment, Academics, Educational Technology, and Assessment Solutions. A working partnership connects these quadrants to support and facilitate the assessment processes of academic units across an institution so the data can lead to actionable results for improvements in teaching and learning.

The two departments in this study present a roadmap (CPAP) that University ABC and any institution globally can adopt for further development to ensure quality programme assessment across an institution. Implementing ATAF can move the work done at the programme level to an institutional level.

The researcher believe that PAIR, CPAP and ATAF can be replicated at higher institutions in South Africa, and elsewhere.

9.5 FUTURE RESEARCH

A study undertaken like the current one lends itself to several research opportunities and networking prospects globally:

- Future research topic envisaged: The design and development of an online tool or website to manage the workflow and completion of a curriculum map, assessment map and Blackboard Learn® Goals Area implementation document to enable the ease of use for PAIR instantiation.
- Implementation at University ABC of a maturity instrument for readiness of programme assessment utilising Blackboard Assessment technologies. This will involve the offices of Institutional Planning, Quality Assurance and Academic

Planning, Department for Education Innovation, Deputy Vice Chancellor for Academic, Deputy Deans for Teaching and Learning, Heads of Departments, and Programme and Module Coordinators.

To bring this study to its full fulfilment, a course and workshop were already offered by the researcher to a University of Technology in South Africa through Enterprises at the University of Pretoria. During 2020 a hybrid course will be designed introducing Programme Assessment and PAIR. This priority course, under the auspices of the Education Consultant unit in the Department for Education Innovation, will be offered to the academic staff at University ABC.

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APPENDIX A

EXAMPLE OF THE GOALS FRAMEWORK IN BLACKBOARD LEARN®

GOAL FRAMEWORK IN BLACKBOARD

IMPORTANT: Please Read this document in its entirety before beginning.

The Goals Area is an important feature in Learn and requires ***careful planning*** before Goals are entered into LEARN. The Goals Area is used to accomplish many tasks by many Blackboard and 3rd party tools. Essentially, an "institutional pattern" needs to be developed that meets the six (6) criteria below and then enforced across your system. The Goals Area is the most important tool in your assessment processes, so we recommend keeping the goals area somewhat centralized and to follow approval processes for changes, as wanton changes will affect your goals reporting and assessment data.

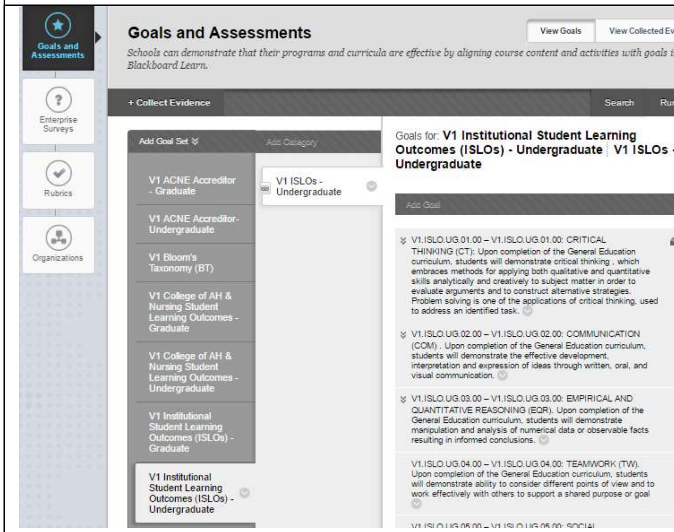
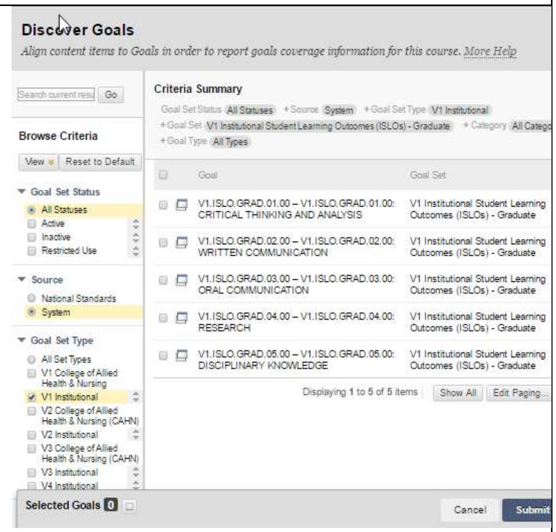
The primary objective when setting up the Goals Area is to find the most economical and recognizable Goal ID schema for your institution. The Goal ID is what lives in the database and, at its most basic level, the Goal ID schema contains enough information for others to know what the Goal refers to and reusable for many years or assessment cycles. At its most basic, the Goal ID's components should be the following:

> Program Code + Goal Type + Goal Number associated with your Goal Statement
>
> Ex: BNUR.PLO.01.00 for *Upon completion of the Bachelors in Nursing Program, nursing students will be able to demonstrate….*

Depending upon the Goal Type and the needs of the institution, more identifying information can be added, as explained in the rest of this document.

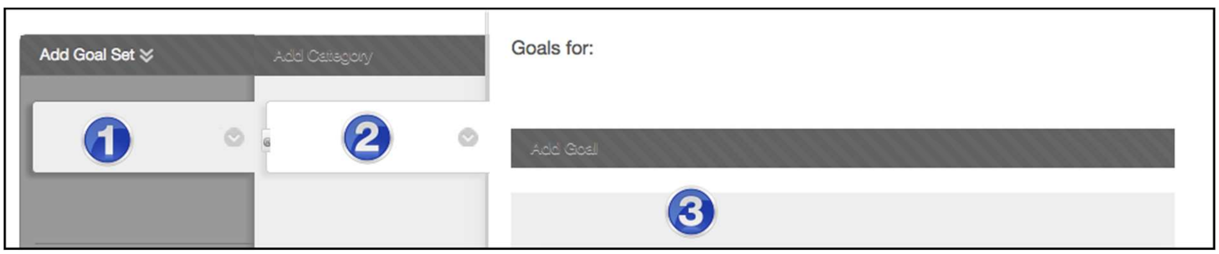
Requirement 1 – Understand Discover Goals and View Goals Relationship

As you develop your Goals Area, you must keep in mind the relationship between the two views of the Goals Area. The **Discover Goals** is the view users will use to select their goal alignments and to set up Outcomes collections. Thus, how you set up the **View Goals** area will affect how the Goals appear to users in the **Discover Goals** area.

View Goals used by Goals Manager, Outcomes Administrator and System Admin to enter Goals	**Discover Goals** used to Add Alignments and Outcomes Collect Evidence > Find Goals
	

Requirement 2 – Understand the Goals Area Data Fields

When entering your Goals, you need to understand the three (3) column **View Goals** area and the relationship of its seven (7) data fields. The objective is to define a consistent, recognizable, and economical naming convention to complete these fields.



<u>Goals Area Columns and Data Field Information</u>

Column / Data Field	Number of Permitted Characters	Purpose
Column 1- Goal Set Name	255 Characters	Name of the Academic Program, Accreditor, or Institution's General Education
Column 1 - Goal Set Type	255 Characters	Name of the College, Division, or Unit the Goal Set Name "lives"

Column 2 - Category	255 Characters	The Degrees offered by the Goal Set Name or the Individual Course IDs within the Goal Set Name
Column 3 - Goal ID	100 Characters	The Goal ID Schema
Column 3 - Unique ID	100 Characters	Same as Goal ID (this field in not editable). **Do NOT let Blackboard auto-generate this identifier.**
Column 3 - Text	Unlimited	First, copy and paste the Goal ID and follow it with a colon (:) then a space and finally add the full text of the Goal statement.
Column 3 – Goal Type	255 characters	Enter the acronym or the full statement identifying the Goal (i.e., General Education, University Learning Outcome, Program Learning Outcome, Accreditation Standard, Course Learning Outcome, etc.)

We recommend creating an Excel spreadsheet to mirror the seven (7) data fields to help you organize your goals and enforce utilization of the schema across your Goals Area.

Column One		Column 2	Column 3			
Goal Set Name	**Goal Set Type**	**Category**	**Goal ID**	**Unique ID**	**Text**	**Goal Type**

Once all the Goal information is collected and your Goal Schema is defined adhering to the requirements below, you can copy and paste the information from the excel file to the appropriate Goals Area data fields.

Requirement 3 – Identify and assign a naming convention for the Goal Types.

Goal Types are the high-level categorization for the types of goals you will have in the goals area. Some of the common goal types are –

- General Education Learning Outcomes or Institutional Student Learning Outcomes
  - You may also have Undergraduate and Graduate level versions of these goals
- Accreditation Standards
  - You many have several external discipline specific accreditors to account for
- Program Student Learning Outcomes

- Course Learning Objectives

After identifying your institution's Goal Types, you will need to assign a **Goal Type Acronym** to each. This acronym will be used consistently across your LEARN system in the Goal ID Schema. You must make sure that these Goal Type Acronyms do NOT conflict with any school, college, division, program, or course code identifiers in your SIS.

Common Goal Types	Goal Type Acronym – Examples
University Core / General Education / Institutional Student Learning Outcomes	UCORE/GEO/GENED/ISLO/SLO
Program Student Learning Outcomes	PO/PLO/PSLO
Accreditation Standards	AS or Accreditor ABbGAreviation (i.e., ABET, ACNE, CAEP, etc.)
Course Learning Objectives	CO/CLO/CSLO

This Goal Type Acronym will be used in the Goal ID Schema you will create in Requirement 5 below and used to complete the following Goal Data fields:

Column One		Column 2	Column 3			
Goal Set Name	**Goal Set Type**	**Category**	**Goal ID**	**Unique ID**	**Text**	**Goal Type**
			Goal Type Acronym Part of Goal ID Schema	Goal Type Acronym Part of Goal ID Schema	Goal Type Acronym Part of Goal ID Schema	Use Goal Type Acronym or full name

Requirement 4 – Select your Goal ID Separator.

Before creating the Goal IDs for the Goal Sets you will enter in to the Goals Area, you MUST choose a **separator.** ALL GOAL SETS on your Learn system MUST USE THE SAME SEPARATOR in its Goal IDs. You can use a period, dash, or underscore to separate the parts of the Goal ID. Best practice is to adopt the same separator used in your Blackboard course ID.

- periods - GENED.01.00 / COUN.PLO.01.00
- dashes - GENED-01-00 / COUN-PLO-01-00
- underscores - GENED_01_00 / COUN_PLO_01_00

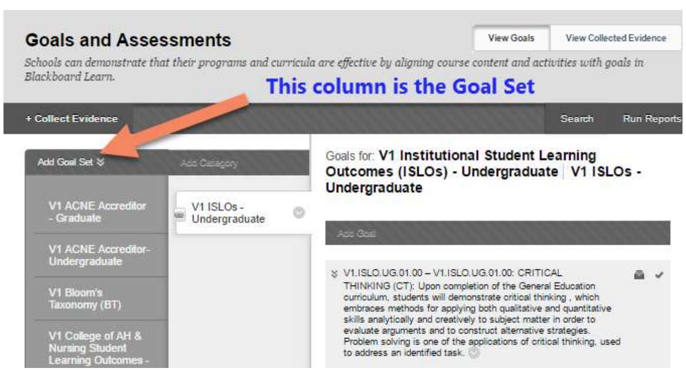
Requirement 5 – Select a Goal ID Naming Schema Convention for your Goals.

PLEASE NOTE – When setting up the schema for the Goals Performance Dashboard for use with Competency based education, you will need to modify the schema below.

The Goal ID Schema should follow the basic patterns below for each unique Goal Set on your system with each Goal Set using the separator you selected above in Requirement 4. The Goal ID Schema will be used in the Goal ID, Unique ID, and Text fields in the Goals Area.

Column One		Column 2	Column 3			
Goal Set Name	**Goal Set Type**	**Category**	**Goal ID**	**Unique ID**	**Text**	**Goal Type**
			Goal Type Acronym Part of Goal ID Schema	Goal Type Acronym Part of Goal ID Schema	Goal Type Acronym Part of Goal ID Schema	

A Goal Set is the highest-level Goal Identifier. A Goal Set contains one or more Categories. Each Category contains the unique goals (or learning outcomes) associated with that Category. The Goal ID schema you define for the Goal Set and its Categories MUST be consistent across that Goal Set and EVERY GOAL SET on your system MUST USE THE SAME SEPARATOR.



The Goal ID Schema developed for each Category allows for some flexibility as to what is included in the Goal ID so individual programs do have choices. However, the Goal ID naming schema MUST BE CONSISTENT across an entire Goal Set.

Step 5.1: Select a Goal ID Naming Convention pattern for your Goal Set.

As you develop your Goal ID schema, each Goal Set can have its own schema from the conventions below:

- **Numeric** = 123.456.01.00 (123 is a Program code, 456 is the type of goal (i.e., PLO, ISLO, etc), and 01.00 is the goal number)
- **Alpha** = ABC.PLO.01.00 (ABC is a Program Code, PLO is the goal type, and 01.00 is the goal number)
- **Alphanumeric** = 123.ABC.PLO.01.00 (123 is a Program Code, PLO is the goal type, and 01.00 is the goal number)
-

Step 5.2: Understand the Goal Numbering Schema (Parent – Child)

To maintain the correct display order of Goals in the **Discover Goals** view, you will need to use the following numbering system. We recommend accounting for the possibility of Child Goals for every goal in your Goal Sets. Remember, too, this numbering system is for the LEARN database and need not reflect an exact correspondence to how your Learning Outcomes are numbered on webpages, the Catalog, or handouts.

01, 02, 03….. 10, 11 – These are the Goal numbers.

Adding .00/-00/_00 after each Goal number using your selected SEPARATOR designates the Goal as a **Parent Goal**.

EX: 01.00 / 01-00 / 01_00

A **Child** goal (sub-goal of a Parent Goal) would be

Ex: 01.01 / 01-01 /01_01

Step 5.3: Identify your Goal ID Schema for each Goal Type.

For General Education or Institutional Learning Outcomes, the following schemas are recommended for your Goal Set:

(Option 1) GEN ED CODE* + GOAL TYPE + GOAL NUMBER

Ex: GENED_ILO_01_00; CORE-GEO-01-00; GENED.SLO.01.00

*If your school has a specific course code or program code for all GenEd courses, you should use it as the Gen Ed code in the goal ID.

(Option 2) GOAL TYPE ACRONYM + GOAL NUMBER

Ex: ILO_01_00; ISLO.01.00; CORE-01-00

NOTE: If you have both Undergraduate and Graduate versions of your General Education learning outcomes, you will need to distinguish them from each other in your goal ID schema. See some examples below.

GENED_UG_ILO_01_00; CORE-GRD-GEO-01-00

ILO_UG_01_00; ISLO.GRAD.01.00; CORE-G-01-00

For Program Learning Outcomes, the following schemas are recommended:

(Option 1) PROGRAM CODE + GOAL TYPE + GOAL NUMBER

Ex: NUR_PLO_01_00; ENGL-PSLO-01-00; GMGT.PO.01.00

(Option 2) Add the School, College, or Division in which the program exists:

COLLEGE CODE + PROGRAM CODE + GOAL TYPE + GOAL NUMBER

Ex: CAH_NUR_PLO_01_00; CAS-ENGL-PSLO-01-00; SOB.GMGT.PO.01.00

Community College Program Considerations: If you have unique student learning outcomes for AS, AA, AAS, Technical Programs (TP) and/or Certificates, you may need to include the highest degree level designation (the degree level that captures any lower level degree/certificate type goals) in the Goal Schema as well:

PROGRAM CODE + DEGREE TYPE + GOAL TYPE + GOAL NUMBER

Ex: AH_NUR_AS_PLO _01_00; ENGL-AA_-PSLO-01-00; CIS.TC.PO.01.00

For External Accreditation Standards (i.e., ABET, ACNE, AACSB, CAEP, CACREP, ACA, etc.), the following two options are recommended:

(Option 1) When the external accreditor learning outcomes are separate goal sets used across a program or multiple programs:

ACCREDITOR CODE + GOAL NUMBER

Ex: CCNE_01_00; ABET-A-01-00; CAEP.S1.01.00

(Option 2) When the program adopts the accreditors learning outcomes as its program learning outcomes:

(OPTIONAL)COLLEGE CODE +PROGRAM CODE + ACCREDITOR CODE + GOAL TYPE + GOAL NUMBER

Ex: ED_COUN_CACREP_PLO_01_00; MENG_ABET_A_PLO_01_00

For Course Learning Objectives, the following is recommended:

COURSE CODE+ COURSE NUMBER + GOAL TYPE + GOAL NUMBER

Ex: NUR_311_CLO_01_00; CHEMG-521-CLO-01-00; ENGL.491.CO.01.00

(OPTIONAL)COLLEGE CODE + COURSE CODE+ COURSE NUMBER + GOAL TYPE + GOAL NUMBER

Ex: AH_RAD_311_CLO-01-00; SCI-BIOL-401-01-00; CAS.HIST.610.CO.01.00

REQUIREMENT 6: Adding the Goal ID Schema and Goal Statement to the Text Field.

After you identify your Goal ID schema for your Goal, you will add it to the three (3) fields below. We recommend copying the Goal ID from your spreadsheet and then pasting it into the fields.

IMPORTANT – After you paste the Goal ID into Text data field, you MUST ENTER A COLON (:) and then one or two spaces BEFORE you enter your Goal statement.

Column One		**Column 2**	**Column 3**			
Goal Set Name	**Goal Set Type**	**Category**	**Goal ID**	**Unique ID**	**Text**	**Goal Type**
			Goal ID Schema	Goal ID Schema (not editable)	Goal ID Schema: Goal Statement	

By entering the identical Goal ID schema into the three fields—Goal ID, Unique ID, and Text—and entering the colon after the ID in the Text field, you ensure that the Discover Goals area will display the Goals in the correct order.

(OPTIONAL) Requirement 7: Add a Short Name to the Goal Identifier.

After you create your Goal ID Schema, you may want to add a short name to the Goal ID. If a short name is desired to help identify your Goals, the short name MUST BE SEPARATED FROM THE GOAL IDENTIFIER BY A DOUBLE UNDERSCORE (__) AND A SINGLE UNDERSCORE to separate additional words or letters.

EX: GENED.01.00__Written_Communication
COUN-PLO-01-00__Clinical_Practice
ABET_A_01_00__Problem_Solving
ENGL_491_CLO_01_00__Literary_Analysis

NOTE: Adding a short name in the goal identifier will restrict your editing capabilities later. It is recommended that the Short Name be used in the Text field. For instance, the text area would look like this:

EX: GENED.01.00: WRITTEN COMMUNICATION - Upon graduation, students will be able to….

A Completed Excel File with Goal Schema

After you complete all the steps above and have defined your goal schema, a completed excel file might look like the following:

Column One		Column 2	Column 3			
Goal Set Name	**Goal Set Type**	**Category**	**Goal ID**	**Unique ID**	**Text**	**Goal Type**
Institutional Student Learning Outcomes	Institution	ISLO - UG	ISLO.01.00	ISLO.01.00	ISLO.01.00: Upon graduation, students will be effective written communicators.	Institutional Student Learning Outcomes (ISLO)
Goal Set Name	**Goal Set Type**	**Category**	**Goal ID**	**Unique ID**	**Text**	**Goal Type**
English	College Arts & Sciences	Bachelors	ENG.PLO.01.00	ENG.PLO.01.00	ENG.PLO.01.00: Upon completion of the English program, students will be able to analyze various pieces of literature using one or more methods of literary analysis.	Program Learning Outcome
English	College Arts & Sciences	ENGL 490	ENGL.490.CLO.01.00	ENGL.490.CLO.01.00	ENGL.490.CLO.01.00: Upon completion of this course, students will be able to identify major periods of literary criticism and discuss their issues and themes.	Course Learning Objective

Goal Set Name	Goal Set Type	Category	Goal ID	Unique ID	Text	Goal Type
ABET	School of Engineering	Accreditation Standards	ABET.A.01.00	ABET.A.01.00	ABET.A.01.00: Students will be able to demonstrate problem-solving skills.	Accreditor Standard

APPENDIX B

EXAMPLE OF AN ASSESSMENT PROJECT INTAKE FORM OF FRAMINGHAM UNIVERSITY

Author: Education Technology Office | Framingham State University | 100 State Street, Framingham, MA 01701

Assessment Project Intake Form

Primary Contact Information

Name:

Email:

Phone Number:

Program:

Department:

Names and Contact Information of any additional organizers:

Name	Contact	Role/Responsibility

Purpose of Assessment

What is the primary purpose of collecting assessment data?

Check all that apply:

- ☐ Accreditation
- ☐ Internal Program Review
- ☐ Other (please explain)

Specify:

Timeframe

When do you need to report on your data (end date)?

When you expect to begin collecting assessment data?

How many semesters do you need to collect?

When during the semester the student work turned in (mid-term/end of semester)?

Blackboard Assessment Intake Form

Current Method of Assessment

What assessment method are you currently using?

- ○ Course level assessment (Direct Assessment)
- ● Multiple courses assessed against institutional rubric (Juried Assessment)

What is the current process you follow for collecting, reviewing, and reporting on your assessment data?

Describe the evaluators and their process and relationship with the courses in your current method of assessment. Describe what is critical to your process.

What is your sample size and how is it determined? List the courses/course categories involved:

(Internal Only): Where will Bb Goals be aligned in the system?

- ● Course Level Rubric (Direct Assessment)
- ○ Assignment (Juried Assessment)
- ○ Test Question(s)

(Internal Only): Will Bb Goals be assessed together or separately; one rubric or two?

Blackboard Assessment Intake Form

Materials Required

Are the following materials available or do they need work?

Item	Quantity	Ready	Needs Work	Not Ready
Goals		○	◉	○
Rubrics		○	○	◉
Assignment/Test/Collector		○	○	○
add more here		○	○	○

(Internal) Who will enter the Goals into the system?

(Internal) Who will enter the Rubrics into the system?

Roles of Different Groups Involved with Digital Process

Define how each of the following groups is currently involved in the assessment planning, collection, and evaluation processes (i.e. who is evaluating the student work, who is setting up evaluating sessions – for juried reviews, who is communicating with faculty, who is pulling reports).

(Internal) Who is mapping goals to assignment/rubric (Kate vs Individual)?

(Internal) Who is managing the rubrics and goals?

(Internal) Who is evaluating the work?

Assessment Committee (provide training, finalize goals/rubrics, requesting artifacts, pull reports, etc.)

Faculty (align goal in course, obtaining common rubrics into course, volunteer artifacts, etc.)

Other Group(s) Involved (External Assessors, eg. SPs, Office of Assessment, etc.)

Blackboard Assessment Intake Form

Deliverables

Touchpoints	Timeline
Create Assessment site in Blackboard	
Complete the Goal Template document	
Meet to review rubrics and provide feedback	
Meet to review final process and refine documentation	
Meet to review reporting mechanism	
Provide additional training	

Training and Documentation

	Available	Not Available
	◉	○
	◉	○
	◉	○
	○	○
	○	○
	○	○
	○	○
	○	○
	○	○
	○	○

Constraints or Special Requests

General Comments

APPENDIX C

Link to Google Folder and QR Code for access to Appendixes C1-C6

https://drive.google.com/drive/folders/1pOOj9BLiFFm-WWrT3uOu7mqlR8WSSvSw?usp=sharing

C-1: Example of Constructive Alignment Workshop presented for Case Study 1 & 2

C-2: Example of the presentation for proof of concept of Blackboard Goals Tool and PAIR Framework

C-3: Example of an Institutional Effectiveness Software Buying Guide from WEAVE

C-4: Griffith University Framework for Program Review

C-5: Results of the 'Proof of Concept' survey

C-6: Blackboard Exemplary Course Program Rubric