Factors to consider in the transition from a teacher-centred model to a learner-centred model in a computer-rich learning environment

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Abstract

This study reports on an exploration of one group's experience of making the transition from a teacher-centred to a learner-centred computer-rich classroom. The learners' experiences are investigated in the light of the premises of learner-centred learning as they are defined by the American Psychological Association. The researcher seeks to identify the factors that would make the transition to a more learner-centred learning environment easier for learners and provides some factors that teachers need to consider if they wish successfully to transform their classrooms to a learner-centred learning environment.

A case study examines the reactions of one group of learners to the transition. Learners were required to complete three types of projects. These projects were on different levels of learner-centeredness. The data was collected in three main ways: from participant observation, interviews and focus-group discussions, and from an analysis of the assessment results on the projects.

The study concluded that learners had to *learn* how to cope and perform well in a learner-centred class environment, and that the matriculation examination at the end of the year undermines the effectiveness of learning in a learner-centred learning environment.

Keywords
Learner-centered; learner-centred; intrinsic motivation; learning environment; meta-cognitive; anxiety; relevance; projects; co-operative learning; effort; assessment.

Samevatting

Hierdie studie lewer verslag oor die ondervindinge van een groep leerders tydens die oorskakeling vanaf 'n onderwyser-gesentreerde na leerder-gesentreerde rekenaarrykke leeromgewing. Die leerders se ervarings word ondersoek in die lig van die beginsels van leerder-gesentreerde leer soos deur die Amerikaanse Sielkunige Vereniging gedefinieer, met die uitsig om faktore te identifiseer wat die leerders se aanpassing by en prestasie in 'n leerdergesentreerde leeromgewing te fasiliteer asook om aan die onderwyser rigtigwysers te verskaf vir die faktore wat in aanmerking geneem moet word by die suksesvolle oorskakeling na 'n leerdergesentreerde leersituasie.

'n Gevallestudie is onderneem om die reaksies van een groep leerders tydens die oorskakeling te volg. Leerders moes drie verskillende tipes projekte wat op verskillende vlakke van leerder-gesentreerdheid was, voltooi. Die data is op drie maniere versamel: deelnemer observasie, onderhoude en fokus-groep besprekings en die analise van die assesseringsresultate. Die studie het onder andere bevind dat leerders moet leer om in 'n leerdergesentreerde leeromgewing te funksioneer en presteer, asook dat die matriekeindeksamen die effektiwiteit van leer in die leerder-gesentreerde leeromgewing belemmer.

Sleutelwoorde: Leerder-gesentreerd; intrinsieke motivering; leeromgewing; metakognisie; angstigheid; relevansie; projekte; ko-operatiewe leer; moeite assessering.

Soli Deo Gloria

I dedicate this dissertation to my late father, Mr. R. B. Raath.

Acknowledgements

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Chapter 1

Factors[1] to consider in the transition from a teacher–centred model to a learner-centred model in a computer-rich learning environment

1.1   Introduction

In this dissertation the researcher reports on how one group of learners' made the transition from a more teacher-centred to a more learner- and computer-rich classroom. The learners' experiences were investigated and described in terms of the American Psychological Association's definition of "learner-centred learning" (Lambert and McCombs, 1998). In this study, the researcher hopes to identify those factors that would make the transformation of education to a more learner-centred learning environment easier for the learner, and to provide guidelines for teachers about what he or she needs to consider before successfully transforming his/her classroom into a learner-centred learning environment.

1.2   Background

During the last decades of the previous century, changes from traditional teacher-centred education towards learner-centred education occurred throughout the world. In the United States, extensive research sponsored by the American Psychological Association (APA) into effective learning and learner-centred learning culminated in the formation of the Presidential Task Force on Psychology and Education in 1990.

This change in educational focus has meant that some form of Outcomes Based Education has been introduced into schools in different countries including the United States of America and Australia.

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[1] The word **factor** (plural: **factors**), as used in the title, text and elsewhere in this study, does **not** refer to mathematical factors, statistical factors or factorial analysis. The researcher uses it to describe or refer to the component features, elements or characteristics of learner-centred learning as defined by the American Psychological Association (APA). Thus, when the researcher uses the word "factors", she is referring to those features, elements or characteristics that need to be considered when learners make a transition to a more learner-centred classroom. (E. Labuschagne)

When Outcomes Based Education (OBE) was introduced into South African schools in the form of Curriculum 2005 (Northern Province Department of Education, 2000), it brought with it concepts such as *continuous assessment* and *authentic learning experiences*. Outcomes Based Education (OBE) differs from traditional education in certain basic ways, of which the change from teacher-centred classrooms to learner-centred classrooms is one of the most prominent. In those grades where Curriculum 2005 has not yet been formally introduced, pupils engage in projects that require them to compile portfolios for continuous assessment. Authentic learning experiences involve learners in active participation in their learning (this is often described as *hands-on learning*). Because, in the past, hands-on learning was confined to subjects that lent themselves to practical activity subjects (such as woodwork and motor mechanics), the introduction of this concept into so-called academic subject classes is new. In the computer-rich classroom this concept is not new because the subject entails a large practical component. In such classrooms, the requirements for projects are more complex than the mere practice of computer skills, and much more input is requested from the learner.

Since 1994 several changes have been made to the education system in South Africa, the most important of which is the institution of Outcomes Based Education in the schools. Although Outcomes Based Education has not yet been fully implemented in high schools in South Africa, certain changes that are based on a new educational paradigm have been instituted for the higher grades.

Learners in grades 10 to 12 have to hand in a continuous assessment portfolio (the CASS portfolio) for each subject, including Computer Studies. The Department of Education requires each pupil to produce such portfolios as an ongoing project. As they are being completed for the subject concerned, examiners take them into account in order to assess the learner's progress. Such portfolio projects constitute the learner's first contact with learning in a learner-centred learning environment.

1.3   Research problem

While some teachers have been trained in the principles of Outcomes Based Education and changed methods of assessment, planning and group work, learners have not been prepared for the changes in the education system. A widespread belief that learners will automatically benefit from Outcomes Based Education-inspired changes in approach to education seems to prevail. The researcher however observed that many learners did not seem to react very positively to the continuous assessment projects they had been given and many learners did not experience group work as being "fair".

This study attempts to identify the factors that need to be considered when the transition is made to a more learner-centred classroom. If these factors are taken into account, learners should be able to obtain maximum benefit from changes to the traditional educational approach.

1.4   Aim of the research

This study aims to examine the principles of learner-centred learning as described by the APA in order to identify those factors (intrinsic and extrinsic to the learner) that influence the learner's ability to benefit from projects that are prescribed for learning and assessment purposes. The researcher's intention is to provide educators with ways of helping the learner to function well in learner-centred classroom

1.5   Objectives of the research

The specific objective of this study is to examine the way in which factors of learner-centred learning, as identified by the APA, influence the performance of learners in a more learner-centred learning environment, and to note those factors that need to be kept in mind when transitions are made to a more learner-centred learning environment. The factors that were considered are the following:

- cognitive and meta-cognitive factors

- motivational and affective factors

- social and developmental factors

- individual factors

1.6   Research questions

1.6.1   Context of the research questions

In order to identify the factors that need to be considered when the change to a more learner-centred learning environment is made, the researcher needed to situate them within a larger context.

Larger Context:
The changes in the school system internationally: the introduction of OBE, cognitive learning theory and learner-centered learning
The introduction of OBE in South Africa with the introduction of Continuous Assessment Projects as prescribed by the department of Education in the Limpopo Province

↓

Profile of the target group

↓

The factors contributing to the learner's successful transition to learner-centered learning in the computer environment

↓

Cognitive and meta-cognitive aspects	→	Construction of knowledge Thinking about learning and thinking
Motivational and affective aspects	→	Interactions between: Intrinsic motivation; Extrinsic motivation and Emotional states
Developmental and social aspects	→	Group interaction, collaboration on projects, group pressures
Individual differences	→	Individual approaches to projects Gender differences

Figure 1.1: The larger context of the study

1.6.2 Research questions

The main research questions of this study are tabulated in the table that
follows (Table 1.1).

Larger Context:
The changes in the school system internationally: the introduction of OBE, cognitive learning theory and learner-centered learning
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An attempt to answer these questions will be made by studying the learners' reactions to (and performance on) three projects that differ in the extent to which they reflect the principles of learner-centred learning. For each of the projects, the four factors of learner-centred learning will be considered.

1.7   Rationale of the study

The rationale behind this study is to determine the extent to which the four categories of criteria that define learner-centred learning influence the learners' readiness to learn in a more learner-centred learning environment. If the extent to which the different factors influence the learners ability to benefit from the change to a more learner-centred learning environment can be determined, such information could be valuable to educators and planners who effect changes in curricula.

1.8   Previous research

A search of the NEXUS database was undertaken to determine the extent to which this study is relevant to recent studies that have been undertaken in this topic. The following table shows the keywords used in the search and the number of returns from the database:

Table 1.2: Search words for the NEXUS database search

Keyword	Number of returns
Change	19
Learner AND centred	8
Motivation	19
Change AND motivation	1
Learning AND environment	4
Change AND learner	31
Learning AND events	15

Learning AND computers	28
Change AND learner centred	0

The following table lists studies that are relevant to this research.

Table 1.3: Recent relevant literature

Author	Title	Level	Institution
1. Mampane, S.T	Management of change as a determination of school climate in the traditionally Black schools in Gauteng Province	MEd	University of Pretoria
2. De Villliers, M.R.	The dynamics of theory and practice in instructional systems design	PhD (Education)	University of Pretoria
Seekola, L.C.	Cooperative cognitive learning with computers: a case study	MEd	University of Pretoria
Miller, P.A.	How South African Further Education and Training learners acquire, recall, process and present information in a digitally enabled environment	PhD (Unpublished)	University of Pretoria

The study by Mampane is relevant because she considers the changing learning environment in South Africa, looks at ways of overcoming resistance and motivating learners, teachers and parents.

The study by De Villiers looks at learning events and learning environments in order to facilitate effective learning in systems using computer technology. She pays a lot of attention to the various underlying theories and defines a model to facilitate instructional systems design.

Seekola studied cooperative cognitive learning in the computer-rich environment of a FutureKids centre in South Africa and found that although effective learning took place, the students did not work *cooperatively* as prescribed, but were placed in front of a computer and told to work together.

Miller studied the dynamics of the interaction between the way learners acquired, reviewed and processed information and the digital environment, paying attention to a profile of typical characteristics of the present generation of learners. Miller found that the learners exerted an important influence on one another and noted that the effect of extrinsic motivation on the learning activities is of cardinal importance.

While these studies are relevant to this study, none of them specifically identifies the different factors that influence the South African learner's ability to learn effectively in a changing learning environment.

1.9   Research approach

A qualitative research approach seeks to understand an event from the participant's point of view (Macmillan & Schumacher, 1993). The participants in this study include the students and the teacher. Because the present study is a case study that investigates the experiences of one group, the research is concerned with understanding how events unfold in a temporal sequence (McMillan & Schumacher, 1993). Steyn (2001) quotes Merriam when he suggests that the primary rationale for qualitative research is *understanding*.

This study is qualitative in approach because it seeks to understand and describe the events in the computer classroom in order to identify whatever factors may influence events. Although some quantitative methods are used to analyse the results of the assessment of the learner's projects, these

analyses are used with a qualitative emphasis so as better to understand the events that took place.

1.9.1   Reliability

Reliability refers to the *consistency* of research and answers the question: "If I approach the study again using the same methods, will I get the same answer?" (Kerlinger, 1986: 405). Reliability is the "accuracy or precision of the measuring instrument" (Kerlinger, 1986: 405).

In qualitative research, reliability refers to the consistency of the researcher's interactive style, data recording, and the interpretation of the meanings that participants derive from the data. This latter exercise difficult because no-one interacts, records and interprets exactly like anyone else (Macmillan & Schumacher, 1993). Macmillan & Schumacher (1993) suggest that adequate descriptions of the following factors will reduce obstacles in the way of attempting to obtain reliability if they are described adequately because they will enable others to discover similar phenomena. The table below shows the factors that have to be adequately described in order to maintain the reliability of the study. This table has been derived from the strategies proposed by McMillan and Schumacher (1993).

Table 1.4: Obstacles in the way of establishing reliability (and ways of reducing them)

Obstacle	Obstacle diminished by adequate description of:
Researcher role	Social relationship of the researcher and the participants
Information selection	Criteria Rationale Decision process used in sampling

Social context	Physical
	Social
	Interpersonal functional scenes of data collection.
Data collection strategies	Multiple methods used: ▪ Ethnographic observation ▪ Ethnographic interviews ▪ Documents
Data analysis strategies	Process of data analysis
Analytical premises	Initial theoretical framework of concepts that informs the study and others added as the study progresses

The researcher also used another measure to ensure the reliability of the study: she discussed classroom events with teachers at the same school in different subjects to find out if they experienced similar events in their classrooms.

1.9.2 Validity

Kerlinger (1986:417) defines validity as the answer to the question: "Are we measuring what we think we are measuring?" Kerlinger (1986) distinguishes between the following types of validity:

- Content validity: the representativeness of the sample or content
- Criterion-related validity: this is achieved by comparing the test of scale scores with external variables of criteria known to measure the attribute under study.
- Construct validity: this type of validity explains the meaning of the test, and focuses on the properties that are measured.

Validity of the study, as described by Kerlinger, presents many problems to those engaged in qualitative research. To validate the content of the test, the researcher must assess the items of the test to determine how representative they are of the universe from which the test is derived. When measuring the content validity of a test, it is difficult to decide which criteria must be used to ascertain whether the attributes are actually being measured or not. To validate the construct would mean that the reason for the variance on a test and the theory behind it must be explained and justified.

McMillan and Schumacher (1993) propose that the validity of qualitative research designs refers to "the degree to which the explanations offered match the realities of the world" (McMillan and Schumacher, 1993:391).

- **The internal validity of a qualitative design**

They state that internal validity of a qualitative design is "the degree to which the interpretation and concepts have mutual meanings between the participants and the researcher" (McMillan & Schumacher, 1993: 391). High internal validity is contingent on the way in which data has been collected and analysed. McMillan and Schumacher suggest that various strategies can be used to increase the validity of the research.

The table below is based on the suggestions made by McMillan and Schumacher, and includes the efforts the researcher made to increase the internal validity of this study.

Table 1.5: Strategies to increase the validity of qualitative research, based on
the suggestions by McMillan and Schumacher (1993: 391-394)

Strategy	Rationale for the strategy	How the strategy was used in this study
Lengthy data collection period	A lengthy data collection period gives the researcher the opportunity to analyse data continually, refine ideas, and to make sure that the research-based categories and the participant realities match.	Data was collected over 11 months. Analysis, and the refining of ideas took place continuously.
Participant language	Interview formats that utilise the language of participants are less abstract than many other instruments.	Interviews were held over a period of time and were carefully compiled in the language of the participants.
Field research	The natural setting reflects the reality of the experience more closely than laboratory or contrived settings.	The research was conducted in the school itself – in the natural classroom setting.
Disciplined subjectivity	Researcher self-monitoring submits all the phases of the research to continuous self-questioning and re-evaluation, and takes various biases into account.	A journal was kept throughout the data collection period that also reflected the feelings and reflections of the researcher. This provided a source for indications of possible biases that could then be considered when analysing the data.

- **External validity of a qualitative design**

  In a qualitative research design, the researcher's aim is not to generalise from results but to extend the scope of the researcher's understanding of the phenomena. Whatever detailed descriptions are provided will enable others to understand similar situations so that they can extend these understandings in further research (McMillan & Schumacher, 1993).

1.9.3 Credibility

McMillan and Schumacher (1993) point out that while reliability may be a threat to much qualitative research, validity can be considered to be its great asset and strength. If one takes the aim of the qualitative research design into account, the detailed description of the situation and the events add to the credibility of the study.

1.9.4 Methodology

The learners in this study were required to complete three different types of projects during the last year of school. The learners' behaviour while completing the three types of projects was observed. The teacher of this class kept a journal in which details of observed behaviour, the comments made by the learners during the learning process, and the discussions with the learners were recorded. The events in the classroom, and the assessment of the outcomes of three different types of projects were analysed by the researcher in order to determine the extent to which the different features that characterise learner-centred learning functioned when students made the transition to a more learner-centred classroom.

For each type of project, the learners reactions and assessments of the outcomes were analysed according to the following features of learner-centred learning:

- Cognitive and meta-cognitive factors
- Motivational and affective factors
- Social and developmental factors

- Individual factors

The assessment criteria used for the assessment of the outcomes of the projects are in line with the Department of Education in the Limpopo Province's guidelines.

1.10   Research design

A literature study was carried out to determine the current thinking on learner-centred learning and Outcomes Based Education in order to place the study in a wider context.

Learners were observed in the execution of three different types of projects. The completion of the tasks, and the assessment of the extent to which the learning outcomes were achieved, were also taken into consideration in order to identify the factors that need to be considered if learners are to benefit from a more learning-centred learning environment. The overall research design is that of a naturalistic inquiry set in a case study.

The three types of projects are set on three different levels of learner-centredness because although all the projects are learner-centred to some extent, the projects do not equally reflect the principles of learner-centred learning.

The three types of projects can be classified as follows:

Table 1.6: Project levels of learner-centredness

Projects designed largely in accordance with learner-centred learning principles	Projects that reflect fewer learner-centred principles	Projects that reflect very few learner-centred learning principles
The FutureKids Project	Prescribed CASS project	Class projects
Projects with high intrinsic motivation	Projects with a lower level of intrinsic motivation	Projects with the lowest level of intrinsic motivation

The researcher observed learners' reactions to different tasks. The completion and the quality of completed tasks (as determined by the assessment of the projects) were considered according to the affective, cognitive, motivational, social and individual factors. This was done in order to ascertain the degree of importance of each of these factors in the learners' readiness to benefit from learner-centred learning. The different reactions to and assessment of the different types of projects were compared to determine the extent to which each of the principles of learner-centred learning influences the learner's readiness to benefit from the more learner-centred learning environment.

1.11   Data collection methods

The data collection methods used for all the questions and sub-questions of this study are the same. They are:

- **Participant observation**

    As the researcher and the teacher in this instance are the same person, observation of the class and classroom events is inevitably subjective to some degree. The researcher took care to be self-critical and to evaluate observations over time. These observations were recorded in tables and re-evaluated over time. The researcher was aware of interactive elements that can make the study too subjective and (in so doing) limit the internal validity of the research.

    The learners' reactions to the work, in groups and individually, expressed in behaviour and verbally, was observed by the researcher.

    The learners were observed in a non-artificial environment as the classes were part of the usual curriculum for the learners. The composition of the class was not manipulated by the teacher in any way.

- **Interviews and focus group discussions**

The learners were drawn into discussions by the teacher throughout the year. They were encouraged to express their feelings and frustrations with the learning process. The learners were also asked certain questions in small groups and individually. These questions mainly concerned the personal significance of the projects – whether or not the learners felt they were learning, and the relevance of the projects to their learning and experience. Focus group discussions on the topics of learner-centredness and learners reactions were held with some of the other teachers at the school in order to ascertain whether certain reactions were observed *only* in the computer-rich classroom or whether other teachers also noticed the same reactions in their classes.

- **Analysis of assessment results**

    The class projects and the CASS projects were formally assessed according to the principles prescribed by the Department of Education. The FutureKids projects were assessed according to principles that were not prescribed by FutureKids, but that were more in line with the assessment of the other projects, in order to have a common base to analyse the assessment.

    The results of the assessment of the three projects were analysed in different ways according to the principles of learner-centred learning as defined by the APA.

1.12 Limitations of this study

- The scope of this study is limited by the nature of the study and the limited time available for the study. The study is an exploration into the factors that can contribute to learner's reactions to the prescribed projects in the computer class. Only one group of learners were observed while they were reacting to three different types of projects.

- The findings of this qualitative study cannot be reliably generalised because the sample of learners was limited to the learners who had

elected to take the school subject Computer Studies and because the sample is too small and limited. The learners observed in the sample came from only one school.

- The learners were all from one year's intake. Race was not taken into consideration for this study because the learners all came from a behaviourist teacher-centred learning environment.

- The differences in background and culture of the learners were not researched in depth prior to the study. The differences in gender, language of tuition and the level at which the learners took the subject Computer Studies, were all taken into account.

- No attempt was made to determine the learning styles of the learners.

- The characteristics of the present generation, or generation-N, have been researched in the USA and may not be generalisable to the present generation of South African learners. Similarly the characteristics of the present generation of learners in different areas of South Africa was not taken into account

- The learners in this study are of roughly the same age and live in the same rural environment. Differences in prior experiences and cultural backgrounds of learners were not measured or discussed in any way. It is known that these differences influence learning. But since teachers in a normal teaching situation would not be to privy to detailed information of this kind without undertaking special investigations, the researcher did not obtain any specific knowledge about learners' individual backgrounds.

- The assumption that the learners share a certain knowledge base was predicated on the fact that the learners are all in the same grade at school and have been at this school for at least one year prior to the start of this study.

- The researcher did not compare the developmental stages of learners. Although there may be great differences in learner experiences, the

scope of the study is too small to research the developmental factors of each learner. Thus, although learners were deemed to share more or less the same developmental level, the individual differences in learner developmental levels were not taken into account.

- The pool of available research on learner-centred learning in South African classrooms is very small.

1.13   Overview of the study

Because the researcher attempted to indicate the dynamic and interactive nature of the factors of learner-centred learning, she complied the document in the three sections that are indicated in the table below.

Table 1.7: Overview of the study

Section 1	The introduction to the study, the context of the exploration, and the research methodology of the study
Section 2	This section consists of three chapters that are intended to be read as a unit. They comprise a literature review that identifies the concepts used, the "story" of the classroom events as they unfolded, and, lastly, the interpretation of classroom events.
Section 3	Conclusions and recommendations

Section 1	**Introduction and contextualisation of the study**

Section 2

Literature Review: (Chapter 2)

The classroom events as they unfold (Chapter 3)

Interpretation of classroom events according to APA principles (Chapter 4)

Section 3	**Conclusions and recommendations (Chapter 5)**

Section 4	**References (Chapter 6) Appendices**
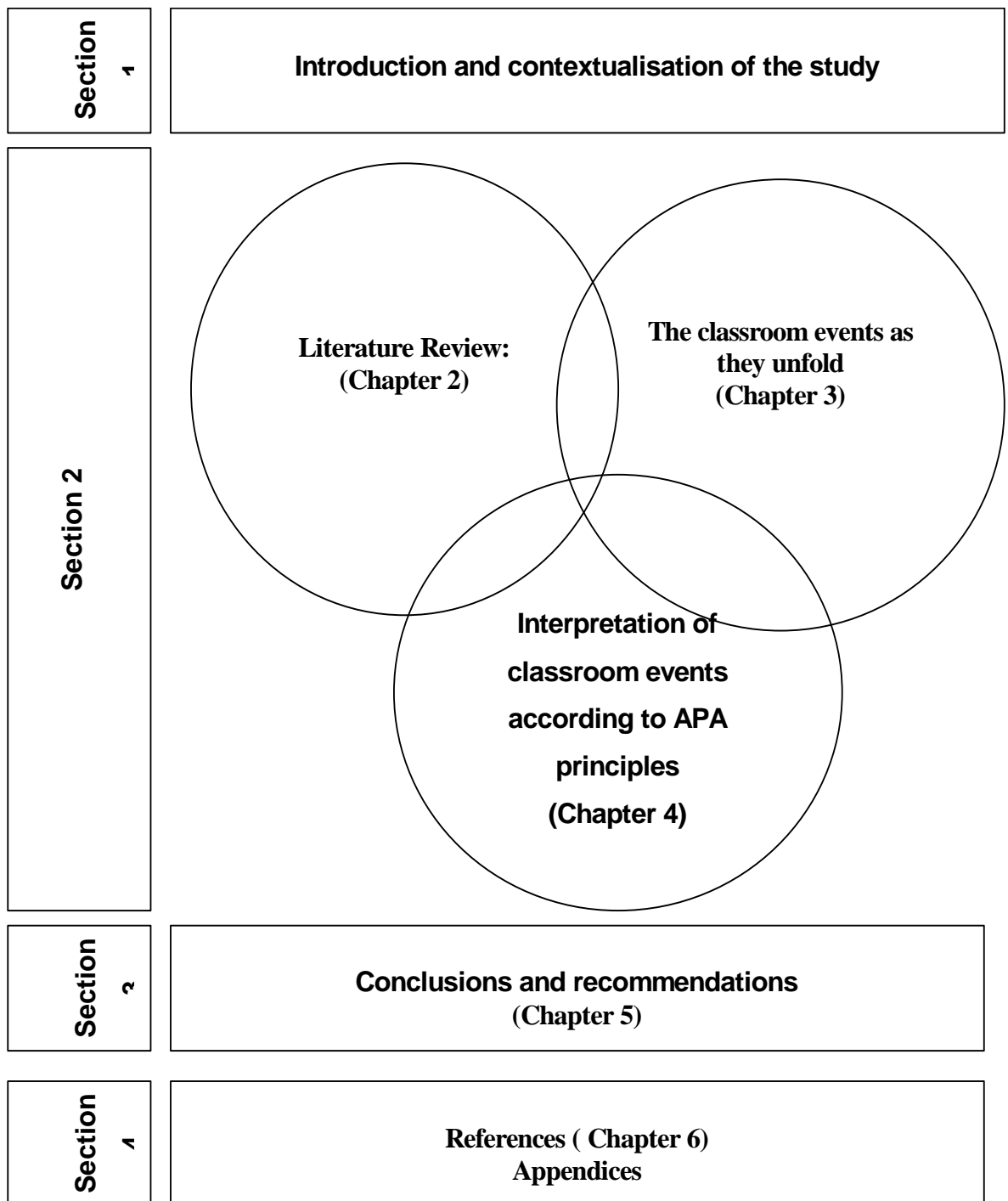
Figure 1.2: Diagrammatic illustration of the overview of the study

1.14   Ethical considerations

The photograph of learners in the classroom does not depict learners in this study.

1.15   Definitions and acronyms

Below are some definitions of the major concepts used in this study.

- **Constructivism**

  Constructivism is a theory that states that people learn by means of constructing their own knowledge by actively asking questions, solving problems and interpreting events in order to reach an in-depth understanding of their world and experiences (Marlowe & Page, 1998).

- **Outcomes Based Education (OBE)**

  Outcomes Based Education is a new approach to education that has been adopted by the South African Department of Education. It is based on constructivist learning theory and places the emphasis on what learners are able to do, understand, know and become, and its activities focus on (or are "based on") the results of the educational process (the *outcomes*) (Northern Province Department of Education, 2000; Vermeulen, 2000).

- **Continuous Assessment (CASS)**

  This is assessment that takes place over a period of time and that is integrated into the learning process. It comprises several assessment methods (Northern Province Department of Education, 2001: 5, Vermeulen 2000). In this study, *CASS projects* refer to the projects prescribed by the Limpopo Department of Education for completion and assessment.

- **Portfolios**

  A *portfolio* is a carefully compiled collection of a learners work that will show the learner's efforts, progress and achievements in one or more areas (Paulson, Paulson & Meyer, in Van Niekerk, 1998).

- **Project-based learning**

  Project-based learning creates unique learning experiences because by means of it learners can engage in activities that help him or her to explore events or concepts that are personally relevant and that are pitched to his or her current knowledge. This enables the learner to construct new knowledge (Open Learning Technology Corporation, 1996; Jonassen & Mayes, 1993).

- **Learner-centred learning**

  Learner-centred learning is defined as learning where the learner is the main character in the learning process: he or she takes the initiative, controls the learning process, and actively learns in a socially interactive way (Hansen, 2000).

- **The American Psychological Association (APA)**

  The American Psychological Association is a professional and scientific body with more than 150 000 members in the United States of America. The members of this association have carried out extensive research into education, psychology and other fields, and many have contributed to much of the theory that is utilised in education.

1.16   Summary

This study reports on an exploration of the factors of learner-centred learning that need to be considered in order to identify the factors that influence learners as they make a transition from a traditional, more learner-centred learning environment. This section has provided a framework for the study. In section 2, the events will be regarded from the following three different perspectives:

- A review of the literature in order to find out what we already know about the topic as well as to establish what existing knowledge can be used as tools for this exploration

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- The unfolding events in the classroom as they are interpreted in the light of the APA principles of learner-centred learning

- The interpretation of those events in the light of the research questions

Chapter 2

Literature review

2.1 Introduction

This study explores the transition of one group of learners from a teacher-centred to a learner-centred learning environment, and aims to identify the factors that need to be considered when making such a transition.

In the first chapter of this study, the researcher presented a framework for the study. In this chapter the issues that need to be considered will be discussed in the light of the existing literature.

Firstly, let us consider a model of learning and learner-centred learning. The different principles of learner-centred learning, as proposed by the APA, will be reviewed in the light of the literature. Finally, the researcher will review the literature that describes possible models for the application and assessment of Outcomes Based Education in South Africa.

The figure below offers a structure for the discussion of the relevant literature in this chapter. The diagram is used throughout the chapter so as to facilitate the reading of the chapter. In the first diagram, the shaded areas indicate the research question and the main parts of the chapter. In the subsequent diagrams, the highlighted areas indicate the topics under discussion.

Research question : What are the factors that should be taken into consideration for the learner to make a successful transition to a more learner-centered learning environment?

Part 1: Theoretical background underlying the concepts explored

Theoretical background underlying learner-centred learning: Model of learning

Aspects of learner-centred learning as identified by the APA

Cognitive and meta-cognitive aspects

Emotional and affective aspects

Develop-mental and social aspects

Individual differences

Outcomes Based Education (OBE) in South Africa
Projects
Assessment of student work

Part 2 Literature providing tools to investigate factors

Cognitive and meta-cognitive aspects

Affective and emotional aspects

Developmental and social aspects

Individual differences

Figure 2.1: Diagram representing the structure of chapter 2

Part 1: Exploring the theoretical background underlying the concepts

Research question : What are the factors that should be taken into consideration for the learner to make a successful transition to a more learner-centered learning environment?

Theoretical background underlying learner-centred learning: Model of learning

Aspects of learner-centred learning as identified by the APA

Part 1: Theoretical background underlying the concepts explored

Cognitive and meta-cognitive aspects

Emotional and affective aspects

Develop-mental and social aspects

Individual differences

Outcomes Based Education (OBE) in South Africa
Projects
Assessment of student work

Figure 2.2: Theoretical background: the international context

2.2   Theoretical background

The concepts of how learners learn in a learner-centred learning environment is based on the constructivist model of learning, which defines how learners learn effectively and what the roles of the participants in the learning process should be.

2.2.1   The constructivist model of learning

In contrast to the objectivist tradition that holds that meanings exist "objectively" outside of the experience of the learner and need to be found and then understood (Duffy & Jonassen, 1992), the constructivist model holds that although the we experience a real world that does indeed exist "outside" of ourselves, we ourselves actually construct the meanings that we

project onto the world – however "objective" the outside world may seem. This means that many different and varied meanings can be projected onto any particular event, concept or phenomenon (Duffy & Jonassen, 1992). Learning is an active process by means of which learners construct concepts and ideas on the basis of their existing knowledge, ideations, attitudes, emotions and prejudices (Kearsly, 1998) By asking questions, interpreting events and solving problems, i.e. active involvement in exploring events and concepts, the learner constructs and develops his or her own understanding of the world and so learns new things (Marlowe & Page, 1998).

The teacher helps the learner to *construct* his or her own knowledge by giving the learner the opportunity to explore concepts and apply ideas (Slavin, in Potgieter & Cronjé, 1998) A learner understands new events in relation to his or her past experiences, and the active learning process helps the learner to develop logical thinking (Marlowe & Page, 1998).

In contrast to the constructivist model of education, the traditional approach is seen as being content-driven, with little involvement required from learners who are expected to be passive and receptive. In this kind of traditional teacher-centred learning, teachers deliver their received wisdom and certified information to passive recipients, and the main emphasis is on practising rote learning rather than acquiring any problem solving skills (Northern Province Department of Education, 2000).

2.2.2   Learner-centred learning

The concept of learner-centred learning is based on the belief that people learn more effectively when they are *interested* in a topic or problem and thus are motivated actively to seek a solution to such problems (Norman & Spohrer, 1996). This idea is also central to Bruner's constructivist learning theory in which he states that the learning process is an active one in which the learner must discover principles for himself/herself and that instruction must be offered in the context of experiences that make the learner willing and eager to learn (Kearsley, 1998).

Learner-centred learning regards the learner as the main character or protagonist in the learning process or "drama" – the one who takes the initiative and therefore learns in a socially interactive way. This model is in contrast to that of the passive recipient of information in a system where the teacher is *the* authority through whom all learning is made possible (Hansen, 2000). Because the learner is an active agent in learning, learner-centred learning places "the control of the learning process in the hands of the learner" (Open Learning Technology Corporation, 1996: 05).

Table 2.1: Summary of differences between objectivism and constructivism

Objectivist model	Constructivist model
Meaning exists outside the learner, in a real world that is independent of the learner.	Meaning is constructed by the learner – although a real world does indeed exist outside of the learner.
A learner acquires knowledge passively.	Learners are actively involved in constructing knowledge.
The teacher controls the learning situation by "giving" correct and immutable knowledge to passive and receptive learners.	The learner controls the learning process.
The emphasis is on rote learning.	The emphasis is on problem solving.

The American Psychological Association has identified the following identifying features or premises of learner-centred learning (Lambert & McCombs, 1998: 9-11):

- Learners have different frames of reference and perspectives because they come from different backgrounds and experiences and have different goals and hopes. These differences must be respected if learners are to become engaged in their own learning process and if they are to take responsibility for their own learning.

- Learners manifest unique differences in their states of mind, talents and learning styles and these must be taken into account if they are to identify the challenges and learning experiences they need for self-development.

- Learning is a constructive process. Learners construct knowledge most effectively if the content concerned is relevant and personally meaningful to the learner. The learner connects with what is being learned because of his or her prior knowledge and experience.

- A friendly and encouraging social environment in which the learner feels appreciated, respected and valued creates a situation in which learning occurs best.

- Learning is a *natural* process because learners who are respected are *naturally* curious and therefore want to learn and improve their situations.

- Although negative feelings and thoughts may interfere with the learning process, the learner should not be blamed for these. Negative feelings must somehow be dealt with and neutralised.

Based on Lambert and McCombs (1998:10), on the basis of the premises outlined above, have identified the following categories of factors that impact on learners and learning.

- cognitive and meta-cognitive factors
- motivational and affective factors
- developmental and social factors
- individual differences

Because these categories or domains together constitute a complete picture of learner-centred learning, the researcher used them as categories to scaffold the framework of this study.

2.2.2.1 Cognitive and meta-cognitive aspects of learning

As individual understanding is based on the existing knowledge and experiences of the learner, (Jonassen & Mayes, 1993), and most effective learning takes place if the knowledge is personally meaningful to the learner

(Lambert & McCombs, 1998), placing the learning experience in a context that is meaningful to the learner leads to the construction of useful knowledge that can be transferred to new situations (Jonassen & Mayes, 1993).

Shin (1998) describes the self-regulating ability of the learner as the ability of the learner to participate actively in the learning process. This ability includes:

- strategic knowledge
- self-efficacy
- ownership
- orientation towards mastery
- self-reflection

Meta-cognition is the process of thinking and understanding a person's own cognitive processes (Flavell, in the Open Learning Technology Corporation, 1996: Learning Concepts). It is the active monitoring and control of the cognitive processes, and is central to planning, problem solving and evaluation (Open Learning Technology Corporation, 1996).

Sinitsa (2000: 5) points out that some "meta-learning" activities, besides the mastering of new knowledge, are also performed during a learning task. These are:

- determining the current status of one's knowledge in relation to a task
- setting learning objectives
- the search for appropriate information sources and tools
- selecting adequate units for learning
- arranging necessary activities wherewith to practise the application of the new knowledge
- monitoring and sequencing learning
- assessing one's own learning

The "meta-learning" that Sinitsa (2000) refers to has the same control and monitoring functions that are described by Flavell (Open Learning

Technology Corporation, 1996), and is regarded by the researcher as being synonymous with Flavell's concept.

Alexander and Murphy (1998) cite Garner who states that learners who reflect on the easiest way in which to learn and perform, and who use that reflection to change the ways in which they behave, are more likely to succeed than those who do not do this.

2.2.2.2 Motivational and affective factors

"Motivation is the concept that is intended to explain one of the most elusive questions: Why do we do what we do?" (Ginsberg & Wlodkowski, 2000: 1).

Motivation to learn is what underpins a student's willingness or reluctance to participate in the learning process. Thus even *unwillingness* is underpinned by various valid reasons or goals (Lumsden, 1994).

In this study, the researcher distinguishes between **intrinsic** and **extrinsic** motivation.

Intrinsic motivation describes motivation that comes if the task is engaged in for its own sake and not for the sake of reward (i.e. if the "reward" resides in the task itself). Learners who are intrinsically motivated tend to spend more time and effort on the learning task (Malone, 1981).

Extrinsic motivation happens when external rewards are used to motivate the learner to complete a task. Under some conditions, external motivation destroys intrinsic motivation. Performance on certain tasks is also, under some conditions, rendered inferior by extrinsic motivation (Malone, 1981).

It is desirable for learners to participate in learning activities because of the pleasure and satisfaction that they get from these activities. "Intrinsic motivation is superior and preferable to extrinsic motivation" (Mwamwenda, 1994: 183).

What is intrinsically motivating learning?

Malone (1981: 335) organises the characteristics of an intrinsically motivating learning environment into the following three categories:

- challenge
- curiosity
- fantasy

Malone (1981: 336) stresses the importance of challenge as an intrinsically motivating factor, quoting Csikszentmihalyi (1979) in saying that for an activity to qualify as challenging it needs to:

- have flexible levels of challenge so that a person can match his or her levels of performance to the actions that are required
- have a clear set of criteria for performance
- provide feedback to the learner
- have a broad range of challenges

Malone (1981) points out that a challenging environment must have goals that are personally meaningful to the learner, preferably on multiple levels. He also points out that curiosity is aroused by incongruity and complexity (Malone, 1981). Hunt and Piaget, in Malone (1981) postulate that there is an *optimal* level of complexity – and that too much or too little is not interesting.

Zimbardo (Malone, 1981) points out that the motivation to perform a task is increased if a person is given a choice or the illusion of a choice.

Keller, in Kearsly (1998) describes four components that would make a learning activity motivating. They are : "arousing interest, creating relevance, developing an expectancy of success, and producing satisfaction through intrinsic or extrinsic rewards" (Kearsly, 1998:online).

Positive attitudes, beliefs, perceptions and feelings should be motivating and should be developed in a classroom (McCombs & Whisler, 1997).

Self-esteem is an important factor in intrinsically motivating tasks because a challenging environment activates a person's self-esteem. The positive side to this is when the learner rises to the challenge and is successful, she or he

feels good about herself or himself. But the opposite is also true, and when a learner is not successful, she or he may be feel demotivated (Malone, 1981).

Ginsberg and Wlodkowski (2000) define four conditions for intrinsic motivation that emphasise the social and affective conditions of the learner:

- Inclusion: the learners and teacher should feel respected by and connected to one another.

- A positive attitude: a favourable disposition toward learning should be fostered by personal and cultural relevance and choice.

- Enhancing meaning: challenging learning is learning that confers social merit on the learner and gives him or her a sense of personal meaning.

- Engendering competence: learners should feel that they are effectively learning something of value to themselves.

The major measurable motivational outcome is *effort*. "Effort will occur on two basic requisites: the task must be valued by the student and the student must believe himself to be capable of successfully completing the task" (Small, 1997).

2.2.2.3   Developmental and social aspects of learner-centred learning

The importance of learning occurring in the context of social interaction is emphasised by the statement: "Learning occurs best in an environment that contains positive interpersonal relationships" (Lambert & McCombs, 1998: 9-11). Johnson . and Johnson (1994) state that there are three ways in which learners interact while learning: in competition, individually, with no attention to others, or towards a goal shared with others.

Vygotsky supports this by stating that full cognitive development requires social interaction (Kearsly, 1998). The importance of the peer group of the learner and interactions in the classroom are thus very important for the learning process.

OBE acknowledges the importance of social interaction in the learning process by requiring learners to engage in group projects. Cooperative learning forms an important part in more learning-centred learning environments.

For cooperative learning to be successful the learners need to work towards a shared goal in a situation in which the contribution of each member is valued and necessary, and where the goal is "owned" by all the members of the group (Johnson & Johnson, 1994). All members must be held equally responsible for the outcome by all members of the group (Johnson & Johnson, 1994).

Potgieter and Cronjé (1998) conclude that when a learner is exposed to the "new" constructivist approach to learning and working in groups, many learners do not necessarily know how to cope. They have to be *taught* to learn in cooperative learning situations. They must learn to accept responsibility for the learning in the group. Equally, the success of all the learners in the group must be experienced and shared. As learners learn to work together, they become more and more ready to accept the challenges of learner-centred learning.

Salomon and Perkins (1998) point out that learners must learn how to participate in and use the social context – as, for example, in knowing when and how to ask for help. In this way, they create reciprocal situations in which help is exchanged.

2.2.2.4   Individual differences as an aspect of learner-centred learning

Learners each come to the learning situation with their own personalities, learning styles, motivation and focus. When a learner creates knowledge based on his or her previous knowledge, he or she has to imbue concepts or things with personal meaning.

Each individual has a typical way of thinking remembering and solving problems (Open Learning Technology Corporation, 1996). Learners come to the learning experience with prior knowledge that is peculiar to themselves

and with different beliefs and backgrounds that must be respected if learners are to participate actively in their learning processes (Lambert & McCombs, 1998). Differences in talents, emotional states, abilities and needs must all be taken into account if learners are to participate successfully in the learning and self-development that they need (Lambert & McCombs, 1998).

Learners also think and learn in different ways and tend to have a consistent approach to learning.(Litzinger & Osif, in Blackmore, 1996). Understanding such preferences is important if one wants to get learners involved in learning experiences. Such preferences can also influence the learning that learners achieve in a positive or negative way (Blackmore, 1996). Lambert and McCombs (1998) point out that learners need to examine and modify their learning preferences if such learning preferences do not facilitate a learner's progress towards his or her learning goals.

In general, sensitivity to individual differences in learners in the classroom and variations in learning materials is needed if one hopes to accommodate all learners and if one wants to help learners to learn effectively in a learner-centred classroom (Lambert & McCombs, 1998).

2.3   Conclusion

Weinstein (1998) sums up the gist of the APA principles when he states that learning happens best when learners are challenged to link new information with existing knowledge in ways that are personally meaningful, are when they are intrinsically motivated to make an effort. Such effort, Weinstein (1998) maintains, should be supported by positive emotions, personal interest and control, and all learners should be respectfully acknowledged among their peers despite individual differences among learners.

2.4   The national and local context: OBE

The next part of this chapter explores a relevant selection of the literature that deals with the implementation of OBE in South Africa and the assessment practices prescribed. The relevant section is highlighted below.

Research question : What are the factors that should be taken into consideration for the learner to make a successful transition to a more learner-centered learning environment?

Theoretical background underlying learner-centred learning: Model of learning

Aspects of learner-centred learning as identified by the APA

Cognitive and meta-cognitive aspects

Emotional and affective aspects

Develop-mental and social aspects

Individual differences

Part 1: Theoretical background underlying the concepts explored

Outcomes Based Education (OBE) in South Africa
Projects
Assessment of student work

Figure 2.3: Theoretical background: the national context

Nationally the model of education used in this country has changed from the behaviourist teacher centred model to the constructivist model of learning with the introduction of Outcomes Based Learning in South Africa since 1994.

2.4.1 Outcomes Based Education

Outcomes Based Education (OBE) is a learner-centred approach to education because the emphasis is on what the learners wants to achieve and what the learner should be able to know, to understand, do and become − the so-called "outcomes" (Northern Province Department of Education , 2000: 5). In the OBE approach to education, all teaching and learning activities are aimed at the outcome that will be attained at the end of the process (Vermeulen, 2000).

South Africa has opted to implement transformational OBE which aims at "equipping all learners with knowledge, competence and the orientation needed for success after they leave school or have completed their training; its guiding vision is that of a thinking competent future citizen. Learners must be equipped to transfer success at school to life in a complex, challenging and transforming society" (Northern Province Department of Education , 2000: 9).

2.4.2 The design of the learning experience

In the constructivist model of learning, learning is facilitated when the learner is actively involved (Salomon & Perkins, 1998) in a learning situation that is personally meaningful to him or her (Jonassen & Mayes, 1993). Learners need to construct knowledge that is based on their existing knowledge (Open Learning Technology Corporation, 1996). When one designs projects for learning, one needs to take these factors into consideration so that one can provide the learner with a meaningful learning experience.

Norman and Spohrer (1996) point out that intrinsically motivating problems that are set in realistic situations are a major focus of learner-centred learning. The characteristics of intrinsically motivating learning experiences are discussed below.

2.4.3 Project-based learning

In terms of the constructivist learning theory that underpins Outcomes Based Education, learners construct new ideas and concepts from the basis of their existing knowledge and information, and they must be presented with information in a way that is suited to a learner's current understanding (Open Learning Technology Corporation, 1996). The locus of control over learning in a constructivist learning environment rests with the learner (Open Learning Technology Corporation, 1996), and not with the teacher.

The placement of learning experience in a context that is meaningful to the learner leads to the construction of useful knowledge that can be transferred to new situations (Jonassen & Mayes, 1993). Rogers states that learning is facilitated in a learner-centred environment in which the learner can safely

engage with and confront practical, social, personal or research problems (Kearsly, 1998).

One of the ways to achieve this context and confrontation is to give the learners a project to complete because by doing this, one confronts the learner with problems that have to be solved and provides the context within which the learner can construct useful knowledge.

Using projects to generate learning experiences is one of the ways in which OBE confronts the learner with a context that facilitates learning.

2.4.4 Assessment

Assessment is the process by means of which information about students is gathered. Different methods such as observation of the student, testing of knowledge and skills or the examination of student product, may be used (Hart, in Le Roux, 1999).

Mentowski points out that "assessment is a means to educational goals, not an end in itself" (Mentowski, 1998: 303).

Baron's (1998) characterises learner-centred assessment as follows:

- It should help learners to function successfully in society by representing the content skills and dispositions that society values.
- Assessment tasks must also function as learning events.
- Learners must be encouraged to "self-assess" their progress. Publicly stated performance criteria must be published so that the learners can monitor their own work.

The Department of Education of South Africa emphasises the importance of a variety of methods by which information about the learner's competence should be gathered. These methods include, among others, tests and examinations, learner portfolios, self-and peer assessment, and projects (Department of Education, 1997)

Assessment criteria are adduced so that a teacher has benchmarks wherewith to determine whether or not certain outcomes have been reached. These criteria are derived from the outcomes, and form the framework for assessment (Department of Education, 1997).

Summative assessment gives information about the learner's competence at the end of a learning experience, a lesson or a phase. Summative assessment is usually applied in a formal manner in the form of a test, examinations, assignments or demonstrations (Vermeulen, 2000).

Baron (1998) states that learner-centred performance-based assessments must be phased in over a period of time, and that tasks should be:

- contextualised (i.e. authentic and based on the real world of the learner's experience)
- engaging
- non-trivial
- challenging

2.4.4.1 Portfolio assessment

A portfolio is a purposeful collection of a learner's work that will "exhibit the student's efforts, progress and achievements in one or more areas" (Paulson, Paulson & Meyer, in Van Niekerk, 1998: 82).

Portfolio assessment is regarded as a means wherewith to inform a learner about his or her actual performance level (Tillema, 1998). The portfolio focuses on the assessment of the learner's performance and development − and *not* on his or her ability to recall facts, as with traditional tests (Van Niekerk, 1998: 85). Van Niekerk points out that learners should decide on most of the content of the portfolio and that it should include elements of self-reflection (Van Niekerk, 1998). At the same time it is pointed out that learners will not know automatically how to compile a portfolio and that they will need guidance (Van Niekerk, 1998). Self-evaluations should also form part of portfolio assessment (Ascher, 1990)

Portfolio assessment is regarded as part of summative assessment. Portfolio assessment is the assessment of a collection of work completed over a period of time. It demonstrates to what extent the learner achieved the required outcomes (Vermeulen, 2000). Tillema (1998) points out that although it provides feedback about the level and quality of the learner's performance in a concrete way, the validity of portfolio assessment as an assessment tool has not yet been established.

The content of the portfolio should not be prescribed too rigorously. The selection process, by means of which the learner decides what to put in, reflects the meta-cognitive maturity of the learner. The process of attaching meaning to the contents of the portfolio promotes meta-cognitive growth (Herbert, 1998).

According to Paris (1998), portfolio construction and assessment confer the following advantages on learners:

- The collection of work in a portfolio places the emphasis on work samples taken from the regular curriculum.
- It provides ongoing information about what and how learners are learning.
- It provides a system for collecting and monitoring students' work.
- It does not require extra work without any apparent purpose on the teacher's part.
- It can provide increased information to parents about learners' work.
- Learners learn to take responsibility for collecting evidence of their own work and to assess their own progress.
- They become more actively involved in applying criteria of learning and motivation, and in understanding the principles involved as they become engaged in self-assessment. This enhances learners' motivation and ownership of their own learning.

Paris (1998) points out that three kinds of evidence should be considered across the curriculum when compiling a portfolio:

- A portfolio should include samples of daily work, as well as the concrete artefacts related to learner performance in class.
- A portfolio should include evidence of the process of learning so that others can see their thinking in their work.
- Teachers and students should include self-reflections from time to time that describe how they perceive their abilities and progress.

Barrett (1999) agrees with Paris (1998) in the content that he requires for a portfolio, but adds that learner goals, teacher feedback, clear and appropriate criteria for the evaluation of the work, and standards and examples of good work should be included in the portfolio.

Barrett (1999) describes three approaches to assessment: portfolio; teacher-centred; learner-centred, and mixed model. In the teacher-centred model, the teacher takes responsibility for the portfolio and there is little or no self-assessment by the learner. In peer assessment, peers are involved in assessment. In the student-centred model, students are in charge of their own portfolios and they choose what to include. They also show evidence of learner self-assessment, peer-assessment and collaboration with others such as parents, teachers and fellow students.

2.4.4.2   Continuous assessment

Worthen (1993) states that the proponents of alternative assessment maintain that a learner's achievements cannot be properly assessed on the basis of the limited information obtained from an examination or test. They need to be assessed from an examination of the learner's processes and products, which would include self-assessment checklists, products such as diaries and portfolios, and performances such as typing tests. Worthen (1992) argues that alternative assessment such as portfolio assessment (which is continuous assessment), will provide more information and should become the principal assessment procedure in the classroom.

Assessment in Outcomes Based Education is designed to help learners to achieve success. It is integrated with learning and is also continuous in nature (Bertrams, in Vermeulen, 2000: 67).

Up until 2001, performance testing of grade 12 learners was based on a single written examination at the end of grade 12 (Northern Province Department of Education, 2001: 5). Although Outcomes Based Education is not fully implemented beyond grade 8 in 2001, the Department of Education decided to implement continuous assessment for grades 10 to 11 in all school subjects from 2001 (Northern Province Department of Education, 2001: 6).

Continuous assessment is assessment performed over a period of time, on an ongoing basis. It may include various assessment methods, such as tests, assignments, portfolios, projects and examinations (Northern Province Department of Education, 2001: 5).

The Department of Education (2001: 5) points out that the benefits of CASS Assessment include:
- paced learner assessment
- assessment in authentic contexts
- assessment carried out by an educator who works directly with the learner
- the promotion of formative assessment and continuous feedback about learning and teaching processes
- better informed summative content

As a general guideline, the Department of Education prescribes the following techniques for assessing the subject's skills, knowledge and attitudes (Northern Province Department of Education, 2001: 6):
- oral and practical work
- classroom work based on tests and class work
- assignments and homework
- portfolios
- projects

- site visits

- role plays

- controlled examinations including trial/mid-year exams

For the CASS assessment, the learner portfolio should include the following (Northern Province Department of Education, 2001: 7):

- summary sheet as contents page and moderation record

- tests that have been written

- assignments and projects

- practical work – planning, and how it was assessed

- classwork and homework books (wherever such counts toward the CASS mark)

Continuous assessment is seen as a high-quality strategy and a way to "account publicly for the achievement of learner outcomes" (Northern Province Department of Education, 2001: 1). For this reason, marks have to be moderated internally and externally. The principal and heads of department do internal moderation, the district carries out the management, and external moderation is done by SAFCERT and a provincial moderation panel for each region (Northern Province Department of Education, 2001).

Part 2:   Tools suggested by the literature for the exploration of the classroom events

To answer the main research question and identify the factors that influence the learners' performance when making a transition to a more learner-centred learning environment, not only the factors in of each aspect of learner-centred learning must be considered, but also the conditions for effective learning. The literature provides us with certain tools to approach the question. The relevant section is highlighted in the figure below.

Research question : What are the factors that should be taken into consideration if the learner is to make a successful transition to a more learner-centred learning environment?

Theoretical background underlying the learner-centred learning: Model of learning

Aspects of learner-centred learning identified by the APA

Part one: Theoretical background underlying the concepts that have been explored

Cognitive and meta-cognitive factors

Emotional and affective factors

Develop-mental and social factors

Individual factors

Outcomes based education in South Africa
Projects
Assessment of student work

Part 2 Tools suggested by the literature to investigate factors

Cognitive and meta-cognitive factors

Affective and emotional factors

Developmental and social factors

Individual differences

Figure 2.4: Tools suggested in the literature.

2.5 Effective learning

In Gagné's theory there are several types of learning, each requiring differing techniques of instruction (Kearsly, 1998). Five major types of learning are identified: verbal information, intellectual skills, cognitive strategies, motor skills and attitudes that are relevant in the classroom situation (Kearsly, 1998; Mwamwenda, in Potgieter & Cronjé, 1998). Gagné suggests that the following sequence of instructional events satisfies the conditions necessary

for each progressive step and so facilitates effective learning (Kearsly 1998; Potgieter & Cronjé, 1998), These nine steps are:

- gaining attention
- informing learners of the objective
- stimulating recall of prior learning
- presenting the stimulus
- providing learning guidance
- eliciting performance
- providing feedback
- assessing performance
- enhancing retention and transfer

2.6 Cognitive and meta-cognitive aspects of learning

When learning the learner must gain new knowledge and skills. The constructivist model of learning proposes that the knowledge is constructed based on existing knowledge.(Kearsly, 1998). A part of this process of constructing knowledge is asking questions, interpreting events and solving problems (Marlowe & Page, 1998). This process includes the cognitive and meta-cognitive aspects of learner-centred learning. In order to learn, the learner must:

- **Plan**   Shin (1998) points out that the learner must select and arrange the learning strategies needed to perform the task, select adequate units for learning and search for appropriate information sources and tools (Sinitsa, 2000).
- **Analyse and strategise**   The learner must analyse the difficulty level of the demands of the task (Shin, 1998) in order to determine his or her own level of knowledge in relation to the task (Sinitsa, 2000). S/he must then decide on the strategies needed to solve the problem (Shin, 1998) and set learning objectives (Sinitsa, 2000). In addition the learner must analyse his or her own strengths and weaknesses, learning styles, learning strategies and motivation (Shin, 1998).

- **Monitor**   Learners monitor their own progress and make sure that they are moving toward the goal (Shin, 1998; Sinitsa, 2000). They need to check the strategies they have selected and must decide if they need to adapt them (Shin, 1998). In addition, they must arrange whatever activities are necessary to practise the application of their new knowledge (Sinitsa 2000).

- **Revise**   Learners must modify their strategies when problems exist (Schmitt & Newby, 1996, in Shin 1998). Learners must also evaluate their learning at the end of the project so that they can find out to what extent they have reached their learning goal (Shin, 1998). Alexander and Murphy (1998) cite Garner when he states that learners who identify the ways in which they learn and perform best and who use that reflection to change the way in which they behave, are more likely to succeed than those who do not do this. Sinitsa (2000) points out that a learner's assessment of his or her own learning is a meta-cognitive task that should accompany learning.

- **Take ownership of their work**   Shin (1998) quotes Lebow (1955) who describes the learners' sense of "regulating their own learning" by building personal commitment to meaningful goals and making changes, as well as the processes of learning on their own as ownership.

- **Validate their own work**   From a constructive-developmental point of view, the process of constructing meaning that has personal validity, is self-authorship (Baxter Magolda, 1999). Learners need to assess their knowledge and learning and need also to reflect on their processes so that they can give a personal value to their learning (Sinitsa, 2000).

2.7   Emotional and affective factors

Motivation refers to the learner's willingness to learn (Lumsden, 1994). Intrinsic motivation is the motivation to do a task where the reward for doing the tasks lies in the satisfaction of doing the task, while external (or extrinsic) motivation is based on having a reward outside the task (such as marks).

Mwamwenda (1994) points out that possessing intrinsic motivation is more desirable than possessing extrinsic motivation.

Table 2.2 shows the factors of intrinsic motivation as derived form Malone (1981). It also shows other motivational factors (Kearsly, 1996).

Table 2.2: Factors of intrinsic motivation (Malone 1981 & Kearsly, 1996).

Factors of intrinsic motivation	Component(s) of the intrinsic motivation factor
Challenge	Flexibility
	Set criteria for performance
	Feedback
	Range of challenges
	Personally meaningful goals
Curiosity	Incongruity
	Complexity
Fantasy	Fantasy
Choices	Choice
Relevance	Relevance

Even if the task has been designed specifically to be intrinsically motivational, Ginsberg and Wlodkowski (2000) point out that there are four other conditions that are also prerequisites for intrinsic motivation:

- a feeling of mutual respect and connectedness between the teacher and the learners
- a positive attitude towards learning
- learning that has social merit and personal importance to the learner
- a feeling on the part of learners that they are effectively learning something that is of value to them

McCombs and Whisler (1997) note that positive attitudes and self-esteem also influence the motivation to learn. Malone (1981) states that when learners feel that they are up to the challenge of the task, this will enhance their motivation to perform a task. But when learners feel that they will fail in their performance of the task, their motivation is diminished.

2.7.1 Which factors impact negatively on the willingness to learn?

When extrinsic rewards are given, this may undermine the learner's intrinsic motivation because extrinsic rewards makes a project less intrinsically motivating (Lumsden, 1994)

The *personal relevance* of what a person is learning as a motivational factor is noted by Keller in Open Learning Technology Corporation (1996), Ginsberg & Wlodkowski (2000) and Malone (1981). However, when a learner does not perceive his or her needs accurately, he or she may fail to attach personal relevance to what he is learning (Forcheri et.al, 2000).

When a learner does not successfully meet the challenge of a task, this may give rise to a "fall in self-esteem and a subsequent loss of motivation" (Malone 1981: 360). Learners may resist learning in an environment where they feel vulnerable or have apprehensions about control (Ginsberg & Wlodkowski, 2000).

Anxiety can decrease the motivation to learn (Open Learning Technology Corporation, 1996). The willingness to learn may further be impeded by a student's fear of failure or because of fears of participating in class discussions (Teel & DeBruin-Parecki, 2001). Extrinsic motivation may undermine intrinsic motivation (Lumsden, 1994) and this may cause learners to put in a minimum of effort to obtain a maximum reward (Lepper, in Lumsden, 1994).

Learners may resist change in the classroom because they are used to the ways of doing things that they have already developed throughout their school careers (Teel & De Bruin-Parecki, 2001). They may feel comfortable

and familiar with the old ways of doing things (Teel & DeBruin-Parecki, 2001), and so resist new ways of learning.

Learners may not want to learn in a learner-centred classroom because they see school as a place where they are *supposed* to follow orders and where decisions should be made for them (Teel & DeBruin-Parecki, 2001).

2.8   Social and developmental factors

All individuals progress through stages of physical, intellectual, emotional and social development (Mid-continent regional educational laboratory, 1993, in Lambert & McCombs, 1998). The effectiveness of the learning experience is optimised when the material is presented at a level that is appropriate to the developmental level of the learners and where an awareness of the developmental stages can facilitate efforts to create optimal contexts for learning (Mid-continent regional educational laboratory, 1993, in Lambert & McCombs, 1998).

The characteristics of a particular *generation* of learners also give indications as to what is appropriate material and presentation. Don Tapscott (1999) calls the generation of learners younger than 22 "the Net generation" or N-generation. He argues that these learners grow up in a world where digital technology is part of the landscape. Most of these learners can use a computer and are connected to the Internet, or at least have some experience of that and are not afraid of technology. According to Tapscott (1999), these learners have the following characteristics in common:

They tend to be:
- exceptionally curious
- self-reliant
- "contrarian"
- focused
- able to adapt
- globally oriented
- high in self-esteem

He also points out that these children and young people are used to being active users, and so they do not want to be passive viewers of or listeners to information (Tapscott, 1999).

Learning is assisted when the learning environment provides interaction with others in a flexible and diverse setting (Mid-continent regional educational laboratory, in Lambert & McCombs, 1998).

If learning is to be effective, learners need to be respectfully and appropriately supported in their learning environments – in spite of the individual differences between them (Weinstein, 1998). They also need to be shown that their opinions are valued in the learning environment (Baxter Magolda, 1999; Lambert & McCombs: 1998). Learning not only takes place in a social context. According to the theory of Bandura, learners observe and model the behaviour of other people (Kearsly, 1998).

Where crucial social factors have been implemented in learner-centred learning, one may expect that cooperative learning will produce following advantages:

- better academic performance
- enhanced short- and long-term memory
- improved self-esteem
- improved intrinsic motivation and emotional involvement
- more pro-social behaviour and better interpersonal relationships within the peer group
- enhanced aspirations to achieve scholastically (Le Roux & Lippert, 1993)

Gohkale (1995) points out that group tasks must include both goals for the whole group and individual responsibility for the progress of the group if the group work to be effective.

Panitz (1996) distinguishes between cooperative and collaborative learning. He points out that cooperative learning is more concerned with the product of the learning process while collaborative learning is concentrates on the

interaction between the learners and the process of learning. Cooperative learning is more teacher-centred while collaborative learning is more learner-centred (Panitz, 1996). OBE requires cooperative learning as part of the learning-centred learning environment (Northern Province Department of Education, 2001).

In consideration of the factors mentioned above the following figure displays a summary of the elements of developmental and social factors according to which the events in the classroom will be discussed.

Developmental stage of self-authorship
Level at which the material is presented
Quality of the setting as far as atmosphere and diversity , respect and support is concerned
Use of the social environment – asking for and giving assistance

In cooperative learning:
 	
   ▪ individual accountability
   ▪ shared goals
 	
positive interdependence

Table 2.3: Summary of developmental and social factors that can be used as tools for the consideration of the classroom events

2.9 Individual differences in learner-centred learning

Learners not only come to the learning environment with a certain history behind them that colours their opinions, interests and goals, but also with differences in their learning styles, development, abilities, feelings of efficacy and various other needs (Lambert & McCombs, 1998). A person's learning

style also describes that person's distinct way of thinking, remembering, and problem solving (Kearsly, 1998).

Kolb's theory describes four distinctive styles of learning that permit one to classify learners as divergers, assimilators, convergers, or accommodators (Kearsly, 1998; Oughton & Reed, 2000). These learning styles are based on the way in which individuals *process* information. The individual learning style of the learners and the way in which the learning material is accommodated also suggest a variety of learning styles that need to be taken into account when considering the factors that influence successful transition to a learner-centred classroom (Blackmore, 1996).

The constructivist theory of Bruner holds that learning is the process by which an individual makes meaning of his or her experiences (Kearsly, 1998). The beliefs that a learner possesses about his or her own abilities and capabilities influence his or her behaviour and academic performance (Pajares, 2000). "Self-authorship means that the learners believe that one can construct knowledge claims, make one's own inner psychological life, and regulate relationships with others to maintain one's own identity" (Baxter Magolda, 1999: 39). The level of self-authorship is central to the way in which a learner constructs meaning and therefore to the effectiveness of his or her learning (Baxter Magolda, 1999).

According to Lambert &McCombs (1998), learners in a learner-centred classroom need to perceive that their individual diversities of background, abilities, cultures and experiences are accommodated and respected in the classroom. Sensitivity towards individual differences is required for effective learning (Lambert & McCombs 1998).

Shashaani's (1992) study concluded that girls had less self-confidence when it came to working on computers, and that girls reported fear and feelings of helplessness when confronted with computers. This significant gender difference was attributed to the socialisation process (Shashaani, 1992). Van der Voort et.al. (1998) found a difference in the use of electronic media (including computers) between the two genders in both the Netherlands and

Britain, but that when programmes offered on *television* were of a kind that girls liked, there was no differences.

Taking the elements into account, the following table combines the elements mentioned above into a table that can be used as a basis for discussing class observations of the individual factors that have to be considered.

Table 2.4:   Individual factors that can be used as a basis for discussion

Topics that need to be discussed before learner-centred education can be introduced	Individual factors within topics
Sensitivity towards diversity in the classroom	Language Culture Abilities Gender
Accommodation of individual differences	Learning styles
	Self-efficacy and self-authorship

2.10   Conclusion

When considering the four factors of learner-centred learning as identified by the APA, **it becomes clear that these factors interact with each other**. Self-authorship encompasses individual, social and cognitive factors (Baxter Magolda, 1999). Motivation and all affective factors that affect learning depend on the emotional and developmental state of an individual. The cognitive and meta-cognitive factors of learning are heavily influenced by the individual personal states and attitudes if one considers the fact that self-beliefs influence the way information is processed, how a learner is motivated, and how much effort he or she will display (Pajares, 2000).

Marzano (1998) describes the interaction between the self-system, cognitive and meta-cognitive system when a task is presented to an individual. The cognitive system processes the knowledge specific to the presenting task (Marzano, 1998) and the meta-cognitive system contains information about the plans, goals, timelines, resources and their interactions (Marzano, 1998).

When a learner is presented with a task, the self-system evaluates relevance and then any possible threat to that learner. The learner will then approach the task with negative or positive affects and high or low motivation. If a learner approaches the task with high motivation, he or she will engage in the task and the meta-cognitive and cognitive processing of the task will occur. If the learner approaches the task with low motivation, he or she will engage in compensatory activities and the meta-cognitive processing of the compensatory activity will take place – followed by the cognitive processing of the compensatory activity.

The description of this model is presented as a graphic representation of Marzano's (1998) description of the self-system.
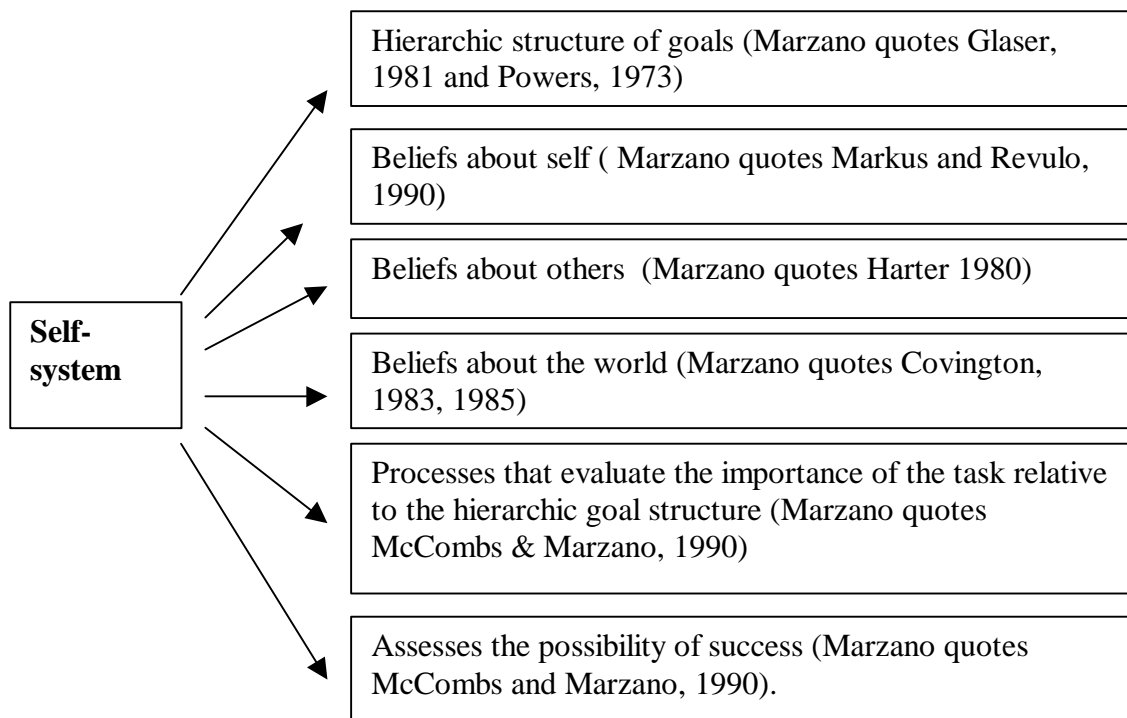
Figure 2.5: Marzano's (1998) description of the self-system

Chapter 3

Making the transition: the story

3.1   Introduction

This case study considers the experiences of 26 learners in the computer class in their final year of high school.

Grade 12, or the Matriculation year, is the final secondary school year for South African learners. This year is currently regarded as being the most important year for school learners because they earn their first qualification to compete in the labour market, and enrolment in tertiary training institutions depends on the results that they obtain in this year. As places in tertiary institutions such as technical colleges, technikons and universities are relatively scarce these days, the application process becomes extremely competitive. Only students who have obtained the best results at the end of grade 12 are even considered for many university courses. This increases the anxiety about marks that learners tend to experience during this year. Learners experience this final year as a very challenging and stressful end to their school careers.

Traditionally the result of the year, and therefore the Matriculation certificate, was based solely on the results of the final examination. In 2001 a new system was introduced: learners were required during the year to compile a CASS portfolio which would contribute 25% toward their final year-end results.

During 2001, 26 grade 12 learners and I embarked on a journey of learning in a computer centre. These learners had elected to do Computer Studies as one of their six subjects in the senior phase of high school. The subject Computer Studies entails learning expertly to use three programs: a word-processing program, a spreadsheet program, and a database program. The learners on the higher grade had also to learn to do programming by using the PASCAL authoring program. The last part of the syllabus for both the standard and the higher grade is theoretical. The topics covered are mainly

learning about computers, their components, software, operating systems, networks and the impact of computers on society. At the same time, these learners also followed the FutureKids curriculum. This case study considers *only* the practical part of the subject, in which learners demonstrate their expertise in using the three application programs and the FutureKids project, which shares a part of that objective but which is not limited only to the use of the three programs mentioned above.

3.2   Background

3.2.1 The school

Figure 3.1: The entrance to Merensky High School

Merensky High School is situated outside the town of Tzaneen in the Limpopo Province of South Africa. The school is situated on a farm. A variety of subjects, ranging from the usual academic subjects like Languages, Mathematics, Science, Biology and Computer Studies to technical and agricultural subjects are offered by the school.

Figure 3.2 Merensky High School Farm

The school also offers the FutureKids Curriculum. FutureKids is an independent international organisation that specialises in computer literacy training for children and adults. The FutureKids curriculum aims at making learners computer literate so that they can use technology to their advantage both in school and in the workplace. The curriculum covers the usage of the following programs: word processors, spreadsheet programs, database programs, desktop publishers, presentation packages and drawing programs. Programming, PC building, Repair and Upgrading, and Pastel are electives offered in the curriculum. Although learners may choose to do FutureKids in addition to the usual curriculum, learners doing Computer Studies mostly follow the FutureKids curriculum as well.

Figure 3.3: Learners in the FutureKids Classroom

The learners at the school come from diverse backgrounds and although classes are offered in Afrikaans and English, learners' home languages also include Northern Sotho, Tswana, and Venda. There are approximately 800 learners of both genders in the school.

3.2.2 The class

The grade 12 Computer Studies class for 2001 had 26 learners who were taking subjects at either the standard and higher grade level. All these learners also attended the FutureKids classes. There were Afrikaans and English speaking learners of both sexes in the class. All the learners were between 17 and 18 years of age. The demographic of the class is as follows:

Table 3.1: Demographic of grade 12 Computer Studies class of 2001

	Boys	Girls	Higher grade	Standard grade	Total
Afrikaans	5	11	1	15	16
English	4	6	3	7	10
Total	9	17	4	22	**26**
Standard Grade	6	16			22
Higher grade	3	1			4
Total	9	17			**26**

3.3   Projects

One of the ways in which the transition is made to the more learner-centred classroom is by introducing learning and assessment through he completion of projects instead of by means of more traditional instruction and tests.

3.3.1   Introduction

Up until 2001, the learners were only familiar with small projects that were completed mainly in the Computer Studies practical class time. The object of these projects was the practice of skills learned in the class. These kind of 2001 projects were very prescriptive in nature.

Learners were not therefore familiar with projects of larger scope in which the objective is the construction of knowledge. Nor were they familiar with the concept of CASS portfolios. The class was required to complete three types of projects throughout the year. These projects ran simultaneously because the learners were expected to complete the prescribed project in their own time: the FutureKids Project in the FutureKids periods and the class projects in the practical Computer Studies class time.

3.3.2 The prescribed CASS project

CASS projects are projects comprising learner portfolios that are for Continuous Assessment. A single project that required the learner to use the word processor, spreadsheet and database program in one large project was prescribed by the Department of Education. The information used in the project was largely gained from the Internet and was used for all parts of the project. This project's theme was **tourism**. The theme of the prescribed project was regarded as relevant and important because the Limpopo has increasingly become an important tourist destination .

Learners could − to a very large extent − choose the content of the project, and they were encouraged to include content that was relevant to themselves or that intrigued them. These projects were more time-intensive, and although the learners had the opportunity to work on them in class time, they were also expected to do work on these projects after school at home or in the computer centre at school. Although the spreadsheet and database components were individual projects, the learners had to compile a magazine that was a group project.

3.3.3 The class projects

The class projects were small, short and could be completed during a practical period. The practical periods lasted an hour. These projects were prescriptive. Although learners had to display their computer skills to do the project, no research skills were required. These projects gave them no opportunities to choose content, and they were completed in class with the assistance and under the supervision of a teacher. All these projects were completed individually.

3.3.4 The FutureKids Project

In order to complete this project, learners had to create an "electronic portfolio" using an HTML composer. The learners were also expected to include (link to) items made in the other applications used in this project. Learners had earlier completed the FutureKids module that dealt with Microsoft FrontPage. The portfolio included their biographical details,

examples of their work on the computer, pages about their friends and dreams for the future, as well as their interests and hobbies. Learners were encouraged to use the school's digital camera to add photographs for the project (also a new skill). The object of the project was to learn new skills while apply existing computer skills, and to reflect on the experience of their school career, especially the last year at school. They were also asked to give some consideration to their futures. Apart from these minimum requirements, the project was not prescriptive, and learners were expected to reflect their individual interests and insights in the project. Although the nature of the project required that each learner complete a project about himself or herself as the subject, learners were also encouraged to share their skills and ideas.

3.4 Assessment

3.4.1 Introduction

Even though the Outcomes Based Education system had not yet been implemented in the year 2001, certain changes in assessment based on the principles underlying Outcomes Based Education were instituted in 2001. Learners were required to hand in a Continuous Assessment Portfolio for each subject that would make up 25% of the final mark while the examination at the end of the year would still count for the remaining 75% of the final mark

The projects required for the Continuous Assessment Portfolio are based on more learner-centred principles. As these learners had not been educated in an Outcomes Based Education system of education, their experience of education until that point had been based on the instructivist model.

3.4.2 Assessing the projects under consideration

The requirements for the subject Computer Studies demanded that the Continuous Assessment Portfolio contain various class projects and class tests, under the heading of *informal assessment*, a prescribed project, and the results of examinations, under the heading *formal assessment* (Northern Province Department of Education, 2001).

The prescribed project and the shorter class projects were assessed according to the various skills that had to be displayed in the projects. Assessment sheets were compiled in which learners were allocated marks according to an assessment matrix. All the assessment for the CASS Portfolios was summative assessment.

Although the FutureKids curriculum includes the writing of examinations set by the company, the examinations do not extend to the project in grade 12. The learners were assessed on a more informal basis throughout the project: the educator commented on content and the skills that were displayed, and entered into frequent discussions with the learners about various possibilities inherent in the project and the use of the skills. The FutureKids project in grade 12 is given as part of the learning process and the assessment of the project is mainly formative. For the purposes of this study, however, the project was also assessed along the same lines as the project for the formal subjects at the end of the project. The learners were not shown this assessment.

3.4.3   Conclusion

The change in assessment was important to the learners because it impacted on their end-of-year results. As has already been noted, they regarded those results as being all-important because they determined their possible enrolment at a university or possible employment in a job market where supply far exceeded (and still exceeds) demand.

The learning experience was marked by various factors that were new to the learners in this class and that had been implemented for the first time in the learning environment. These factors were:

- a more learner-centred learning environment

- changes in assessment methods and the introduction of portfolio assessment

- project-based learning

3.5 The story unfolds

3.5.1 Introduction

The learning for the 26 learners and for myself during 2001 was contained in three different types of projects that we did simultaneously. Because I had been newly appointed to Merensky High School, many new experiences awaited both me and the learners. Although this story is told chronologically, it is related separately for each type of project.

The learners were confronted with some changes in the learning environment. Not only were they confronted with a different way of learning (i.e. by means of projects), they were also exposed to the new role of the teacher in the learning environment.

3.5.2 Initial reactions

A variety of reactions to the different types of projects was noted from the outset. Other initial reactions also include the way in which many of the learners initially reacted to the teacher.

3.5.3 Initial reactions to the teacher

As the content of the curriculum was no longer offered in an instructivist manner, the role of the teacher also differed from what the learners had come to expect. The learners were given the project and were expected to participate in a discussion to make sure that they were certain about what was expected of them. Initially the learners did not participate in this type of discussion, but the many questions that they asked took the place of this discussion as the work progressed. The teacher of this class helped learners individually whenever they asked for assistance or to clear up certain issues. She also initiated discussions with learners to stimulate them to reflect on the learning processes in which they were participating. The teacher facilitated the learning processes of the learners when requested to do so, and whenever she observed that learners were not progressing satisfactorily with the assignments and needed more guidance.

Learners did comment on their unease with the new role of the teacher by commenting on the way "things used to be". It was observed that many learners were unsure of themselves and wanted the "old ways" back because they felt that they used to know what to expect at all times and thus felt more secure. The learners described "the way things used to be" as an instructivist environment in which learners were given templates and were shown how to change the templates (they learned the computer skills they required to make the changes as they progressed). The learners were obviously comfortable with this arrangement and many of them expressed a dislike of having to find a solution to a problem or to learn a new skill by using any other method.

3.5.4 Initial reaction to the projects

Reactions to the different projects did not vary very much. Prior to 2001, the learners had never done a project of such large scope or with so much choice in content and presentation as in the FutureKids Project. A project of this type was an entirely new experience for the learners. One might therefore have expected that the reactions to this project would have differed significantly.

In the FutureKids Project, the learners were expected to create an electronic Curriculum Vitae containing the details of the learner, and his or her experience of the final year at school. The learners had to include a page with their personal details, a page about their interests, a page on which they reflected on their friendships and a page that described their dreams for the future. Learners were encouraged to include evidence of their computer skills as well as other skills by including examples of work done in other classes and subjects. Learners were expected to use as many different programs as possible and to incorporate the whole in a website that would be burned onto a CD Rom. The learners would then be able to keep the CD as evidence of their competence and as a record of their final year at school. A scanner and digital camera were placed at the learners' disposal.

The learners were given a choice as to exactly what material they wanted to include in their project. Although there were minimum set requirements,

learners were encouraged to do much more. Learners were expected to make the project relevant to themselves by their choice of content.

The project was initially greeted with mainly positive attitudes. While most learners were eager to keep a record of the year, there were some negative comments from the beginning, comments that indicated that some thought that it was a waste of time while others indicated that they were not interested in doing the project. Many learners did not relate their feelings or views about the project, but merely started to work on it. Some learners very soon indicated that they did not know where to start. Others were concerned because they were not sure that they were doing it correctly. It soon became clear that some learners did not know how to plan the project or where to start. While some learners asked for assistance with the skills that were required, many learners' questions were not of a technical nature: it appeared that they were rather seeking assurance that they were doing the right thing. Some learners started off very slowly by orienting themselves in relation to the program. But generally they spent little time choosing content or trying to use any other than the most basic skills. It was observed that some learners even experienced difficulty in retrieving saved files. Few learners exhibited the skills they needed to search for their work on the network, and some did not want to try to look for lost files without the teacher's assistance.

The projects referred to as the CASS projects in this study are the projects prescribed specifically for the continuous assessment portfolios. The CASS project consisted of three parts, all on the same theme, and a research project. Learners were expected to use Excel and Access to create a database and spreadsheet that contained the details of the many guesthouses, hotels and other tourist amenities and attractions in the Letaba area, or if they chose to do so, in the country as a whole.

The compilation of a computer magazine was given as a group project. Learners had to gather whatever information was needed to build the database from newspapers or the Internet. Learners also had to compile a research project on a topic chosen from suggestions made by the teacher. The research project was an individual project. At the same time, learners

were given the different components and explanations of what was expected from them. As the same topic was used for all the CASS projects, the information gathered was relevant to all parts of the project.

The CASS project was greeted with more of a mixed reaction than the FutureKids project. Many learners felt right away that they were not interested in tourism. Many learners expressed the view that they did not know where to start. Some learners said that they were not interested in doing the project. Some learners said that they wanted a template that they could adapt along with step-by-step guidance on the project. After discussing the advantages of their own selection of content and skills, some learners maintained that it was too difficult and time-consuming. Some learners said that they did not want a choice in the matter of content inclusion: they wanted to be told *exactly* what to include. As with the FutureKids projects, it became clear that some learners were very doubtful about where and how to start the project or how to plan the content of the project ahead of time.

The observed behaviour of the learners also showed some diversity.

Some learners buckled down and started the project immediately. While most learners asked for assistance at the beginning of the project, observation of their subsequent behaviour made it clear that some of them were asking for reassurance rather than for assistance with specific tasks.

Some learners started on the project and then complained most vociferously. They also appeared to be unsure of themselves.

Some learners experienced difficulty with the saving and recalling of their files on the network, even though all the learners had saved and retrieved files through the network during the previous year.

Some learners were very negative about starting the project. They played around and had to be frequently reminded about the project. Most of these learners made very negative remarks about the project.

Learners did not start work on the group project until it was almost time to hand it in.

While the class projects were initially done with another teacher, I assessed these projects and prepared the final CASS files that were included in these projects. While initial reactions to these projects were not observed personally by the researcher, the reactions of the learners to these projects were discussed with and described by the teacher. The learners were expected to complete these projects in class. Most learners knuckled down and started on these straight away, but other learners reacted negatively. Some of these projects were left incomplete and some were not completed within the time frame set for it.

The formal class projects were similar to the class exercises that learners were used to. Most of these projects had to be executed exactly as given: there was no choice with regard to content or the skills that had to be used to execute them. These projects did not take very long to do and required less thinking and exploring work on the part of the learner. No research was required to do these projects and the end results were mainly identical. Most learners could complete the projects easily in the class time given. Some learners did not finish all these projects because they were not interested and wasted time by doing various other things and not spending their time on the projects. Some learners did not seem to think that these projects were important and thought that they would not earn marks. However, by far the largest part of the class completed the projects with little or no comment.

Some learners commented on the theme of some of these projects. Some described them as "boring". But, on the whole, they were executed without comment.

3.5.5 Reactions to the teacher over time

The reactions to the teacher seemed to intensify as time passed. The learners who were fairly positive towards the changes in the learning environment seemed comfortable in discussing their learning experiences and difficulties with the teacher. At the same time learners who started off very negatively towards the projects remained very negative and were very difficult to draw into discussions about the projects or their own learning experiences. These learners also frequently made the comment that they did

not see the sense in doing projects and wanted to be told exactly what (they did not want any choices). Their reaction to the facilitation of the teacher was also negative. Discussions were entered into only at the insistence of the teacher – and then only grudgingly. These learners said that they resented the new way of doing things and were not ready to cooperate. When they asked for assistance, learners were guided to revise the strategies that they were using in order to find solutions to the problem they were experiencing. It was common for the learner to react in an irritated fashion when only *pointers* to the solution were given rather than the solution itself.

3.5.6 Reactions to the projects as time passed

The trends that appeared at the beginning of the projects continued. Although progress in the CASS project and the FutureKids project was largely the same, learners seemed to comment more on the CASS project than on the FutureKids project. The learners' reactions toward the CASS projects and the FutureKids projects were almost the same, except that the learners commented that the FutureKids project was "too much work" if they were not going to earn marks for it.

A variety of different reactions continued to be noted.

The behaviour of some learners continued to be positive. These learners made steady progress and even though they commented on the relevance of the topic, they said that they disliked the process of making the project and would rather be given a test. Some learners commented that although they would prefer to work from a template, they were learning a lot.

Some learners were more vociferous at this stage. These learners were making some progress, but tended to spend less time on the content of the projects than on the formatting of the work. These learners also expressed anxiety about their ability to do the project. Some made remarks like "I don't know if the work is correct" – even on pages where the open-ended nature of the question or the task meant that there was no "right" or "wrong" answer. Many of these learners also said that the project was frustrating because they were unsure about the content (they had to choose part of the content

themselves). Many of the learners complained that they did not have enough time to complete the projects.

Other remarks included:

"I don't like doing these projects, but I know I'm learning a lot."

" I struggle to master the skills, but once I have done them like this I can really use the skills."

" I like doing this type of project – I like finding things out for myself."

For some learners, progress was markedly slower than for others. These learners were very negative towards the projects: they said that they were not interested in the topic, that the project was a waste of time. It was noticed that many of *these* learners had problems in executing tasks and that they lacked the needed skills. The teacher did intervene when this was noticed to help the learners master their needed skills. However it quite frequently happened that learners needed help with the same skills more than once. It was noted that some learners were reluctant to make the projects their own: they did not seem to take responsibility for the projects.

One learner stated that the CASS project was too much work for the proportion of marks that it contributed towards the final mark. Some learners also had problems in planning the projects. They tended to regard these projects as a waste of time and stated that they did not learn much by doing them. Some the learners tended to spend a disproportionate amount of time on searching for information on the Internet and on repeatedly changing the format of the FutureKids project without actually making substantial progress. Some learners also complained quite often that they needed more time to complete the project.

It was noted that some of the learners cut classes. Some learners used the time they gained by doing this to do homework for other classes or to play games − until they were reprimanded. There was a distinct differences among learners' attitudes towards the work. Some would buckle down and work immediately; others needed encouragement from the teacher before they started to put effort in to the project; others tried to get away with doing

nothing or doing work for other subjects until reprimanded (thereby displaying very low levels of motivation to get the tasks done).

Learners generally left group work project fairly late. Some groups worked very well together and arranged times in which they worked on the project. Some learners complained that the group was not working and elected to do most of the work of the group. Some learners were very negative and left the task, making half-hearted attempts to start on the project when they were forcibly reminded of the due date for the project. There were numerous complaints that the groups were not working well together. Many learners expressed the idea that it was grossly unfair that the whole group got the same marks for the project because not all members worked equally hard on it.

3.5.7 Learner reactions towards the end of the project

The tendencies observed during the work on the project seemed to intensify toward the end of the academic year. It was noted that the class on the whole became more negative towards the work as the pressure towards the end of the year increased.

The final marks for the CASS project had to be submitted to the Department of Education at the beginning of September. This effectively ended any opportunity to work on the CASS and class projects. The pace of work for all the learners picked up in all their subjects, and the learners were then engaged in the last lap toward the important examination that started during October.

Some learners seemed to be able to work at their own pace. These learners did not express feelings of anxiety. They were not always positive about the projects but got on with it nevertheless. Some learners complained about the time needed to complete the projects. The learners who were able to work at their own pace made good progress with the work.

Some learners were also more vociferous towards the end of the project. They still commented on the same issues as before, but now time became a larger factor and the learners seemed anxious about not being able to do the

work well enough in the time left. While these learners did make progress, they were less able to work at their own pace and needed more reassurance from the teacher.

Some learners did not make good progress. The comments made by the learners became markedly more negative as time passed. Some learners frequently expressed anxiety. While some learners had difficulty in doing the project (usually because of a lack of skills), they apparently did not feel that it was worthwhile to make an effort to learn new skills. These learners more or less gave up. Some others also made no progress. They made no effort to complete the tasks or learn the skills that they lacked, commenting that they felt that the projects were not worth the effort. They said that it was not worth putting all that energy into a CASS project that counted 10% of the 25% of the final mark, or to do the FutureKids project for no marks at all. Some learners said that they were tired and wanted to play games instead of working as they had been working hard at all their subjects. The general feeling expressed amongst these learners was not anxiety about their abilities but rather an "I can do this but can't be bothered" kind of attitude.

The group project that was ignored by too many learners for too long became due by the end of the time left to spend in the classroom. Some groups went all out and arranged work-at-home sessions and produced well-thought-out magazines. Some others followed the instructions to the letter and produced passable results. But others merely decided that it was a waste of time and that they were not going to work on the group project at all. The remaining members of these groups then completed the entire magazine. Except for the most successful groups, learners complained about the project. It was observed that the members of a group where the general atmosphere was negative tended also tended to become negative. It was also observed that in such groups the learners had trouble in planning the project. It also seemed that the learners could not get those members who were "cruising" to participate fully in the project

3.6   Summary

This chapter describes the classroom events and the assessment of the projects. The description of the classroom events is divided into three parts:

- the initial reaction of the learners

- the reactions of the learners as the year progressed

- the reactions of the learners towards the end of the projects

The learners' observed reactions to the change to a more learner-centred learning environment covered a wide range of behaviours. Learners were encouraged to express their feelings about the classroom events and the way in which they were learning. These reactions, both positive and negative, seemed to intensify as the year progressed.

Chapter 4 discusses the learners' reactions to the constituent components of learner-centred learning as described by the APA (Lambert & McCombs, 1998):

- cognitive and meta-cognitive factors

- affective and motivational factors

- developmental and social factors

- individual factors

Chapter 4

Interpretation of the classroom events

4.1 Introduction

This dissertation reports on a defined group of learners' reactions to a change from a less learner-centred learning environment to a more learner-centred learning environment. The researcher's intention in doing this was to identify and describe those factors that should be considered when learners make such changes. Throughout the year, the researcher observed learners' reactions to events in the classroom and assessed their final projects.

In order to understand the events of the year as they unfolded, the researcher will in this chapter (1) systematically report on how learners reacted to changes in their learning environment, and (2) describe the results of her assessments of the various projects that they were required to do. Examining assessments is one way of understanding the measure to which the learners did (or did not) fulfil the requirements of the projects. The results of the assessments and the learners' reactions will then be considered in terms of the APA-defined factors of learner-centred learning. (The APA proposes various cognitive and meta-cognitive, motivational and affective, social and developmental, and individual factors of learner-centred learning as the identifying principles of learner-centred learning (Lambert & McCombs, 1998).)

4.2 Classification of learner reactions

4.2.1 Introduction

As described in chapter 3, the researcher began to observe a variety of behaviours as soon as the learners started work on the projects. The learners can be divided into three distinct groups on the basis of (1) comments they made, and (2) observations of the learners' behaviour made by the teacher (the researcher). This division into groups was not a physical division made during the completion of the projects. The researcher used this division as a basis to classify learner reactions, thereby enabling both an understanding and interpretation of

classroom events. The researcher will discuss the classroom events in terms of the APA principles of learner-centred learning in this chapter after she has identified the three distinct groups.

4.2.2 Classification of learner reactions

The type of comments that were made by learners are considered in the following categories:

- comments (either negative, positive or neutral) that reflect affect towards the task

- comments about the content of the different projects

- comments about external factors (such as time)

- comments about the learners' perception of his/her ability

- comments about the difficulty level of the tasks

- comments about the relevancy of the task

The table below categorises the types of comments made by the learners.

Table 4.1: Classification of learner reactions on the basis of the type of comments made by the learners

Category	Typical types of comments made by the learners
Affect	▪ "I don't want to explore the subject." ▪ "I don't want to explore the program." ▪ Expressions of feeling being overwhelmed and wanting step-by-step guidance: "Please give us a template." ▪ Uncertainty as to how the project should be approached: " I don't know where to start", "What must be included on this page?", "How will I know if the work is right?"
Relevance	▪ Topic considered to be highly irrelevant: "I'm not interested in tourism." ▪ Topic considered to be fairly relevant "It is interesting." ▪ No specific comment made about the relevancy of the topics.
Significance	▪ Very significant: "I have really learnt a lot." ▪ Fairly significant: "I have practised some skills." ▪ Insignificant: "I don't learn anything." ▪ "It is a waste of time as we won't get marks for it."
Time	▪ Too time-consuming to do the research: "It takes too much time to find the information. We won't be able to finish." ▪ Too time-consuming because the projects are not performed as part of everyday class work and are performed in addition on an already-full workload: "We are tired. We have too much other work."

4.2.3 Classification of learner reactions on the basis of the observations of the teacher

The observations of the teacher were divided into the following categories on the basis of:

- the effort that learners put into the task

- the approach that learners had to the task

- the ability of learners to work independently

- the ability and willingness of learners to work in a group

- the attitude of learners

Table 4.2: Categorising learners' observed behaviour

Category	Observed behaviour
Effort	▪ Initially most learners put in some effort. ▪ While some learners slackened their effort as the project progressed, others sustained their effort. ▪ Some learners gave up after a while and stopped any effort to complete projects.
Approach	▪ Some learners started the project with confidence. ▪ Some learners were very uncertain about what to do when they were given choices about content and presentation in a project.
Independent work	▪ Some learners needed encouragement to complete the project. ▪ Some learners could not make any progress without the teacher's guidance.

	▪ Some learners found the project challenging, especially when they were required to carry out independent research on a topic and thus could make progress on their own. ▪ When they asked for assistance, the researcher suggested to learners that they revise their strategies so that they could find their own solutions to the problem they were experiencing. It was common for learners to react with irritation when the researcher only gave them *pointers* − thus compelling them to find solutions for themselves.
Group work	▪ Some learners worked well with others toward their joint goal. ▪ Some learners were very negative, and did not play their part in the group work. They merely relied on their fellows to complete the group project and thought that they would get the same reward (marks) as the others. ▪ Some learners took too much responsibility. They did not trust the others in the group to do the work well enough.
Attitude	▪ Some learners had very negative attitudes. They tended to cut classes and leave work totally incomplete. ▪ Some learners had positive attitudes. They tended to feel positive if they thought that they had learned a lot. ▪ Some learners had very positive attitudes. A lot of effort was put in over a period of time. ▪ Some learners had fairly positive attitudes. They could do the work easily, but felt they did not get much out of it.

Although the learners' behaviour varied across the three different types of projects throughout the year, their behaviour and comments had enough in common to warrant dividing them into three distinct groups.

These observations were made in the classroom between January and the completion of the tasks at the end of September. The description below is based on observations of the whole period.

4.3 Three discernible groups

The learners were grouped together during the analysis of classroom events on the basis of certain observed commonalities. The groups are clustered together mainly on the basis of similarities between actual progress made and the effort that the learners expended. It was noticed that although the other categories were not necessarily identical for all the learners placed together in a group, the differences were not too far apart. The composition of each group therefore fairly reflects a uniformity of attitudes. The groups are named after their basic approach to the projects. They are the Positive Group, the Ambivalent Group and the Negative Group.

4.3.1 The Positive Group

The learners grouped together as the Positive Group made fewer comments on the projects and started work right away. The comments they did make included concern about the topic of the CASS projects (most learners failed to see its relevance), and some comments about "how things used to be". But learners did on the whole find the projects significant. Most felt that they provided good practice for the examinations and that they gave them opportunities to learn and refine some skills.

These learners invested a lot of effort in their projects. They wanted suggestions or help with specific, small problems from the teacher. The learners in this group were able to plan the content of the projects and were not overly concerned with the "correctness" of what they were doing. Instead they interpreted the questions for themselves with a minimum guidance from the teacher. They showed the ability to work independently. These learners also showed a little irritation when they were guided to the solution of their problems rather than having the teacher

point it out. In spite of this, many learners remarked that they had learned a lot when they had to figure out solutions for themselves. The attitude of the learners in this group was either *positive* or *neutral*.

4.3.2 The Ambivalent Group

These learners were more vociferous in criticism and complaint than the Positive Group. They made numerous comments, especially about the relevance of the topic and the projects. Many learners in this group expressed frustration with the process of learning by doing projects. There were also complaints about the time allotted to complete the project, especially in the light of the time it took for them to obtain the information that they needed. It was observed that many of the learners in this group had difficulty in planning the project and in making a start. Some learners in this group said that they could not do the project and they wanted the teacher to give them "a template" on which they could make some changes. A template would effectively cut out the element of being able to choose content for the project and some of the thoughtful input that learners made. It would also reduce the learning process to the level of an unthinking application of computer skills. Using a template would also mean that the learners would not have to plan or structure their learning events. Most of the learners in this group put a fair amount of effort into their projects. Although the progress for this group was slow, learners did make progress. Learners in this group also tended to be fairly ambivalent in their reactions: the same learner would express very negative feelings and attitudes towards the projects on one day (or during one period), and then would later express much more positive views. Many learners agreed that they learned a lot by doing projects but that they disliked the process. They preferred to have solutions to problems given to them instead of being given pointers towards solutions. Some of these learners did appear to be very uncertain of themselves when confronted with choices about content and the appearance of the project.

4.3.3 The Negative Group

The learners in the Negative Group made more negative comments than the learners in the other groups. Some learners in this group said that they could do the project easily and that it was not challenging. Others said that they did not

know what to do and could not apply the skills without assistance. What all the learners in this group had in common was a lack of satisfactory progress. Most of the learners in this group thought that the topic was irrelevant. They seemed to be inclined to do the same things repeatedly without planning the project properly. Most learners of this group also demanded a template on which to base the projects. The learners in this group took very little trouble over the projects; they seemed to feel that if they could not do it perfectly immediately, it was not worth doing at all, or that they were incapable of learning the skill. Many of these learners also felt that the projects were not relevant to or significant for their learning. Most of these learners were very irritated when, having asked for a solution to a problem, they were merely given pointers and not solutions. Some of the learners in this group did not ask for assistance. When pointers were offered to them, they retorted that the work was easy and that they could do it. Some asked for constant assistance but wanted solutions to be given without any input from themselves or any attempt on their part to try to solve the problem.

4.4   Results of the final assessment of the projects

The projects were assessed at the end of the year. This assessment shows the performance of the class on the three types of projects. The learners have been numbered and performance on each different type of project plus the performance the group (as discussed above) is shown.

4.4.1   Individual assessment

The class projects and CASS projects were assessed on the basis of the skills that had to be displayed. The mark for the CASS project is an average of the three sub-projects out of a total of 20. The mark for the class project is an average for the 8 projects that made up the class projects, and is reflected as total out of 20.

The FutureKids Project was assessed in terms of the skills that were needed to complete the project, the complexity of the project, and the thought that had gone into the pages that required reflection. Marks were given on the basis of the following scale:

1.   Not done at all.

2.   Done, but not satisfactory – very little effort, thought and skill was expended.

3   Satisfactory – minimum requirements were mostly met.

4   Good – all minimum requirements were met and more than the minimum of thought, skill and effort was expended.

5   Very good – The project gave evidence of (1) mastery of the programs used, and (2) the reflection and effort expended on the project (an indicator of achievement of the mastery required in these areas).

Table 4.3 (below) shows i*ndividual results.* These reflect the mark each student received for each type of project. The last column of the table reflects the group into which the learner was placed on the basis of observations that were made by the teacher and comments that were made by the learner.

Table 4.3 Individual results

Student No	Class projects	CASS project	FutureKids Project	Group
1	17	16	14	1
2	17	12	12	2
3	9	2	4	3
4	18	10	14	1
5	12	13	12	2
6	12	12	12	1
7	16	13	12	1
8	13	4	5	3
9	15	13	13	2
10	13	12	14	1
11	14	11	6	1
12	13	8	13	2
13	8	0	2	3
14	15	9	13	2
15	12	12	14	2
16	12	9	10	3
17	16	14	12	1
18	13	5	0	3
19	6	0	0	3
20	11	5	0	3
21	4	5	6	2
22	16	13	17	1
23	19	14	18	1
24	18	18	14	1
25	17	18	13	1
26	17	16	13	1

Learners who scored less than 6 out of 20 (30%) for any of the projects may be said not to have displayed the skills or knowledge required. Learners who had between 7 and 14 (70%) for the projects displayed a satisfactory to good level of skill and knowledge, and learners who scored more than 14 showed that they had mastered or displayed more than the skills and knowledge required.

4.4.2 Individual assessment results and the groups

The Positive Group has 12 learners, the Ambivalent Group has 7 learners and the Negative Group has 7 learners. The learners' results are considered on the basis of the groups into which the learners were divided because of the observations of the teacher and the comments made by each learner.

In order to compare the performance of the learners in the FutureKids assignment to the performance of the learners in class projects or to performance of the learners in the CASS project, it is necessary to convert the marks for the FutureKids Project to a mark out of 20.

4.4.3 Assessment results: The Positive Group

The assessment results for the learners who make up the Positive Group (on the basis of observation and comment) is given in the table below.

Table 4.4 Individual results: The positive group

Student No	Class projects	CASS project	FutureKids Project
1	17	16	10
4	18	10	14
6	12	12	12
7	16	13	12
10	13	12	14
11	14	11	6
17	16	14	12
22	16	13	17
23	19	14	18
24	18	18	14
25	17	18	13
26	17	16	13

Each learner's result for each of the project types can be seen on the graph below. From this graph it is clear that – for most learners in this group – the CASS and class projects score fairly closely together, but that the FutureKids project does not follow this pattern so closely. It is also clear that the class projects tended to have higher scores than the other two types of projects – except for one learner whose marks for all three types of projects were similar. Only one learner in this group had a mark below the satisfactory mark for only one project (the FutureKids one).
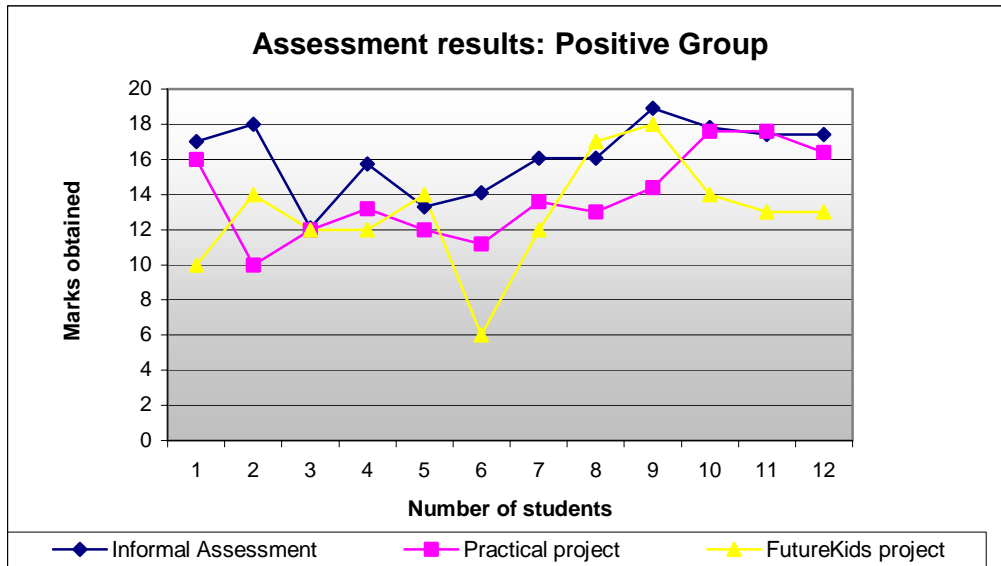
Figure 4.1 Assessment results: The Positive Group

4.4.4 Assessment results: The Ambivalent Group

The assessment results for the learners who make up the Ambivalent Group (on the basis of observation and comment) is given in the table below. There were 7 learners in this group.

Table 4 5: Assessment results: The Ambivalent Group

Student No	Class projects	CASS project	FutureKids Project
2	17	12	8
5	12	13	12
9	15	13	13
12	13	8	13
14	15	9	13
15	12	12	14
21	4	5	6

The result of the assessment of the different projects is reflected in the graph below. The result for this group seems to be more diverse. There is a big difference in the results for learners 1and 5 for the three different projects, while

learners 2, 3, 6 and 7 have similar results for the three projects. Learner 4 shows similar results for the FutureKids and class projects, with the CASS project showing much lower results than the other two types of projects.
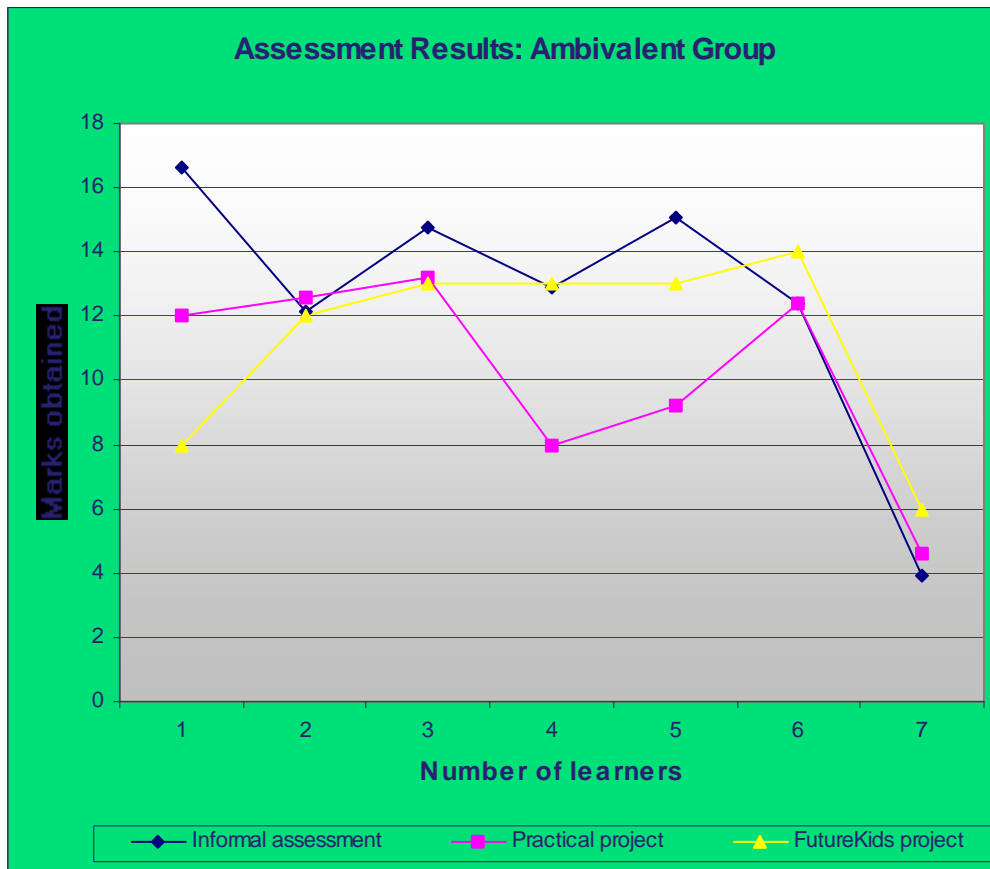
Figure 4.2: Assessment results: The Ambivalent Group

4.4.5 Assessment results: The Negative Group

The assessment results for the learners who make up the Negative Group on the basis of observation and comment is given in the table below.

Table 4.6: Assessment results: The Negative Group

Student No	Class projects	CASS project	FutureKids Project
3	9	2	0
8	13	4	5
13	8	0	2
16	12	9	10

18	13	5	0
19	6	0	0
20	11	5	0

The result of the assessment for the different projects for each learner of the Negative Group is represented in the graph below. The difference in the results for the different type of projects is much bigger than with the other two groups. While the class projects were mostly satisfactorily completed for all learners (except learner 6), the CASS project and FutureKids Project were mostly unsatisfactory. Four of the 7 learners in this group did not do the FutureKids Project at all. Only one learner in this group completed the FutureKids Project in a satisfactory way. While more learners (5) completed the CASS project, the results on this project were also poor, with only one learner obtaining more than 40% for the project.
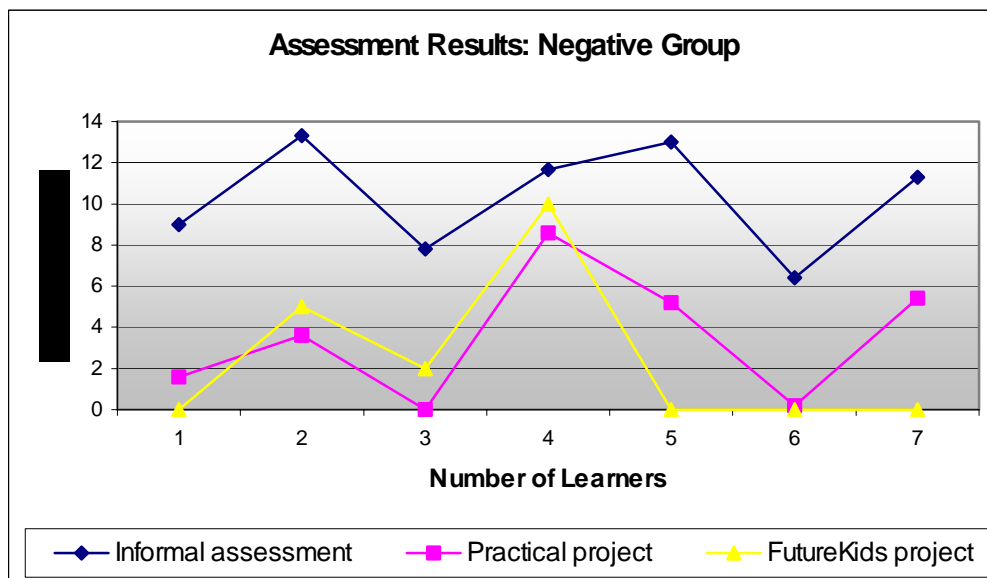
Figure 4.3: Assessment results: The Negative Group

4.4.6 Assessment results and the type of projects

Besides looking at the results of the assessment from the point of view of the groups into which the learners have been divided, the results can also be looked at in terms of the projects.

The table below reflects the number of projects that have been completed and the quality of each project as reflected by the assessment.

Table 4. 7: Projects and the assessment results

Assessment results	Class projects	CASS project	FutureKids Project
Not satisfactory: 0-30%	2	7	5
Task completed, but does not meet outcomes: between 30 and 45%	1	4	4
Tasks completed satisfactorily: 46-60%	5	9	10
Task well done: between 61 and 80%	16	4	6
Task very well done: above 80%	2	2	1
Total	**26**	**26**	**26**

The results of the assessment are expressed as percentages in the table below.

Table 4.8: Assessment (expressed in percentages) for project types

Assessment	Class projects	CASS project	FutureKids Project
Not satisfactory: 0-6.5	7.69	26.9	19.2
The task is completed, but does not fulfil the outcomes: between 30and 45	3.85	15.4	15.4
Tasks completed satisfactorily: 46-60	19.23	34.6	38.5
Task well done: between 61 and 80	61.54	15.4	23.1
Task very well done: above 80	7.69	7.7	3.8

Although the sample is too small for any meaningful statistical analysis, expressing the results per project as a percentage does tend to highlight trends within a class's results.

When expressed in a graph, the trends are clear:
▪ More of the class projects were completed satisfactorily or better than either the FutureKids or CASS project.
▪ Fewer FutureKids Projects were completed very well than either the CASS or class projects.
▪ More class projects were rated *better* than *satisfactory*. Fewer FutureKids projects and CASS projects were rated as being *more than satisfactory*.
▪ Although the CASS project and the FutureKids Projects seem to follow the same pattern, more FutureKids Projects were left incomplete than were

CASS projects – with many fewer class projects being left incomplete or rated as *very poorly done*.
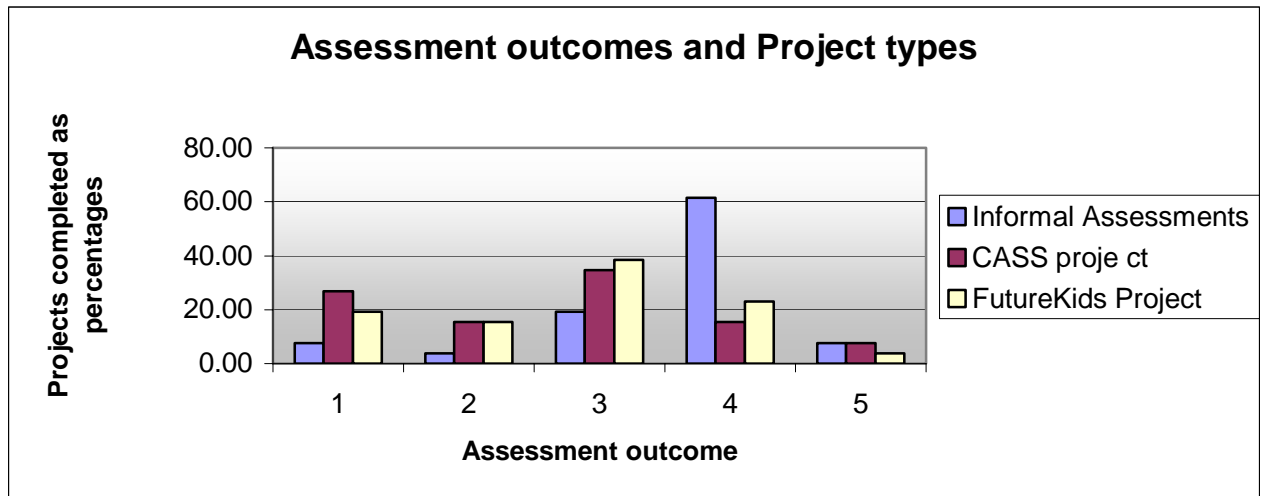
Figure 4.4: Assessment outcomes and project types

In figure 4.4 above the numbers 1 to 5 on the Assessment outcomes axis reflect the quality of the result (as in tables 4.7 and 4.8).

In order to answer the research questions, the results of the assessment of the projects and the events in the classroom need to be considered against the background of the factors of learner-centred learning that have been identified as the principles of learner-centred learning by the APA.

4.5 Classroom events

The interpretation of the events in the classroom is considered from two different angles: that of the Gagné's (Kearsly, 1998; Mwamwenda in Potgieter & Cronjé, 1998) nine events of instruction for effective learning, and the APA's (Lambert & McCombs, 1998). principles for learner-centred learning. The results of the assessment are considered on the basis of the principles of learner-centred learning.

4.5.1 The classroom events and Gagné's nine events of instruction

- **Gaining attention**

  In the CASS project and the formal class projects, learner attention was secured by giving learners a copy of detailed information about and guidelines for completing the tasks. For the FutureKids Project the learners were shown a completed project in HTML format projected by a data projector. Although the finished electronic CV interested most learners, attempts to arouse interest in the CASS project were less successful because some negative comments were heard as soon as the projects had been handed out. Some learners asked why the topic of tourism had been chosen, while others immediately asserted that they did not know what to do.

- **Informing learners of the objective**

  Learners were informed verbally about the objective of the project. Learners were informed about the objective of the FutureKids Project several times during the year. Although this tended to act as a motivator for some learners, other learners did not attach any importance to the objective of this project once they had been told that they would receive no marks for the completion of the project.

- **Stimulating recall of prior learning**

  As large parts of the projects required the application of computer skills that had already been learned, learners were reminded of those skills. They were also encouraged to show each other previously learned skills in order to stimulate recall. While the teacher revised the skills with which most learners had problems, the reactions of learners to the revision of the skills was three-fold: some learners were happy to revise, some learners felt that they had still not mastered the skills, and yet others felt that the teacher was wasting their time and that they did not need to be reminded of the skills needed for the project.

- **Presenting the stimulus**

  The stimulus was presented in the form of (1) the Internet where the learners could do their research, and (2) the programs used to complete

the projects. Those parts of the projects that had been begun or that had been partly completed were also used as stimuli for more complicated parts of the project. The learners were told how the part of the project that had been completed could lead to further parts of the project. This was mostly true for the CASS project. For the FutureKids Project, the stimulus was mainly presented by means of discussions about the realities of the learner's life and the possibilities for the project that flowed from these realities. For the formal class projects, the stimulus was presented in the form of the program that learners were expected to use to complete the project.

- **Providing learning guidance**

  The learners' questions were answered by questions to encourage learners to discover the necessary principles and skills for themselves, by pointers presented by the researcher, and partly through the showing of some of the skills. The questions and incomplete instructions were meant to guide the learning process and act as a stimulus for the learner to explore on his or her own. The learners were also given guidance in the form of discussion about where the project would fit into the bigger picture, and assistance to the learner in choosing what material to include or exclude from his or her projects. Giving learners partial answers in order to stimulate learner interest and to encourage them to take responsibility to experiment and find the complete answer for themselves, was met with varied comments. Some learners felt that although it was less easy to use their prior knowledge and the pointers given to arrive at the answer they were seeking, this option was very satisfying both emotionally and intellectually because it was more challenging. Others were merely irritated by this approach. These learners interpreted the teachers' reluctance to provide "finished" answers as either incompetence on the teacher's part or a demonstration of negative attitudes on the part of the teacher.

- **Eliciting performance**

  Learners were continually encouraged to consider their projects and the progress they had made. For the CASS project they were asked to

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reconsider what was needed for the project (and in what way their projects already reflected that), and what would be needed to complete it. For the FutureKids Project, the lines between learning guidance and eliciting performance were less clear-cut and the discussion of the learners' projects and their lives at that juncture served both to provide guidance and to elicit performance. The learners were encouraged to reflect on what they had learned and how they were learning in order to stimulate more learning.

- **Providing feedback**

  The formal class projects were assessed and the assessment marks were given as feedback. However, this process did not take place quickly enough after the project was completed and the feedback was sometimes too late really to help learners to rectify the problems that had occurred. The feedback for the FutureKids Project was verbal and continuous. Feedback was often given by way of encouragement for work that had been successfully done, or while giving suggestions about what might be done for the rest of the project. Learners who reacted very negatively were given less guidance and feedback as the time went on.

- **Assessing performance**

  The learners' performance on the project was assessed at the completion of the projects. This assessment did not form part of the learning process and was a summative assessment of the learners' performance on the tasks. The learners received the mark and assessment matrix in their CASS files, but they were not given the opportunity for formal self-assessment.

- **Enhancing retention and transfer**

  Learners were given the mark sheets in their CASS files for the formal and CASS projects. Learners were expected to study these in order to identify outstanding problem areas and to transfer what had been learnt to future assignments, especially the high-stakes examination that followed shortly after the completion of the projects. For the FutureKids Project, the lines between the different steps were not so clearly drawn and the process of

discussing the learners portfolios also served to enhance transfer to other situations.

All nine of these steps occurred on a continuous basis throughout the year and were not so clear-cut as might seem from the discussion above. The interaction between teacher and learners was hindered by the expectations of both groups. The learners expected to be taught in the manner they were accustomed to, and the teacher expected the learners to take more responsibility for their own learning.

This discrepancy between expectations often led to frustrations, both on the part of the teacher and learners. It was also noted that some learners reacted very negatively to suggestions and guidance from the teacher. These negative reactions became a topic for discussions about the work that provided more stimuli and guidance and that helped to elicit better performances as well as to give feedback. These discussions became not only shorter but also less frequent as time went on. With learners with more positive attitudes, the discussion were much more valuable and progress on tasks more evident.

4.5.2 The classroom events and the principles of the APA

The factors that influence learning and learners cannot be regarded in isolation because they are interactive and integrated (Alexander & Murphy, 1998). When attempting to understand events in the classroom, it is important to keep in mind that the APA's proposed statement of principles simply makes it easier to identify the various relevant factors and the extent to which they have to be considered when one changes from a more teacher-centred classroom to a more learner-centred learning environment.

4.5.3 Classroom events and the cognitive and meta-cognitive factors of learner- centred learning

From observed behaviour in the class it was clear that learners encountered more problems in the CASS and FutureKids projects. The nature of the class

projects did not make the same demands on the learners because learners had to execute a number of instructions to complete the class projects. This required certain computer skills, but made no great demands on the learners' abilities to plan, structure and monitor their work. in contrast to the CASS and FutureKids projects, learners did not have to devise as many strategies to complete projects. Although the class projects are hands-on projects and therefore not entirely teacher-centred, these projects were closest to what learners had experienced in other classes.

Because the CASS and FutureKids projects are more learner-centred, they made different demands on learners. The reactions of learners to the CASS and FutureKids projects are discussed in terms of the way in which learners approached the following cognitive and meta-cognitive tasks:

- planning, analysing and strategising
- monitoring
- revision and self-reflection
- taking ownership of their own work
- validation of their learning

4.6 Planning, analysing and strategising the learning task

Frequent learner comments included statements like:

- " I don't know where to begin."
- " I don't know if it is right."
- "I need a template."

Learners also expressed feelings of uncertainty about how to approach the projects of which they could choose the scope and content

Such comments indicate that these learners found planning the projects and selecting the appropriate units for learning problematic. Asking for prescriptions also indicates that learners also had problems in selecting the appropriate tools for completing projects.

Most learners managed to find appropriate sources for the work. Learners who asked for step-by-step guidance and templates were observed to experience severe difficulties in planning projects and selecting strategies to solve problems. Although such learners would often ask for assistance, they actually seemed to be asking for someone *to take over the responsibility* for selecting content and strategies for completing the tasks.

It was observed by the researcher that learners who needed a lot of facilitation from the teacher often had more difficulty with planning the project than with the actual skills that were necessary for the project.

The learners in **the Positive Group** were able to plan the projects and although some learners did indeed hark back to "the way things used to be" (by which they meant the traditional instructivist and teacher-centred learning environment), these learners were able to structure projects successfully. Some of the learners in this group found these projects challenging because they had the freedom to structure and plan projects as they wanted to. Learners in this group also mentioned that they liked applying the skills they had learnt in a way that they themselves could design.

The learners in **the Ambivalent Group** had more problems with the planning and structuring of the projects. A lot of the uncertainty and frustration that was expressed by this group might have been caused by learners' uncertainty and their inability to plan the projects meaningfully. The learners in this group needed a lot of input and guidance from the teacher to help with the progress of the work − both in planning and structuring projects. It was noted, however, that learners quite often wanted the teacher to "take over" the planning and structuring process, and not merely guidance. This could indicate that the learners felt that they were not able to do the planning and structuring of the projects themselves. The extent of the influence of the affective aspect and the cognitive aspect cannot be separated.

Like the learners in the Ambivalent Group, the learners in **the Negative Group** could also not plan and structure the projects. The learners also demanded a template, and it was observed that they had real difficulty in planning the projects. The learners in the Negative Group either wanted the teacher to take over the planning process, and lay out the strategies needed to complete the project, or else they avoided doing the project properly. The facilitation of the teacher was needed for every step of the work that was completed. Some learners remarked that they could do all this and that they did not need to complete the project.

4.7 Monitoring, self-reflection, taking ownership, and the validation of the work

None of the learners in any of the groups were used to verbalising thoughts about how they learned or about which way is the most effective for the learner. Nor had they ever spent time before verbalising reflections on what should change to make their learning more effective.

Learners were asked to reflect on the way in which they learn, and to think about whether they were *learning* by doing the various projects. This reflection on their own learning processes is expressed in terms of how personally significant they found the projects on the basis of how much they thought they were learning by doing the projects.

The learners replies and comment on how much they were learning can be expressed on a four-point scale as follows:

1   I learn a great deal by doing these projects.
2   I learn by doing these projects.
3   I learn little by doing these projects.
4   I learn nothing by doing these projects.

Eleven learners said that doing the projects was significant to their learning, and that they were learning a lot by doing the projects; 7 learners reported that they were learning by doing the projects (but were not learning a great amount); 3

learners said that they were learning "a little" by doing the projects; 5 learners thought that they were learning "nothing" by doing the projects.

Table 4.9: Learners' opinions about the significance of the projects compared to the groups

Significance of projects to learning on an four-point scale	Number of learners in The Positive Group	Number of learners in The Ambivalent Group	Number of learners in The Negative Group	Total number of learners
1	4	4	3	11
2	5	2	0	7
3	1	0	2	3
4	2	1	2	5
Total	12	7	7	26

A comparison of the learners' view on whether they were learning significantly with the satisfactory completion of the project, revealed the following pattern:

Table 4.10: Comparison between perceived significance and task completion

View of the significance of the project	Number of learners	Satisfactory completion of the Class projects	Satisfactory completion of the CASS projects	Satisfactory completion of the FutureKids Project
1	10	10	10	10
2	6	6	5	5
3	5	4	3	3
4	5	4	4	4

The learners who felt that they were learning a lot, all completed the projects in a *satisfactory* or *better* way, while most of the learners who felt they were learning nothing did not complete the projects that were more learner-centred.

Some learners were more outspoken when it came to how personally relevant they thought the projects were. Many learners did not specifically comment on how relevant they thought the projects were. If the learners thought that the projects were not relevant, they did not appropriate ownership of the work. This meant that they were not adequately involved in the learning process.

In order to get a clear picture of the learners' views of the relevance of the projects, they were given numbers according to the following scale:

1. The learner made no comment on the relevance of the project (i.e. was neutral).
2. The learner was positive.
3. The learner was negative (i.e. he or she thought that the project was not relevant).
4. The learner was very negative (i.e. he or she stated strongly that the project was irrelevant).

These numbers were then compared to task completion in order to identify a trend. The results are reflected in the table below:

Table 4.11: Task completion and relevance

Student No	Class project	Practical project	FutureKids Project	Group	Relevance
19	6	0	0	Negative	1
20	11	5	0	Negative	1
6	12	12	12	Positive	1
15	12	12	14	Ambivalent	1
9	15	13	13	Ambivalent	1
7	16	13	12	Positive	1
2	17	12	8	Ambivalent	1

1	17	16	10	Positive	1
26	17	16	13	Positive	1
25	17	18	13	Positive	1
24	18	18	14	Positive	1
23	19	14	18	Positive	1
4	18	10	14	Positive	2
3	9	2	0	Negative	3
16	12	9	10	Negative	3
5	12	13	12	Ambivalent	3
12	13	8	13	Ambivalent	3
18	13	5	0	Negative	3
8	13	4	5	Negative	3
10	13	12	14	Positive	3
11	14	11	6	Positive	3
14	15	9	13	Ambivalent	2
22	16	13	17	Positive	3
17	16	14	12	Positive	3
21	4	5	6	Ambivalent	4
13	8	0	2	Negative	4

From this table it is clear that:

- most of the learners were either very outspoken about the relevance of the project or they did not discuss the relevance of the tasks in the class
- the comments on relevance and the division into groups do not follow a pattern

When learners' views about how personally relevant the projects were, are compared to the satisfactory completion of the projects, it becomes clear that there is a definite pattern.

Table 4.12: Perceptions of relevance and task completion

View about the relevance of the project	Satisfactory completion of the Class projects	Satisfactory completion of the CASS projects	Satisfactory completion of the FutureKids Project	Number of learners in group
1	0	0	0	0
2	7	7	7	7
3	7	7	7	7
4	10	7	8	12

One may note that:

- none of the learners found the topics of the projects personally very relevant
- all learners who found that topics had some relevance to themselves completed the projects satisfactorily
- learners who did not see the personal relevance of the projects were less likely to complete the projects that requires high intrinsic motivation

4.8 Classroom events and motivation and affective factors of learner-centred learning

The following table shows the degree to which the different projects can be considered intrinsically motivating.

Table 4.13: Motivation and the projects

Characteristics of intrinsic motivation		Class projects	CASS projects	FutureKids Project
Challenge	Flexibility		✓	✓
	Set criteria for performance	✓	✓	✓
	Feedback	✓	✓	✓
	Range of challenges		✓	✓
	Personally meaningful goals			✓
Curiosity	Incongruity			
	Complexity		✓	✓
Fantasy	Fantasy		✓	✓
Choices			✓	✓
Relevance				✓

The degree to which the projects are intrinsically motivating (with reference to the criteria used in table 4.13) is discussed below.

When extrinsic rewards are given it may undermine the intrinsic motivation of the task (Lumsden, 1994). When extrinsic rewards are given for a project, it makes the project less intrinsically motivating.

4.9 The degree of intrinsic motivation of the different projects

(1) The FutureKids Project

This project is seen as being the highest intrinsic motivator because:

- it gave the learner a large range of choice about what should be included or left out of the product
- there was no external reward offered for the completion of the task. Part of the task was that learners could burn a CD-ROM containing the project.

- there was a high degree of challenge inherent in the task. Learners had to learn new computer skills and refine existing skills. Learners also had to reflect on their learning.

- the levels of challenge were flexible as all the parts of the project were not equal in difficulty level and the learner could use different programs. The topic of the project was the learner. While this made the topic relevant to the learner, not all learners found that it personally meaningful to master the skills needed to do the projects.

- the task had no set situation that would stimulate fantasy or curiosity – except for their own interpretation of how the CD could be used as a reflection of their actual skill at a given time or how it would be reviewed by themselves at some point in the future. The learners' fantasy was stimulated in a different way when they were asked to create some pages which would be relevant to the future.

(2) The CASS project

This project is seen as being a medium intrinsic motivator because:

- there was little choice as to the theme. But learners could choose their own applications of the information gathered.

- Marks were allocated for this task (it would count 10% of the final CASS mark). The total CASS mark counted 25% of the final mark. The CASS project contributed 10 to this mark. This external motivator made the project less intrinsically motivating.

- There was a high degree of challenge in this project because learners were expected to apply the skills that they had learned in a way that was not prescribed too closely. The learners had to decide how applications could be used to portray the information gathered.

- The criteria to complete the project successfully were set out. Feedback was given throughout, but not in the form of marks.

- The goals for the successful completion of the projects were prescribed, and some learners did not find these goals personally meaningful.

- The fantasy of creating this project for the local tourism industry was part of the situation that was set for the project and the learners could decide how the programs could be best applied in the given situation.

- Learners' curiosity was stimulated by the requirement of Internet searches to find tourist destinations.

- The topic was not really relevant to the lives of the learners, except to those who might have had some family business interests in tourism.

(3) The class projects

These projects are seen as being lower in intrinsic motivation because:

- no choices in the execution of these tasks were given. Learners were expected to apply the computer skills in a prescribed way.

- Marks were allocated for each task. While the number of marks allocated varied, all together the tasks would count more or less the same as the CASS project. The tasks were graded throughout the year. This made the task less intrinsically motivating.

- There were limited amounts of challenge inherent in these projects. They were more were like drill exercises of skills learned than a challenge to apply such skills in different situations.

- The class projects did have set criteria for performance.

- The goals of the projects were prescribed and were not necessarily personally meaningful to the learners.

- The exercises allowed little space for fantasy or curiosity.

- The topics of the exercises were mostly personally irrelevant to the learners.

4.10   Intrinsic motivation and the results of the assessment

The percentage of tasks left incomplete indicates that the highest percentage of tasks left incomplete were those with the highest levels of intrinsic motivation.

Table 4.14: Tasks left incomplete

	Low intrinsic motivation / Class projects	Medium intrinsic motivation / CASS projects	High intrinsic motivation / FutureKids Project
Tasks left incomplete	12	3	5
Total possible tasks	208	26	26
Percentage of tasks left incomplete	5.8%	11.5%	19.2%

Note the relatively high percentage of tasks requiring a high intrinsic motivation that has been left incomplete.

Motivation can be measured by the effort expended (Small, 1997). Although some projects were completed, the effort expended on these projects was very small because the learner had not done much more than go through the motions. One can argue that, for these tasks, the motivation was very low – more or less on a par with those in which the tasks were left incomplete. When the tasks left incomplete are compared to those for which effort expended was unacceptably small, the following pattern emerges:

Table 4.15: Tasks for which an unacceptably low level of effort was expended

	Low intrinsic motivation	Medium intrinsic motivation	High intrinsic motivation
Tasks for which unacceptably low levels of effort were expended	13	7	9
Total possible tasks	208	26	26
Percentage of tasks left incomplete	6.3%	26.9%	34.6%

The following factors may have undermined the intrinsic motivation that explains the pattern of non-completion of the more intrinsically motivating projects:

• The class was not familiar with the teacher and the teacher did not comply with their expectations of the classes because she employed a different teaching strategies and created a different kind of learning environment from those to which they had been previously exposed. This may have caused a lack of connectedness or understanding between some learners and the teacher in the class environment. Learners may also resist change because they have become used to the way things have always been done (Teel & DeBruin-Parecki, 2001). This resistance does not help to create a learning environment of mutual respect and trust.

• Many learners expressed the wish to be given a template, a test or a set of instructions that would exclude the necessity of planning and making choices when doing the project. Teel and DeBruin-Parecki (2001) note that learners may resist changing to a learner-centred classroom because they feel and expect that decisions should be made for them and that they should follow orders.

- It was observed that many learners had a negative attitude towards the projects. This was especially true for the learners in the Ambivalent and Negative groups. The performance on the CASS and FutureKids projects was the poorest for these 2 groups. This negative attitude may be part of a reaction to having different expectations with regard to what actually happened (Teel & De Bruin-Parecki, 2001).

- Some learners questioned the significance of the projects. It was clear that these learners did not feel that the projects were at all relevant, neither on a social nor on a personal level.

Some learners expressed feelings of anxiety about their ability to do the projects. Anxiety has a negative influence on motivation (Open Learning Technology Corporation, 1996). Some learners experienced many problems in the planning of the project. From that point onward they seemed to believe that they could not do the projects. This caused a decrease in levels of motivation.

Table 4.16: Anxiety and the division into groups

Group	Number of learners	Frequency of the expression of anxiety			
		Seldom / never	Sometimes	Often	Very often
Positive	12	4	7	1	0
Uncertain	7	0	3	3	1
Negative	7	3	3	0	1
Total		7	13	4	2

If one compares the frequency of **expressions of anxiety** about the projects with the groups into which the learners were divided, the following pattern emerges:

- In the Positive Group, most learners sometimes expressed feelings of anxiety, but none did so very often.

- In the Ambivalent Group, learners expressed feelings of anxiety more that in the Positive Group (with one learner expressing feelings of anxiety very often).

- In the Negative Group, learners very seldom expressed feelings of anxiety (only one learner frequently expressed feelings of anxiety).

The 5 learners who **never expressed anxiety** about their ability to do the work performed as follows

Table 4.17: Performance of learners who never expressed anxiety.

Class projects	CASS project	FutureKids Project
9	2	0
8	0	2
16	14	12
11	5	0
4	5	6

It is noted that most of these learners performed very poorly on the CASS and FutureKids projects. One learner who never expressed anxiety performed well on the projects.

Twelve learners **infrequently expressed anxiety** about their ability to complete the projects. Their performance on the different tasks were as follows:

Table 4.18: Performance of learners who expressed anxiety infrequently

Class projects	CASS projects	FutureKids Project
17	16	10
17	12	8
18	10	14
12	12	12
16	13	12
13	4	5
14	11	6
12	12	14
19	14	18
18	18	14
17	18	13

All of the learners who at times expressed anxiety had scores of 60% and more for the Class project, while the performance on the CASS project varied (with mainly between 50 and 90%, with one learner scoring less than 30%). Three of the 12 learners scored below 50% on the FutureKids Project (with 7 projects between 50 and 75%, and one project above 80%).

Seven learners **fairly frequently** expressed feelings of anxiety.

Table 4.19: Performance of learners who fairly frequently expressed feelings of anxiety

Class projects	CASS projects	FutureKids Project
12	13	12
15	13	13
13	12	14
15	9	13
12	9	10
6	0	0
16	13	17

One of these learners performed poorly in all the projects while the performances of all the others' varied. For the class projects these learners (with one exception) scored 60% and above. For the CASS projects, 3 learners scored less than 50% while the others scored between 60 and 65%. For the FutureKids Project, the learners scored between 60 and 85%, with one learner not completing the project at all.

Two learners **frequently expressed feelings of anxiety**.

Table 4.20 : Performance of learners who frequently expressed feelings of anxiety

Class projects	CASS projects	FutureKids Project
13	8	13
13	5	0

For the class projects, both these learners scored 65%. For the CASS project, both these learners scored below 50% (one of them below 30%). For the

FutureKids Project, one of the learners left the project totally incomplete while the other scored 65% for the project.

When one considers these results, it does not seem as though any specific pattern emerges.

4.11 Social and developmental factors of learner-centred learning

The literature provides the tools to shape the discussion of the events in the classroom pertaining to the social and developmental factors of learner-centred learning. The figure below contains the structure for this discussion.

Developmental stage of self-authorship
Level at which the material is presented
Quality of the setting as far as atmosphere and diversity, respect and support is concerned.
Using the social environment – asking and giving assistance.
In cooperative learning: • individual accountability • shared goals • positive interdependence

Figure 4.5. Tools derived from the literature study to shape the discussion

- **Self-authorship** entails the development of the individual's level of making what he has learned his or her own, while maintaining his or her own identity internally and in the social environment (Baxter Magolda, 1999). Learners asked to be given the content so that they could include only what was being prescribed in their projects. This indicates that they did not trust the meaning that they were making. The learners compared what

they had included with the content of the other learners to see if they were "correct" because the teacher insisted that the learner should include in the project what they thought satisfied the outlines of the project.

- **The level at which the material is presented** should be appropriate for the developmental level of the learners. The learners had difficulty planning and completing some of the projects. Learners indicated that they wanted to return to the "way things were", and they requested that they be given content for the projects – even for the FutureKids Project (for which the topic was entirely personal to the learner). Their requests could indicate that the developmental levels of the learner and the projects were not compatible enough. Learners had more difficulty completing the CASS and FutureKids projects satisfactorily. In both these types of projects the learners had to incorporate their own content while the content of the class project (which gave the learners fewer problems) was given. The teacher and learners were new to each other and the developmental level of the learners was not specifically taken into consideration when the projects were designed and allocated. The responses of the learners indicate that the level of the tasks given may not have been appropriate to the developmental level of the learners.

- **The setting** and the support experienced by learners contribute to the effectiveness of the learning that takes place in it. The classroom had a very relaxed atmosphere in which learners were encouraged to discuss the projects they were engaged in and to exchange sources that they had found. Learners were also encouraged to discuss their progress and any difficulties they had with the teacher. Initially learners did not discuss their progress and problems with the teacher – other than asking for the projects to be changed or for content to be designated. But eventually most learners began to engage in informal discussions of their learning with the teacher. It was noted that the learners who had a very negative attitudes towards the projects and the way in which they were expected to learn did not initiate discussions with the teacher and were very non-

committal when the teacher initiated discussions of their work with them. Learners never indicated in any way that they found a lack of respect for themselves or their diversity in the classroom. Discussions and guidance were given in both languages. Learners were answered in the language in which they asked a question and the teacher was sensitive to the language in which the learner received tuition, always addressing the learner in appropriate language. Learners indicated that they did not like being given guidelines or pointers when asking for assistance. Most learners wanted to be given the solution. This aversion may indicate that learners experienced the teacher as being insufficiently supportive.

- **Using the social environment** as a resource for the solution of the problems encountered when completing the projects was not observed early on in the year. But, as time went by, more and more learners asked one another for sources needed to complete the projects.

- **Cooperative learning.** One part of the CASS project required the learners make a magazine as a group project. The learners had to make a magazine to which each learner contributed. The group project would then be assessed The learners could choose the members of the group themselves. Each group had 4 or 5 members. The group was expected to divide the work for the magazine so that each member would contribute equally to make the magazine and would select those articles that would suit his/her abilities and strengths best. This was intended to give each member a special importance within the group. The groups did most of the work on the magazines outside of the class time. There were 4 groups with 4 members each, whilst 2 groups had 5 members. Although 5 of the magazines were of a good standard, the remaining two were poorly done. Both these latter two projects were poor in quality because one or two learners tried to carry the burden of the entire magazine alone.

  o **Individual accountability**. Each member had to take the **responsibility** for the part of the project that he or she had to

make. In some groups, learners cooperated really well and all the members made a contribution to the magazine. Some learners, however, simply did not contribute to the effort and left it to the rest of the group to ensure that the quality of the finished product would be acceptable. Some members were deeply unhappy because the defaulting member(s) refused to cooperate. The learners who *were* motivated to do the task thus felt helpless and cheated. They did not want to be penalized for the defaulting member's lack of application, and felt hard done by because they did more than their required part for the same marks that the others received. Many learners, especially those in the unsuccessful groups, complained that *assessment for group work is unfair*. Learners also felt that since the final mark contributed to their *individual* results at the end of the year, a group mark should not be awarded. Two groups were particularly unsuccessful as the burden was taken up by only one or two learners.

o **Shared goals**. The learners were presented with a **shared goal**: the completion of the magazine. The learners had to write articles on new developments in the world of computers. The information for these articles was to be found on the Internet and in computer magazines. A number of advertisements were required, and learners had to write a letter column that gave advice and answered questions about computers. The learners also had to design and make several advertisements and an impressive title page. An index and editorial article was also required. The most successful groups gathered together over a weekend to create the magazine while others worked on their own to produce the content which was then put together in a magazine by a single learner. Ideally, each member had to contribute to the goal in order to complete it. But what happened in practice was that each learner tended to complete his own part without sharing his or her knowledge or skills with the rest of the group.

o **Positive interdependence** Although the project was planned with positive interdependence in mind, some learners simply did not contribute to the group effort at all. These learners did not respond when the rest of the group asked them to do their part: they usually just said that they did not have time or that they did not like the projects and so were not going to do them. The experience of working in groups was therefore very frustrating to some learners who complained that group work was "unfair". All but one group handed in a magazine. The quality of one magazine was exceptionally poor. in contrast, one magazine was of excellent quality. Although most magazines were neat, content did not reflect any new learning and tended to lean heavily on the copying of articles from magazines and the Internet instead of showing evidence of proper research and creative activity.

4.12   Individual factors of learner-centred learning

The learners came to the learning experience with different backgrounds and life experiences. The individual factors below include observations made concerning the learning styles of the learners and issues of self-efficacy, gender, language, and level with which they engaged with the subject.

4.12.1   Self-efficacy beliefs

The effect of **self-efficacy beliefs** of the learners was not measured, but because the following self-efficacy beliefs have a bearing on the events in the classroom (Pajares, 2000), the researcher's observations about the behaviour of the learners are described in the terms of self-efficacy beliefs listed below.

● **Choices made by the learners**

Learners not only made choices on a cognitive level by choosing the best tools to complete the project; they also made a choice about whether or not to participate in group activities and to complete or not complete the projects. The type of choices made by the learners is

reflected in the effort they expended on projects during the year. The assessment of the choices made by learners is reflected in the assessment of the effort as described below (see following item). The learners who chose to cut class regularly and not participate in the group project were deemed to have made no effort to complete the projects and were awarded a 1 for effort. Those learners who attended class more regularly than the previous group and who participated a little in the group project were also the ones who tended to play around in class and work on the projects sporadically. These learners were awarded 2 for effort. The learners who attended class regularly and who chose to participate a lot extent in the group project were awarded a 3. The learners who were more conscientious in their choice of class attendance and who worked well in the groups were awarded a 4 for effort. Those who attended every class, who chose to work during class time, who participated strenuously in the group project, and who worked in group projects after class time were given a 5 for effort.

- **Effort expended**

    A varied amount of effort was expended on the different projects. Most learners put in more effort when completing the class projects while many learners put in almost no effort to complete the FutureKids Project. There were however learners who put a great deal of effort into completing the FutureKids Project although they were definitely in the minority. Most learners put some effort into completing the CASS project.

    For the purpose of this study, the learner's effort during the year was observed and an assessment out of 5 was given. These marks mean the following:

    1. No effort

    2. Some effort made to complete the project

    3. A fair amount of effort expended to complete the project

    4. A good effort

5.   A very good effort sustained over a long period of time

When the pattern of individual performance on the three tasks and the pattern of effort are compared (as they are the graph below), the patterns that emerge are very similar.

Individual Performance and Effort

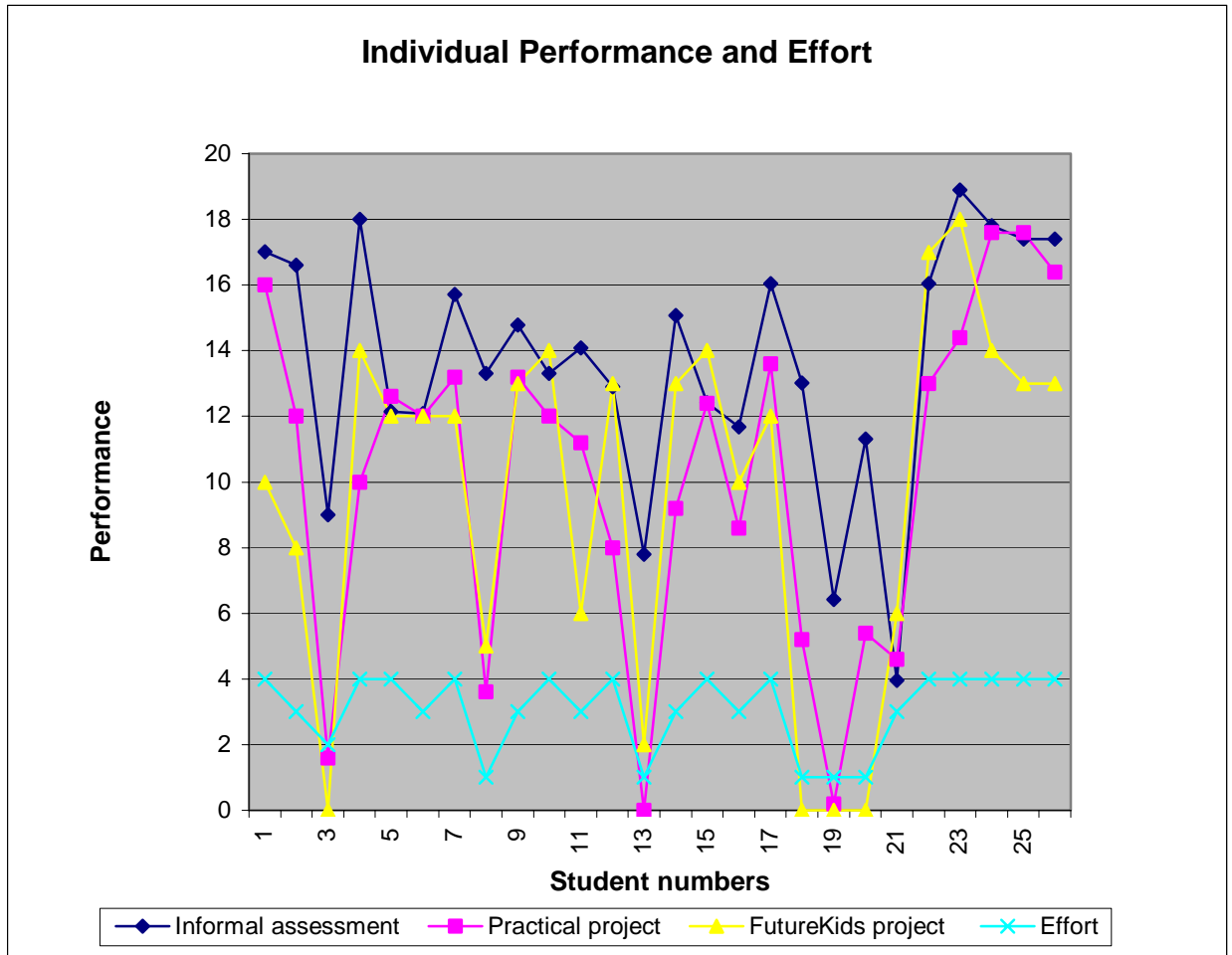Figure 4.6 Individual performance and effort

●   Perseverance

Because effort was assessed after the year on the basis of the researcher's observations of the learners' behaviour in class, the perseverance of learners as they worked on the projects is also reflected as effort in the graph above because the perseverance of the learner determined the degree of his or her effort during the year.

●   Resilience

The resilience of a learner in the classroom may be described as the learner's ability to overcome obstacles in the learning environment that (in various ways) frustrated or hindered his or her efforts and application. Resilience means having the inner strength or ingenuity to work in an unfamiliar way. It also means believing sufficiently in one's own ability to complete the project. Those learners who expressed anxiety and frustration with the learning project were also voicing their implicit belief in their own ability to tackle the work.

● Stress and anxiety

Learners who expressed doubt and anxiety about their ability to do the work needed more guidance and facilitation from the teacher. Their anxiety expressed the measure of their implicit belief in their own ability to work on the project.
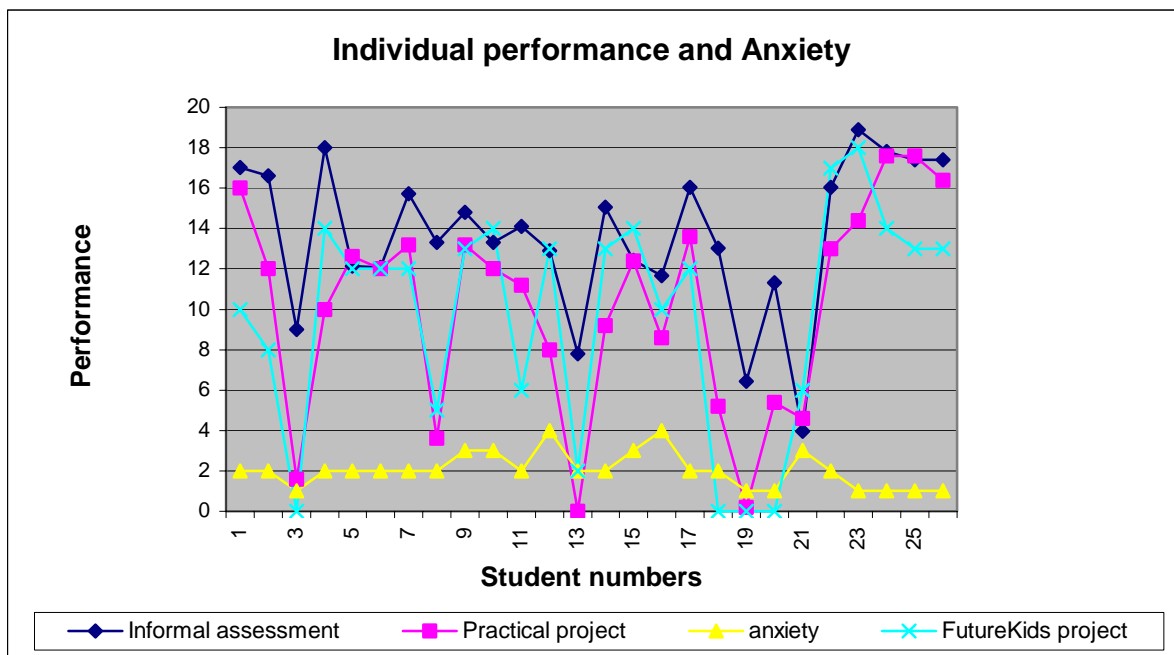
Figure 4.7: Individual performance and anxiety

A comparison between the pattern that emerges of the learners' individual performances on the three types of projects and the patterns of the anxiety expressed by the learners do not show any obvious correlation.

4.12.2 Gender

The researcher's observations in the classroom of learners' reactions to changes in learning environment shows that the different genders did not seem to react very differently – apart from the fact that the girls seemed to express themselves more freely than the boys, and that they tended to express their anxiety and frustration more often than the boys did. The boys on the other hand expressed very strong opinions more frequently than the girls. The patterns of performance of the learners are compared to gender in the graph below.
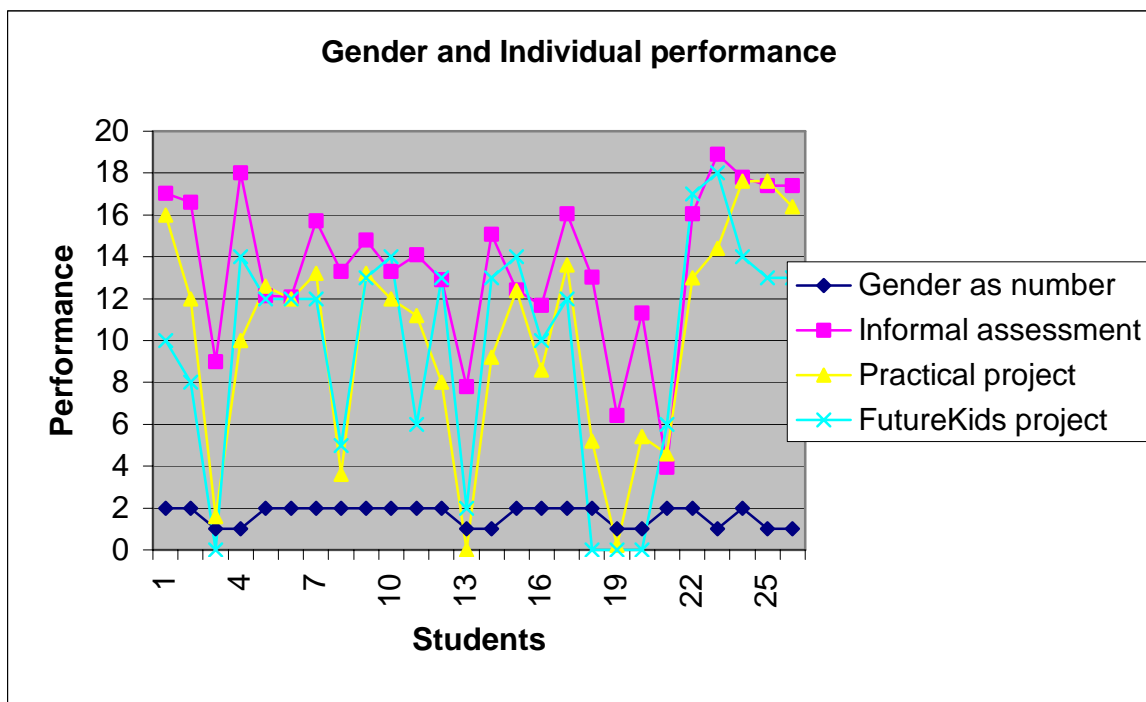
Figure 4.8: Gender and individual performance

Gender is expressed as either 1 for male or 2 for female. If plotted on a graph together with individual performances on the three types of projects, it is clear that no discernible pattern emerges.

4.12.3 Language

The language in which the learners are taught reflects some differences in the cultural background of the learners. The actual differences in culture is not discussed here, but the researcher plotted individual performances on the different projects and the language group to which the learners belong on a graph to see if any discernible pattern appeared. Afrikaans was given 1 and English 2 in order to plot the patterns of performance on the graph.
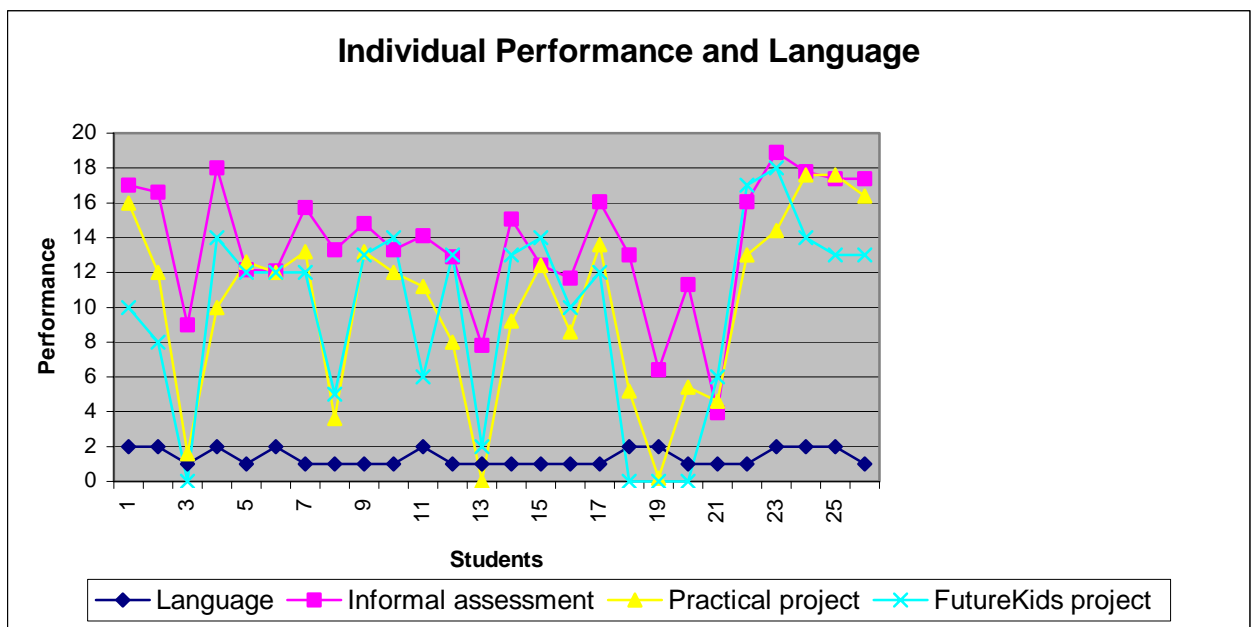
Figure 4.9: Individual performance and language

The graph does not show any discernible pattern between the language group of the learners and their performance in the three different types of tasks.

4.12.4 The level on which the learners did computer studies

Four of the 26 learners in this class took computer studies on the higher grade. This meant that in addition to the CASS assignment and the FutureKids projects (that were also completed by learners who took Computer Studies on the standard grade), these learners were required to learn to write computer programs by using Turbo Pascal as the programming language. Some of the class projects done by these learners were programming projects. The learners also had a different teacher for the programming component of their work although they worked on the CASS project and the FutureKids Project together with learners taking the subject on the standard grade.

Learners on the higher grade performed better than the learners on the standard grade. It was also noted that they were also able to plan their projects more easily. The learners on the higher grade did not express any feelings of anxiety and did not seem to experience any difficulty about doing the projects. Although some of these learners expressed frustration with the way in which the projects were done, they made excellent progress and mostly showed sustained effort during the year.

Learners on the standard grade expressed the belief that only "clever people" can do the programming component of Computer Studies. Although the higher grade learners modestly abstained from expressing this opinion, this belief seems to be established in schools, even in later years. It is likely that learners on the higher grade simply believed in their ability to be successful more than did learners on the standard grade.

The higher grade learners all completed the CASS projects and the class projects and obtained above 80% for these two types of projects; two of the learners obtained above 80% for the FutureKids Project while the other 2 obtained marks in 60% range.

All four of these learners had a positive attitude and were confident that they could master the work. Although these learners were not very talkative, when the

teacher initiated discussions, two of them expressed the opinion that the projects were too easy and that they were not learning anything. The other two said that they were learning some things and were refining some of their skills. Toward the end of the year, one of these learners often asked for help. While these learners were not all grouped together for the group project, they all formed part of the groups who communicated well and produced good quality magazines with adequate content. These learners did not complain about carrying the other learners in the group and they were in the groups who came together to complete the magazine after school hours.

4.13   Learning styles

No assessment was made of the learning styles of the learners in this group. It was noticed, however, that they approached the work in different ways and that each learner enjoyed some component of the work – even when they found the overall situation frustrating.

4.13.1 Interactivity of the factors of learner-centred learning

The different factors of learner-centred learning are interactive. One learner comment could reflect all four factors at once. A learner who says, " I am learning a lot but I don't like learning by doing projects", could be making a comment that is relevant to three of the four factors highlighted by the APA.

When a learner says, "I am learning a lot", that learner is commenting on his or her learning process. That learner's statement therefore refers to the cognitive and meta-cognitive factors of learning. When a learner says, "I don't like doing projects", that learner is expressing an affect that also implies low motivation for the task. By making such a statement, the learner could also be saying that the way in which learning happens in this instance is not his or her *preferred* way of learning (a reference to an individual factor of learning).

Although the researcher analysed classroom events on the basis of different factors of learner-centred learning in order to clarify and identify individual events, it should not be forgotten that these factors are reciprocally affected by one

another. The diagram below attempts to show the reciprocal influence that prevails between all the factors of learning.
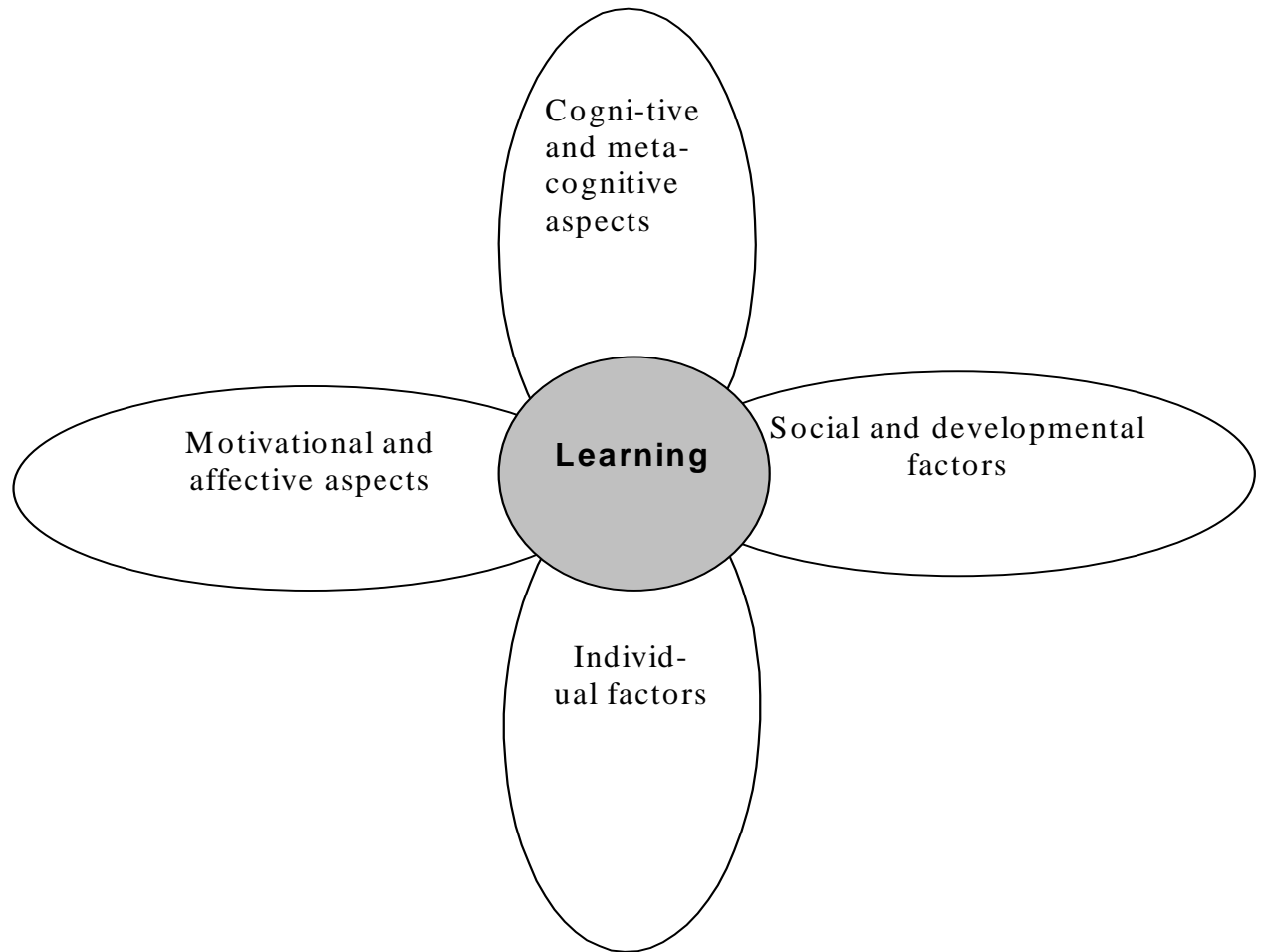
Figure 4.10: The reciprocal effect of factors affecting learning

4.14   Conclusion

Making the transition to a more learner-centred classroom is affected by many different factors that have a reciprocal effect on one another and that are both internal and external to the learner. The variety of reactions of the learners and their actual progress in the classroom shows that the transition has many challenges for the learners and the teachers involved.

Chapter 5

Conclusions and recommendations

5.1   Introduction

Because of the introduction of Outcomes Based Education in South Africa, learners have been required to make a change from a teacher-centred learning environment to a learner-centred learning environment. The researcher's observations of a select group of learners in classroom situations indicated that learners do not *automatically* reap the benefits of learner-centred education. This study attempts to identify the factors that should be kept in mind when making the transition so that learners can reap the benefits of learner-centred learning.

The researcher engaged in a case study of one specific group of learners and observed their reactions to the transition from a teacher-centred to a learner-centred model of learning.

In order to identify the factors that influence the learners' performance in the learner-centred computer-rich learning environment, the researcher used the factors of learner-centred learning as described by the APA as a framework. These factors are:

- cognitive and meta-cognitive factors of learner-centred learning
- affective and motivational factors of learner-centred learning
- social and developmental factors of learner-centred learning
- individual factors of learner-centred learning

Chapter 1 seeks to provide a framework for the study. It attempts to place the research in context, and discusses the background, rationale and research methodology. In chapter 1, research questions are also defined and the limitations of the study are noted.

Chapter 2 of this study examines the available literature with a view to providing a theoretical background and highlighting the tools that the literature suggests for discussing classroom events.

Chapter 3 describes the classroom events. These comprise (for the purposes of this study) the reactions of learners to the transition to a learner-centred learning environment.

The researcher provides an analysis of these classroom events in chapter 4. The issues that relate to assessment and the planning of the learning events, as well as the reactions and performance of the learners in a more learner-centred learning environment, are discussed within the framework provided by the factors of learner-centred learning as they are defined by the APA.

This chapter will endeavour to answer the research questions that the researcher formulated in chapter 1. The chapter will also include a summary of the research and a discussion of the results which will highlight what has been learned from the research and what recommendations might be made for further research and practical adjustments. The discussion is structured in terms of the framework provided by the APA's principles of learner-centred learning.

5.2 Summary of the research

Since most learners in South African High Schools need to make the transition from a teacher-centred to a learner-centred learning environment, information about those features of learner-centred learning that influence a learner's transition would prove valuable to both teachers and planners of the curriculum. As has been noted, the research questions were based on the principles of learner-centred learning as identified by the APA (Lambert & McCombs, 1998).

The research questions that the researcher asked are set out in the table below:

Table 5.1: Research questions: the main research question and sub-questions

The main research question:			
What factors of learner-centred learning − as identified by the APA (American Psychological Association) − should be taken into consideration if learners are to make a successful transition when they move into to a more learner-centred learning environment?			
Factors of learner-centred learning under investigation: sub-questions and component elements of sub-questions	**Cognitive and metacognitive factors**	What cognitive and metacognitive factors should be taken into consideration?	How did the cognitive and metacognitive factors of learner-centred learning affect the learners' performance in the learner-centred classroom?
	Affective and motivational factors	1. What affective and motivational factors should be taken into consideration? 2. Which factors should be kept in mind when designing projects for use in the learning-centred classroom?	a. How did the intrinsic motivational factors affect the learners' performance in the learner-centred classroom? b. How did the extrinsic motivation factors influence the learners' performance in the learner-centred classroom?
	Developmental and social factors	What aspects of developmental and social factors need to be considered?	How did these factors influence the learners' readiness to learn in a more learner-centred learning environment?

| | **Individual difference factors** | What aspects of individual difference need to be considered? | a. To what extent do individual approaches influence the learners' readiness to learn in a more learner-centred learning environment? b. Is there a difference between the reactions of boys and girls to the transition to a more learner-centred learning environment? c. Does the language of tuition affect learner reaction to the transition to a learner-centred learning environment? d. Does the level at which learners are studying Computer Studies (as a school subject) influence the learners' transition to a learner-centred learning environment? |

The researcher's case study followed the reactions of one group of learners to the transition from a teacher-centred to a learner-centred computer-rich class environment. Learners were required to complete three types of projects. These projects reflected different levels of learner-centredness. The researcher collected the data in three main ways: (1) participant observation, (2) interviews and focus-group discussions, and (3) the analysis of the assessment results on the projects.

A literature review provided the theoretical background for the study as well as a tool that the researcher could use to analyse the classroom events and

assessment results. The events in the classroom were analysed in terms of a structure extrapolated from the literature review, and considered (in turn) the cognitive and meta-cognitive, affective and motivational, social and developmental and individual factors of learner-centred learning.

Table 5.2 below summarises the research questions and the resultant answers to those questions collected and processed by the researcher.

Table 5.2: The sub-questions answered: a summary

APA factors of learner-centred learning	Sub-questions implied by the APA factors can be reduced to the following areas of concern:	Answers to such implicit sub-questions are contained in the following statements that have been assembled as a result of the research:
Cognitive and meta-cognitive factors of learner-centred learning	Planning, analysing and forming strategies	- Learners need guidance to plan projects. - Being positive about a project and seeing it as a challenge facilitates the ability to plan a project. - Learners who cannot plan the project are frustrated about and uncertain of their abilities. - Anxiety about recalling prior learning does not prevent a learner from attaining skills. - Being in different to the skills needed to complete a project may prevent a learner from mastering those skills needed to solve a problem.
	Monitoring, self-reflection, taking ownership and validation of the learning	- Learners' reflection on how significant the project is to learning influences the likelihood of a satisfactory completion of the projects occurring. - Learners' views about how relevant the topic is to them personally does not affect the outcomes.

Affective and emotional factors of learner-centred learning (continued on following page)	Intrinsic motivation	• If learners perceive that a project is to some degree personally relevant to themselves, they will complete a project. • Learners who perceive that a project is not personally relevant to themselves are unlikely to complete the project. • Anxiety about personal ability to complete the project does not hamper learning. • The discrepancy between expectation and reality undermines intrinsic motivation.
	Extrinsic motivation	• High-stakes examinations and year-end results undermine a learner's intrinsic motivation to complete the project.
Developmental and social factors	Self-authorship	• Development of self-authorship facilitates learner-centred learning. • The project and the level of the learners' development must be compatible.
	Cooperative learning	• Cooperative learning must be "managed" if it is to be successful. • Learners must learn to cope in cooperative learning situations.
	Social environment	• Learners learn to use the social factors of a class situations to solve problems.
Factors of individual difference	Individual approaches	• Individual choices made by the learners influence their performance in a learner-centred class.

	Gender	• Girls are more likely to express anxiety. • Gender does not influence a learner's performance in the projects.
	Language	• Language does not influence the learners' transition to a more learner-centred learning environment .
	Level at which the subject Computer Studies is taken (HG or SG)	• Learners who take Computer Studies as a subject on the higher grade are more likely to perform well in the learner-centred learning environment.

5.3 The lessons learned from the research

In this discussion of the lessons learned from the research the following structure is used: (1) The lessons learned from each research question and sub-question are described; (2) This is followed by a discussion of the methods used and the results obtained (when compared to other research results), and (3) the contribution that they make to the body of knowledge we have about the transition from a teacher-centred to a learner-centred learning environment. Since the research methodology was discussed in detail in chapter 1, this discussion focuses on the shortcomings of the data collection methods for each research question.

5.3.1 What elements of the cognitive and meta-cognitive factors of learner-centred learning should be considered when making the transition to a learner-centred learning environment?

The following factors were identified as having influenced the progress of the learners in a more learner-centred computer-rich learning environment:

a. The learners had never before attempted to vocalise an assessment of their own work, nor had learners ever talked about how they learn. Some learners responded well to discussions that aimed at making them think about their own learning processes. There wasn't much evidence to suggest that learners were beginning to use this

knowledge to learn more efficiently. The learners only considered the way in which they were learning.

b. Learners seemed to be conditioned to seeing the total assessment of their work in the form of *marks* received at the end of an assessment. For this reason, they were not interested in learning for the sake of learning, and they did not seem to regard their own assessment of their work as important. Marks were regarded as definitively important. Because learners did not think that their own assessment of their progress was at all important, they did not want to spend any time on it.

c. Learners performed better on the class projects than on the FutureKids and CASS projects. This indicates that learners do not automatically have the skills to plan and structure the content of the projects. Learners who are used to working in a more instructivist computer-rich environment may need much more guidance if they are to learn how to plan and structure the learning events for themselves.

d. Some learners were more able to plan their projects and identify what was needed to solve their problems and use appropriate strategies to solve the problems. These learners had the following in common:
    - They saw the project as a challenge.
    - They liked applying their skills in a way that they could control.

e. The learners who had problems in this area had the following in common:
    - They expressed feelings of frustration and uncertainty.
    - They asked the teacher to take over the planning, and they wanted the teacher to provide the strategies they needed to solve the problem.
    - They expressed the opinion that it is the teacher's job to do the planning and devise the strategies to solve the problem.

f. The recall of prior learning is a way in which learners can analyse their skills in relation to the problem. The concept of the recall of prior learning was initially greeted by three attitudes:
    - They were happy to confirm that they had the skills they needed.

- They were anxious because they had not yet mastered the skills properly.
- They were blasé and indifferent, and felt that it was a waste of time to make sure that they had the skills they needed.

g. Learners who were happy to revise could generally apply the skills. Learners who were anxious about their skills learned the skills needed. Learners who were blasé and indifferent could either show that they had indeed mastered the skills or had problems completing the project because they lacked skills.

h. The projects made different demands on learners.

- The projects that were low in intrinsic motivation did not need a great deal of planning from the learners.
- The CASS project and FutureKids Project needed a great deal of planning and strategising from learners.

i. Monitoring their own progress on a project required self-reflection.

- Learners had not reflected on their own learning before.
- Learners had very different views about whether or not they were learning by doing the projects. These views ranged from the view that they had learned a great deal to the view that they had learning nothing.
- Learners who felt that they had learned nothing were most likely not to complete the projects.
- Learners who felt that they had learned a great deal by doing the projects completed it on a satisfactory level.
- The results of the assessment show that learners who felt that the projects had no personal relevance for them were less likely to complete the projects.
- It was evident from the fact that they asked the teacher to solve their problems and prescribe content that some learners had not adopted adequate ownership of their work.

5.3.1.1 Discussion of the methodology used in this study to answer the question asked in section 3.1

When considering the answers to the questions noted above, certain implications of data collection methods are discussed.

Learners were not assessed in terms of their levels of skill and knowledge prior to the study. The researcher made the assumption that they were all on more or less the same level because they were all in the same academic class at school. The influence of learners' prior knowledge on their performance in the learner-centred classroom was not controlled.

The prior experience of the learners that may have influenced their approach to problems was not taken into account. It is not clear whether the learners' inability to plan was the cause or the effect of the frustration and anxiety that they expressed.

Being unconcerned about analysing the skills that they needed for the task could indicate that the learners concerned had mastered the skills and knowledge they needed – and that they were bored by being asked to revise skills they had mastered or else that they did not know whether they had mastered the skills or not. No attempt was made in this study to determine whether or not learners had reflected on their skills prior to recalling the skills they needed, and the reaction of the learners is therefore not adequately explained.

Focus group discussions with learners was the only method that the researcher used to determine the degree of learner self-reflection. Additional data-gathering on this topic might yield more information about whether learners are indeed thinking of their learning – and not just verbalising their thoughts. Additional information could also point to ways in which learners might be stimulated to consider their learning and thinking processes.

5.3.1.2 Comparing the results to those found in the literature review

A study of the literature indicates that the personal relevance of knowledge to a learner is important for effective learning (Lambert & McCombs, 1998). Although this study also indicates that the personal relevance to the learner is important, it is interesting that none of the learners found the topics very relevant. Of the 12 learners who indicated that they had not found the topics relevant at all, 8 completed the projects satisfactorily.

Learners are not used to reflect on their own learning or to take responsibility for how and how much they learn. Some learners seemed very reluctant to take responsibility for this and remained unresponsive to any suggestions that they could do so: they felt that how and how much they learned was the teacher's responsibility. This concurs with Teel and De Bruin-Parecki's (2001) statement that learners may be reluctant to accept changes because they have a specific view of the role of the teacher and already feel comfortable with the way in which they have come to believe that the learning environment should operate.

5.3.1.3 What have we learned about the cognitive and meta-cognitive factors of learner-centred learning?

The following factors of cognitive and meta-cognitive factors of learner-centred learning should be kept in mind when learners make the transition to a learner-centred learning environment:

- Learners will need facilitation from the teacher to reflect on their own learning.
- Learners need to learn how to successfully plan and strategise in order to complete projects.
- The incongruence between the learners expectation of the learning situation and the reality of it may cause frustration and anxiety. This may hamper the learners' performance.

5.3.2 What are the factors in the affective and motivational elements of learner-centred learning that should be taken into consideration?

To answer this research question, two sub-questions were considered. They are:

    a. How did the intrinsic motivation factors affect the performance of the learner when making the transition to a learner-centred classroom?

    b. How did the extrinsic motivation factors influence the learners' performance in the learner-centred classroom?

The researcher identified the following factors:

- Learners made the most effort to complete the projects that were the least intrinsically motivating.
- The average performance on the different types of projects indicates that learners performed better on the projects requiring low intrinsic motivation.

(1)   Anxiety

- Four out of 7 learner who never expressed anxiety completed the projects successfully, while 3 learners who never expressed anxiety did not complete the projects.
- Most learners who did express anxiety completed the projects successfully.
- Two learners expressed anxiety very frequently. One of these learners completed the projects successfully while the other did not.
- Anxiety did not seem to be a predictor of the outcome of the learning.

(2)   Expectations

- Learners quite frequently expressed expectations that differed from the reality of the class events.

(3)   Relevance

- None of the learners in this group thought that the projects were personally very relevant.
- Learners who did not see any personal relevance to the projects were less likely to complete the intrinsically motivating projects.
- Learners who perceived some degree of personal relevance completed most of the projects
- Learners performed better and completed the extrinsically motivated projects more often than the intrinsically motivating projects.

5.3.2.1   Discussion of the research methodology used to provide the answer to the research question

The determination of the learners' levels of anxiety, personal relevance and expectation was based on focus group discussions and the observations of the participant observer. Asking the learners to complete questionnaires might yield more detailed data that could be useful for ascertaining levels of anxiety, personal relevance and expectations. This might yield more information about the way in which learners' performance in a learner-centred learning environment is affected by these factors.

Although there was an almost equal chance that learners who did not express anxiety would complete the projects as those who did not complete the project, the number of students in this study is too small to determine the significance of this result. Learners may also have been anxious without verbalising their feelings. Adding a data gathering method that would yield data about the feelings of anxiety without requiring that it be verbalised might show that learners were more (or less) anxious than might be assumed. This study did not attempt to measure the anxiety of the learner in any way other than from the learners' expressions of anxiety.

5.3.2.2   Discussion of the answers to the research question in the light of the literature review

According to the literature, intrinsic motivation is preferable to extrinsic motivation (Mwamwenda, 1994). Motivation can be measured as *effort* (Small, 1997). The motivation to complete tasks adequately was measured in terms of the *observed effort* expended on the projects.

The learners in this study showed a better performance on the least learner-centred projects. These findings are not what was expected. The literature indicates that learners should be spending more time and effort on intrinsically motivating tasks (Malone, 1981), and that intrinsic motivation is superior to extrinsic motivation (Mwamwenda, 1994). Lumsden (1994), however, points out that extrinsic motivation may erode intrinsic motivation. Other factors that can undermine intrinsic motivation include: personal relevance of what the learner is learning (OLTC, 1996, Ginsberg &

Wlodkowski, 2000, Malone, 1981); feelings of vulnerability and anxiety (Ginsberg & Wlodkowski, 2000, OLTC, 1996); expectations (Teel & De Bruin-Parecki, 2001); and extrinsic motivation.

The two factors that can undermine intrinsic motivation and that played a strong role in this class would be the discrepancy between the expectation of class routine and the teacher's behaviour (on the one hand) and the reality of these factors (on the other), as well as the fact that the results of the least intrinsically motivated projects counted for marks toward the results of a very high stakes year.

5.3.2.3 What have we learned about the influence of affective and motivational factors of learner-centred learning on this group?

The following factors that influence the motivational and affective factors of learner-centred learning should be kept in mind:

- The learners' view of the relevance of the projects was an indicator of performance.
- The discrepancy between the learners' expectation and the reality of the classroom situation may hinder the transition.
- The emphasis on extrinsic motivation erodes intrinsic motivation.
- The expression of anxiety about the ability to complete the projects did not indicate the eventual performance on the projects.

5.3.3 What developmental and social factors should be considered?

To answer the question above, the following sub-question is considered:

5.3.3.1 How did the developmental and social factors influence the learners' readiness to learn in a more learner-centred learning environment

- Learners' concern that the content of the projects be "correct" indicates that self-authorship was not yet well developed.
- Learners' difficulties in planning and strategising for the learner-centred projects as well as their yearning for "the way things were" (ways that did not require them to plan and strategise), may indicate

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that the projects and the learners' developmental levels were insufficiently compatible.

- Learners did not manage to work well in a cooperative learning situation.
- Learners learned to use the social situation in the class as a resource after some months had elapsed.

5.3.3.2 Discussion of the research methodology used to answer this question

The developmental levels of the learners were not measured. Questionnaires and other data-gathering methods to measure the developmental level of the learners might yield data that would assist the teacher in planning a project that would appeal more to the learners because it would then be based on the developmental level of the learner.

Cooperative learning was not successful in this study. The teacher did not control the division into groups in this instance. This factor may have influenced learner performance. Too little time was spent on the group project in class time and the poor outcomes of some groups may be the result of having too little time together to work as a coherent group.

5.3.3.3 Discussion of the answers to the research questions in the light of the literature review

Baxter Magolda (1999) stressed the importance of the development of self-authorship for successful learning. The conclusion about the developmental levels of the learners and the requirements of the project point to the importance of this factor.

Potgieter and Cronjé (1998) concluded that learners must learn how to cope in cooperative learning situations. This may explain the poor performance of the learners in the cooperative learning situations because this was the first time that learners had encountered this kind of learning in groups like these.

5.3.3.4   What have we learned about the effect of developmental and social factors of learner-centred learning?

- The development of self-authorship facilitates learner-centred learning.

- The project and the level of the learners' development must be compatible.

- Cooperative learning must be managed to be successful.

- Learners must learn to cope in cooperative learning situations.

- Learners learn to use the social factors of the class situation to solve problems in the learning tasks.

5.3.4`What are the individual factors that should be considered?

Sub-questions attempting to identify the way in which the following individual factors influenced the performance of the learners are discussed:

- Individual approach to the projects

- Gender

- Language of tuition

    - The level at which the learners took the subject Computer Studies (HG or SG)

(1)   To what extent do individual approaches influence the learners' readiness to learn in a more learner-centred learning environment?

- Choices made by the learner, as well as perseverance, are expressed as *effort* in this study. The individual performance and the effort expended show a pattern of concurrence.

(2)   Is there a difference in the reaction of boys and girls to the transition to a more learner-centred learning environment?

- Girls were more likely to express anxiety about their ability to complete the projects

- The performance of the projects was not influenced by gender.

(3)   Does language affect the learners reaction to the transition to a learner-centred learning environment?

- The language of instruction of the learners was not an indicator of performance on the projects.

(4)   Does the level (HG or SG) on which the learners take the subject Computer Studies influence the learners transition to a learner-centred learning environment?

- The level on which learners studied Computer Studies was an indicator of the outcome of the projects because all learners who were taking Computer Studies on the higher grade performed well in all the projects.

5.3.4.1   Discussion of the answers listed above in the light of the research methodology used to answer this question

The learners' approach to solving the problem presented by the projects in terms of their learning style was not taken into account. Although observations made in the class identified certain approaches, it may be very useful to classify the different approaches formally.

Although gender and language did not seem to influence the learners' reaction to the transition to the learner-centred learning environment, the study was too small to make a definite conclusion in this regard.

Since learners who were taking Computer Studies on the higher grade performed well in all areas for reason that are not adequately explained, more data is needed to determine the importance of this factor. Factors that may explain this phenomenon could include the approach to the projects, the level of these learners' skills prior to the study, as well as their level of development of self-authorship. More data collected by means of questionnaires and other data gathering methods is needed to provide adequate insight into why these learners performed better. As this group is particularly small, this finding may not be accurate.

5.3.4.2   Discussion of the answers to the research questions in the light of the literature review

The literature indicates that specific approaches to learning tasks as well as individual learning styles play a role in effective learning (Kearsly 1998, Blackmore, 1996). Sensitivity towards the learners' divergent backgrounds,

cultures and experiences facilitates effective learning (Baxter Magolda, 1998). The answers to the research question under discussion concur with the view of the literature.

The literature does not provide us with any direct clues about why the performance of the learners on the higher grade is better. Prior experience and the level of their skill and knowledge before the projects started may provide the necessary clues.

5.3.4.3 What have we learned about the effect of the individual factors of learner-centred learning in this study?

- Individual choices made by the learners influence the performance in class.
- Girls are more likely than boys to express anxiety.
- Gender does not influence the learners' performance in class.
- The language of tuition does not influence the learners' performance in the learner-centred learning environment.
- Learners who take Computer Studies on the higher grade are more likely to perform well in a learner-centred learning environment.

5.4 Recommendations

5.4.1 Recommendations for policy and practice

The factors of learner-centred learning as discussed in the previous part of this chapter have been identified as having an effect on the performance of learners in a more learner-centred learning environment when the transition is being made to a more learner-centred learning environment. Some guidelines for making the transition to a more learner-centred learning environment easier for the learner and for facilitating effective learning can be derived from these findings. They are the following:

- Learners must be guided when making the transition to a more learner-centred learning environment.
- Teachers should pay attention to the learners' abilities to plan and form strategies when they approach a problem. Some assistance in the planning of projects may be needed. A part of the project could

include formal planning that would facilitate the process of learning by solving problems presented in a project.

- Learners are not used to communicating what they think about their own learning. Many learners do not take self-reflection on their learning seriously. Planning a project to include self-reflection and providing guidelines for self-reflection, as well as showing learners that self-reflection should be taken seriously, may also help to develop this capacity.

- Learners need to take ownership of their work. Teachers can consider various methods in which to encourage ownership.

- As the projects count toward the high-stakes examination at the end of the year, intrinsic motivation is eroded. Teachers and policy makers should consider this and plan for ways to diminish the effect of this extrinsic motivation on the learners. Strengthening the factors that promote learner-centred learning and intrinsic motivation may help to diminish the effects of the extrinsic motivation.

- The development of self-authorship needs attention. With the transition to learner-centred learning, this factor needs to be developed consciously.

- Putting learners into groups does not mean that cooperative learning will take place. The careful planning and management of cooperative learning needs attention. Learners and teachers need to learn how to work effectively in a cooperative learning situation. More training for teachers and learners should help the process

5.4.2 Recommendations for further study

With the identification of the factors that influence learners' abilities to learn in a learner-centred learning environment, it becomes clear that not enough is known about the dynamics of these factors, nor about how to promote the positive factors or how to diminish the effects of the negative factors.

The following suggestions for further research may be indicated:

- As the development of self-authorship has been identified as a factor that influences learners' performances in a class on an individual,

cognitive, social and affective/motivational level, more research is needed on how to facilitate this development in a South African context.

- Further research on the planning of projects and the preparation of projects to promote intrinsic motivation and effective learning is needed.

- Further research to facilitate the development of meta-cognitive factors is needed. Learners do not know how to plan and devise strategies for solutions to problems presented as projects. The learners also do not take self-reflection seriously and do not apply what they know about how they learn to their learning. Research on this factor and the development of a plan to assist learners in the development of effective meta-cognitive activities are needed.

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