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ADDRESSING POOR WRITTEN LANGUAGE SKILLS:
An Integrated Design-based Approach

by

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Submitted in partial fulfilment of the requirements for the degree

MAGISTER TECHNOLOGIAE: LANGUAGE PRACTICE (CALL)

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Department of Applied Languages

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June 2007

DECLARATION BY CANDIDATE

“I hereby declare that the dissertation submitted for the degree MTECH: Language Dynamics: CALL, at Tshwane University of Technology, is my own original work and has not previously been submitted to any other institution of higher education. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references.”

R E Kotzé

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To Deon

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I would like to express my sincere gratitude and appreciation to:

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ABSTRACT

Poor written language skills amongst first year language students at the Department of Applied Languages at Tshwane University of Technology in South Africa inspired an investigation into an integrated approach for improving these skills. The approach needed to take into account that regular within-class intervention, extra classes and language-specific academic support courses were not practicable at the time. An innovative interdisciplinary learning design, including constructionism, peer assessment, CALL, authentic learning, a process approach to writing, as well as motivational strategies, had therefore been developed by consulting the relevant literature. Thereafter the design had been tested as is necessary for a design research approach. Further iterations for the refinement of the design were not entered into in this first pilot cycle, as the viability of such an investigation had to be determined first. Students showed a highly significant improvement in their written language skills and a noteworthy improvement in their editing skills. The results had further shown that the integrated approach is relatively easy to adopt, is sustainable in future and is also cost-effective. Future iterations would therefore not only be viable, but also profitable for the department.

Keywords: Integration, Interdisciplinary, Process Approach, CALL, Constructionism, Peer Assessment, Authentic Learning, Motivation, Design Research, Writing Skills

EKSERP

Swak geskrewe taalvaardighede onder eerstejaar taalstudente by die Departement Toegepaste Tale van Tshwane Universiteit van Tegnologie in Suid-Afrika het ’n ondersoek na ’n geïntegreede benadering vir die verbetering van hierdie vaardighede geïnspireer. Die benadering moes in ag neem dat normale klasverbande intervensie, ekstra klasse en taalspesifieke akademiese ondersteuningskursusse nie op daardie tydstip prakties uitvoerbaar was nie. ‘n Innoverende interdissiplinêre leerontwerp, insluitende konstruktionisme, portuurassessering, RGTO, praktykgerigte leer, ’n prosesbenadering tot skryf, sowel as motiveringsstrategieë is daarom ontwikkel deur die relevante literatuur te raadpleeg. Daarna is die ontwerp getoets soos vereis vir ’n ontwerpgerigte navorsingsbenadering. Verdere iterasies ter verfyning van die ontwerp is nie aangepak nie, aangesien daar eers deur hierdie eerste loodssiklus bepaal moes word of so ’n ondersoek lewensvatbaar sou wees. Studente het ‘n hoogsbetekenisvolle verbetering in hulle geskrewe taalvaardighede en ‘n betekenisvolle verbetering in hulle redigeervaardighede getoon. Die resultate het verder gewys dat die geïntegreerde benadering relatief maklik opneembaar, volhoubaar asook koste-effektief is. Toekomstige iterasies sal derhalwe nie slegs lewensvatbaar nie, maar ook winsgewend vir die departement wees.

Sleutelwoorde: Integrasie, Interdisiplinêr, Prosesbenadering, RGTO, Konstruksionisme, Portuurassessering, Praktykgerigte Leer, Motivering, Ontwerpgerigte Navorsing, Skryfvaardighede

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1.1 INTRODUCTION

Many students experience difficulties with a subject in basic English communication skills at Tshwane University of Technology in South Africa in their first year, which is evidenced by the fact that 44% of students failed this subject in the year 2005 (MIS, 2006a). What is even more surprising though is that so many of the students who specifically enrol for a diploma in languages at the Pretoria campus, fail their language-related subjects. This is made clear by the fact that, of the first-year students who enrolled in 2005, 43% failed the subject Applied English (MIS, 2006a) and 80% failed the subject English Editing (Howse, 2006). It seems strange indeed that so many of the students who specifically choose to study languages would fail it.

In an interview conducted with the head of the English section of the language department at TUT (Ahrens, 2006), she expressed the concern that students' written language skills "have deteriorated steadily over the past ten years", and that language students were no different in that regard. In the same interview she remarked that tests administered in the university had revealed that while the language ability of some students correspond to that of grade 8 learners, the language level of most students was equivalent to that of learners in grade 6 or 7. This problem is not unique to TUT though, as researchers and lecturers internationally (Carrasquillo & Rodriguez, 1996:2; Cole, Cruickshank & Newell, 2003; Collett, 1994:1; Jeffery, B, 2001:51; Nagel, 1993:1) are unanimous in pointing out that the English Second Language Skills of students who enrol for tertiary education are not up to the required standard.

What are the reasons for such poor language skills among those entering the university system? One may speculate that it is because students grow up in the first language culture and only make contact with the target language, English, for the first time when they enter the school system. One might further consider that their parents, of whom many are either preliterate or speak poor English themselves, are unable to assist their children (Asmal, 1999). Poor schooling and inadequate school facilities further exacerbate this problem (Asmal, 1999; Nagel, 1993:1; Taylor, 2006). Other contributing factors might be the prevailing lack of purpose and discipline in schools (Asmal, 1999; Taylor, 2006), principals who are inadequate in their jobs and teachers who are poorly trained and informed and who are unable to manage their time properly (Taylor, 2006). In addition to this, educators are often in a state of uncertainty because of the post-1994 transition from an old schooling system to a new one and the need to master new curricula and methods of pedagogy

(Asmal, 1999; Taylor, 2006). The change from conventional education to an outcomes-based education (OBE) system, for example, has in many ways exerted a destabilising effect on schools and educators (DOE, S.a.; Taylor, 2006). Standards vary enormously from one school to another and standards are generally too low (Asmal, 1999, Taylor, 2006). These factors together conspire to produce students who have matriculation certificates and enter the tertiary system but who do not have the requisite language skills and abilities to perform successfully in a tertiary setting.

Once students arrive in tertiary institutions, they are expected by their lecturers to possess language skills commensurate with tertiary study. The fact of the matter is, however, that most first-year students cannot cope effectively with their subject content because their language skills are indeed deficient. And because lecturers already struggle to cover the full syllabus in the time allotted to them by the timetable, they simply do not have the time to teach whatever essential remedial language skills the students may need.

Can this problem be solved by compelling first-year students to attend academic support courses? Will remedial language classes arranged by the faculty or by departments provide a solution? Although such a course of action might possibly offer some redress, the financial and human resources needed for such interventions are not always available to universities and other tertiary institutions in this particular time of widespread mergers and the institutional turmoil that accompanies them. Another option that might make a considerable difference to the situation is the application of an integrated, interdisciplinary teaching intervention also incorporating Computer Assisted Language Learning and Teaching (CALL).

It has become urgently necessary for educators, faculty heads and institutional administrators to consider what would best address this already widespread and growing problem. The purpose of this research is therefore to offer an analysis of the problem and to suggest a feasible solution.

1.2 BACKGROUND

Asmal (1999) remarked as long ago as 1999 that many educational challenges faced South Africa. The gross deficiencies of the South African education system were caused by the fact that, prior to 1994, the majority of the population did not have access to adequate

education. The deficiencies inherited from that era are still evident today in innumerable schools, colleges and universities throughout the country. While it has been the intention of successive post-1994 governments to remedy the situation as quickly and widely as possible, such deficit cannot be easily effaced. While new generations of learners are being offered the fundamental skills, knowledge and training that were denied to their predecessors, widespread shortage of properly trained personnel and resources, and a chronic lack of funding hamper the government's efforts to provide good-quality education for all learners. The introduction of outcomes-based education has also caused a great deal of uncertainty and anxiety among teachers. While the jobs of teachers are perennially insecure, many of them also feel less than capable of implementing the new education system and its accompanying curricula and techniques in their classrooms (Asmal, 1999).

The government's new policy to merge various tertiary institutions (DOE, 1996:16-19) has further complicated the issue. While the cost of merging institutions (DOE, 1996:20) is immense, it is often accompanied by the retrenchment of core teaching staff ─ even though student enrolment figures increased enormously until 2005, when an effort was made for the first time to cap the numbers of students enrolling in tertiary institutions (MIS, 2006b).

The South African population is comprised of a variety of ethnic cultures such as Sotho, Zulu, Tswana, Pedi, Xhosa, Afrikaner, and English, each with its own distinctive language, culture and traditions. Some of the learners from these ethnic groups, only make contact with the target language (TL), English, for the first time when they enter the school system, a fact that makes it difficult for students to cope at school and later at tertiary institutions when they arrive there (Carrasquillo & Rodriguez,1996:20-22).

According to counsellor Morulane (2006) of the TUT Directorate for Student Development and Support, the academic support programmes on the Pretoria Campus are overwhelmed by great numbers of students who do not even possess fundamental English language skills. She further explains that poor and inadequate facilities render the staff at the Pretoria Directorate for Student Development and Support powerless to help such students. Students who are turned away from these programmes because there is no place for them, nearly always have no other remedial option for improving their language skills.

While teachers and lecturers are adversely affected by these deficiencies, it is the students themselves whose lives and hopes are most blighted by these seemingly intractable

problems and difficulties. The full tragedy of this situation is always most apparent in language departments. Students who enter tertiary education institutions to study languages often do not possess even the most fundamental language skills. While it is enormously stressful for lecturers to engage in any kind of remedial language teaching while at the same time coping with the demands of their own syllabuses, the practical effect on the students themselves is indeed catastrophic and it is hardly surprising that they quickly become demotivated, confused and apathetic in what is essentially a lose-lose situation.

1.3 CONCEPTUAL FRAMEWORK

In this section, which offers a conceptual framework for this study, the researcher briefly describes the different levels of integration, the elements of which these levels are composed, and how the requisite elements work together as a whole. Figure 1.1 below offers a graphic representation of the elements of integration and how they relate to one another in the conceptual framework.

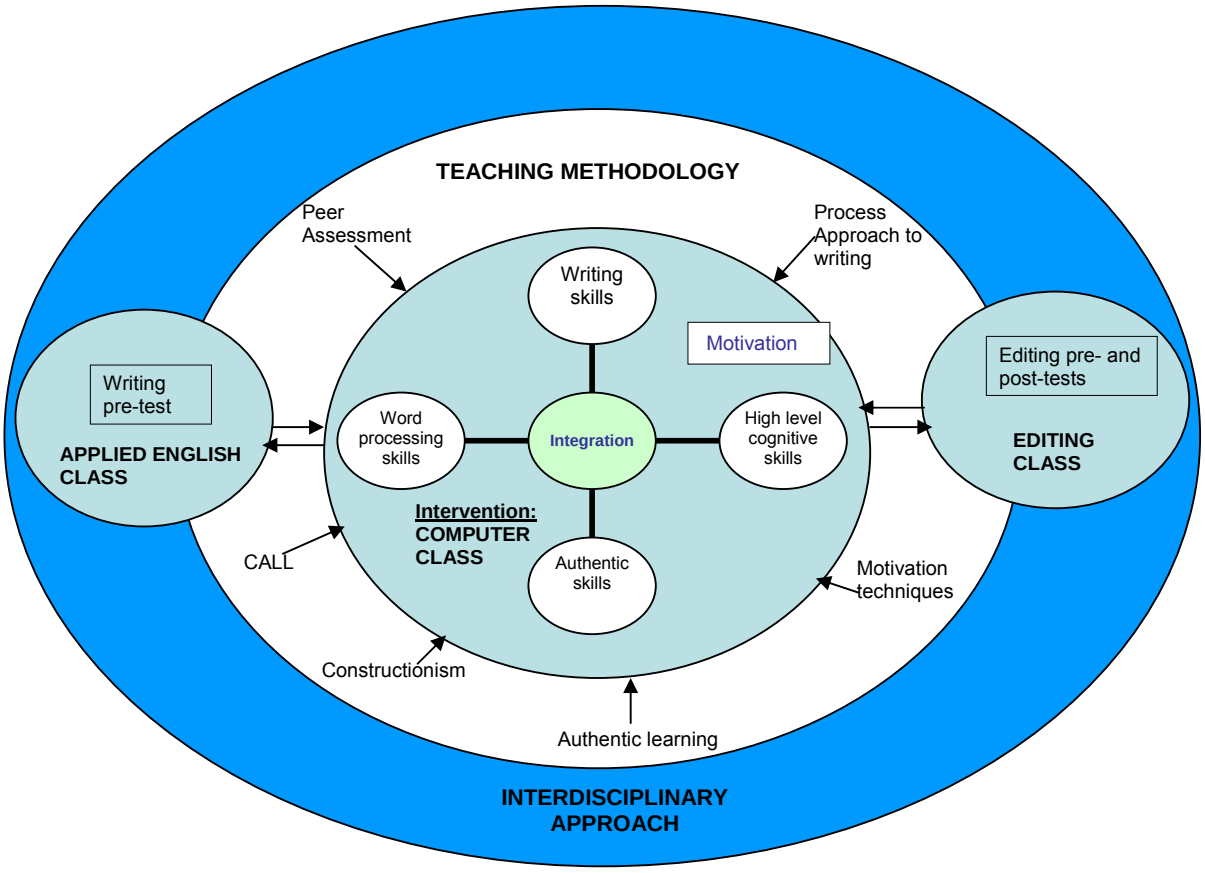

FIGURE 1.1: Conceptual Framework

The conceptual framework on the previous page shows that integration is at the heart of this study. *Integration* in this context means not only a merging of practice, theory, technique and culture (French, 1998) in the classroom. It also means merging (integrating) classrooms, teachers and subjects (Koch & Kriel, 2005) to create holisms characterised by authenticity and integrity (French, 1998).

The first level of integration takes place in the classroom where the different components of the model (such as word processing, engagement in authentic tasks, and the learning of higher level cognitive skills through peer assessment) need to be integrated. Motivation, which is a necessary precondition for successful teaching and learning in every classroom setting, positively enhances the synergistic interplay of the components mentioned in the previous sentence.

During the intervention, students (in the classroom) had been given the opportunity to practise and improve their **writing skills** by means of a process approach (Dison, 1989:114; Tecle, 2001:28) to writing: drafting a letter, consulting others, peer editing, word-processing and rewriting to produce an end-product as if in the workplace.

Each student wrote a letter in the Applied English class, which were then **peer assessed** in the Computer Usage class with the help of colour highlighters. Corrections were indicated in pencil above the highlighted words or phrases and comments were provided in writing at the end of these letters. Peer assessment, in which students review and edit the work of their peers (Ballantyne, Hughes & Mylonas, 2002), encourages students to think critically about their own writing (Burgess, 2001). These letters, complete with the critical content, were then returned to their owners in a follow-up session, and they were then typed on a **word processor**. The original writers of the letters then further improved their productions by processing the text through various word processor functions such as those that check spelling, grammar and style, the thesaurus, the dictionary, and word count. Students were free to solicit the help of peers and the lecturer at any stage.

Research by Cook, Goldberg and Russell (2003) and Collett (1994:77) suggests that word processors contribute in a positive way to the improvement of students' written language skills. These researchers note that when students write on a computer, they tend to revise their work more often during the writing process. The students also tend to collaborate and communicate with peers more often about their writing while it is still in progress, and profit

from the teacher's comments right from the early stages of the writing process (Cook, Goldberg & Russell, 2003).

When a process such as this is used to practise writing and when the word processor's tools are utilised to refine the writing produced, the end-product is characterised by **authenticity** because that is the way in which writing is produced in the workplace. It is important for students to be able to feel the relevance of what they are learning (Andrews, Isaacs and Stein, 2004), to be able to apply the knowledge that they have acquired during this process (Authentic Learning, S.a), and to be able to relate the product of their writing to those of other practitioners in the field.

Motivation is also increased by this kind of practical exercise. The satisfaction that derives from a job done well is experienced as internal motivation, and the way in which the task is related to what happens in the real world, as well as the opportunity to gain additional marks, is experienced as external motivation. It is important for teachers who encourage students to write to create a practical and psychologically supportive environment and to explain to the students the actual purpose of an exercise before giving them authentic writing tasks (Bruning & Horn, 2000). Students are also encouraged by extrinsic motivational factors such as the possibility of augmenting their initial mark (Harris, 1991). The integration of the above mentioned elements in the classroom was influenced by the method that the lecturer chose for the intervention of this study. As part of the second level of integration, this study employed a combination of methods. Peer assessment, authentic learning, computer-assisted language learning (CALL), a process approach to writing and different motivational techniques were therefore mixed together to form a new integrated approach to facilitating classroom learning.

The **third** and yet higher level of integration required a cross-fertilisation between different subjects. An initiative like this needs to be planned, scheduled and implemented by the lecturers who teach different subjects. Reference was made earlier in this section to how a writing task performed in the Applied English class was further refined in the Computer Usage class when editing skills learned in the Editing class were put into practice by applying skills that are normally only learned in word processing. In this way, an integration was effected between the skills that students had learned in Editing class and those that they had learned in the Computer Usage class.

This kind of pedagogical method is known as *constructionism* (Harel & Papert, 1991:1). The constructionist model suggests that students produce or construct an end-product by making use of skills learned in different subjects (French, 1998). Constructionism asserts that learners learn how to plan, research, create, assess, edit and revise texts as they go about producing “artefacts” or refined end products (Alessi & Trollip, 2001:13).

In this section the researcher’s conception of the study had been portrayed by means of a diagram of the conceptual framework as well as an explanation thereof. This explanation included a brief discussion of the different levels of integration as well as how the various elements worked together on each of these three levels and how the elements can be integrated both within a classroom and between classrooms.

1.4 STATEMENT OF THE PROBLEM

It is clear to the lecturers of English at the Department of Applied Languages of Tshwane University of Technology (TUT) that the majority of students who enrol at the university experience great difficulty with English as a second language. As indicated above, the poor pass rates of first year students enrolled for a diploma in languages show that they too experience difficulty with the fundamentals of the English language.
Lecturers are faced with the problem of students who do not have the expected language skills in place. Teaching time is limited and lecturers cannot teach these expected fundamental skills, which are essential for language courses, in the normal allocated time slots. Staff and budgetary cuts make proper supplementary courses impossible and existing academic support programmes cannot cope with the ever increasing student numbers.

Written language skills, especially, prove to be difficult for students, but adequate time to practise these skills in class, do not currently exist. Students need a great deal of practise in the writing and editing of texts in order to help them towards reaching the competence level required at a tertiary institution. These students’ present levels of competence also render them unable to operate efficiently in business, the professions and in industry.

Subjects are currently taught in isolation from one another, with each lecturer focusing on their specific field only. Very little is done to integrate the learning experience of the student, with the subject Computer Usage being especially separated from other modules. Apart from doing little to improve their language skills, such factors undoubtedly undermine the

already shaky motivation of most students. The practical effect of separating the practical application of one subject from another, means that students are being offered an impoverished learning experience. In such circumstances, even students who pass their courses and receive their degrees have not benefited as much as they might have done from their studies, and they go out into the world with a whole range of poorly developed social, thinking and practical skills.

The need to find a workable solution to all these problems that takes all of the above factors into account, is of vital importance to the future of both the university and its students. Students at the Department of Applied Languages, for example, will be the translators, editors, copywriters and writers of the future. They will be unable to function even at an adequate level unless they develop a whole range of language, practical and social skills of the highest quality.

Students of languages will not only be expected to work in an environment where they will have to be able to write grammatically and linguistically correct, but will also need to be able to edit their own and others' texts. Most positions in the job market, whether in industry or any other field, also expect applicants to be able to work without assistance on computers and to be familiar with word processing programs in particular. It is therefore important that students know and use the attributes that computers are bringing into editing and writing practices.

What the above boils down to is that: students lack the expected language skills at first year level, there is no time teach these basic skills during normal contact sessions, extra classes are not feasible at present, students are not willing to spend their own time to catch up and do not take the responsibility of attending classes regularly, and the expectations of industry are high, requiring a high level of language competence and the ability to use the computer.

The study therefore undertook to investigate the influence of an integrated approach towards improving the written language skills of students on the cognitive and affective aspects at work in a first year language course.

1.5 RESEARCH QUESTIONS

In the light of the research problem discussed above, the following main question was derived:

- What is the influence of an integrated approach towards improving the written language skills of 1st year language students at TUT on the cognitive and affective aspects at work in a classroom?

In order to answer the above question, this study explored two sub-questions, namely to determine what the influence of an integrated approach towards improving the written language skills of 1st year language students at TUT is on the:

- cognitive experiences of these students in the classroom.
- affective experiences of these students in the classroom.

By answering these questions, the researcher hoped to make a contribution to whatever remedial measures would be instituted in the future in the university. The researcher envisaged that the answer to the questions above would make possible solutions to the urgent language problems of first-year students clearer than they have hitherto been. The researcher also hoped that the findings of this research project would inform future practice and that they would make a contribution to the solution of the endemic problems of isolated teaching, student motivation and students going out into the working world unprepared and unskilled for the tasks that they have to perform.

1.6 GOALS OF THE STUDY

The questions above were derived from the research problem and they suggest the goals that might be achieved through the medium of this research. The objectives of the study were to determine the influence of an integrated approach towards improving the written language skills of 1st year language students at TUT on the:

- cognitive experiences of these students in the classroom.
- affective experiences of these students in the classroom.

In order to reach these goals and answer the questions that have been posed, an appropriate research methodology had to be chosen. This methodology is briefly described in the following section.

1.7 RESEARCH METHODOLOGY

The researcher decided to adopt a design research methodology (Bielaczyc, Collins & Joseph, 2004; Brown, 1992; Collins, 1992) because of its relevance to and utility in educational settings. The researcher therefore made use of both quantitative and qualitative approaches in the study.

1.7.1 Research Design

A design experiment methodology seemed most appropriate for the study because its goal was to create a strategy that could be applied in the classroom and then tested empirically. From this a context-specific theory was derived. The researcher felt that it was necessary to consider both the practical and theoretical aspects of the research. Cobb et al. (2003) concur that design experiments entail both the design of the learning as well as the study of whatever learning takes place within the context dictated by the research.

It had been the purpose of this study to inform and improve practice by means of a holistic approach (Design-Based Research Collective, 2003). Both cognitive and affective aspects of classroom learning had been addressed through the mixed-mode design experiment methodology (Squire, 2004), which combines both quantitative and qualitative aspects of research.

Triangulation, the gathering of supporting evidence from more than one source to provide insight into a theme or perspective (Cresswell, 1998:202) had been used to strengthen the approach. This triangulation took place on different levels: multiple sources of data had been consulted, both quantitative and qualitative research methods had been employed and different theories of learning was combined in informing the strategy and intervention used in the study.

Furthermore, a practitioner researcher, together with peers had been involved in the analysis and interpretation phases of the study, thus ensuring *crystalisation* of the data.

Crystalisation (Richardson, 2000:934) is the idea that in looking at the world there are multiple dimensions and angles of approach and that what we see depends on the angle from which we are looking, such as when one looks at a faceted crystal in the light. As this study focused on both quantitative and qualitative methods of enquiry crystalisation, in addition to the earlier mentioned triangulation, had been of importance for the outcomes of the study.

1.7.2 Population and Sampling

The population the researcher had focused on was 1st year language students at Tshwane University of Technology. The majority of the students in the sample were between eighteen and twenty years old. At the time of the study, approximately one hundred (100) first year students had enrolled to study languages at TUT, although only 55 of this number were present on the Pretoria Campus. Of the students on the Pretoria campus, only half (approximately 27 students) were enrolled for all three of the subjects included in this study at a first year level. The size of the sample was therefore 27.

Convenience sampling is sampling in which cases (in this case students) that are relevant to the phenomenon under study and to which the researcher has easy access are included in the research sample (White, 2005:120). Convenience sampling had been used in this first pilot cycle for the following reasons:

- Only students at the Pretoria campus had been included in the sample as the practitioner researcher had ready contact with them.
- Only students who had enrolled for all the three subjects on which the research is predicated were selected so that the interdisciplinary focus of the study could be maintained.
- Students who were taking part in another simultaneous study were not included even though that study (see Annexure A) would eventually form part of the bigger design experiment.
- The study focused on both process and outcomes, and the researcher could return regularly to the sample for the confirmation of data. The researcher therefore engaged in member checking. *Member checking* means validating the accuracy of data during and after data collection by taking it back to members to verify (Shenton, 2004).

Although attrition was possible, it was not likely to occur because the research was conducted during scheduled class times. Extrinsic motivational techniques, such as a possibility for improving one's marks, were also employed as a factor in the design of the experiment.

It could therefore legitimately be inferred that the sample was representative of the population. This inference could be made as the sample consisted of 1st year language students, aged between eighteen and twenty, enrolled for a diploma in languages at TUT at the time of the research, just like the population.

1.7.3 Data Collection Techniques

In assessing the data, it is important to address at least three types of dependent variables, namely climate variables, learning variables and systemic variables (Bielaczyc, Collins & Joseph, 2004). *Climate variables* had been measured by means of a questionnaire, through observation and by analysing the end-products of the intervention, whereas scrutinising the answers to the questionnaire, the pre-tests and post-tests, as well as the final writing product, all provided information about the *learning variables*. Information regarding the *systemic variables*, on the other hand, had been obtained through means of semi-structured interviews and a research diary. The data collection techniques used and the corresponding variables measured therewith are discussed in more detail in chapter 3.

The writer took cognizance of the fact that cognition is an important factor to assess in design experiments and therefore greater attention would be given to this variable in future cycles. The decision to include only minor aspects of cognition was taken so as to limit the scope of the study and keep it manageable in terms of available resources.

Students received marks (grades) for the activities that they undertook as part of this study. These marks were used to reinforce the external motivation of the students.

1.7.4 Data Analysis

The data were mainly analysed in a qualitative way, although the researcher also performed some quantitative analysis in the study. Data derived from marking pre- and post-tests were

quantitatively analysed by means of descriptive statistics (White, 2005:168), and the qualitative data were analysed by means of the following steps (White, 2005:186):

- "Becoming familiar with the data and identifying main themes in it (reading);
- Examining the data in depth to provide detailed descriptions of the setting, participants, and activities (describing);
- Categorizing and coding pieces of data and physically grouping them into themes (classifying); and
- Interpreting and synthesizing the organized data into general conclusions or understandings (interpreting)."

1.8 LIMITATIONS AND DELIMITATIONS

This research, which made use of the methodology and sampling techniques described above, may have certain limitations such as those that pertain to generalisability, scope and purpose. These limitations, as well as the delimitations to describe and limit the members included in the group to be studied, are discussed in the next section.

1.8.1 Limitations

Because convenience sampling had been used, the generalisability of the findings was limited to the characteristics of the subjects and caution is needed in generalising of the findings. The study therefore rather provided rich and thick descriptions of all details in order to make the transferability of findings possible. Transferability, rather than external validity or generalisability, refers to transfer between cases (Begley & Tobin, 2004). Transferability does not make bold claims, but seeks to determine whether findings can be carried over to similar settings and people with similar experiences (Van Ryneveld, 2004:120). This pilot study remained focused on the possibility of transferability rather than generalisability.

Design research projects are usually large in scope with many contributors and test more than one cycle of learning. As this had been a pilot study to determine whether such studies and further cycles would be viable, the scope of the study was limited and only included the participating researcher, an assistant and 27 participants. It is envisaged that future studies will attempt to elicit strong collaboration from the various lecturers involved so that even more integration can be effected.

The purpose of this study was not to generalise, but rather to maximise transferability. The actual size of the group was therefore not decisively important.

1.8.2 Delimitations

The study was only confined to language students on the Pretoria campus of TUT, who had enrolled for first-year courses in Applied English, Editing and Computer Usage in the year in which this study took place. Another simultaneous study involved students from the Pretoria campus who remained after the sample for the study described here had been selected.

It had already been pointed out that because transferability rather than generalisability was the focus of this study, the research confined itself to a specific group of language students. Sixteen (all females) of the potential 27 students completed the intervention as well as an informed consent form and were therefore included in the study. In the following section, the researcher will discuss the significance of the study.

1.9 SIGNIFICANCE OF THE STUDY

What follows is an indication of how the researcher envisaged that this research project might provide a model of practice for: (1) circumventing the chronic constraints of time and resources that bedevil higher education, (2) augmenting student motivation and skills, and (3) meeting to some extent the needs of the industry. It had also been suggested that the strategy that had been followed may realise the ideal of integrated learning and thus serve to inform others.

Because time and other resources are scarce commodities in the current higher education landscape and the academic support departments are unable to help the majority of students, a different approach had to be sought. In such circumstances, the kind of integrated and interdisciplinary approach actualised in this study could well be regarded as a model for practice embodying an effective remediation of the students' difficulties. Additional advantages of the model proposed by the study may be that costs could be kept low, that the language skills of students might be improved, and that levels of motivation for study might be increased among participating students.

The researcher envisaged that the study would suggest ways in which students could receive the additional practice that they so urgently needed to improve their written language skills without the language department having to sponsor supplementary programmes or employ more staff. Apart from giving students an opportunity to become more skilled in literacy techniques because of the additional practice provided by the study, the researcher anticipated that students might even improve their basic language skills to such an extent that they might pass in greater numbers than they had hitherto done.

Because departmental budgets were already known to be insufficient to meet current academic obligations or to employ an adequate number of staff, it was supposed that a solution to such problems, indirect though it might be, might be appreciated by both staff and management.

It was further envisioned that an integrated approach that utilised authentic tasks might be able to train students to think and work in a constructivist and integrated way. This would be an enormous improvement over the current reality that teaches students to become passive recipients of information that they are expected to regurgitate as exactly as possible in tests and examinations. It was further envisaged that employers in industry and elsewhere would be grateful to receive students who were accustomed to habits of collaborative and cooperative work, and who were able to express themselves in writing and in speaking to standards that would be a credit to themselves and their employers.

It was also anticipated that the study would implement a model of educational practice through subject integration that would conform with the ideal of the kind of OBE education that had been the centerpiece of school-level education for the past ten years in South Africa. The researcher further envisaged that other researchers and especially educators might be inspired to implement an integrated approach in their situations.

An integrated approach, such as that proposed by the study, was therefore understood to be both useful and applicable to the needs of students, researchers and educators. The researcher certainly both hoped and expected that the report would inform future practice. The following section examines the ethical considerations engendered by the study.

1.10 ETHICS

A study which uses people as the focus of an investigation needs to conform to certain ethical considerations (Leedy, 1993). Because research is only ethical when it protects both the interests and the identities of all participants, it was considered necessary to draw up an informed consent form which volunteer students were invited to read and sign if they still wished to take part in the research. Students were informed about the purpose of the research, the freedom of choice they had with regard to participation, and their right to remain anonymous should they consent to become research participants (see Annexure C).

1.11 TERMINOLOGY USED IN THE STUDY

The relevant terminology used in this research report is defined in the paragraphs that follow. For each term the researcher included both a very brief review of the literature on the specific term, as well as the researcher's interpretation of that term for use in this research.

1.11.1 Integration

According to French (1998), *integrated learning* is not undifferentiated learning: it is learning that brings together "the worlds of practice and technique and theory and culture effectively in one space". He further explains that learning is "ongoing growth through interaction" between "elements of experience". He adds that integrated learning is synonymous with "wholeness" in learning, and that it is inherently connected to integrity and authenticity.

Integration may be understood as team teaching or mainstream teaching, characterised by an integration of subjects and teachers (Koch & Kriel, 2005). Olivier (2002:49), when writing about OBE and integration, states that knowledge, skills and values are "bonded together into an end-product" and that knowledge and skills are consequently "contextualised". In this study, *integration* refers to an integration of practice and theory with the addition of elements of authenticity. Integration in the study will therefore be understood to include interdisciplinary teaching, and the integration of context with method, and learning with tools.

1.11.2 Computer Assisted Language Learning

According to Garret (1988), computer-assisted language learning (CALL) is software that enables students to manipulate language in an engaged manner while performing authentic tasks. CALL is also seen as the 'search for and study of applications of the computer for language teaching and learning' (Levy as quoted by Chylinski, 2005). The present author tends to prefer the following rather more complete definition of computer-assisted language learning as being:

> "an approach to language teaching and learning in which computer technology is used as an aid to the presentation, reinforcement and assessment of material to be learned, usually including a substantial interactive element" (Wikipedia, 2006).

In this study, computer-assisted language learning (CALL) refers to the use of the computer as a tool that promotes language learning and teaching.

1.11.3 Peer Assessment

Peer assessment is an "arrangement in which students consider the quality of their fellow students' work" (Admiraal, Pilot & van den Berg, 2003). It may therefore be both formative and summative, and may also be instrumental in helping students to think critically about what they are doing (Burgess, 2001). *Peer assessment* refers to the process in which students review and edit one another's work for the purposes of this research.

1.11.4 Process Approach to Writing

The process approach to writing involves students being taken through a long process of writing in which they are requested to write, consult others, revise, edit and rewrite (Tecle, 2001:28). During this process, peer editing and self-questioning techniques are employed (Dison, 1989:116) and students interact with one another and pose questions to their teachers (Tecle, 2001:28).

The *process approach to writing* in this study may be characterised as the constant revision and editing of self-produced texts by making use of various tools such as word processors and by relying on various human agencies such as peer editing and teacher guidance.

1.11.5 Motivation

Huitt (2001), after consulting various sources, came to the conclusion that motivation generally can be seen as something inside a person, (a desire) to enter into action and to provide direction. The internal state of motivation can also be enhanced by means of extrinsic motivational techniques such as rewards (Harris, 1991).

In this study, *motivation* refers to both the intrinsic and extrinsic motivational factors that may enhance learning in a classroom.

1.11.6 Authentic Learning

Authentic learning refers to those learning experiences to which learners can attach personal relevance (Andrews, Isaacs & Stein, 2004). They are furthermore learning experiences in which students learn how to interpret and apply knowledge (Authentic Learning, S.a.), and how to apply such knowledge to meaningful tasks in a context of authentic realism (Moore & Tweddle, 1992:12).

In this study, *authentic learning* means (1) learning to apply skills and knowledge in situations that simulate as nearly as possible the conditions of original situations in the so-called “real world”, and (2) performing such tasks in a way that resembles the kind of performance that would take place in the original situations by established language practitioners in industry and other occupations in the world of adult employment.

1.11.7 Constructionism

The constructionist paradigm maintains that learners construct products of learning (Harel & Papert, 1991:1) by (1) setting goals and planning, (2) informing themselves about the necessary facts and then creating artefacts, and (3) by examining their productions critically and then revising or reconstructing their artefacts (Alessi & Trollip, 2001:13).

This definition of constructionism corresponds very closely to the researcher’s own definition of constructionism which asserts that learners create meaningful end-products by going though the processes of planning, producing and revising.

1.12 CHAPTER OUTLINE

What follows below is a brief description of the content of each of the remaining chapters.

- Chapter 2 reviews the literature that is relevant to the research questions and to the two sub-questions. It focuses on the elements of an integrated approach to writing, the methods that are used in applying such an integrated strategy, and the need for such a strategy.

- Chapter 3 contains a description of the paradigm on which the study is based. It also discusses the design experiment as a research strategy and visits the topics of trustworthiness, authenticity, and transferability in this study. Chapter 3 further includes a description of the data collection methods and the process of data analysis.

- In chapter 4, the researcher describes the intervention in detail, and the setting in which the intervention played out.

- Chapter 5 relates and describes the effect of this first cycle of the design experiment on the students' dispositions and writing skills, and relates the results to the research questions.

- In chapter 6, the researcher summarises the research project and its results, makes recommendations about policy and practice, and suggests topics for future research and development.

2.1 INTRODUCTION

The previous chapter explained in some detail how the English language skills of nearly all of the students who enrol for the first time at the Tshwane University of Technology (TUT) are far below the required standard. It was also explained in that discussion how the university is unable (for various reasons that were specified) to remedy that situation or provide these students with any kind of programme of rational remedial teaching that might bring them up to this required standard. The fact that these students specifically found written language skills problematic had further been pointed out. The research question, to which the researcher was led after an analysis of the relevant facts, asks what influence an integrated approach to improving written language skills might have on various cognitive and affective factors at work in the classroom.

Before any attempt could be made to answer this question, it was necessary to examine the contribution that scholarly literature has made to the themes embodied in this study. This chapter critically examines the literature produced by other researchers who have investigated similar problems. The chapter reviews the question of how other researchers understood the problem, the kind of research that they performed, their findings, the solutions they offered, and the recommendations that they made. In addition to this, the elements that could contribute towards a possible solution to the specific problems experienced at TUT, have been explored and presented here.

2.2 SIMILAR PROBLEMS INVESTIGATED

Different studies, which are relevant to this research in important ways have been examined, seeing as that it is important to view new courses and programmes for implementation in terms of the context of what has been done previously (Jeffery, 2001:124). The studies reviewed included that of Carrasquillo and Rodriquez (1996), Cole, Cruickshank and Newell (2003), Collett (1994), Dison (1989), as well as Koch & Kriel (2005). What follows below are brief descriptions of the most relevant aspects of each of these studies, their findings, and their suggestions and recommendations, where applicable.

2.2.1 Carrasquillo and Rodriguez (1996)

On pages 20 to 36 of their book, Carrasquillo and Rodriquez introduces the term *Limited English Proficient Students* (LEP students). They define such students as those who have very little or no previous contact with the target language (TL) English before they go to school, and whose parents similarly either have a very limited understanding or no understanding at all of either spoken and written English. They assert that because such students are totally unprepared to use English as a medium for studying school subjects, they consequently fail or achieve very poor results.

Carrasquillo and Rodriquez then propose *an integrated approach* for improving students' language skills. On pages 108 to 123 (chapter 7) of their book, they describe how language and social studies can be integrated for the purpose of improving student language skills. It is suggested that this integration of areas can help LEP students to both enhance and apply their knowledge of language, while learning more about the concepts and content of the social studies subject. Content and language development are seen as complementary to each other and should not be separated for this reason.

Similarly, on pages 125 to 140 (in chapter 8) of their book, Carrasquillo and Rodriquez also propose an integration of language and science learning. They suggest that students can likewise develop English language skills such as listening, speaking, reading and writing while they are simultaneously being taught science. Among other things, they suggested that students write using the process and programmatic approaches to writing, evaluate each others' work and be provided adequate time to write often (Carrasquillo as quoted by Carrasquillo & Rodriquez, 1996).

In their final chapter (pages 158-172), Carrasquillo and Rodriquez conclude by noting that the language development of students can best be promoted through encouraging the intentional use of language. They suggest therefore that classroom environments be so arranged that students participate in language activities that are both meaningful and purposeful, and that are anchored to a relevant context because learning occurs "within the context of significant language use". They add that students should be encouraged to interact with peers so that they can develop higher order thinking and linguistic levels.

Although Carrasquillo and Rodriquez focus on school children's language proficiency, the suggestions that they make in this book may prove equally valuable to students at a tertiary institution such as TUT. One may justify such an assumption by saying that South Africa, like the United States, and TUT in particular, are places where many different cultures and languages converge and interact (MIS, 2006c), and where many students have parents who have few if any English language skills and who, in many cases, may even be preliterate. It is evident that a large number of the students enrolled at TUT (and first year students, in particular) could be classified as limited English proficient (LEP) students.

2.2.2 Cole, Cruickshank and Newell (2003)

This journal article describes a model of language support for students with a non-English speaking background (NESB) at the University of Sydney. It is explained that although NESB students who needed language support were previously able to obtain courses from the university's learning assistance centres, increases in the number of enrolments of students who did not have an English-speaking background, made it necessary for faculty itself to offer some more formal kind of tuition programme to those who needed it.

The university therefore developed content-based courses in response to the needs of students whose language skills were unequal to the demands of studying at an English-speaking university. Content-based courses might take the form of English Second Language (ESL) tutorials that follow general lectures, the teaching of course content in tandem with specific language skills, or an ESL programme taught by lecturers who are specialists in both the course content and ESL methods. The rationale for teaching ESL skills in conjunction with curriculum content is that language work in this kind of context is always squarely based on the relevant course content ─ which the student in any case needs to master. Content-based ESL tuition gives an ESL lecturer the opportunity to analyse texts, take specific questions from students, explain the meaning of crucial content terminology and assertions, and interact with students in the very language in which they need to acquire the necessary degree of skill and fluency.

After implementation of these content-based courses at the University of Sydney, it was concluded that such courses are effective for integration of ESL support with content, although it is most effective when students have the same learning needs and follow a course in which the content is integrated with their language learning objectives. Limitations

of this approach included that teaching staff need to be properly qualified both in the subject concerned as well as in ESL and that it is difficult to focus on very specific language needs of students during these classes.

As shown in the previous chapter of this present study, the increase in students who lack the necessary English language skills are proving too much for the infrastructure available to academic support courses at TUT (Morulane, 2006). An alternative way of addressing the needs of the students might be to adopt a content-based approach (Tecle, 2001:28), especially in those cases where lecturers are qualified both in the teaching of their subject and in the methods of tuition for students who are deficient in English as a second language.

2.2.3 Collett (1994)

The motivation for this action research project arose out of a consideration of the huge number of English Second Language (ESL) students at tertiary institutions in South Africa who do not display sufficient competence in the English language. A very high percentage of ESL students are still not able to cope with the demands of their academic courses because of their poorly developed language skills (Collett 1994:1). Academic Development Programmes (ADPs), established to assist students in this regard, labour under a variety of constraints and difficulties such as “staffing, time on task, relevance, and difficulty of integration with learning in other courses” (Collett, 1994:i).

In this mini-dissertation, Collett (1994) argued that Computer Assisted Language Learning (CALL) can enhance learning in an Academic Development environment and also counteract the difficulties listed at the end of the previous paragraph. Collett therefore developed a system to help students practice proof-reading and editing specifically for this purpose and then evaluated it. The system was used in conjunction with other CALL materials (Collett, 1994:i).

The study, however, mentioned that computer-assisted methods have not been widely adopted in academic development programmes (ADPs). Reasons suggested for this poor adoption of computer-assisted methods were insufficient resources, resistance of ADP staff and students to technology and the time and labour that had to be expended on integrating educational technology into courses (Collett, 1994:24).

Collett describes various approaches and methods that may be relevant to language development courses. Among the methods that he describes is the use of the word processor as a writing tool as part of a process approach to writing. Both positive and negative findings regarding the use of word processors are listed and useful advice gleaned from various studies evaluated by the researcher is provided (Collett, 1994:28-30).

It was concluded that computer-assisted language development (CALD) environments promise enhanced opportunities for ESL students to become involved with their own language development to a greater extent. It had also been suggested that the use of technology for teaching may hold concrete benefits for teachers, especially so in CALL, because of the readily available applications suitable for use in language learning and teaching (Collett, 1994:77).

Similarly, the researcher of this present study, experienced that students at TUT do not dispose of sufficient language competence (Ahrens, 2006) and that academic support courses are not able to meet the needs of these students (Morulane, 2006). CALL should therefore be considered for inclusion in a strategy towards improving the written language skills of students at TUT.

2.2.4 Dison (1989)

Laura Dison, in her mini-dissertation, expresses concern that the writing skills of students in South Africa are functionally inferior to their oral skills, especially in the case of ESL (English Second Language) students. Such students tend to write in the same way that they speak, and are then shocked and disconcerted to find that the rules that govern written language are completely different from those that govern oral competence. Accordingly, the aim of the research project was to investigate various factors in the writing process in order to be able to make suggestions for the teaching of writing in ESL environments (Dison, 1989:1).

After examining different approaches, Dison suggested a synthesis of the product and process approaches to teaching writing skills to ESL students (Dison, 1989:71). Dison made a suggestion that the sub-skills of the product-approach to writing should be incorporated and applied as basis for other approaches to writing. She further suggested that the non-prescriptive teaching of grammar might be incorporated into the process approach to writing

(Dison, 1989:114). The process approach, as was noted earlier in this text, takes students through the phases of planning, writing, revising and editing, and moving backwards and forwards between these stages until a satisfactory product has been produced.
Dison also notes that a synthesis approach to writing is most effective when it is used across curricula so that transference between subjects becomes a part of the learning process (Dison, 1989:121). She suggests that writing development should take place in a contextualised manner (Dison, 1989:114), and that peer and self-assessment should be incorporated so that new learning can be reinforced (Dison, 1989:116). Dison also suggests that various strategies for motivating students be included in the programme (Dison, 1989:74).

The researcher in this present study has made a prima facie case for accepting that the written language skills of students entering TUT are non-functional and severely sub-standard (Ahrens, 2006). The researcher agrees that students should be able to transfer their knowledge and skills between subjects and that writing exercises should be contextualised by being integrated with curriculum content. The writing strategy proposed by Dison (1994) may therefore prove useful for contributing to a rational programme for improving the written language skills of students at TUT.

2.2.5 Koch and Kriel (2005)

This peer-reviewed journal article investigated the possible role of language as a contributing factor to the high failure rate of first-year Accounting students at the Nelson Mandela Metropolitan University.

The decision to undertake the investigation resulted both from the high failure rates and the need for a language course that would not be regarded by students merely as an irrelevant add-on course unworthy of their time and attention. After consultation with the language department of the university, they decided to carry out an investigation in order to obtain a better understanding of what the real problems were.

Koch and Kriel came to the conclusion that an inability to read effectively and inadequate reading strategies contributed strongly to the students' inability to understand academic texts. They also came to the conclusion that the poor language skills of students could be adequately understood in terms of their inability to conceptualise ideas as a precursor to

understanding and manipulating language. Since accurate conceptualisation is the indispensable precursor to the expression of written or spoken ideas, they began to understand the language problems of their students within the larger context of other contributory factors.

Koch and Kriel came to the conclusion that instead of offering courses in English for academic purposes or English for other subjects like accounting, it would be far better for appropriately qualified academics to engage in team teaching as a way of delivering course content and improving the language skills of the students. Teaching teams such as the ones they envisaged would require the cooperation of both language teachers and subject specialists in one teaching format. This would enable them to offer tuition in accounting (the subject in which they were particularly interested in their study) and language skills teaching within the same setting.

The premise on which this kind of teaching is based is that English language skills are best taught in relation to the purpose for which they are needed. This ideally would mean that English language skills would always be taught in the context of the specific subject teaching materials, texts and learning tasks for which students have enrolled (the subject in their study being accounting). This would make language skills tuition authentic, relevant and purposeful because it would always be predicated on examples from curricula that students were, in any case, required to master.

The study by Koch and Kriel is very definitely related to the language needs of accounting students rather than language needs of language students of the kind that the researcher is undertaking in this study. One may note, however, the advantages that immediately become available when one get subject specialists to work in cooperation with content specialists in real teaching situations in the lecture hall. Koch and Kriel's research also emphasises yet again how important it is to take relevance, authenticity and purpose into account in any programme that endeavours to improve language skills.

2.3 POINTERS DERIVED

The academic studies that the researcher reviewed above contain a number of indicators that the researcher used in this research. These indicators, pointers or suggestions informed the strategy that the researcher finally designed, compiled and offered for the

improvement of the written language skills of language students at TUT. The list below tabulates the most striking and valuable contributions from the literature that the researcher reviewed in this chapter. The researcher considered all the following approaches for inclusion in her own programme for the improvement of the written language skills of language students at TUT:

- An integration of subjects, approaches and elements should be used for improving language skills.
- Content and language development should take place simultaneously so that they reinforce one another.
- Language and content subject lecturers should ideally work together in teams to teach subject content and improve students' language skills.
- Teaching materials, texts and learning tasks should be authentic, relevant and purposeful.
- The process approach should be used as a basis for teaching students writing skills, and it is essential to give students enough time to practise writing on a regular basis.
- Students should interact with their peers and should carry out assessments of their own and one another's work so that their higher order cognitive and linguistic skills can be reinforced.
- Computer-assisted language learning (CALL) can be used to enhance learning and it is possible to use the word processor as an effective writing tool.
- There are various strategies that can be included to motivate students and these are necessary in any language skills course.

2.4 OTHER IMPORTANT FACTORS

The researcher took note that error analysis is an important step to include before any approach to improving learning may be suggested (Nagel, 1993; Nkani, 1998). In the case of this study, however, the researcher was able to avoid conducting an in-depth error analysis because the necessary information about the students' needs was readily available from official sources in the university. The subject lecturers whom the researcher consulted at TUT were more than willing to discuss the most typical kind of errors to which students were prone. They and other interested parties also made suggestions about the errors which the researcher might review in the study because there was never enough time in scheduled classes to correct errors of this kind and explain their significance to students.

The four extracts below are representative examples of student writing from first-year language students. They give a fair idea of the level of language competence of the average first-year language student at TUT:

"I will be a very good asset to invest on, through my determination towards my academics. I would like to be financed through residence, textbooks tuition fees and pocket money." (Example 1)

"I have been accepted at the university of Pretoria but I cannot be able to pay my fees. I, (name and surname) has applied for language practice and has been a good student." (Example 2)

"I acknowledge the fact that tuation fees, transport fees, residence fees, stationary and textbooks fees would cost a lot of money which my parent won't be able to pay. Apart from these fees the are othe extra fees that are needed such as food and electronics, so clearly without the financial support my dream of becoming a language practitionar would be over before it even starts. (Example 3)

Iam worthy because as my matric certificate show's I did axcellent in my studies. never truenced any of my classes and I work hard at every thing I do and very disciplined." (Example 4)

For ethical reasons, the researcher cannot disclose the identities of the students who produced these texts. But the examples themselves reveal more clearly than a million words exactly how great the difficulties are that students have to negotiate as they attempt to cast their thoughts in English. These examples reveal a whole range of problems from an inability to understand how English syntax operates to the conventions that govern linguistic expression in English. What follows below is a discussion of elements that could be included in a strategy for improving the written language skills of students.

2.5 ELEMENTS FOR INCLUSION

The research studies that were reviewed above offer certain elements that could profitably be included in a programme for the improvement of the written language skills of first-year

language students at TUT. These elements have already been depicted in a conceptual framework in chapter 1 (see figure 1.1 on page 4), and are discussed here in more detail.

In the previous chapter the researcher explained that *integration* is central to an effective paradigm of learning. The researcher also explained that integration of this kind can be undertaken at many levels, the first of which is the classroom or lecture hall where different components are integrated. Apart from various teaching and learning components, such as writing, word processing, authenticity and peer assessment, *motivation* is vital within a classroom setting.

Besides the classroom level, the researcher, in the first chapter, gave details on the second level of integration. On the second level, the approach chosen influences the interplay of the various elements of teaching and learning in the classroom. The methods to be combined to form this approach includes: peer assessment, CALL, authentic learning, motivation, Constructionism and a process approach to writing.

The third level of integration that the researcher discussed in chapter one is characterised by interdisciplinary interaction between the lecturers of different subjects working cooperatively to give students superior learning experiences. When this happens, the curriculum content of different subjects becomes interwoven in the minds of the students.

After this brief recapitulation of the three levels of integration, the researcher will explain the components of the conceptual framework more closely. An integrated approach, constructionism, a process approach to writing, computer-assisted language learning (CALL), authentic learning, peer assessment and motivation will all be discussed in more detail in the following paragraphs.

2.5.1 An Integrated Approach

Ever since the government made the policy decision to establish outcomes-based education (OBE) as the basis of South African school education, it has become the foundation upon which educators have constructed their attempts to reform school education in both theory and practice. De Jager and Nieuwenhuis (2005) note that OBE places “a strong emphasis on the customer”. By *customer* they allude to the employer who will ultimately employ those who are passing through the school system, and who will be the

beneficiaries (for better or worse) of the kind of education that school leavers take with them out into the world. De Jager and Nieuwenhuis (2005) also note that a customer-orientated approach to school education through which the needs of the employment marketplace are taken into consideration, is fundamentally important for the delivery of quality education. It follows from this that it is essential for students to master the kind of skills, abilities, attitudes and knowledge that will stand them in good stead in the “real-world” marketplace beyond the school gates.

One of the fundamental pillars of an outcomes-based approach to education is a strategy of *integration*. French (1998) in an article in the South African Qualifications Authority (SAQA) bulletin, explains the different meanings or levels of integration. Not only does integration entail an integration of the interests of the education and training sectors; it also implies an integrated approach to learning, teaching and educational provision (French, 1998). Any proposed solution to the problem of poor written language skills among students in South Africa should therefore ideally include a strategy of integration.

Integrated learning is learning in which theory, practice, culture and technique work synergistically, and in which different elements interact with one another in an authentic context while continually growing toward completeness (French, 1998). Teachers who actualise an integrated learning model in a pedagogical situation collaborate to produce an environment that helps students to conceptualise the whole picture (Koch & Kriel, 2005).

Costa and Liebman (quoted by Rüschoff & Ritter, 2001) maintain that the curriculum should not be organised into disconnected slots or disciplines because modern-day students live in a world in which knowledge is multiplying at such a rate that even subject specialists are often unfamiliar with some of the latest developments in their own fields. Cunningham (2003) makes the additional point that constant interaction between technology and subject content provides learners with enhanced learning experiences. The term *multimodal* refers to an integration of various approaches so that technology becomes but one element (albeit an important one) on the holism of the learning experience rather than the driving force behind classroom practice. Rüschoff and Ritter (2001) use this example to explain what they mean by an integrated learning environment.

2.5.2 Constructionism and this Approach

An integrated strategy with elements such as those described above for improving written language skills may be seen as embodying a constructivist approach to education. Integration is a vital component of classrooms where constructivist approaches and approaches like 'language across the curriculum' are used (French, 1998).

Constructionism, on the other hand, may be regarded as the practical application of the constructivist learning theory. Construction of knowledge and information processing are therefore regarded as fundamental to language learning (Rüschoff & Ritter, 2001). Like constructivism, constructionism focuses on *building* knowledge structures. Knowledge-creation is said to be particularly successful in milieus in which the learner actively constructs an artefact by tackling an authentic task that has been carefully devised by the teacher to evoke the knowledge that the learner needs (Harel & Papert, 1991:1). Constructionism may be contrasted with instructionism, an approach in which the teacher takes up the traditional role of imparter of knowledge (Papert, 1980). Alessi and Trollip (2001:13) describe constructionism as a process in which learners set targets, make plans, institute enquiries, create materials, assess such materials, and revise their earlier attempts until they are satisfied with the artefact which they produce.

Rüschoff & Ritter (2001) adds principles of constructivism to the present discussion regarding learning theory. The principles suggested include, among other, that learning is to be a process of dynamic, collaborative and self-directed knowledge construction and experimentation, supported by a rich learning environment ingrained in true authentic situations. They maintain, in accordance with this, that the integration of constructivist theory with constructionist goals requires that suitable tasks that engage the learner "in the construction of something shareable" be devised (Rüschoff & Ritter, 2001).

The above descriptions of constructionism correlate with the researcher's view thereof, and especially so for the purposes of this study. It is the belief of the researcher that language students should plan, write, peer assess, revise and edit as part of a process approach in creating meaningful writing products, making use of the computer and word processors in particular. The significance of the editing and writing practice that they undertake as part of the course is that it embodies the actual methods that they will use in their future careers.

This makes the actions that they perform while carrying out these tasks relevant and meaningful to these students and their future careers.

Seymour Papert (1996), argues that the computer makes Dewey's notion of learning through experimentation, practice and contact with the real world much more accessible epistemologically. He further states that educators should find ways to incorporate technology so that it allows students to use knowledge, rather than just causing learning by rote memorisation to take place (Papert, 1980).

This constructionist approach suggests that for learning to be effective, it is necessary that learning involves building of knowledge through construction of an artefact, in an authentic context, through interaction with others and also involving computers.

2.5.3 Process Approach to Writing

There exist various approaches to writing, such as the product approach, the communicative approach, the process approach, the pattern approach and the content-based approach. For the purposes of this project, the researcher is particularly interested in the process approach to writing. The process approach to writing arose out of research into how "real" writers write and compose texts. One of the principal features of the process of "real" writing is that successful writers produce multiple drafts of any important text before they are satisfied that it is ready to be published or otherwise launched upon the world (Trupe, 2001). Such an approach entails that students first produce and then improve their writing through a process of prewriting, proofreading and rewriting (Tecle, 2001:28). This process then needs to be followed by peer editing and critique, and honest self-questioning (Dison, 1989:116). It is normal for students who follow this approach to writing to interact continuously with their teachers during such a process (Tecle, 2001:28).

Trupe (2001) holds that the process approach to writing offers teachers opportunities to intervene in students' writing at any time. He further notes that students who follow the process approach have more opportunities of developing their writing skills and reflecting on what they are doing, and that this inevitably increases the quality of the insight that they obtain from the writing process. He further argues that the regular intervention in the writing process by the teacher produces artefacts of a higher quality. Dison (1989:114) also

suggests that writing should take place in a contextualised manner and that (p. 74) students should be assisted and motivated in formulating ideas and editing their work.

It might be argued that the process approach will result in an even heavier marking load, however, the time spent on the process will decrease the time spent on final versions. This can be said because many of the matters will have been addressed already, during the process, while revising drafts (Trupe, 2001). Trupe (2001) also suggests that teachers can incorporate the process approach into their writing classes more effectively by encouraging the practice of peer assessment, by asking students evocative questions about their successive drafts, and by encouraging students to ask questions during the process.

Process-based learning is regarded as a key principle or component of constructivist theory. The process-oriented approach to learning incorporates the benefits of a “better understanding of linguistic facts” as well as “more learning competence and learning awareness” (Rüschoff & Ritter, 2001).

A professor teaching writing, makes a case for incorporating computers into the writing class. He argues that since computers are an ubiquitous and omnipresent feature of modern urban living and learning, “only Luddites” would contend that their use in classrooms could be inappropriate or unsuitable (CWC, 2002). He nevertheless acknowledges that problems such as inadequate technical support, a lack of training and insufficient funding could successfully militate against the adoption of computers in ordinary classroom situations. But he also adduces research that suggests other compelling reasons why computers should be used in writing classes. These reasons include the fact that computers make brainstorming, writing, revising and editing a lot easier for learners, and that they may increase the students’ perception of their audience and help to promote learning-centeredness in classrooms.

2.5.4 Computer Assisted Language Learning

This study looked into methods that could be used to improve students’ written language skills, including Computer Assisted Language Learning (CALL), which is the use of the computer to aid language learning, in the form of the word processor. It is therefore necessary to look at what other researchers say regarding the use of the computer, CALL and word processors in the language classroom:

Research on student attitudes toward the use of CALL suggest that, although learners do not believe that CALL should replace classroom-based learning, they do believe that it should be used more often (60% of learners) and that it is relevant to their needs (80% of learners), (Ayres, 2002). Jeffery (2001:129) suggests that as most students seek to learn marketable computer skills before they enter the world of employment, it would please all concerned if students were allowed to acquire curriculum-mandated language skills while learning new computer skills at the same time and in the same seamless process. A skillful teacher may therefore use the materials of the field for which support is needed while teaching word processing skills (Jeffery, 2001:142).

A meta-analysis of studies have shown that the computer is valuable in language teaching and learning (Wang, 2005), also when word processing software is applied in learning programmes to improve students' written language skills (Cook, Goldberg & Russell, 2003; Collett, 1994:77). CALL seems to be particularly useful in aiding students with spelling, writing and grammar (Ayres, 2002).

Fandrych (2001) found that although the spelling and grammar checkers of word processors are still not as good as they might be, newer versions of word processors include facilities of this kind that are definite improvements over earlier versions. She advises that teachers should warn their learners about the shortcomings of such spelling and grammar checkers. (It should be noted in mitigation that Fandrych did not test versions of the spelling and grammar checkers later than those included with version 2000 of the software.)

In a constructionist approach, emphasis is placed on task-based and product-oriented learning. In terms of this paradigm, the classroom is regarded as a 'workshop', where tools such as word-processors are "used to create a productive, goal-oriented learning atmosphere" (Rüschoff & Ritter, 2001). Word processors are what the industry calls productivity software. Productivity software can be used to enhance learning (Melville, 2005) and can be defined as software that is used to accomplish something productive, facilitating a specific need or task, such as using the word processor for writing, spelling, and grammar activities (Flores et al., 2004). Other examples of productivity software are spreadsheets, presentation software, and graphic design packages. Productivity software is often used for project-based tasks that are designed to get the user to acquire technological skills while working on other subjects (Flores et al., 2004).

Because word processors were developed specifically as programs that support the writing process, they can logically also be used to facilitate student writing and to assist students as they engage in the process of learning how to produce lucid text, conveniently rewrite drafts, and editing their writing (Jeffery, 2001:142). Jeffrey further claims that:

> "If any one item on the language support list enhances writing skills exponentially, especially for second language students from formerly disadvantaged universities, it is the word-processing package."

Cook, Goldberg and Russell (2003) assert that although earlier research seemed to prove that computer-based writing did not produce satisfactory results, the link between computers and quality of writing seems to have strengthened significantly. From their own meta-analysis, Cook, Goldberg and Russell (2003) conclude that:

> "on average students who use computers when learning to write produce written work that is about .4 standard deviations better than students who develop writing skills on paper",

and that there is evidence that:

> "when students write with computers, they engage in the revising of their work throughout the writing process, more frequently share and receive feedback from their peers, and benefit from teacher input earlier in the writing process".

It should also be noted that the use of computers in teaching does not lighten the load of lecturers. Using computers in fact makes greater demands on teachers in terms of time and labour than does the conventional methods of teaching (Cunningham, 2003; Jeffery, 2001:237). Researchers further caution that computers should be used as part of pedagogically sound learning programmes, rather than in isolation (Chao, Egbert & Hanson-Smith, 1999:1; Noss & Pachler, 1999). They also note that computers should only be used in situations where it is probable that the computer will actually enhance learning and not inhibit it (Alessi & Trollip, 1998). CALL should therefore also be carefully integrated into the learning curriculum (Ayres, 2002).

Chao, Egbert and Hanson-Smith (1999:3-4) contend that the theory that supports CALL and the theory that underlies language acquisition are identical (Chao, Egbert and Hanson-Smith (1999:1). They therefore argue that the following eight conditions for optimal language learning environments, gleaned from research in the areas of SLA (Second Language Acquisition), ESL (English as a Second Language) and learning theory, apply equally to CALL:

- Learners have opportunities to interact and negotiate meaning.
- Learners interact in the target language with an authentic audience.
- Learners are involved in authentic tasks.
- Learners are exposed to and encouraged to produce varied and creative language.
- Learners are given enough time and feedback.
- Learners are guided to attend mindfully to the learning process.
- Learners work in an atmosphere with optimal stress and anxiety levels.
- Learner autonomy is supported and encouraged.

Throughout the planning and execution of this study, the researcher has made an effort to keep these conditions suggested by Chao, Egbert and Hanson-Smith (1999) and other research findings in mind. The researcher has, in addition, kept the observation of Jeffery (2001:239) in mind that students should be *properly prepared* for what they will later be paid to do in their jobs. In the section that follows, the researcher discusses the vital issue of authentic learning.

2.5.5 Authentic Learning

It has often been noted among educationists that conventional methods of teaching and learning need to be drastically and radically changed so that learners will ultimately be better prepared to function efficiently in the future (Rüschoff & Ritter, 2001). Olivier (2002:6) interprets this to mean that learners will be empowered to learn in “more holistic, contextual and system-based ways”.

Mims (2003) lists certain key characteristics of authentic learning as gleaned from research. These characteristics include that: authentic learning frequently is interdisciplinary and is strongly linked to the real world; it requires engagement with complex tasks and higher

cognitive processes; it produces a product that can be shared with people in the world out there; it helps learners to become autonomous; it encourages students to explore and make inquiries; it involves communication with both peers and adults.

Authentic learning experiences are those that are “personally relevant” to learners (Andrews, Isaacs & Stein, 2004) and which take place within authentic real-world contexts (Andrews, Isaacs & Stein, 2004; Rüschoff & Ritter, 2001). The goal of instruction in authentic learning is “not just that students know the facts, but that they also are able to interpret, process, and apply them” (Authentic Learning, S.a.). Teachers should find ways of ensuring that learners experience maximum engagement with their learning tasks and provide learners with realistic, genuine or authentic settings and tasks closely related to what they will later find in the workplace itself (Mims, 2003; Moore and Tweddle, 1992:12). Learners “should be made aware of how pieces of work they have produced relate to adult uses of writing” (Moore and Tweddle, 1992:12).

The findings of a study by Bastiaens, Gulikers & Martens (2005) that compared the performance and experience of students in an authentic as opposed to a non-authentic learning environment did not show any improvement in the performance of students who worked in the authentic environment. Possible explanations for this counter-intuitive finding is that the students in the authentic learning environment might have been distracted by all the multimedia and other technological components that they encountered for the first time, or that students in the non-authentic environment produced longer reports because they used a standard word processor. The conclusions drawn from the study suggested that in future replications of this research, students should be given more time for their tasks, and that, instead of being given the most electronically advanced multimedia equipment, the researchers should rather ensure that students be allowed to undergo “low-key experiences that directly connect to the lives of students”. It was further suggested that an authentic task has greater influence on students than an authentic environment. An authentic task implemented in the classroom might therefore exert a more positive effect on students (Bastiaens, Gulikers & Martens, 2005).

Herrington, Oliver and Reeves (2004) include ten design characteristics of authentic activities, as described by researchers, that “can provide a useful checklist” for teachers and designers. It would be useful to take cognisance of these characteristics when implementing an integrated approach. These ten characteristics are: real-world relevance, loosely-defined activities, complex tasks, different perspectives or opinions about a particular task,

opportunities for collaboration, opportunities for reflection, application across subject areas, the seamless integration of assessment with all other student activities, the creation of polished end-products, competing solutions and a diversity of outcomes.

Research suggests that students tend to put more effort into their work and become more engaged when they realise that their tasks have a practical relevance to the workplace (Bremer & McGeehan, 2006; Mims, 2003). It is further important to remember that learners in future will be working in a more technologically rich environment. Effective integration of technology into learning environments has an affirmative influence on student learning and provides students with valuable skills for use in the workplace (Melville, 2005).

2.5.6 Peer Assessment

Peer assessment is an “arrangement in which students consider the quality of their fellow students' work” (Admiraal, Pilot & Van den Berg, 2003). Peer assessment may be summative or formative. With formative assessment, students may still benefit from the feedback that they receive (Race, 2001).

There are many good reasons for incorporating peer assessment in learning. Race (2001), suggests the following reasons, among others, for using peer assessment as a pedagogical technique: teacher assessment is not always valid; peer assessment gives students more feedback than they might have received from a teacher; peer assessment expands the student’s learning experiences; peer assessment encourages student autonomy; peer assessment develops competencies for future learning.

Self- and peer assessment encourages student autonomy and help students to think critically, employing higher order thinking skills (Bostock, 2000; Burgess, 2001). This observation is, of course, supported by Benjamin Bloom’s work on more complex or higher cognitive skills (Krathwohl, 2002). Such higher order cognitive skills are nowadays needed more than ever for functioning amidst the complexities of our contemporary knowledge society (Rüschoff & Ritter, 2001).

Ballantyne, Hughes & Mylonas (2002) report that peer assessment has been used successfully in higher education. Even academically poor students who teachers do not believe will benefit from incorporation of higher order thinking skills strategies, have been

found to improve significantly academically when they are encouraged to use such skills (Dori & Zohar, 2003). According to Admiraal, Pilot and Van den Berg (2003), students do take peer assessment seriously, they do learn from peer assessment, and they do use the information they receive from peer assessment to revise their work.

Peer assessment is said to be more successful when multiple assessors are used. It is further important that the sections of the curriculum in which peer assessment is to be incorporated, be chosen well as students should have enough knowledge regarding the section to be able to make informed evaluations. While teachers should also moderate peer assessment, they should not do it in such a way that students feel that their evaluations are regarded as worthless. Another way in which to give students a sense that their contributions are worthwhile is by involving them in the compilation of a list of criteria for the peer assessment. It is, however, important that the criteria be synchronised with the outcomes of the work that needs to be assessed (Race, 2001).

Bostock (2000) contemplates whether feedback by fellow students will be accurate and valuable, but suggests that the accuracy of feedback will be improved by the use of clear criteria, anonymity, multiple assessors, and tutor moderation. Burgess (2001) confirms that it is essential to create clear guiding principles for providing feedback to peers. It is added that teachers should note that providing learners with group tasks will not necessarily mean that they will interact with one another, and that the teacher still needs to play a decisive role in the facilitation of interaction (Egbert, 1999:27).

Admiraal, Pilot & van den Berg (2003) further suggests important features of design that should be included to support the effectiveness of peer assessment. Such design features would include the amount of time that should be allowed to elapse between peer assessment and teacher assessment; the fact that oral feedback needs to take place during contact hours; the necessity that the draft article do not to exceed eight pages, and the belief that a combination of oral and written feedback is more profitable than either kind of feedback alone.

Interaction and negotiation are both critical factors for learning and language enhancement (Peyton, 1999:19) and for interactions between learners as they progress towards autonomy (Peyton, 1999:17). If it is well integrated and designed, technology can enhance student learning through the facilitation of higher-order thinking skills (Melville, 2005).

2.5.7 Motivation

After examining a variety of psychology texts, Huitt (2001) concluded that there is a general consensus that motivation may be described as:

> "an internal state or condition (sometimes described as a need, desire, or want) that serves to activate or energize behaviour and give it direction".

The internal state of motivation can also be enhanced by means of extrinsic motivational techniques, such as rewards (Harris, 1991). In 1943, Abraham Maslow produced his widely known theory of human motivation which asserts that human beings have needs and that these needs influence how they behave. The needs can be arranged from the most basic to the most complex. Once a need on one level is met, a person experiences as crucial the need on a level just above the need that had just been satisfied. People never cease from needing something, and this constant neediness motivates and galvanises human beings into action as they attempt to satisfy their needs, ever striving to satisfy higher and higher order needs. The needs that Maslow posits in his hierarchy are (from the lowest to the highest): physiological, safety and security, love, self esteem and self actualization (Maslow, 1943).

Gardner and Lambert, as cited by Ngeow (1998), have contributed the terms *instrumental motivation* and *integrative motivation* to motivational theory. Instrumental motivation in language learning refers to the motivation to learn a language for practical reasons. Integrative motivation in language learning refers, on the other hand, to a need to learn a language in order to fit in with a target community.

It is suggested though, that because learning a second language is like becoming part of another cultural group, the motivation to learn a second language is very different from the motivation that inspires a student to learn other subjects. A teacher is therefore encouraged to go beyond the techniques that have been suggested for inspiring the motivation to learn other subjects (Gardner, 2001).

Bruning & Horn (2000) suggest that to develop the motivation to write, it is necessary to encourage functional beliefs about writing, to nurture engagement through authentic tasks,

to provide a supportive milieu for writing, and, finally, to establish an affirmative emotional environment in which such a development can take place.

According to Hawkins & Oblinger (2005), students today are engaged by “academic challenge, active and collaborative learning, and interaction with faculty”. Bremer & McGeehan (2006) contend that blending of disciplines tends to increase motivation and that such a teaching concept helps students to see “how their acquired skills translate into career opportunities”. Ayres (2002) found that, although learners favour the regular classroom environment to be more motivating than working on computers by themselves, they do value learning with computers.

On the basis of what has been discussed in this chapter, it might be reasonable to assume that an integrated constructionistic process approach, combining CALL, authentic learning, peer assessment and improved motivation, will take heed not only of previous national and international research findings, the specific needs of TUT and other South African tertiary institutions, but also of government educational policy.

In this chapter the researcher reviewed the literature relevant to the research problem, the research questions and the proposed strategy to remedy the particular situation that prevails at TUT and in many other universities. The researcher also critically discussed in detail the elements of the proposed strategy in terms of their relevance and appropriateness to the totality of the research. The topics that were featured in this chapter were: integration, constructionism, a process approach to writing, Computer Assisted Language Learning (CALL), authentic learning, peer assessment and motivation. This review of the literature now leads us into the third chapter of this report, in which the paradigm in which the study had been conducted, are discussed.

3.1 INTRODUCTION

In this chapter, the path towards the researcher's decision regarding the research method for use is set out. To start with, the main paradigms of research are reviewed and briefly compared, leading to a motivation for a mixed-mode approach and design research in particular. More on the design research method follows, after which the researcher's role in this study is explained. The population and sampling methods, data collection techniques and the method for evaluation of the data are then discussed. The chapter concludes with an explanation of how standards of ethics were adhered to and how measures to ensure trustworthiness were employed.

3.2 RESEARCH APPROACH

This section provides a short orientation to the main paradigms in research. It further motivates the choice of a mixed-mode design and design research in particular.

Although it is said that both the major paradigms in research, that is quantitative and qualitative approaches, are applicable to the educational field (White, 2005:80), there is an ongoing debate in the social sciences regarding which paradigm is believed to be the most appropriate for studying social phenomena (Maxim, 1999:3). Although some doubt whether qualitative methods are rigorous enough, others question whether a natural science model with a focus on quantitative methods is appropriate to the social sciences (Bryman, 1988:2-3; Denzin & Lincoln, 2000:10). Researchers hold that the choice of approach depends on the nature of the data and the research problem (Newton & Rudestam, 2001:23; White, 2005:80). A brief comparative discussion of quantitative and qualitative research follows.

3.2.1 Quantitative Research

Quantitative research arises historically out of positivism and the methods of the natural sciences (Bryman, 1988:41; Newton & Rudestam, 2001:27). Knowledge is acquired from directly observing empirical circumstances and from making logical deductions from such observations on the basis of theory (Newton & Rudestam, 2001:27). Variables from a scientifically selected sample of subjects are measured and causal relationships between variables are hypothesised through the application of descriptive statistics (Botha, 2003:21;

Denzin & Lincoln, 2000:8; Newton & Rudestam, 2001:27; White, 2005:81,168). Statistically significant correlations are taken to elucidate the reasons for changes in “measured social facts” (Denzin & Lincoln, 2000:8; White, 2005:81). It is the role of the researcher to remain objective throughout an investigation and to focus on the testing of the initial hypothesis or theory without intrusion of personal preference or bias (Botha, 2003:21; White, 2005:81-82). The present study does utilise, among other approaches, quantitative research. Typical studies in quantitative research include those with an experimental or correlational design (White, 2005:83).

3.2.2 Qualitative Research

Qualitative research can be seen as based more on a post-positivistic philosophy (Denzin & Lincoln, 2000:9; White, 2005:82) and can be described as a strategy for studying the social world from the point of view of the participants, aiming to describe and analyse their culture and behaviour (Bryman, 1988:46; Denzin & Lincoln, 2000:3; Flick, Kardorff & Steinke, 2004:6; White, 2005:81). In research of this kind, descriptive and/or verbal data is gathered and the researcher, who deliberately avoids the neutrality that is characteristic of research in the natural sciences, studies the participants by interacting with them and forming relationships with them (Botha, 2003:21; White, 2005:83). In such research, the context is always an important factor because it influences both the participants and the researcher who make context-bound generalisations that lead to an accumulation of the kind of rich and thick descriptions that constitute the data in qualitative research (Flick, Kardorff & Steinke, 2004:3,6; Newton & Rudestam, 2001:36; White, 2005:84). The qualitative researcher’s efforts, after developing insights into the patterns derived from the data, usually lead to development of an explanation or theory (Denzin & Lincoln, 2000:9; Flick, Kardorff & Steinke, 2004:3,9; Newton & Rudestam, 2001:36-37; White, 2005:82, 85). Ethnography (a study of ongoing events) and historical research (the study of past events) are typical examples of the qualitative approach (Newton & Rudestam, 2001:37; White, 2005:83). Although this present study leans more heavily towards qualitative analysis of data, the qualitative and quantitative approaches are equally important in terms of this research.

3.2.3 Contrast between the Paradigms

Relationship between the researcher and subject

Quantitative researchers usually either have no or very brief direct contact with the subjects of their research (Bryman, 1988:95-96; Denzin & Lincoln, 2000:10). In contrast, the qualitative researcher has prolonged contact with the participants under study as it is important to obtain an understanding of how the participants view reality (Bryman, 1988:95-96; Denzin & Lincoln, 2000:10; White, 2005:81).

Researcher's stance in relation to the subject

The quantitative researcher is detached, looking at the subjects through a scientific pre-determined window, not becoming a part of their lives but viewing from the outside (Bryman, 1988:96-97; Denzin & Lincoln, 2000:10; White, 2005:83). Qualitative researchers, on the other hand, seek to become part of the world of the participant, interacting with participants, extracting their views and experiencing their realities with them (Bryman, 1988:96-97; Denzin & Lincoln, 2000:10; White, 2005:83).

Relationship between theory/concepts and research

The investigations of quantitative research are birthed from theory and concepts to be tested, whereas qualitative inquiries usually lead to discovery of theory (Botha, 2003:21; Bryman, 1988:97; Denzin & Lincoln, 2000: 9; White, 2005:85).

Research strategy

Quantitative research commonly approaches the investigation in a systematic and structured manner (Bryman, 1988:98; White, 2005:82), clearly defining the variables at work and selecting the data collection instruments to be used from the onset, providing a general idea of the findings (Bryman, 1988:98). Conversely, the more open or flexible qualitative research strategy is developed along the way, informed by the data, participants and context (Botha, 2003:22; Bryman, 1988:98; White, 2005:82).

Scope of findings

The quantitative approach works towards findings that are general and which hold for all settings and also larger populations (Bryman, 1988:100; White, 2005:83). By contrast, the qualitative researcher, who performs research in a particular setting of which the representativeness of the sample may be unknown (Bryman, 1988:100), rather focuses on transferability of findings to similar situations, making context-bound generalizations (White, 2005:84).

Image of social reality

In quantitative research the outlook is that of social reality being static and external to the actor, largely ignoring the effect of change and the processes that connect variables at work in a society (Bryman, 1988:101-103; Denzin & Lincoln, 2000:9). Reality is therefore seen as "objective, 'out there' and independent of the researcher" and this reality can be "explained, controlled and predicted" (White, 2005:81). By comparison, qualitative researchers believe that reality is socially constructed (Bryman, 1988:102; Denzin & Lincoln, 2000:8; White, 2005:81) and that multiple realities exist (White, 2005:81); researchers are able to view connections between events and activities successfully, assisting them to study processes in social life (Bryman, 1988:102-103).

Nature of the data

Quantitative data are often presented as numerical statistics and statistical representations and are seen as being precise, rigorous and reliable (Botha, 2003:21; Bryman, 1988:103; White, 2005:80, 94). In qualitative research, data are verbal (Botha, 2003:21; White, 2005:80) and presented through rich and deep descriptions, paying attention to complex detail (Botha, 2003:21; Bryman, 1988:104; Flick, Kardorff & Steinke, 2004:7), which may inform transfer to similar situations.

Although many distinctions between the two main types of research have been depicted here, the reader should take cognizance that these distinctions are not absolute. Researchers investigating a research problem may draw on both quantitative and qualitative techniques in a single study (Bryman, 1988:127; Newton & Rudestam, 2001:45;

White, 2005:84). This mixed-moded strategy is also apparent in design research, which employs both quantitative and qualitative methods (Squire, 2004). The researcher chose to employ design research in this study.

3.3 RATIONALE

What follows, is a motivation for the choice of a combination of modes of research. This is followed by the reasons why a researcher might decide to choose design research for investigating a particular phenomenon.

3.3.1 Why a Mixing of Modes?

A multimodal research design that combines both quantitative and qualitative methods, obtains the advantages of both kinds of research methodology (Bryman, 1988:127). A multimodal approach such as design research therefore combines the precision of empirical procedures and the rigour of statistically quantifiable data characteristic of quantitative research with the flexibility, explanatory power and comprehensiveness of understanding that are characteristic of qualitative research (Newton & Rudestam, 2001:45).

Data collection conducted in one mode can accumulate data that is applicable to either kind of research (Bryman, 1988:128). Researchers, consequently, frequently use one design as the main method, complementing it with the other (Bryman, 1988:128). Bryman (1988:130-151) describes different ways of combining quantitative and qualitative approaches, and points out the advantages that accrue from this kind of combination. The list that follows highlights some of the things that Bryman (1988) has to say about the judicious combination of methods and techniques.

- Through triangualation and crystalisation of method and data, confirmation of findings may be achieved, plus new aspects may be brought to the light (Bryman, 1988:131-132; Cresswell, 1998:202; Richardson, 2000:934).
- Contrasting findings between approaches, may serve as a point of departure for further investigations, pointing out aspects not previously considered (Bryman, 1988:133-135).

- Gaps in data from one approach may be filled by data from another, so that the whole or general picture can be produced (Bryman, 1988:137; Newton & Rudestam, 2001:46).
- Quantitative research, because of its static nature, may be used to depict the structural element in social life and qualitative research the processual in a single study (Bryman, 1988:140).
- An integration of research approaches may provide both insider and outsider perspectives within a single project (Ball & Lampert, 1999:395; Bryman, 1988:142).
- The failure of qualitative research to provide a sense of typicality or generality of the events described, may be overcome by incorporating some quantitative assumptions, such as a measure of objectivity (Bryman, 1988:143; Peräkylä, 2004:283-284).
- Qualitative research may facilitate the interpretation of causal relationships between variables as derived from quantitative research (Bryman, 1988:145).

Bryman (1988:127) cautions that the researcher, while concentrating on methods of investigation, should not be oblivious of the importance of a distinction between quantitative and qualitative *data*. A researcher should also not choose between the different outcomes of the approaches employed if they contradict one another (Bryman, 1988:134).

3.3.2 Why Design Research?

Design research, as conceived by Brown (1992) and Collins (1992), is particularly relevant to educational settings (Bielaczyc, Collins & Joseph, 2004; Collins, 1999:289) and allow researchers to successfully address research problems in real-world settings, such as in the classroom (Brown, 1992; Cobb et al., 2003; Collins, 1999:289), also incorporating technology (Collins, 1992:15; Collins, 1999:297). The researcher is able to bridge the gap between theory and practice, as the study of the function of the design and the consequent ecology of learning, is central to the methodology (Brown, 1992; Cobb et al., 2003; Collins, 1999:15). Design research helps us understand how, when and why educational innovations work in practice (Design-Based Research Collective, 2003).

In addition to improving practice, design research informs theory and as the theoretical results of design research are sifted beforehand for instrumental effect, they may provide swift pay-off (Cobb et al., 2003). Design-based research assists in the creation and broadening of knowledge regarding the development, enacting, and protraction of inventive

learning environments (Brown, 1992; Collins, 1992:16; Design-Based Research Collective, 2003). Research into specific interventions further assists in the creation of context-bound theory that may be used in classrooms (Brown, 1992; Cobb et al., 2003; Collins, 1992:18; Design-Based Research Collective, 2003).

Because a classroom functions synergistically, it is important to study it as a systemic whole. It is possible to study the whole operating system by means of design experiments (Brown, 1992; Design-Based Research Collective, 2003). By treating the classroom as a whole with the elements thereof all interplaying at once, it is further possible to create a situation in which improved cognitive productivity can be obtained at low cost and to deduce from such constructions an appreciation of the theoretical reasons of why things work as they do (Brown, 1992). Moreover, it is possible to construct learning milieu's that promote reflective practice among students, teachers and researchers (Bielaczyc, Collins & Joseph, 2004; Brown, 1992).

Through the design experiment it is possible to take up a mixed approach, combining the quantitative and qualitative methods, so that the method may be chosen to carefully match the particular data (Bielaczyc, Collins & Joseph, 2004; Brown, 1992; Squire, 2004). The researcher using qualitative methods is able to observe how social and contextual variables interact with cognitive variables while the effect of independent variables on dependent variables can be determined through the use of quantitative methods (Bielaczyc, Collins & Joseph, 2004).

Lastly, design-based research further offers prospects for exchange of expertise between disciplines (Design-Based Research Collective, 2003). In the next section, design research is discussed as the design for use in this study.

3.4 RESEARCH DESIGN

Design experiments (Brown, 1992; Collins, 1992), also known as design research (Collins, 1999:289; Edelson, 2002:105) will determine the design of this study. What follows in the sections below is an explanation of what design experiments entail, as well as how this approach may be realised in terms of the research method or design to be used. In addition, the important factors for consideration when implementing a design experiment will be

highlighted, followed by an explanation of why design experiment methodology is suited to this particular study.

3.4.1 What is a Design Experiment?

Design experiment methodology was formed in reaction to the kind of psychological experimentation in which variables are controlled under strict laboratory conditions to determine the causes of different effects, and because experimentation of that kind caused a divide between theory and practice (Cobb et al., 2003; Collins, 1999:289-290). Design experiments, by comparison, endeavor to carry out experiments in real-life situations so as to determine what works in practice (Brown, 1992; Collins, 1999:290; Design-Based Research Collective, 2003).

Design experiments attempt to develop and evaluate education innovations (Collins, 1992:15; Bielaczyc, Collins & Joseph, 2004), in that a method for enhancing learning in the classroom is created and the effects thereof then systematically studied within the defined context (Brown, 1992; Cobb et al., 2003; Design-Based Research Collective, 2003). Rather than trying to control all the variables, researchers observe the different elements at work during implementation (Bielaczyc, Collins & Joseph, 2004; Brown, 1992; Collins, 1999:291). The assumption is that different designs should be tested in order to determine how these designs of different learning environments contribute to learning, cooperation and motivation (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:15). Not only does design research focus on the actual design and testing of interventions, but it also aims to draw context-based theory from close observation and analysis of these interventions (Brown, 1992; Cobb et al., 2003; Design-Based Research Collective, 2003). The theory covers both the process of learning and the methods and instruments designed to support that learning (Cobb et al., 2003).

Design-based research methods respond to surfacing features of the setting. Consequently, design research is also iterative in nature, in that designs are refined continually. The researcher monitors the intervention to determine which aspects of the design are being successfully implemented and which not and then makes changes to the design that further refine it for use in subsequent iterations of the intervention (Bielaczyc, Collins & Joseph, 2004; Design-Based Research Collective, 2003).

Unlike controlled experiments that can only be set up in a laboratory, design experiments are carried out in naturally occurring groups within the classroom environment, with students of varied ability (Brown, 1992; Collins, 1999:291). In a design experiment, the existing teacher is co-opted to facilitate the intervention in the allocated period of time, and because of limited resources and moral considerations that preclude exclusion, control groups are not always a viable option (Brown, 1992).

To conclude this section, Cobb et al.'s (2003) summary of what a design experiments entail are included, as this summary so aptly portrays the researcher's own view of design research:

> "… design experiments are extended (iterative), interventionist (innovative and design-based), and theory-oriented enterprises whose "theories" do real work in practical educational contexts." (Cobb et al., 2003)

3.4.2 The Design/Method for Use

The study of *designs* in education entails the use of both quantitative and qualitative methods (Bielaczyc, Collins & Joseph, 2004; Brown, 1992; Squire, 2004). Consequently, ethnographic techniques may be combined with experimental techniques (Bielaczyc, Collins & Joseph, 2004).

Bielaczyc, Collins & Joseph (2004), contend that educational designs can never be fully specified and that evaluation of these designs can only be "made in terms of particular implementations". The designs may therefore vary widely in dependence on the participants' needs, interests, abilities, interpretations, interactions, and goals (Bielaczyc, Collins & Joseph, 2004). This is also true for design research. In the following sections, the procedure that needs to be followed when carrying out a design experiment will be described. This discussion will include elements such as preparation, enactment and evaluation.

Preparing for a design experiment

A researcher should be very clear from the outset about the theoretical purpose of the study, and should specify exactly what he or she hopes to achieve from undertaking the proposed study. It is further necessary to identify the important ideas and styles of reasoning of the particular field under study, consulting the relevant literature in this regard (Bannan-Ritland, 2003; Cobb et al., 2003). This theoretical aim should include problem identification, a literature survey, and problem definition (Bannan-Ritland, 2003). In chapters one and two of this report, the researcher provided an exposition of the aim, theory and rationale behind this investigation.

In addition to clarifying assumptions about the intellectual and social premises that define the field of study, the research also needs to carry out a needs analysis (Bannan-Ritland, 2003). The researcher must identify what learners know and are capable of, what the current practices are, what other resources are available, as well as how well teachers and learners interact personally and how effectively the group functions as a whole. It may also be necessary to ascertain the views of parents and administrators towards the design and the degree of support that they offer to the research (Bannan-Ritland, 2003; Bielaczyc, Collins & Joseph, 2004; Cobb et al., 2003). A brief explanation of what gave rise to the need for an intervention such as this, as well as an estimation of what the students who took part in the research are capable of, may be found in chapters 1 and 2 of this report.

Conducting a design experiment

After the problem identification, literature survey, problem definition and needs analysis, the next challenge that faces the researcher is to devise an initial intervention design (Bannan-Ritland, 2003; Cobb et al., 2003), verbalise the trial design and develop a more detailed intervention (Bannan-Ritland, 2003). The design draws on existing literature for theoretical and empirical insights; the literature specifies the design and validates the differentiation of essential and auxiliary conditions (Cobb et al., 2003). The reader may obtain a detailed description of the designed intervention by examining chapters 2 and 4 of this report.

It should be possible by using this design to test the inferences made about the way in which the reasoning of students might have changed and the methods that had been used for promoting the changes. It is therefore necessary that multiple forms of data be collected

and documented to provide an accurate picture of the learning ecology (Cobb et al., 2003; Collins, 1992:18). For this reason, chapter 3 of this report brings to the reader an exposition of the data collection techniques that had been used in compiling data for this research project.

The researcher needs to identify the different variables at work, as well as the interrelationships that exist between the variables (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:16). The division between dependent and independent variables depends on the outcomes towards which the researcher is working (Bielaczyc, Collins & Joseph, 2004). Chapters 2 and 5 of this report provide insight into the variables and their interrelationships.

Both dependent and independent variables should be characterised carefully. Dependent variables in this study refer to those factors that are influenced by the intervention and measured through the data collection methods. Dependent variables may include the measure of learning that takes place, the sustainability of the design, the measure in which the design emphasises reasoning and how it affects the mind-set of learners (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:18,20; Collins, 1999:291). Independent variables, which may have an influence on the success of a design, should also be carefully explained. The independent variables in this study are those factors that exert an effect on the dependent variables and therefore also on the outcome of the study. These variables include those that relate to the context, such as the setting, the nature of the learners, required resources and support for implementation, professional development, financial requirements and the implementation path (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:20). Chapters 4 and 5 provide a description of the intervention and implementation path.

In addition to characterizing the different variables, it is essential to denote how the different variables interrelate. The researcher should depict how independent variables interact to affect dependent variables and how this determines the measure of success of the intervention (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:20). In order to assess the distinct variables, various evaluation techniques, including standardised pre-tests and post-tests, survey and interview techniques, and the systematic scoring of observations from the classrooms, should be employed (Bielaczyc, Collins & Joseph, 2004; Cobb et al., 2003; Collins, 1992:18). This portrayal of how the variables influenced one another to affect the outcome of this research had been depicted in chapter 5. Cobb et al. (2003) further assert

that the inclusion of multiple sources of data result in rigorous, empirically grounded claims and assertions being derived from the analysis (Cobb et al., 2003).

It is necessary to consider the feasibility of implementing a design, as was done in chapter 3 of this report. The size of the research team required for implementation depends not only on the specific design, but also on the level of expertise of its constituent members. It is crucial that the members of the research team possess the necessary expertise to conduct the experiment and analyse the data that is generated (Cobb et al., 2003; Collins, 1999:293).

Since educators work together with researchers and other specialists during the investigation in a design experiment, it is critical for educators to be involved in every aspect of the design, its implementation, the determination of goals, and the reporting of the results (Collins, 1992:16,17; Collins, 1999:292,293). This pooling of expertise further allows for evaluation of results from more than one perspective (Cobb et al., 2003; Collins, 1999:293). The facilitator-researcher in this study consulted with colleagues, an assistant and experts in this regard.

Evaluation or retrospective analysis

Once the design and intervention have been finalised, the intervention has been carried out and the data gathered, it is time to evaluate the data. The researcher then uses retrospective analysis to evaluate the impact of the intervention and to determine whether the needs of the stakeholders and participants have been met (Bannan-Ritland, 2003). A retrospective explanation of the process is constructed, in which the sequence of events is depicted as part of a developing and potentially replicable pattern (Cobb et al., 2003). The researcher, therefore, looks at how successfully the design has been implemented and how well it was adapted to a broader context and a broader audience (Bannan-Ritland, 2003). The analysis procedure had been described further under the heading “Analysis of data” that follows later in this chapter.

Bielaczyc, Collins and Joseph (2004) propose that reports on design experiments be compiled in terms of the following stages:

- Pinpoint the essential elements (materials, activities, principles) as well as the goals of the design. Then describe in full how all these elements work together to achieve the goals (Bielaczyc, Collins & Joseph, 2004).
- Carefully describe the settings in which the design was implemented. Include a characterization of the independent variables (Bielaczyc, Collins & Joseph, 2004).
- Depict each phase of implementation as conducted in each unique setting and point out how changes in design affect the realization of or amendment of the goals (Bielaczyc, Collins & Joseph, 2004).
- Report outcomes with reference to a list of standards on dependent variables (Bielaczyc, Collins & Joseph, 2004).
- Explain the weaknesses and strengths of the implementation and include the results of the design, providing a rational portrayal of the changing design (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:18).

The researcher carefully followed each of these stages in compiling this report. In the sections that follow, the researcher discusses various vital issues that need to be taken into account during the implementation of a design experiment.

3.4.3 Important Factors for Consideration/Possible Constraints

Although the design has been specified above, there remain important factors for consideration when carrying out a design experiment. These factors include possible constraints of the research, which together with the factors for consideration are listed below.

- As design-based research relies on techniques from other research methods, design-based researchers striving to promote objectivity often find themselves cast in the role of both advocate and critic. (However, by employing triangulation of multiple sources and kinds of data, it is still possible to achieve critical evidence (Design-Based Research Collective, 2003; Hsi, 1998)).
- Because different members of a research team may be focusing on various elements at the same time, it may be difficult to coordinate the multiple levels of analysis that need to be constructed (Brown, 1992; Cobb et al., 2003).

- Design researchers normally gather a comprehensive amount of data and there is usually not enough time or resources to analyze all the data that has been collected (Bielaczyk, Collins & Joseph, 2004; Cobb et al., 2003).
- Because design experiments are usually mammoth undertakings that require input from many different contributors, it is often difficult to coordinate all of the contributors and the work that they need to do at one and the same time (Bielaczyk, Collins & Joseph, 2004).
- Because design experiments are carried out in "messy" classroom settings, it is impossible to control all the variables at work (Bielaczyc, Collins & Joseph, 2004),

It may just be possible to overcome the constraints mentioned above. The researcher includes her strategy for bridging this problem in the following section on how design experiments apply to this particular study.

3.4.4 Design Experiments and this Study

The researcher regards the particular kind of design experiment that she applied to this study as appropriate because the intention was to generate a design for use in the language classroom. The researcher also deemed it important to scrutinise and test the design in order to elicit context-specific theory from it. The researcher considered both the practical and theoretical aspects of the design as important. Compare the following statement by Cobb et al. (2003):

> "Prototypically, design experiments entail both 'engineering' particular forms of learning and systematically studying those forms of learning within the context defined by the means of supporting them."

They (Cobb et al., 2003) furthermore state that:

> "Design experiments are pragmatic as well as theoretical in orientation in that the study of function – both of the design and of the resulting ecology of learning – is at the heart of the methodology."

Brown (1992) asserts that it is important for a design researcher to make *every* aspect of the classroom ─ and not merely some or other of its separate or constituents parts ─ the object of intensive study. Instead of isolating a single variable for study, the present researcher adopted a holistic approach in order to inform and improve practice (Design-Based Research Collective, 2003).

Bielaczyc, Collins and Joseph (2004) discuss a number of difficulties that may be experienced during the construction of a design experiment. After having taken cognisance of the difficulties that would be involved, the researcher decided only to attempt *one cycle* as a pilot study. Successive cycles would be reserved for future studies. This decision was made in order to contain the study and keep it within manageable proportions because the only people available to work on this pilot project were the researcher (functioning as a practitioner-researcher) and an assistant. Future cycles would involve other practitioners and researchers on a larger scale. This decision to focus on only one cycle also meant that a more manageable amount of data would be generated for evaluation (Bielaczyc, Collins & Joseph, 2004).

The study seeks to address both the cognitive and affective aspects of classroom learning, which is possible to do in the mixed-mode design experiment methodology (Squire, 2004). It is indeed possible to address both these aspects of classroom learning because a mixed-mode design experiment methodology combines both quantitative and qualitative approaches to research.

The researcher used triangulation to strengthen her approach. Triangulation means gathering supportive evidence from more than one source to provide insight into a particular theme or approach (Cresswell, 1998:202). To this end the researcher combed multiple sources of data such as interviews, observations, questionnaires and pre- and post-tests. The researcher also combined different theories of learning to inform the strategy and the intervention used in the study. The involvement of the practitioner-researcher together with peers in the analysis and interpretation phases of the study ensured the crystalisation of the data. The researcher further utilised member checking as an additional way of assuring the validity of the design and practice. *Member checking* means asking students and lecturers whether they believe that the interpretations that were made constitute an accurate portrayal of what happened during the intervention and whether the contribution made by participants was accurately reported (Shenton 2004). The research also employed both quantitative and qualitative methods. Therefore, it also is necessary to refer to the term

crystalisation, which is mentioned in the more recent literature on qualitative research, such as that of Richardson (2000:934). Richardson's explanation of crystalisation is that different human observers look at phenomena from different points of view, and that researchers therefore have to take into account such multiple points of view and approaches to the same idea when they analyze and seek to validate their research. The metaphor on which the idea of crystalisation is based arises from the fact that light will be reflected in a different way to observers who are positioned at different places around a crystal through which a strong light is being refracted.

After this intensive description of the design itself, the section that follows offers a description of the researcher's own role in the study. Other aspects that pertain to this study are included thereafter. These aspects include population and sampling, as well as data collection and data analysis techniques.

3.5 RESEARCHER'S ROLE

There are various roles that researchers may take up during an investigation. Stake (1995:103) suggests that such roles can include instructor, participant observer, reader, evaluator, storyteller, advocate and interpreter. Stake (1995:103) further states that each researcher makes a distinctive contribution to a particular study, because the researcher decides exactly how to bring each of these roles into play in research.

During this investigation, the researcher found occasion to adopt many of these mentioned roles. As observer and partly also participant observer, the researcher formed an integral part of the intervention, in that she observed the learners and setting both from a distance and while helping and encouraging students during the classroom writing and computing activities.

Another role the researcher assumed was that of instructional designer and facilitator. The researcher both designed the integrated learning intervention to improve students' written language skills and facilitated the practical implementation of the learning activities in the classroom. The design required the researcher to identify various methods that would contribute to the integrated strategy, to plan and design the classroom activities, and to determine how to implement them in spite of the constraints and obstacles that applied to the research. During implementation of the integrated approach, the researcher was also

the main facilitator of the learning activities, interacting with the learners. Such interaction required the researcher to discuss the activities with the students, to encourage and motivate them to do the best that they were capable of, to offer them advice when they needed it, and to assess the products of the learning activities.

The researcher also performed in the role of interpreter during the observation, questioning, and communicating activities that took place. Documents produced and answers to questionnaires were further interpreted. This meant in practice that the researcher collated the views and interpretations of the participants (Stake, 1995:95).

3.6 POPULATION AND SAMPLING

The research population may be defined as the “universe” to be sampled (Fink, 1995:1) or all the cases that correlate with the description of the unit of analysis (White, 2005:113). The population that the researcher focused on in this research was first-year language students at the Tshwane University of Technology. The majority of these students were between eighteen and twenty years old at the time of the intervention. Of the approximately 100 students studying languages at TUT during this time, 55 were enrolled on the Pretoria Campus. Of those students on the Pretoria campus, only half (approximately 27 students) were enrolled for all three of the relevant subjects at the first-year level, and so only these were possible candidates to be included in the eventual sample.

A *sample* is a segment of a particular population (Fink, 1995:1). Sampling means choosing people for inclusion in the research from this particular population (White, 2005:114). One of the most important requirements of a sample is that it be representative of the population from which it is chosen (Fink, 1995:1; White, 2005:116). To ensure that the sample is representative, the researcher should state the objectives of the research clearly, provide clear and definite eligibility criteria and choose rigorous sampling methods (Fink, 1995:4-9). In addition to this, the population should be carefully and meticulously described. Such a description needs to include its size, the method and procedure that the researcher intends to use in the compilation of the sample, the number of people that will be in the sample, and an explanation of how the researcher arrived at such a number (White, 2005:115).

Convenience sampling is sampling in which cases are selected because they have something to do with the phenomenon under study and because the researcher has ready

access to these cases, such as when an educator selects participants from his class (Fink, 1995:18; White, 2005:120). While convenience sampling of this kind may limit the generalisability of results (White, 2005:120), this was in no way a problem in this study because it was never the intention of the researcher to generalise the findings. Convenience sampling was used in this first pilot cycle for the following reasons:

- Only students at the Pretoria campus were included in the sample because they could easily be contacted by the practitioner-researcher and were thus available for the purposes of the research.
- Only students who had enrolled for all three of the subjects mentioned above were included so as to fulfil the conditions of the interdisciplinary component of the research.
- Students who were involved with another simultaneous study were not included even though that study (see Annexure A) will eventually form part of the bigger design experiment.
- The study focused on both process and outcomes and the researcher could seek to return to the sample regularly for confirmation data, making use of member checking (Shenton, 2004), which refers to validating of the accuracy of data during and after data collection by taking it back to members to verify.

The sample size was therefore fixed at twenty-seven students. While attrition was in principle possible, it was not likely to happen because the research was conducted during scheduled class times. Extrinsic motivation techniques, such as the opportunity to improve marks, were also included in the study in the hope that it would motivate students to complete the intervention. Attrition did in fact exert an influence on this particular study because 16 of the 27 students in the sample (all of whom, incidentally, were female) did in fact complete the intervention.

It could be inferred that the sample was in fact representative of the population. This inference could be made as the sample consisted only of first-year language students (both male and female) between eighteen and twenty years old, who were registered at TUT at the time of the research.

3.7 DATA COLLECTION TECHNIQUES

> "All measurements (even observations) are *indexes* to constructs of interest, not the constructs themselves. Measures are created, not found, and decisions about the creation of measures are among the most important made" (Cobb et al., 2003).

Design research requires the researcher to collect various forms of data (Cobb et al., 2003; Collins, 1992:18). Multiple data collection methods may result in an improved response rate, may improve the prospect of approximating mode bias, may allow the researcher to control costs more efficiently and may allow the researcher to incorporate the strengths of different modes, while eluding weaknesses of each (Maxim, 1999:300). It was for these reasons that the researcher included (apart from the literature review) a questionnaire, observation, pre- and post-tests, semi-structured interviews, a research diary as well as written documents as data collection techniques.

The first task that confronted the researcher was to conduct a literature survey. It is characteristic of design experiments that they look to the literature for innovative methods that can inform the design (Cobb et al., 2003; Design-Based Research Collective, 2004). This is exactly what the researcher set out to do. This literature review (see chapter 2) did in fact inform the research both in terms of the nature and size of the problem under investigation and of the design and intervention used in the study. Such an informed design provides the researcher with a measure of control, as the design is engineered by the researcher (Cobb et al., 2003).

In a design experiment, it is necessary to address at least three types of dependent variables, namely climate variables, learning variables and systemic variables (Bielaczyc, Collins & Joseph, 2004). Climate variables include engagement, cooperation, risk taking and student control; learning variables include skills, dispositions, meta-cognitive strategies, learning strategies; and systemic variables include sustainability, spread, scalability, ease of adoption, and costs (Bielaczyc, Collins & Joseph, 2004).

The data collection techniques best suited to climate variables are observation, interviews and surveys, while information about learning variables are most successfully obtained from pre- and post-tests as well as by means of the evaluation of products and performances.

Data on systemic variables, on the other hand, are best gathered by means of interviews, follow-up observations and surveys (Bielaczyc, Collins & Joseph, 2004; Collins, 1999:291).

Because this study focused on many different variables, it was necessary to employ various data collection techniques (Bielaczyc, Collins & Joseph, 2004; Cobb et al., 2003; Collins, 1992:18). The data collection techniques and corresponding variables measured in this study are depicted in table 3.1 on page 61.

TABLE 3.1: Data Collection Techniques and Corresponding Variables

	Climate variables				**Learning variables**			**Systemic variables**		
	Engagement	Cooperation	Enjoyment	Effort	Content Knowledge	Skills	Dispositions	Ease of adoption	Sustainability	Costs
Questionnaire			●				●			
Observation	●	●	●	●						
Pre-test					●	●				
Post-test				●	●	●				
Semi-structured interviews (Annexure D)								●	●	●
Final product (writing exercise)				●	●	●				
Research diary								●	●	●

3.7.1 More on the Data Collection Types

Questionnaires

A questionnaire is a widely used data collection instrument consisting of either open or closed questions and that requires responses from participants (Saslow, 1982:14; White, 2005:127). Although the questionnaire is usually a quantitative data collection tool (White, 2005:127), responses to open-ended questions can also enrich and inform qualitative analysis. The questionnaire (see Annexure B) in this study contained mostly open-ended

questions, which are suitable for complex issues and allow the respondent to answer sufficiently (White, 2005:127). These questions covered factors such as the enjoyment experienced by students and their dispositions towards the intervention. A biographical section was not included in the questionnaire as the respondents were all known to the researcher.

Advantages of the questionnaire are that it is comparably cost effective, poses the same questions to all participants, can ensure anonymity, and composes of questions devised for particular purposes (White, 2005:127). It is, however, important that the researcher are clear on the objectives for which the data is being collected; the objectives should all be framed in terms of the research questions (Saslow, 1982:14; White, 2005:127).

Interviews

An interview consists of a structured or unstructured interaction in which the interviewer poses questions which are then answered by the interviewee. It is important to accurately record the interview, making use of either of a planned coding system or an audio-recorder (Newton & Rudestam, 2001:97; White, 2005:127-128). All interviews should take place according to a schedule that has been agreed upon by both the interviewer and the interviewees, and the interviewer should never fail to ask the interviewee's permission to record the interview on a tape recorder if that is what the interviewer intends to do (Hermanns, 2004:209). The interviewer should put the persons being interviewed at ease by explaining to them in a friendly way what the purpose of the research is and what the expectations of the interviewer are (Hermanns, 2004:209, White, 2005:127-128). It is vitally important for an interviewer never to be biased and to include the questions (including probing questions) in the analysis (White, 2005:127-128).

The advantages of interviews include the fact that they give the interviewer a measure of flexibility and opportunities to probe interesting points more deeply. Interviews are also characterised by a good response rate and they give the interviewer opportunities to observe the non-verbal behaviour of those being interviewed (Fontana & Frey, 2000:660; Maxim, 1999:281). Questionnaires further give the interviewer a large amount of control over the format of the interview and the order in which questions will be posed. Answers in interviews are more spontaneous and the view of the respondent only, and in the face-to-

face format of the interview, a researcher can make certain that all questions are answered (White, 2005:144).

Semi-standardised (Hopf, 2004:203) or semi-structured face-to-face verbal interviews (Fontana & Frey, 2000:645) were employed here to provide the researcher with a measure of flexibility in posing questions. A list of questions (see Annexure D) was drawn up beforehand, but the researcher probed further where necessary and little restraint was put on answers (Hopf, 2004:204; White, 2005:146). Since the researcher conducted all the interviews herself, it can be said that the interviews were conducted by an interviewer who was well acquainted with the research approach and questions (Hopf, 2004:207).

Observation

While observation may in principle be performed anywhere, it requires a great deal of concentration from the researcher because there is usually only one chance to observe an event. An observation of an important event requires not only careful observation of the setting, activities and participants, but also observation of non-verbal communication of the participants (White, 2005:158-159). It is usual for a researcher to make written notes of observations, and to augment observations (where possible) with supplementary audio and video recordings for the purpose of later verification.

Before the researcher engages in the observation process, he or she should list the particular points, actions, attitudes, qualities or situations that might yield the most valuable data (White, 2005:158). It is important for a researcher to remain open to unexpected elements during observation and so to allow participants the kind of freedom that creates the conditions in which participants feel free to say or act out whatever is on their minds. It is also obviously important to connect observed events with the elements of the context in which they were evoked (Baszanger & Dodier, 2004).

In this study, the researcher observed (see Annexure J for an exposition of the observational field notes) the students and classroom settings while continuing to act in her capacity as a lecturer assisting students. This kind of involvement may be seen as a form of participant observation (Angrosino & Mays de Pérez, 2000:674; White, 2005:161-163) Factors such as engagement, effort, cooperation and enjoyment were observed and recorded in the form of field notes.

Tests

A test is a step-by-step process in which the respondent acts in response to assembled stimuli. A test therefore makes it possible for a researcher to allocate marks, grades or percentages, and to deduce from such measurements the performance or ability of students with regard to the factors in which the researcher is interested. The researcher employed a one-group pre-test-post-test design as part of the quantitative contribution to the study (White, 2005:95).

The students were given standardised editing tests (see Annexure F) before and after the intervention to test their editing ability. In addition to the editing tests, students had to produce a writing artefact which they then refined during the intervention. The final product thus produced was compared to the first draft that they had completed before the intervention. It was through such means that the researcher collected data about content knowledge and skills.

Research diary

Newton and Rudestam (2001:97) encourage researchers to record impressions, reactions and whatever noteworthy happenings might occur during the data collection phase in a *research diary*. Because the use of a diary for such purposes helps to prevent errors of recall and misinterpretation, it is vitally important for entries to be meticulously and conscientiously constructed (Maxim, 1999:283).

Since it was the researcher alone who made diary entries, problems of inattentiveness, uncertainty and allocation were avoided (Maxim, 1999:284-285). The researcher used the research diary (see Annexure K for an exposition of the research diary entries) to collect data about systemic variables such as ease of adoption, sustainability and cost. The researcher mostly recorded her impressions during and right after the intervention.

Data collected through the data collection techniques are raw. The researcher's next step therefore had to include careful analysis of the data. The following section contains a discussion of data analysis procedure.

3.8 DATA ANALYSIS

Analysis of data in this study consisted of both quantitative and qualitative techniques. Qualitative data analysis, however, dominated as most of the data had been qualitative in nature. Cobb et al. (2003), holds that retrospective analysis applies especially to design research because:

"…retrospective analysis results in situated accounts of learning that relate learning to the means by which it can be supported and organised."

To measure data derived from pre- and post-tests, quantitative techniques were followed, whereas qualitative techniques of data analysis were followed for the remainder of the data. In this section the quantitative techniques used are set out first, followed by the qualitative techniques used.

3.8.1 Quantitative Analysis

Quantitative analysis of data involves the use of statistical techniques, organizing, calculating and depicting numerical data (Saslow, 1982:149; White, 2005:168,170). Different scales of measurement may be used (Saslow, 1982:36-40), including the nominal, ordinal, interval and ratio scales (White, 2005:168-169). As this design "involved two conditions" and the scale of measurement was interval, t-tests could be employed in the analysis of the data (Saslow, 1982:214).

The raw data (marks) had first been tabulated (Saslow, 1982:32,150,152; White, 2005:171), after which paired sample t-tests had been performed to determine the treatment effect (Saslow, 1982:215). These t-tests involved the pairing of two conditions (in this case, each student's pre- and post-test score) (GraphPad Software, 2002). The difference between the scores had then been calculated and the average of the scores "compared to their variability" (Saslow, 1982:215), resulting in a t-value, which depicted the average distance of the scores from 0.

When there is a big enough difference between the paired scores and the variability of these scores is small, it means that there is a significant difference between the pre- and post-test scores (Saslow, 1982:215; SISA, S.a.). If the t-value is negative, it further indicates

that such a difference was positive (in the sense that the post-test scores were higher than the pre-test scores), which would mean that the students had indeed improved. A significant difference on the paired t-test employed in this study would imply that if another researcher were to perform a similar experiment in similar circumstances, there would be a 95% chance that the results would be the same as they were for this study.

In addition to the t-value obtained, the mean (or average) was calculated for the pre- as well as the post-test scores (White, 2005:180) so as to indicate the degree of overall improvement. Descriptive statistics are often used in educational research where their purpose is to condense data lists so that an easy overview of distribution can be obtained (Saslow, 1982:149; White, 2005:168,170). The difference between the means had therefore been depicted by means of a bar-graph in each case where one bar indicated the average score in the pre-test and the other bar indicating the average score in the post-test. The measurement effect had further been controlled in that students were not subjected to a foreign setting or person taking measurements and in that the participants were only informed about the research after the intervention had already taken place (Saslow, 1982:42).

Although data from the questionnaires had been qualitatively analysed by means of coding, the frequency of reasons given in response to certain answers had also been determined. This meant that all related reasons were counted and produced as percentages. If for instance 10 out of the 16 students indicated that they had enjoyed the integrated approach because it had been relevant, the researcher calculated ten 10 out of 16 as a percentage and indicated this in brackets in the qualitative exposition, under the section: “Variable-oriented Depiction” in chapter 5. In the next section the qualitative analysis procedures is discussed.

3.8.2 Qualitative analysis

Design research requires iterative evaluation cycles leading to contextual theory (Cobb et al., 2003). The researcher had therefore made use of a similar qualitative process in analyzing the data and had also incorporated iterative analysis of the data (Bernard & Ryan, 2000:782-783; Miles & Huberman, 1994:8).

Researchers suggest that early data analysis should start during the data collection period of a study, as it enables the researcher to go back to the field for collecting of missing data (Miles & Huberman, 1994:50; White, 2005:186). Data analysis begins with careful organization and storage of the qualitative data, of which the building blocks are words (Miles & Huberman, 1994:50-51, White, 2005:80,187-188).

Because such data is collected in a raw form, it is necessary to process it before any kind of organisation of data can be undertaken. This processing stage requires the creation of properly legible and understandable expositions from rough field notes and transcriptions (Miles & Huberman, 1994:51). When such a processing has been completed, the researcher moves on to the actual data analysis. Figure 3.1 below illustrates the traditional sequence of analytical events:

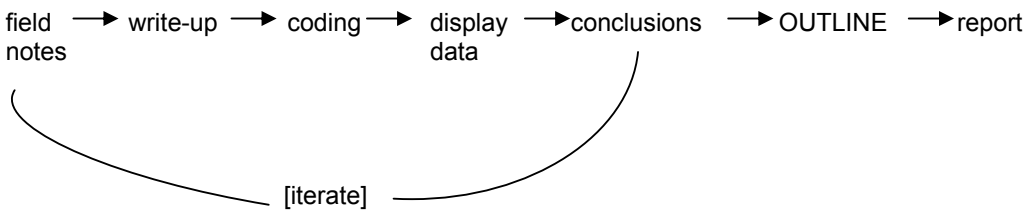

FIGURE 3.1: Traditional Analysis Sequence (Miles & Huberman, 1994:85)

Once the writing-up process has been completed, the researcher will possess an initial overview of the data and will then be able to record the early reflections and the questions to which such reflections give rise (Miles & Huberman, 1994:52; White, 2005:187). Asking another person to review the write-ups and write notes about it, could further help the researcher decide about the value of her reflections. Such notes might also be made about the documents for study (Miles & Huberman, 1994:52-55).

The next step is to assign codes, also called tags (Bernard & Ryan, 2000:782), to different sections according to what the researcher deems important (Bernard & Ryan, 2000:780; Miles & Huberman, 1994:56; White, 2005:186). This is done by writing a word or code in the margin next to the section that the code describes. Similar sections may then be collated and cut and pasted into a single document (Miles & Huberman, 1994:56-57). In order to not become overwhelmed by the multiple forms of data and by a very large quantity of data, the researcher should remember to keep the research questions and objectives in mind at all times (Cobb et al., 2003; Miles & Huberman, 1994:56). It is further important that the

researcher define codes, so that all the analysts may understand what the codes mean (Miles & Huberman, 1994:65).

As the researcher proceeds with the coding, certain patterns or themes may arise, which may then be indicated (by means of codes) in the margin (Bernard & Ryan, 2000:780-781; Miles & Huberman, 1994:57; White, 2005:187). The researcher may create a list of codes beforehand and make whatever additions and adjustments may become necessary along the way (Miles & Huberman, 1994:57-58). With each revision of the data, the researcher may delete codes or add new codes as new themes and patterns are discovered and others discarded (Miles & Huberman, 1994:62).

Miles & Huberman (1994:69), suggest the following advantages of pattern coding:

- "It reduces large amounts of data into a smaller number of analytic units.
- It gets the researcher into analysis during data collection, so that later fieldwork can be more focused.
- It helps the researcher elaborate a cognitive map, an evolving, more integrated schema for understanding local incidents and interactions.
- For multicase studies, it lays the groundwork for cross-case analysis by surfacing common themes and directional processes."

It may be useful to map the codes by creating a visual representation or model (Bernard & Ryan, 2000:782) of how these codes fit together and to write memos (sentences or paragraphs) about the codes and the relationships that exist among them (Bernard & Ryan, 2000:783; Miles & Huberman, 1994:70). It is further necessary to describe the setting, participants, and activities in detail (Cobb et al., 2003; White, 2005:186). Following from this, the researcher may then prepare preliminary propositions that point provisionally toward the findings and conclusions of the study. Such provisional findings may later help the researcher to produce a coherent argument or explanation (Miles & Huberman, 1994:75; White, 2005:186). Case analysis meetings, an interim case summary and vignettes may further prove useful (Miles & Huberman, 1994:76-83).

The initial exploration of the data therefore leads to a description of "what is going on" and "how things are proceeding", after which the researcher has to explain "why things occur as they do" (Cobb et al., 2003; Miles and Huberman, 1994:90; White, 2005:187). To obtain a

clear idea of the "what" and the "how", displays, such as matrices and networks, may be used. Displays of this kind are helpful for compressing and ordering the data (Miles & Huberman, 1994:141).

In addition to exploration and description, the researcher needs to explain "the why" of what has happened and make predictions (Miles & Huberman, 1994:143). In order to do this, it is necessary to not only make associations, but also to observe the devices of effect (those things that lead to the effects that are measured by the researcher) in a delimited local setting, which are always "multifold, operating over time" (Miles & Huberman, 1994:170). During this process, the researcher should look for negative evidence that might refute associations and whatever preliminary conclusions have been made (Bernard & Ryan, 2000:782; Miles & Huberman, 1994:271). Miles & Huberman (1994:170), further impresses on researchers to take both a "'variable-oriented', conceptual" approach *and* a "'process-oriented', story-like" approach when attempting to explain findings. An explanatory effects matrix or case dynamics matrix may be used to guide the researcher in explaining development of one aspect into another over time, and causal networks are used to explain what causes what. Cobb et al. (2003) contend that a *retrospective* explanation is required for an educational achievement and that this explanation should depict the process through which a series of contextual events can be seen as part of an emergent and potentially reproducible pattern. Finally, in order to test such explanations, the researcher needs to determine whether predictions that are rooted in the explanations can be corroborated (Miles & Huberman, 1994:170).

The researcher is further encouraged to be quite specific about the criteria and types of evidence that are used for making particular forms of conjectures so that other researchers will be in a position to understand, monitor, and critique the analysis (Cobb et al., 2003; Miles & Huberman, 1994:2). From the analysis, conclusions may then be drawn and recommendations made.

In this study, the researcher took the following steps to analyse the qualitative data:

- The researcher made an exposition of the rough field notes and transcriptions.
- The researcher noted her early reflections on the data and the questions that arose from it.

- After the two steps above had been taken, the researcher defined the codes and assigned them to different organizing parts.
- In addition to coding, the researcher identified patterns in the data.
- The codes were then mapped and displays were prepared, after which memos had been written.
- The next step was to develop propositions and prepare an interim case summary.
- The researcher also made associations and mined out the devices of effect.
- Lastly, the researcher employed the use of causal networks to explain causes.

The results of the analysis are presented in chapter 5 of this report. In the next section, the ethical considerations that are pertinent to this research will be discussed.

3.9 ETHICAL CONSIDERATIONS

Leedy (1993) contends that in a study with human participants, the researcher must take into account issues of ethics. As recommended by Newton & Rudestam (2001:265), the researcher became familiar with the ethical procedures and requirements of the institution under whose aegis the study took place, following all the necessary guidelines to ensure that the participants were protected at all times. The reader may view the informed consent forms given to participants in Annexure C. The researcher adhered to the following principles pertaining to ethics at all times during this investigation:

- Informed consent
  The students were informed about the researcher's intentions during the research, and the researcher obtained written permission from participants to include all transactions occasioned by the research as well as whatever products might be produced during the course of the intervention in the research report. The researcher also informed the students and other participants about the purpose of the research and explained the roles that they would play in the intervention (Miles & Huberman, 1994:291; Newton & Rudestam, 2001:266-273).

- Voluntary participation
  The researcher carefully explained to all participants that they had a choice about whether or not to participate in the study, and that they could voluntarily withdraw at any time from the proceedings without incurring any adverse consequence or penalty

(Newton & Rudestam, 2001:271; White, 2005:211). All the students and professionals who took part in the study participated on a voluntary basis.

- Confidentiality and anonymity
  Students and personnel were told that all information generated by the study might be used for research purposes. The information was kept in a safe place and was only used for the purposes disclosed to the participants. The researcher took great care to preserve the anonymity of the participants at all times (Newton & Rudestam, 2001:272).

- Analysis and reporting
  The researcher adhered to the highest possible scientific standards by acknowledging all the shortcomings and efficiencies of the study, by providing a detailed report of the findings, and by making an accurate presentation of data and disclosure of the methods used in the study.

The researcher therefore complied in every respect with all the ethical considerations that were necessary for this study. The research committee charged by the university with ensuring that ethical standards are adhered to in all research, also examined the study and found it to be satisfactory. In the section that follows, the researcher describes the procedure taken to ensure the trustworthiness of the research.

3.10 ENSURING TRUSTWORTHINESS

Scientific rigour describes that particular quality with which the best researchers strive to invest their research at all times so that their research will display all the hallmarks of integrity, strictness, honesty, conscientiousness, comprehensiveness and clarity that are the characterising features of all the best scientific research in the world (Begley & Tobin, 2004). Scientific rigour is therefore not only a *quality* of research; it also describes the particular approach or attitude that a conscientious and capable researcher displays while conducting research. The researcher in this particular study based her claim to scientific rigour on the trustworthiness criteria adduced by Guba and Lincoln (1985:299). *Trustworthiness* includes issues of credibility, transferability, dependability and confirmability and these qualities are the qualitative parallel of, respectively, the quantitative internal and external validity, reliability, and objectivity (Newton & Rudestam, 2001:98).

The Design-Based Research Collective (2003) explains that design research makes use of techniques from other research paradigms to ensure soundness. Such techniques include thick description, step-by-step analysis and agreement or coherence between the interpretations that are made. The collective also asserts that design researchers should be critical towards their work, should describe carefully the methods and processes used during research and should triangulate “multiple sources and kinds of data” to ensure that the assertions they make are reliable. Partnerships with other researchers and iteration further enhance validity by bringing theory, design, practise and measurement into coherent agreement over a period of time. What follows below is a description of the strategies that the researcher pursued to ensure the trustworthiness of this study.

3.10.1 Credibility

Credibility may be defined as the “soundness” of the inferences that are made in a research report so that the findings would be both credible and reasonable (Van Ryneveld, 2004). It is possible to demonstrate credibility by means of strategies such as member checks, peer debriefing, prolonged engagement, persistent observation and audit trails (Lincoln, 1995).

Credibility is the end product of prolonged field experience and persistent observation (Botha, 2003:44). Prolonged engagement ensures both that the participants come to trust the researcher and that the researcher is able to re-evaluate her points of view and perceptions (Guba & Lincoln, 1985:196). The researcher aimed to ensure credibility in this study by staying in the field as long as was necessary to collect sound data and by re-examining the data so as to ensure that clear themes would arise. The intervention itself stretched over four weeks, however, the researcher was able to return to the field after the intervention had been completed, whenever the researcher needed to clarify information obtained through the data collection of the study.

This return to the field at a later stage is called *member checking* (Shenton, 2004), and it is regarded as a valuable means for increasing credibility and accuracy. In this study, the researcher not only returned to the participants, but also obtained separate confirmation from peer researchers and from her research assistant. The supervisor and co-supervisor of the project further scrutinised the findings to ensure that it reflected the research data in the clearest possible way.

The credibility of the findings was further increased by triangulation (Cresswell, 1998:202) and crystalisation (Richardson, 2000:934). (Both these methods of corroboration, namely triangulation and crystalisation, had been described in chapter 1.) It was for this purpose that the researcher made extensive use of both quantitative and qualitative approaches and the various data collection techniques described above. Different theories of learning constituted a firm theoretical basis for this study, and more than one person scrutinised and certified the analysis and interpretation of the data.

3.10.2 Dependability

Dependability concerns the extent to which the research may be replicated. It requires a researcher to provide a detailed description of all the elements of the research including the design, data collection and analysis (Van Ryneveld, 2004). Researchers need to be critical of their research at all times if they wish to produce reliable and dependable conclusions (Begley & Tobin, 2004). They also need to reflect on whether their findings are consistent with the data collected (Van Ryneveld, 2004).

The researcher has described the research plan and implementation in thorough and extensive detail, and has remained critical and reflective throughout. The researcher has, in addition, sought to enhance dependability by means of triangulation, and thereby has also sought to ensure that the inherent disadvantages of certain data collection techniques were compensated for by the inherent advantages of other data collection techniques. The insight contributed by colleagues and fellow researchers in verifying the acceptability of the research further contributed to the dependability of this study.

3.10.3 Confirmability

Begley and Tobin (2004), contend that the process of auditing and reflection, can also be used to authenticate confirmability (apart from dependability), and that this involves ascertaining whether it is clear that the interpretations have in fact been derived from the data rather than merely from some imaginary source. Confirmability therefore entails establishing whether the data can be confirmed by other researchers (Van Ryneveld, 2004).

Through the production of different forms of raw data, analytical notes, the products of data reconstruction and synthesis, process notes, diagrams and personal notes, the researcher created the conditions for enabling the auditing of the data, the analysis process, and ultimately for the findings of this research project to be established upon a sound basis. Triangulation of method, of data sources, and of theoretical viewpoints added to the confirmability of the study by verifying the strength of the research assumptions.

3.10.4 Transferability

While transferability refers to a type of generalisability, the transference referred to here takes place between similar cases (Begley & Tobin, 2004). The feasibility of such transferability therefore depends on how similar the original situation is to the one to which one wishes to transfer (Botha, 2003:46-47). A researcher cannot claim that the findings are indeed transferable, but can only provide adequate information to help the readers determine if the findings of the research are applicable to their situations (Guba & Lincoln, 1985:298).

The aim of this research was not to ensure the generalisability of findings but rather to enable transfer to those particular situations and contexts that are comparable to the ones encountered in this study. Instead the researcher provided clear, accurate and rich descriptions of the context and interactions to enable other interested parties to evaluate whether or not their situations are significantly similar to those that form the basis of this investigation.

3.11 SUMMARY

This chapter provided an overview of the research design that was used in this investigation. It offered short descriptions of the main paradigms as well as a more detailed and thorough explanation of what design research entails as well as an explanation of the researcher's motivation for adopting a mixed-modal research strategy. Description of methods for sampling, data assembly and analysis were then followed by a description of the researcher’s role. The chapter concluded with an explanation of what ethical considerations governed this research and the measures that the researcher took to ensure trustworthiness. The following chapter (chapter 4) contains details about the intervention

itself. These details include descriptions of the preparation, the actual sessions, the assessment procedures that were used, and a description of the setting in which the intervention played out.

4.1 INTRODUCTION

In the previous chapter the research paradigm for use during the investigation and the data collection techniques were discussed. The third chapter did not, however, provide any specific details about the intervention. In this fourth chapter the researcher illustrated, by means of rich and thick descriptions, the details of the intervention carried out and the setting in which it took place.

The researcher further described, in this chapter, the independent variables that had influenced the outcomes of the study, also briefly recapping the information on those independent variables that relate to the integrated method and which had already been described in detail in chapter 2 of this report. Apart from reviewing the independent variables, the researcher provided a more detailed explanation of the dependent variables that she first discussed briefly in chapter 3. The researcher included this thorough depiction of the variables so as to provide the reader with an easy reference when interpreting the variable-oriented results of the investigation in chapter 5. (Chapter 3 also contains an explanation of what the terms *dependent variables* and *independent variables* meant in the context of this study.) In the section that follows, the researcher will describe the setting of the intervention.

4.2 SETTING

This intervention was implemented across disciplines in that different subject lecturers agreed to collaborate to create a holistic and authentic experience for the participating students. The main part of the intervention took place in the Computer Usage class (taught by the researcher), whereas smaller events took place in the Editing and Applied English classes.

The computer class, at the time of the intervention, was located in a laboratory with long fixed tables across the room and with six computers set on each table (see Figure 4.1 on page 77). On the lecturer's desk, facing the class were two computers. The first one was for normal use, and the second was programmed to relay whatever appeared on the first computer's screen onto the screens of the students. This useful function gave the lecturer the ability to explain various points and demonstrate software functions to the students on their own individual screens, as though making a personal presentation to each of them. In

addition to the equipment already mentioned, the lecturer had a laptop with a newer version of Microsoft Word installed on a table to the one side of the room for the duration of the intervention. This laptop was installed to enable the students to use the dictionary function which they could not access from the version of Microsoft Word that had been installed in the laboratory.

The classrooms that the students attended for Editing and Applied English were set up in a way similar to that of the computer laboratory. There were also long fixed tables arranged in parallel across the room; the lecturer's desk stood in the front of the classroom and faced the students' tables. No computers, however, had been installed in these classes.

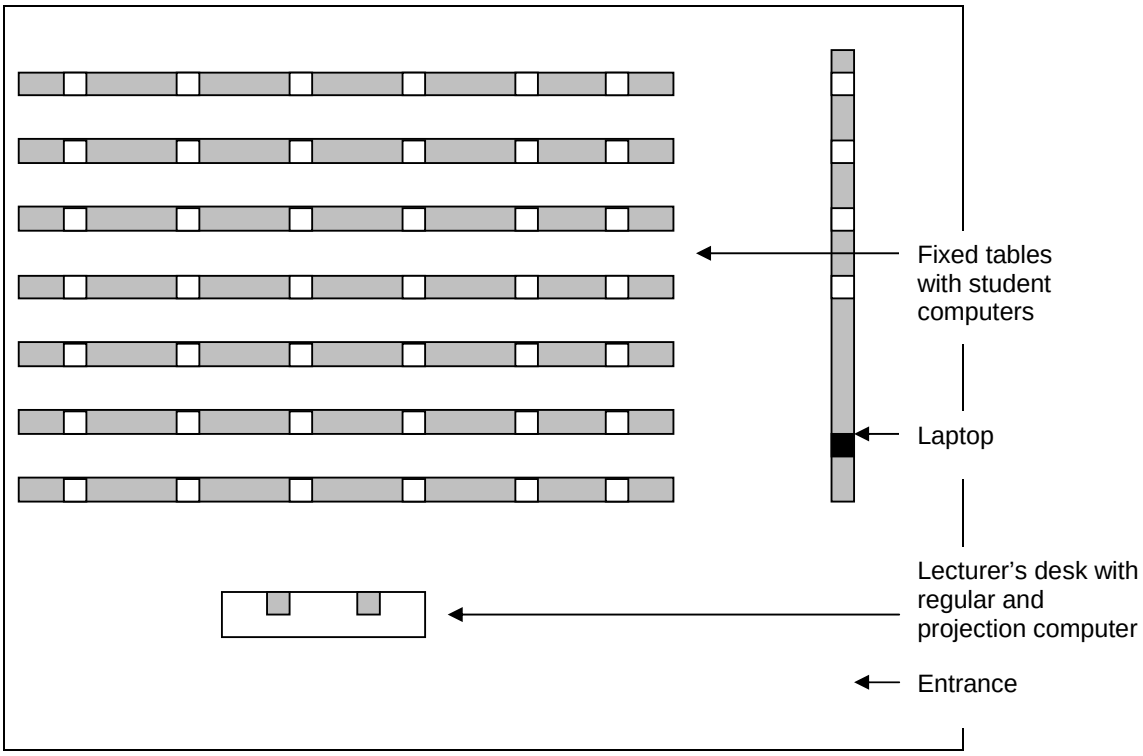

FIGURE 4.1: Diagrammatic Representation of Computer Classroom

4.3 INTERVENTION PLAN

What follows below is a presentation of the systematic course of action that the researcher followed during the intervention. This discussion includes a detailed description of the preparation, enactment and assessment stages of the intervention.

4.3.1 Preparation

The period in which the intervention would take place was carefully chosen to intersect with the period in which the students would anyway have been receiving training in the use of Microsoft Word. The students had already learned how to type correctly on the word processor as well as how to apply the basic functions of Microsoft Word. The last section of the word processor training programme was devoted to those functions of Microsoft Word that are especially helpful to language practitioners. The functions that the researcher concentrated on during the intervention included the word count function, the thesaurus, the dictionary, the spelling checker, the grammar checker, and the style checker. In addition to explaining how these functions worked, the researcher briefly explained how the TRK (track changes) function works.

During this period, the lecturer set up exercises to be used as pre- and post-tests before and after the intervention in consultation with other lecturers. The head of the English section of the department provided helpful suggestions for the writing exercise which included a letter and a rubric for assessing the writing exercise (see Annexure G). The writing exercise and the rubric were then submitted for approval and comment to the lecturer who lectured the first-year students in Applied English.

In addition to the writing exercise, the researcher, in consultation with the lecturer who lectured the first year Editing class, prepared two standardised editing exercises (see Annexure F). Newspaper articles of a similar level of difficulty and length were adapted for this purpose. The Editing lecturer suggested certain points for the students to cover in the intervention since she had been unable to teach these aspects of the English language in sufficient depth during the periods allocated by the official timetable. Among the matters that she suggested for inclusion were tense, spelling, concord, punctuation and capitalisation. Punctuation and capitalisation were pared together to form one of four focuses of the editing pre-test. Five errors from each of the categories above were included in each of the two editing exercises (for pre- and post-test respectively), amounting to 20 errors in each exercise. The Computer Usage lecturer drew up memoranda (see Annexure F) for the pre- and post-tests, which the Editing lecturer reviewed for accuracy and appropriateness.

Instruction documents (see Annexure H) to accompany each activity in the intervention were compiled for the use of the students to ensure that students knew exactly what to do.

These documents included instructions for the editing of standardised editing exercises, the peer editing of a fellow student's writing exercise, and for applying MS Word's functions to their own writing exercises. To help the lecturer focus and make efficient use of class time, a rough programme for each of the sessions during the intervention was put together (see Annexure I).

The students were briefed beforehand about the intervention and its significance, and the connection and relevance of the intervention to the "real" working world of the language practitioner was made clear to students. The students were also given a document that indicated the times of the sessions of the intervention and the number of marks that the students would be allocated for the exercises performed in each session. In order to motivate the students to participate, the researcher explained that the marks that they obtained during the intervention would be added to the marks of an earlier computer test in which they had performed badly.

It was also explained to those students who had not been included in the sample for this study that they would receive a chance to complete the intervention at some later period during the year. In the meantime, these students were provided with Internet Explorer exercises (a mandatory module of the computer course for first year language students). It was arranged that the students who were participating in the study would complete the Internet Explorer exercises at exactly the same time that the students falling outside the sample would complete the exercises that had been used during the intervention. By means of this arrangement, all students would be accorded the same amount of exposure. These Internet Explorer exercises had already been compiled because they formed part of the syllabus for the computer usage course and were not a constituent part of the intervention.

4.3.2 Pre-tests

The Computer Usage lecturer arranged with the Editing lecturer to schedule the editing pre-test (see Annexure F) during one of the normal one-hour Editing classes. This pre-test was strictly and carefully supervised. The students were at no point allowed to speak to one another or look at one another's work. Because the students were normally given editing exercises for the practice of specific Editing skills during this period, the format and purpose of the pre-test was readily comprehensible to the students and did not disrupt the normal activities of this class. The Editing pre-test consisted of a standardised editing exercise in

which students had to underline a total of 20 errors (five in each of the four categories mentioned earlier). Not only were they asked to identify errors by highlighting them, but also to insert the correct answer above each error. Each of the four types of errors had to be highlighted in a different colour. The participants were asked to highlight the spelling errors in pink, the tense errors in orange, errors of concord in green, and errors of capitalisation and punctuation in yellow.

The writing of the writing pre-test (see Annexure G) took place in the Applied English class on a day that the researcher had arranged with the Applied English lecturer who, conveniently, had an important meeting which he had to attend. The researcher was thus able to administer the pre-test during the normally scheduled class time of the first-year Applied English group. The students were asked to write a letter in which they requested a loan that would enable them to study at a tertiary institution. The students were required to complete the letter during the one-hour class period. The rubric that the researcher had prepared (see Annexure G) was handed out together with the instructions for writing the pre-test. This rubric, together with an oral explanation, gave the students the framework and context for writing the letters and also indicated the marks that would be allocated. The students were also encouraged to ask questions for purposes of clarification.

4.3.3 Practice – Intervention Session 1

During the next three weeks, the participating students practised editing and word processing skills in their scheduled Computer Usage classes for two hours each week. In the first place, the students were asked to make peer assessments of one another's writing exercises on photocopies of the letters that they had written previously. The students completed this peer assessment exercise in the first of two hours available during the week for the subject Computer Usage. Once again they made use of highlighters to indicate errors, although only one colour per exercise was used this time around for all the categories of error. Apart from underlining errors and writing corrections above them, each student was encouraged to include some helpful written comments for the author. The lecturer also suggested that students might discuss errors among themselves as well as with the lecturer.

In the second place, the students were asked to apply the functions of the word processor that were mentioned above to an electronic copy (saved on 3.5” floppy disks with their

names on) of the editing pre-test. The students applied these functions of the word processor in the second of two hours available during the week for the subject Computer Usage. Before doing this, students were asked to switch on the TRK (track changes) function so that they could track the changes that they made to the text and format. The students were then asked to apply the spelling checker, and the grammar and style checkers. Students were cautioned that these checkers were not always accurate because they were applied automatically by the software without any reference to any human or other context. They were therefore asked to consider each suggested change very carefully indeed, and, if necessary, to consult their fellow students and the lecturer if they were in any doubt. They were then asked to apply the thesaurus function to see if the authors of the letters could not have used more suitable words than the ones that they had initially used. The students were also asked to look up the meaning of words of which they were unsure by making use of the dictionary function. To end with, the students applied MS Word's word count function to determine whether their letters consisted of the requested 200 words.

4.3.4 Intervention Session 2

During the second two-hour session in the Computer Usage class, the students applied the functions of Microsoft Word (which they had practised in the previous session) to their own writing exercises. Once again, they were asked to apply the spelling checker and the grammar and style checkers (but without the TRK (track changes) function turned on). The TRK (track changes) function was left out so that students would be able to focus only on improving their letters. But students were invited to use the dictionary and thesaurus functions and once again converse with and consult one another as well as the lecturer. They were then asked to check the length of their own letters by making use of the word count function.

4.3.5 Intervention Session 3

Because many of the participating students were absent for one or other of the two intervention sessions mentioned above, the researcher had to arrange a third session so that these students could catch up. Since the group consisted of a sufficient number of students to make communication feasible, the researcher once again invited the participants to converse with one another and to consult the lecturer if they so wished. The

lecturer took pains to ensure that the same process that was followed in the other sessions was followed in this (third) session.

4.3.6 Post-tests

The researcher once again arranged for the editing post-test (see Annexure F) to take place under the supervision of the students' normal lecturer in a scheduled one-hour Editing class. This post-test again consisted of a text that contained 20 errors. Although a different text was chosen for this occasion, the researcher took pains to ensure that the text corresponded in the level of comprehension and difficulty and type of error to those that had occurred in the pre-test text. The students were then asked to follow the same procedure that they had followed for the pre-test. They used differently coloured highlighters to identify each of the four error types and highlighted the errors that they identified. This test was also written under strict test conditions. The final writing artefact (the letter), on the other hand, served as the outcome (post-test) of the writing activity. This letter was duly printed out after it had been completed so that it could be compared with the initial draft (pre-test).

4.3.7 Assessment

Once the intervention had been completed, the Computer Usage lecturer (who is also a qualified language lecturer) marked the writing pre-tests and post-tests according to the rubric (see Annexure G) that had been developed for this purpose. Other language lecturers moderated the marking by carrying out random spot-checks on both sets of letters.

The lecturer marked the editing pre-tests and post-tests according to a standard procedure by consulting the memorandum (see Annexure F) that had been compiled beforehand. Once again, random spot-checks were performed by the Editing lecturer and the research assistant. The marks were not disclosed until after the intervention had been completed.

Following the above description of the intervention, the researcher next includes a discussion of the variables that had been at work during the intervention. First the researcher describes the independent variables that had influenced the outcome of the intervention, after which follows a description of the dependent variables which had been influenced by the intervention.

4.4 INDEPENDENT VARIABLES

The independent variables that influenced the results of this study, did not only include the those factors that made up the integrated approach used (set out in chapter 2 of this report), but also those of the setting in which the intervention took place, the learners, facilitators and researchers involved, the resources and support and the sequence of the implementation activities (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:20). The researcher now presents a brief overview of the independent variables of this study in the sections that follow.

4.4.1 Methodology

The researcher employed various strategies as part of the integration of method used during the intervention for this study. Constructionism influenced the intervention. In terms of the constructionist premises, the students were required create an artefact (Harel & Papert, 1991:1) such as the letter that the students wrote and refined in this study. A process approach to writing, in which students refine and edit their work until polished (Tecle, 2001:28) and Computer Assisted Language Learning, with computers as aid in performing language related activities (Garret, 1998), further had an effect on the intervention. Peer assessment, in which students review one another's writing (Admiraal, Pilot & van den Berg, 2003), was used to stimulate higher cognitive functioning (Bostock, 2000; Burgess; 2001). Students were also given an authentic learning task (the letter) to complete. Authentic learning occurs when the setting, task and motivation are as close as possible to what one would find in industry and other sectors of the job market (Andrews, Isaacs & Stein, 2004; Rüschoff & Ritter, 2001). The researcher also used external motivational techniques (Harris, 1991) to enhance the co-functioning of these methods during the intervention. For a detailed description of these variables, the reader is invited to refer to chapter 2.

4.4.2 Nature of the Learners

It was explained in chapter 1 of this study that students enrol at Tshwane University of Technology's Department of Applied Languages in order to become language practitioners in an ethnically diverse country in which many different languages are spoken. Many of these students, however, are neither motivated nor equipped to do their best and so they

frequently either barely scrape through or fail their subjects ignominiously. Many first-year students are still basically uncertain about what they want to do with their lives, and this inevitably results in poor academic performance.

The majority of first-year students are between 18 and 20 years old and come from schools in which classes were overcrowded, facilities were limited, and the quality of education left a lot to be desired. In such circumstances, the kind of English language skills that learners acquired was inadequate, unsatisfactory and dysfunctional, to say the least. Most students are still relatively young and inexperienced and have no clear idea of what it takes to succeed as students and ultimately as language practitioners. It would seem therefore that what the students most need in their lives is structure, guidance, support and motivation.

4.4.3 Professional Development

The researcher's experience in the practice and teaching of both language and computer-related skills provided a strong motivation for her to carry out this specific intervention. Because the intervention was designed to improve students' language skills with the assistance of computers, the researcher's experience was clearly relevant both to the intervention itself and the needs of pupils who participated in it. The intervention also benefited from sources and assistance other than that provided by the researcher. The researcher, for example, consulted her colleagues and other experts in these fields, including a number of professors, both before, during and after the intervention. This process of consultation continuously enabled the researcher to refine the design of the intervention before arriving at the final format and method. Invaluable support such as this was augmented by the researcher's critical examination and review of the best literature and researchers who have worked in this field in the past. All these factors combined to provide the researcher with first-hand experience of planning, designing and implementing a research initiative in a university setting.

4.4.4 Resources and Support

Available resources included those to which the researcher had access even before the idea of an intervention such as this had occurred to her. The resources included the different classrooms described in the previous chapter, computers, highlighters, pens and paper. A fourth-year student (or research assistant) performed various support functions

such as helping to answer students' questions, to hand out notes and to assist students who had computer problems in the lecture rooms. Various computer laboratory technicians also supported the researcher when she asked them for help.

4.4.5 Financial Requirements

Because the intervention took place during regular scheduled class periods and because the lecturers who would have taught those periods agreed to facilitate the intervention sessions, no additional expenditure was required to pay for special facilities or extra help. Apart from some additional photocopies that needed to be made, the researcher made creative use of the resources that were already available at the university. This meant that no expenditures other than those on routine daily matters were incurred by the intervention.

4.4.6 Setting

The lecture rooms that would have been used in scheduled lectures in the Applied English, Editing and Computer Usage lectures served as the setting for the intervention. A complete and detailed description of the setting is contained in section 4.2 of this chapter.

4.4.7 Sequence of Events

The intervention was preceded by a preparation phase in which the planning, the training of students and the assistant, and the preparation of the materials, documents and tests took place. It was also during this phase that the pre-tests in both editing and writing were written.

During the intervention itself, the students were involved in a mostly predetermined sequence of activities. In the first session, students peer assessed the writing exercises of fellow students and practised word processing skills on an electronic copy of the editing exercise. In the second session, the students applied the word processing functions to their own writing pre-tests. In the third session, the students who had been absent from one or other of the previous sessions were given the opportunity to complete the activities that they had missed because of their absence.

Once the intervention had been completed, the students wrote an editing post-test. The final version of the writing exercise (after the students had modified it during the intervention) served as the writing post-test. The documents that had been produced during the intervention were then assessed according to pre-determined criteria.

A complete explanation of the planned intervention is provided in chapter 3 of this report. What follows in the next section is an exposition of the dependent variables.

4.5 DEPENDENT VARIABLES

It had been important to the researcher that various aspects of student learning be influenced through the intervention. These aspects or dependent variables comprised of three kinds, namely climate variables, learning variables and systemic variables (Bielaczyc, Collins & Joseph, 2004).

In order to assess the climate variables, the researcher needed to determine the extent of the engagement, cooperation, enjoyment and effort that students invested in the intervention. While the learning variables focussed on as part of this research were the content knowledge, skills and dispositions of the learners, the researcher focussed on the sustainability, cost and ease of adoption of the intervention as part of assessing the influence that the intervention had on systemic variables. The following paragraphs clarify what each of these variables meant in terms of *this investigation*.

4.5.1 Climate Variables

Cooperation

In this study, when relaying that students cooperated, the researcher meant they interacted in a meaningful way while they carried out predetermined tasks. This also meant that students discussed the task at hand with their fellow students or lecturer; that they asked for help; that they gave each other insight into matters; that they were determining whether their thoughts were on par with one another as to what to do. By doing these things, students became aware of various dimensions of which they had not previously been aware. Students in this manner could become aware of additional aspects regarding the

exercises and their future roles as language practitioners that they had not previously considered, testing their own hypotheses on matters.

Enjoyment

Although enjoyment is an elusive concept, it can be deconstructed, albeit with some difficulty. Enjoyment need not be defined only in terms of overwhelmingly positive emotions. There are many degrees of enjoyment, some of which are quiet and introspective, and others of which are more extroverted and emotive. The researchers is of the opinion that the enjoyment experienced by the students could be deduced from facial expressions, from body language, from listening to what students said to one another, and from reading their descriptions of some or other aspect of what they achieved in the intervention. The most accurate assessment of enjoyment, however, came from asking the students themselves directly how much they had enjoyed taking part in the intervention.

Engagement

For the purpose of this investigation, *engagement* in a task meant the extent to which the student was absorbed in the task or the concentration and focus that the student had to invest in completing the exercise. While facial expression and body posture also to some extent revealed the degree of engagement, the researcher found indicators of engagement in the products generated by the learners as well as in the descriptions that the students gave of their own engagement.

Effort

When students exerted themselves to complete the task required by the intervention, the effort and energy which they expended were visible in the artefact itself. In order to ensure the validity of this deduction, the researcher also observed the students at work because the degree of effort a student needed to expend on the task is probably proportional to the student’s ability, preparedness and expertise. The researcher also found that she could determine the degree of effort that a student had made by examining the various drafts that the student had produced and by comparing these various versions to one another.

4.5.2 Learning Variables

Content knowledge

Content knowledge may be defined in this study as the degree of knowledge and expertise necessary for performing certain tasks competently in a defined field (the field in the case of this study being English language, writing and editing). While the answers that students provide in tests and the products that they produce accurately reveal the extent of the content knowledge, the researcher supplemented these measures of content knowledge by specifically asking students what they have learned and how they had learned it. She then collated all these elements to produce a plausible account of what transpired inside the students' minds during the intervention.

Skills

In this study *skill* was defined not merely as ability or human potential, but rather as learned competence in applying knowledge while carrying out a specific task. Because skill was understood to involve *action*, it was necessary for the researcher to observe the students while they were engaged in a task. The end-result of applied competence (such as an artifact) could further reveal the *value* of the skills. The participating students also disclosed information about the way in which they perceive their skills in the narratives that they were asked to produce. The researcher was specifically interested in skills in the three areas of word processing and English writing and editing.

Dispositions

The attitude of the learners toward their learning, subjects, tasks and resources was a matter of great interest to the researcher because these attitudes and dispositions revealed valuable information about the affective aspects of the intervention. It was assumed that the method, resources and content of the intervention would influence the outlook of the participating students either positively or negatively or not at all. Such changes (or lack of them) in the students attitudes would then be understood as indicators of the cognition that was achieved and the learning that took place. The researcher therefore observed and probed aspects regarding the dispositions of learners in this study.

4.5.3 Systemic Variables

Ease of adoption

In this study, *ease of adoption* implied the readiness and ease with which the new integrated approach was received and implemented. To ascertain the degree of ease of adoption of the approach, it was necessary for the researcher to consult the lecturers, students and researcher and to discern their views by means of questionnaires, interviews and entries in the research diary.

Sustainability

Sustainability in this study referred to the possibility of carrying on the approach exemplified by the intervention in the future. Factors that might influence sustainability included the availability of resources and expertise as well as the disposition of administrators and lecturers towards the approach itself. Sustainability may also be regarded as being closely linked to ease of adoption. Ease of adoption might therefore be understood to correlate positively with sustainability.

Cost

Since the survival of a company or department depends on sound financial practice, it is always better if costs can be kept to a minimum while excellent service is produced. If this research could therefore prove that only minimal and existing resources needed to be co-opted to create a truly effective and efficient learning intervention, such a model would be bound to create interest among heads of departments and other educators whose best efforts are being subverted by the lack of students' skills in the areas studied in this intervention. An intervention of this kind might also prove profitable in the sense that if the skills of first-year students in these subjects could be substantially improved, more students would pass and therefore continue with their studies and employers would be far more ready and willing to accept graduates from the university.

This chapter has described the intervention and the setting in which it took place. It also discussed and explained the variables of the study in some detail. Since this chapter and

those that preceded it provided an exhaustive explanation of the circumstances and the conditions of the intervention and the variables in terms of which it operated, chapter 5 will now provide a detailed exposition of the findings.

5.1 INTRODUCTION

Since chapter 4 already contains a detailed description of the planned intervention as well as an exposition of the meaning of the independent and dependent variables at work in the study, the researcher felt that it would be unnecessary to repeat those descriptions here. It is essential, however, to understand the ground that was covered in chapter 4 because it serves as a context and background against which the results of the investigation, as discussed in this chapter, may be interpreted.

The researcher has portrayed the results in two ways. Because it is not always easy for those who were not directly involved in the research to follow an explanation of the findings in terms of the variables, the researcher has also included a “process-oriented, story-like” explanation (Miles & Huberman, 1994:170) of the process that took place. The researcher further explained the measure of correlation achieved between the results from different data collection methods and how the results relate to the questions that were posed in chapter 1.

5.2 PROCESSUAL EXPOSITION

Cobb et al. (2003) hold that the research findings should be cast in the form of a retrospective explanation of the research process, that depicts the sequence of events that occurred during the process as part of a developing and potentially replicable pattern. It is on the basis of this suggestion from Cobb et al. (2003) that the researcher explains the findings of the investigation in terms of process in the sections below. Because this report includes only the results of a pilot study and because future iterations still need to be undertaken, it was not possible to portray the results in terms of a changing design (Bielaczyc, Collins & Joseph, 2004; Collins, 1992:18).

5.2.1 Beforehand

Before the intervention actually took place, the participating students wrote pre-tests that consisted of a letter. The editing pre-test, also written before the intervention took place, consisted of a standardised editing exercise.

In this preparatory phase, the lecturer prepared sheets for taking field notes which she organised in terms of the dependent variables on which she wished to focus. These sheets were filled in with appropriate notes during the session in the small gaps of time during which the students were otherwise engaged and no one was calling upon her for assistance.

5.2.2 Intervention Session 1

Part 1: Peer editing a copy of a fellow student's writing exercise (that was earlier produced as writing pre-test)

At the beginning of the session, the lecturer (the same person who performed the role of researcher) explained to the participating students what they would need to do. The lecturer also pointed out the relevance of the task they were to perform to the daily activities of a language practitioner in the industry or workplace. Each student was handed a photocopy of a fellow student's letter produced in the writing pre-test, as well as a highlighter with which to highlight errors. The lecturer asked the students to highlight all errors and write corrections above the errors. Each student had further been provided with an instruction sheet that contained the instructions for performing this task.

Once the students had been briefed, they could begin the activity. Since the students had already undertaken the editing pre-test the week before, they were able to start at once without requiring lengthy explanations or time in which to orientate themselves.

The lecturer observed that the students did not have nearly enough skills and knowledge to carry out the job competently by themselves. But since the students were eager to learn, they began to ask one another and the lecturer questions about the editing after they had been encouraged to do so. As soon as the students realised how the information that they obtained from questioning would help them to perform the task, they became less inhibited and more willing to ask others for the information that they needed. From the questions that the students asked, the lecturer was able to deduce that they were thinking about the problems in hand and learning new editorial content knowledge and skills by correcting the errors that a fellow student had made.

The lecturer also noticed that the students enjoyed using the coloured highlighters. Once they became aware of the different types of errors they had to look out for, the students really became engrossed in their work and put considerable effort into their editing. Towards the end some students even asked for additional time so that they could complete the work conscientiously.

Part 2: MS Word functions performed on an electronic copy of the standardised editing exercise

Even after the lecturer had explained the purpose, instructions and relevance of the task, the students still required some time to work out for themselves what the task was about and how they would go about in this part of the intervention. Some asked questions of clarification while others quietly scrutinised the paper-based instructions without asking the lecturer any questions.

Once the initial orientation phase was over, the students set about applying the TRK (track changes), word count, thesaurus, dictionary, spelling and grammar checker functions to an electronic copy of the standardised editing exercise that had also been used previously as the editing pre-test. Although some students immediately began to show signs of fatigue and apathy, they seemed to acquire a new burst of energy when the lecturer pointed out that contemporary language practitioners nearly always carry out their writing and editing tasks on computers. The lecturer then made further suggestions to the students about how they might apply the word processor functions mentioned above to the editing of the text.

Some students in the group still seemed to be uncertain about how to use some of the word processing functions while others were uncertain about how to access the dictionary function on the laptop because many of them had never used a laptop before. The lecturer encouraged the students to ask both their fellow students and the lecturer for advice regarding anything about which they felt unsure. As the students began to understand more and more clearly what it was that they needed to do and how they should do it, they began to interact with one another and with the lecturer more and more. They also then seemed to begin to *enjoy* the exercise, and most of them put in additional effort towards the end as they strove to complete their tasks according to the instructions that they had been given.

It nevertheless became apparent to the lecturer that because the task that the students were given in this exercise only involved the application of various word processing functions to some standardised text rather than their own or someone else's work, the students were not as engrossed in the exercise as they might otherwise have been. Their evident interest in the useful word processor functions fortunately compensated for their feeling of not having any sense of ownership about the task in hand. Most of the students seemed especially to enjoy using the TRK (track changes) function, the word count and the dictionary functions, and their interest in these functions seemed to motivate them to exert greater efforts to complete the exercise in a satisfactory way. In the end, the texts which the students handed in were all covered with red lines and textual additions because of the colour selected by the word processor to show the tracked changes in the text.

5.2.3 Intervention Session 2

Part 1 and 2: Typing their own writing exercise and applying the word processing functions (practised in the previous session) to their own writing exercise

In part one of this session, the students were asked first to type their own writing exercise. In part two of the session, they were asked to apply the word processor functions that they had previously revised in session 1 to their exercises in an attempt to improve upon their initial effort. The students were then also in the position to benefit from the peer editing that their fellow students had performed in session 1 on copies of their writing exercises.

As soon as the lecturer explained that the students had to type their own writing exercises and had handed these students their exercises, they started typing and appeared to be deeply engaged in this task. A few minutes later, one student's computer rebooted before giving her an opportunity to save her work, and she soon realised that she had lost all her unsaved work. One after another, the other computers followed suit. The students became frustrated and disheartened as this rebooting process repeated itself over and over again.

Although the research assistant went to find the computer laboratory technicians who could have helped, they were otherwise occupied and unable to offer immediate assistance. The lecturer nevertheless remained calm and gently encouraged the students to persevere. She also suggested that they save their work at regular intervals. The calmness of the lecturer seemed to have a salutary effect on the students. They also seemed to become more

philosophical about the rebooting problem, and so were able to focus on the task at hand while accepting that they had also to deal with computer problems.

Once the students had completed the typing of their exercises, they began to apply the word processor functions to their texts. During this part of the session, the students seemed to be especially deeply engaged with their assignments and began to display strong signs of a sense of ownership of their work. No doubt the fact that they might augment their marks by handing in an improved product provided an additional motivation for them to redouble their efforts.

The lecturer continued to provide encouragement and make suggestions throughout the session. She also continued to encourage the students to consult one another and the lecturer for help in completing the tasks. Because the students by that time had already identified strongly with what they were doing, they appreciated being able to get all the help that they needed. A great deal of interaction consequently took place and it became apparent to the lecturer that the students were in fact improving their skills and augmenting their understanding about the field in which they were engaged. The lecturer also deduced from various cues that the students were really enjoying the process of correcting their own errors, and a number of them stayed long after the class had ended so that they could finish the exercise.

5.2.4 Intervention Session 3

Continuation of the intervention with those students who had been absent for some of the previous sessions

Because many of the students had been absent from previous sessions of the intervention, the researcher decided to give such students an opportunity to complete the parts that they had missed because of their absence. Because these students had already completed one part of the intervention, they already understood to some extent what the intervention involved. This understanding (based on previous experience of the exercise) enabled them to orientate themselves more quickly. Once they had realised what they had to do, they bent over their work and concentrated intently on what they had to do.

Even though fewer students were involved in this session and even though they were not all doing the same task at the same time, the frequency and freedom of the interaction among the students did not seem to be adversely affected, and the students in fact gave every sign of enjoying the interactions. The lecturer's encouragement also prompted the students to ask her for advice. And because there were fewer students taking part in this session, the lecturer was able to give far more attention to each of the students individually during the course of the session, and the students themselves seemed to enjoy the ready availability of assistance and advice from the lecturer and from one another.

Because the computer virus that caused the repetitive rebooting had been dealt with by the computer laboratory tecnicians before this third session had commenced, there were no resource problems to hamper the students' enjoyment. Once again it was evident that the students especially enjoyed improving their own writing exercises because they put a great deal of effort into the improvement of their previous versions and displayed every sign of enjoyment while doing so. Towards the end of the session the lecturer realised that this session had been rather too long for the students because they began to show signs of fatigue and disengagement. And yet, in spite of their exhaustion, most of the students put as much effort as they could muster into the intervention because they were motivated by the understanding that they had been given another opportunity to improve their work and therefore obtain far better marks than they would have got for their original productions. This gratitude for being given another chance motivated these students to make whatever efforts they could to improve their work until they were satisfied that they could do no more.

In addition to this last session, the students were still required to write the editing post-test (which could only obviously be written once the intervention had been completed). Although they were tired, most students accepted that they had to do the test. Two students, however, clearly did not feel like writing the test. In spite of the lecturer's encouragement to make one last effort, student "M" was clearly disenchanted and did not give it her full attention. When this student handed in her test, the lecturer saw that she had not marked twenty errors as required, and so she asked her to at least continue until she had marked twenty errors. She sighed and frowned, took her paper back, hastily highlighted a few more errors, and once again handed her paper in. The lecturer was gratified to notice that this particular student's attitude did not seem to infect the others because they simply continued to take their time and produce the best possible version they were capable of.

5.2.5 Afterwards

All the students wrote an editing post-test once they had completed the intervention. They also filled out an ethical consent form and completed a questionnaire on the integrated approach.

5.3 VARIABLE-ORIENTED DEPICTION

The results from each data collection method had been portrayed separately to allow the readers to also decide for themselves whether any discrepancies or correlation of the findings did occur between the findings of the different instruments. The findings from each particular instrument had further been organised into sections according to the dependent variables that had been identified in the analysis of the findings from that particular instrument. The content under each heading (or dependent variable), explain which factors influenced that particular dependent variable. The reader may wish to revisit Table 3.1 in chapter 3 for an overview of the dependent variables, as the table presents the dependent variables in graphic form together with the corresponding data collection instruments.

5.3.1 From the Questionnaires

Enjoyment

All 16 students indicated that they had enjoyed the integrated approach and they gave various reasons for doing so. The reason that they most frequently quoted for their enjoyment was the fact that the exercises had given them an opportunity to acquire and improve their skills and knowledge (75%). Student H, for example, enthusiastically revealed that she had “learned three subjects at the same time” and that she had “improved in all three”.

The reason second most frequently quoted (30%) was the perceived relevance of the intervention to the subjects in which they were enrolled (Applied English, Editing and Computer Usage) and to the careers to which they aspired. Student A’s enjoyment was inspired by her perception that the integrated sessions were “very helpful and very relevant” to what they were doing “in class”. Student P indicated that she found that it “was fun to be

able to edit" and that she "felt like a real editor." The following quotation from one of the questionnaires further reveals that the students not only enjoyed and appreciated the whole new experience, but also understood its relevance:

> "…this system of learning appeals to me because it is easy to adapt to, you learn fast and more. You see the importance of each subject and how they connect to each other" (Student G).

Some also attributed their enjoyment to the helpful assistance and commitment of their lecturer (19%):

> "All of us were given attention by the lecturer and we ended up spending even more time than was required of us," (Student J),

Some of them enjoyed the novelty and interest aroused by the functions of the computer (13%):

> "It is much more enjoyable when doing it with the computer because there were a lot of interesting things to learn" (Student E),

Yet others derive enjoyment from the interaction among peers and the cognitive input obtained from peer assessment (13%):

> "we were able to consult fellow students therefore we all helped each other improve our knowledge" (Student N).

Dispositions

The answers to the questionnaire made it clear that the integrated approach evoked in students a more positive disposition towards their classes and the content and skills that they were learning. Students' remarks revealed a new interest in and an excitement towards their subjects and the content and skills that they were learning. Student G disclosed that she believed that the editing exercises had helped her to improve her "skills", and had made her realise "how fun editing is", whereas student C appreciated that this method of teaching

had given her an opportunity to “see” where she had “actually made mistakes”, rather than “just get[ing] a mark back”. Student B was of the opinion that her ability to use “different computer functions” was “an advantage” to her, especially with regards to her “studies”.

Particularly noteworthy were the following two remarks. The first was from student F: “Now I’m quite happy that I came to my classes”. The second was from student B:

> “What I learned is a legacy, it won’t just go away because I will keep using the things I learned to my best ability.”

it was both touching and inspiring to read student M’s remark that she would have liked the integrated sessions to have “started early” in the year. It was also heart-warming to hear from other students that they had gained a new confidence. In similar vein was F’s remark:

> “…Now I can read my work after writing and feel good about it” (Student F).

In addition to obtaining a more positive attitude towards the subjects for which they had enrolled, all the students agreed that their knowledge and skills had been enhanced through the integrated approach, and they also offered reasons as to why they believed that they had mastered the skills and knowledge contained in the intervention. These reasons implied both cognition and meta-cognition. All the students felt that the content and skills that they had learned was relevant and that both skills and content would help them improve their marks (19%), and that it would be valuable when they wrote their assignments (6%) and examinations (75%), when they embarked on their future careers (75%), as well as later in life (31%).

One student, however, did show a negative attitude towards the acquisition of the computer skills. This student (M) indicated that she already knew most of the computer functions that were being taught and that she therefore did not believe that the computer as such had much of an influence on her “editing skills”. She did, however, indicate elsewhere in the questionnaire that she did in fact learn some new computer functions and that she had learned “many other skills” as well as new content knowledge.

The researcher compiled a list of the content knowledge and skills that the students believed they had learned. She reduced this list by grouping the students' statements according to their similarity, and provides a summary of what these lists indicate in the following paragraphs.

While students were of the opinion that their language usage in general had improved, they particularly noted concord, spelling, tense, grammar, sentence structure, punctuation, vocabulary and word choice as areas of improvement. The questionnaires further revealed that students thought that their writing skills had improved. Students mentioned that they believed that they had learned how to write a proper formal letter and introduction. They also believed that they could write more clearly and to the point after the intervention, that they could use more detail in explanation, and a correct writing style to organise their message. Other points that the students highlighted were that they learned that writing can always be improved. They agreed that they had realised what mistakes they made in their writing, and they were of the opinion that their thought process had improved during the writing process.

When it came to editing, the students indicated that they had acquired the skills of both how to edit by hand and by computer, and of identifying and rectifying the mistakes in their own text and in the text of others. Students added that they had learned how to read and edit their work attentively after writing so as to ensure that it made sense. Some also asserted that they had acquired some understanding of editing rules and had realised that editing can be fun.

Computer functions that students believed they had learned included the spelling checker, the grammar checker, the thesaurus, the word count function, the dictionary, the TRK (track changes) function, the find-and-replace facility, and the ability to set a language preference for documents. A few students also indicated that they had learned how to enhance the language and appearance of a document by using the computer.

Some additional outcomes of the intervention noted by a number of the students were that they had gained sufficient confidence to practise editing as a profession. Others pointed out that they had learned how to work more quickly, type faster, keep within the specified time limit, follow instructions, think for themselves, and make final decisions about corrections. A few students added that they had learned something from their own mistakes, that they had

arrived at a new understanding of their potential as writers, and were able to “see the importance of each subject and how they connect to each other” (Student G).
The students identified a number of reasons for the fact that they had increased their knowledge and skills. The students’ answers to the questionnaire disclosed that they believed that the exercises had increased their skills and understanding of writing and editing. The students believed that the intervention had accomplished these things by enabling them to understand the relevance of authentic tasks in learning (43%), the usefulness of computers to such processes 100%), the value of the lecturer’s effort, knowledge and assistance (75%), the value of increased interaction through peer assessment (31%), and the importance of the exercises and the construction of artefacts (50%). Students further indicated that the repetition and revision of the process approach to writing had been invaluable for increasing their content knowledge and skills (63%). A few of the students added that their positive attitude and willingness to learn had exerted a positive influence on their performance (13%).

Wisdom

Answers to the questionnaire showed that some students also obtained some degree of higher-order wisdom from their experience of the integrated approach. Student G, for example, indicated that she had realised that “there is always room for improvement” because “nothing’s perfect”. Student J claimed that she had learned “to think for” herself because she had realised that the “computer’s suggestions are not always right”. Student F also understood the general principle that “everything” to do with language requires “good editing skills”. In addition to these flashes of insight, the following exert from Student G’s questionnaire not only shows a great deal of wisdom but also highlights the need for more interventions ─ not simply because of the serious language errors contained in her remark but also because such errors emphasise how urgently these students need improved reading and comprehension skills:

> “Editing is not just spelling errors, capitalization mistakes and punctuation. Learning the meaning of the words, because only when you’re understand what you’re reading, that you can start editing” (Student G).

5.3.2 From the Field Notes on the Observation

During the observation phase, the researcher focussed mainly on how the four dependent variables of engagement, cooperation, enjoyment and effort had been affected, and by which independent variables they had been influenced. Some features that related to content knowledge and skills had arisen as a by-product of the observation. In the paragraphs that follow below, the researcher shows how the variables related to one another during the various sessions of the intervention.

At each new stage of the intervention the students required an initial period of preparation (process approach to writing) before they started applying themselves to the tasks. This initial preparation phase required the lecturer to explain to the students how to carry out the task (professional development). It also required the lecturer to explain the *relevance* of the task they were about to perform (authentic learning) and to encourage the students to do their best (motivation).

In addition to the lecturer's input, the research environment and resources had to be properly organised. This required that the seating and computers be properly arranged, and the 3½ inch floppy disks, pens and instruction sheets of the students needed to be readily available. The student exercises also needed to be properly printed and ready to be handed out. The tasks themselves had to be appropriate and relevant to the needs and level of the students, and the students had to be given time to put their thoughts in order. The students had different preferences about how to prepare themselves. Some preferred to study the instructions quietly by themselves while others preferred to interact with their fellow students and the lecturer. Further encouragement and suggestions about what the students needed to be focused on (as required by a process approach to writing) became necessary at the later stages of each task. When the task in hand was especially unfamiliar to students, they seemed to need even more preparation and encouragement than usual.

A computer virus (resources and support) that caused the computers to shut down and reboot unexpectedly intermittently during the second session of the intervention, understandably caused various degrees of frustration and dismay among the students. The lecturer, however, remained calm under these aggravating circumstances. The lecturer reacted by giving the students even more encouragement and thus motivated them to

persevere even more with the exercise. Her calm encouragement in difficult circumstances fortified the students with the perseverance they needed to complete their tasks.

Engagement

It soon became clear that if the students were to become fully engaged in and committed to the task in hand, the initial preparation phase was vitally important. The researcher noticed that the helpful suggestions that were made at intervals during the performance of each task seemed to cause an observable increase in engagement and commitment. When the students became really engaged with the task, they did not seem to notice the passage of time, and some even asked for extra time so that they could turn in the best possible exercise. This total involvement of the students when they are so caught up with what they are doing that they do not notice their surroundings but rather enjoy what they are doing because they are intrinsically motivated to work hard, is described in Csikszentmihalyi's flow theory (Hoeltke, 2003). It therefore appeared that the *degree of engagement* exerted a proportionate positive influence on the amount of effort that students were prepared to put into the tasks that they performed.

Another factor that influenced engagement was the nature of the task in hand. When a task was very urgent or involved a great deal of construction and difficulty, the students seemed to be even more engaged. In addition to this, the sense of urgency that students experienced further increased the level of engagement that they displayed. The possibility of earning extra marks from turning in better quality productions must have also influenced the level of engagement shown by the students.

Although a computer virus that manifested during one of the sessions threatened to disrupt engagement and cause the level of engagement to drop, the encouragement provided by the lecturer-researcher helped the students push through and maintain their commitment to the extent that some of them even asked for extra time after the class had ended so that they could finish their exercises. On other occasions, the facilities provided by the computer seemed to inspire a higher level of engagement. The length of a particular session also seemed to have an influence on the level of engagement. The researcher noticed that engagement faltered when students became tired towards the last stages of a long session. In such circumstances, it was once again encouragement that enabled all the students to pull through and complete their exercises.

Cooperation

The researcher noticed that interaction was minimal during the time in which students were typing their own letters. Interaction was also minimal at the beginning of each new task when students were familiarising themselves with what they needed to know about the task they had been given, and also because not everyone began and ended the sequential tasks simultaneously. Encouragement and suggestions from the lecturer also helped students in this case to cross the barriers between their own worlds and those of their fellow students and the lecturer. Once they had crossed such barriers and acquired more confidence, cooperation and interaction among students increased in proportion to the passing of time. Some students, however, seemed to require time and encouragement before they realised that their computer lecturer could in fact assist them with their language-related problems. As students began to realise that they could obtain a genuine advantage from soliciting input from their peers and the lecturer and that such assistance could make their task much easier, they began to cooperate more freely and easily.

One surprising element of the intervention was that peer assessment not only encouraged interaction, but seemed rather to stimulate interaction right from the stage when it was first undertaken to the end of the peer editing session. On the other hand, when students used the computer, their interactions became more apparent and visible. Perhaps this could be attributed to the fact that some students still felt a little unsure about how to apply the functions of the word processor (and needed help to do so), or because they enjoyed making use of these functions and helping others to do so.

In addition to the factors mentioned above, the number of students present in the class proved to be a significant factor. Because fewer students attended the third intervention session, those students who did attend had more opportunities to interact with the lecturer and did so with more enthusiasm because they were not required to wait their turn before the lecturer could pay attention to their queries.

Enjoyment

The enjoyment that the students experienced increased after each initial preparation phase because they became more confident about how to approach each task. The encouragement and suggestions that the lecturer offered during the course of each session

seemed also to help the students to enjoy the intervention, and their enjoyment seemed to increase in proportion to the degree of engagement and cooperation that was taking place at the time. Moreover, the fact that their lecturer could assist them, not only with computer-related matters, but also with those matters relating to language, added to the level of enjoyment that the students experienced.

During the period when students were typing their writing exercises, they displayed neither enjoyment nor displeasure (because of the inherent nature of the task). But when the students began to correct their own writing exercises, they manifested a great deal of enjoyment, even more so in fact than when they were peer editing their fellow students' texts. It was evident, however, that the students clearly enjoyed *both* tasks. This can be deduced from the fact that they did not want to stop working when the class was supposed to end. It was also evident that the students made a connection between the intervention tasks and those that they would encounter as language practitioners in the "real" world, and this added to their enjoyment.

Students seemed especially to enjoy using the coloured highlighters and the functions of the word processor. Some actually expressed their pleasure in using functions such as the TRK (track changes) function, the word count, and what they called the "electronic dictionary". The laptop (installed with a dictionary) was also a novelty to nearly all the students and they enjoyed using it. Levels of enjoyment were increased because those who had used a laptop before experienced pleasure at being able to "show off" their skills.

The computer problems occasioned by the virus that manifested in the second session unfortunately diminished the enjoyment of the students to a considerable extent, especially because they became tired when the session dragged on past its scheduled time. Although the encouragement that the lecturer offered in these difficult circumstances did not seem noticeably to increase their enjoyment, the students reacted positively to such encouragement and managed on the whole to let go of their negative feelings of frustration and discouragement. In contrast to this, the enjoyment of the students was far more noticeable in the third session after the computer laboratory tecnicians had managed to remove the computer virus and restore the computers to their normal functioning.

Effort

Preparation, peer interaction, professional development, motivation and cooperation all unquestionably exerted an influence on the degree of effort that the students manifested at any particular time. Once students had understood what each task demanded of them, and once they realised that they could communicate freely with their lecturer and with their fellow students and that such communication could only be to their own advantage, they tended to put greater effort into the accomplishment of their tasks.

The computer functions certainly created a great surge of effort on the part of the students because they obviously enjoyed applying the functions to their own work and to the work of others. On such occasions, the degree of effort that students put into improving their own writing exercises because of the advantage that they would gain from doing so, was quite more than the effort they put into other tasks.

The students nevertheless understandably became tired and apathetic when sessions began to draw out beyond their scheduled times and when the computers that they were trying to use became unusable because of the virus. During such times students needed an additional input of encouragement from the lecturer to exert the same degree of effort. It should be noted that some students exerted an enormous amount of effort in every session. Such effort might have been motivated by the opportunity that they were given to improve their marks or because they anyway possessed the required internal motivation to improve their knowledge and skills by making diligent use of the opportunities that the intervention offered.

The students who attended the third session realised that that session offered them a last opportunity to complete their exercises. Because of this, a sense of urgency pervaded the room and it was evident that students were definitely exerting themselves and making a great effort. But these students who completed the intervention exercises during the third session still had to write the editing post-test which was handed out to them at the end of the session. During this phase of the activity, two of the students sat back and looked tired and uninterested. Even though the lecturer made a considerable effort to encourage them, one of the two students (M) still did not cooperate, and she handed in her test without even having highlighted twenty errors as she was required to do. And so the lecturer handed the test back to her and asked her to complete it. She sighed and frowned and then hastily

drew a few lines with the highlighter and handed back the test. One possible reason for this negative reaction might be that this student already had obtained a very high mark for Computer Usage and so probably felt that she did not need to put any additional effort into such a small task when she was already feeling so tired. This particular student had completed a course in computer skills before she embarked on the Language Practice course. She had also applied for an exemption from first year Computer Usage which had not been granted. After this refusal of an exemption, her attitude to the Computer Usage class had become somewhat negative. Perhaps she felt that she was wasting her time.

5.3.3 From the Pre- and Post-tests

Editing pre- and post-tests

While most students showed some improvement between taking the pre- and post-tests, some improved substantially. Improvements ranged from as little as 2% to an astounding 25%. Four of the 16 students who had failed the pre-test passed the post-test, and four students whose pre-test marks would disqualify them from gaining admittance to the examination, obtained marks in the post-test which would have qualified them for writing an examination.

Three out of the total of 16 students, however, fared worse in their post-test. These students had all started out with a failing mark, and the percentage by which their marks deteriorated ranged from as little as 3% to 10,5% (Student M). The student who fared worst in her post-test was predictably student M, the very student who had had been unresponsive to the encouragement of the lecturer to put in just a little more effort and who had handed in her test without having highlighted the required number of errors. There may be a number of possible reasons why the other two students did not show any improvement. They might have been tired because some students get out of bed very early in the morning to travel long distances to get to class (this particular session had started at 08:00 in the morning). These students might further have been dispirited by the fact that it was the end of the week (a Friday). The intervention sessions were also undeniably lengthy. In addition to being tired, the students might also have been hungry because some come from very poor families with very few resources, and it is quite possible that some of them might simply not have had any opportunity to eat anything. They might also have been ill for one or another reason. There are also various other reasons that might be considered. One such reason

could be that these students did not comprehend as clearly as expected what they were required to do during the computer-editing session of the intervention.

While the average improvement rate of those who fared better in the post-test was 13%, the overall rate of improvement shown by the students was 7%. If one dropped the mark obtained by student M from the calculation, the overall rate of improvement for all the students would rise to 8%.

The paired samples t-test, in which two conditions (i.e. each student's pre- and post-test mark) were paired and the difference calculated, resulted in a t-value of -2.90 and a P-value (level of significance) of 0.0117. This indicated a significant difference between the paired scores. The average distance of the scores from 0 was therefore significant. This difference was also positive because the post-test scores were higher than the pre-test scores. This means that the students did in fact improve significantly between the pre-test and the post-test, and that there would be a 95% chance that any researcher who conducted a similar experiment under comparable circumstances would in fact obtain the same results that the present research obtained in this investigation. While the mean for the pre-test was 38%, that of the post-test was 47%. The comparison between the means for the editing pre-test and post-test is depicted visually in a bar-graph below (figure 5.1 on page 108).

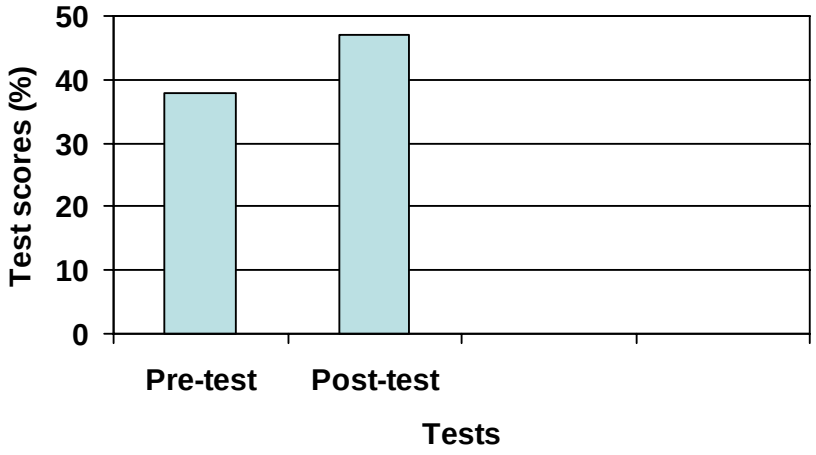

FIGURE 5.1: Bar Graph to Show the Difference in Means between Editing Pre- and Post-tests

The results obtained from the different categories that were tested evoked even more surprise. The students showed an average decrease of 3% in their marks for punctuation

and capitalisation, but a 3% increase for their marks for tense. In spelling and concord, however, they showed a significant overall improvement of 12% and 24% respectively. The mean scores for the editing results *according to category* are depicted by a bar graph in figure 5.2 on page 109.

The paired samples t-test according to category resulted in a t-value of 0.62 and a P-value of 0.5470 for punctuation and capitalisation. This indicates that there was no significant difference between the paired scores because of the difference being negative. The students therefore performed worse in the post-test than the pre-test in punctuation and capitalisation. The mean for the pre-test marks for punctuation and capitalization was 39%, while that for the post-test was 36%.

The t-value for the category tense was -0.50 and the P-value was 0.6238. This once again reveals no significant difference between the paired scores because the difference is positive. The students therefore did not improve significantly in the ability to handle tense even though the post-test scores were slightly higher than the pre-test scores. The mean for the pre-test for the category tense was 41%, and that for the post-test 44%.

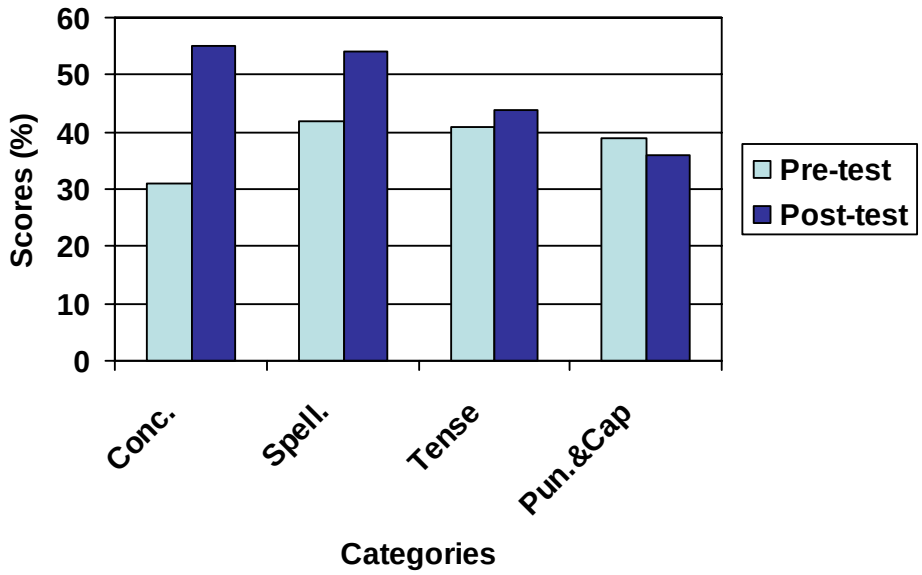

FIGURE 5.2: Bar Graph to Show the Difference in Means between the Editing Pre- and Post-tests according to Category

The t-value for the category spelling was -3.04 and the P-value 0.0095. This indication of a significant positive difference between the paired scores meant that the students had improved significantly with regard to spelling. The mean for the pre-test for spelling was 42%, and that of the post-test 54%.

But the greatest difference was evident for the category concord. The t-value with regard to concord was -4.32, and the P-value was 0.0008. This indication of a positive significant difference between pre- and post-test scores meant that the students improved significantly in the category concord. The mean for the pre-test was 31% and that of the post-test 55%!

Writing pre-test

An inspection of the letters that were written for the pre-test show that the students had not realised the importance of revising and editing their own work and that they did not follow the instructions. Many, for example, had omitted important details such as the loan amount while others simply reproduced in a mindless way the examples in the instructions and rubric. Their sentence structure and paragraph sequences had not, on the whole, been properly thought through and the message in most cases was illogical and confused. The register of the writing and the words chosen were at times quite inappropriate. Some students merely boasted instead of stating their accomplishments in a reasoned way while others either did not understand or forgot that they had been asked to couch their requests in polite language. The areas in which the students most frequently encountered problems involved language, structure, style and detail. While most of the students demonstrated difficulties in these areas, some also showed a weak grasp of vocabulary.

Writing post-test (end-product)

Although the intervention was too limited in scope to provide a full systematic alleviation in these problem areas, and even though the letters still required a great deal of attention, each letter nevertheless showed at least some degree of improvement ─ even if such improvements amounted only to the correction of a few language and spelling errors. In contrast to this, the letters of some of the students showed considerable improvements in structure, style, language and content. Specific improvements and corrections were implemented in the areas of format, capitalisation, style, spelling, sentence structure, detail,

word choice, language usage, tense, verbosity, spelling, (making) sense, message structure, punctuation and concord.

All 16 students showed an improvement in marks between the pre- to the post-test that ranged from 4% to 24%. Nine students who had failed on their pre-intervention marks managed to achieve a pass mark because of the intervention, and three students were reclassified from *non-examination admittance* to *full examination admittance*. The average improvement in the whole group was 11%.

The paired samples t-test for the writing pre-tests and post-tests resulted in a t-value of -25 and a P value of less than 0.0001. This indicated a highly significant difference between the paired scores with a positive difference (the post-test scores were higher than pre-test scores). The improvement in the students' marks was therefore highly significant and suggested a 95% chance that other researchers would obtain similar results in a similar experiment. While the mean for the pre-test was 45%, the mean for the post-test amounted to 55%. Figure 5.3 (on page 111) provides a graphic representation of the comparison between the means for the editing pre- and post-tests.

FIGURE 5.3: Bar Graph to Show the Difference in Means between the Writing Pre- and Post-tests

5.3.4 From the Transcriptions of the Interviews

From the interviews it had been apparent that both the lecturers and the head of department (HOD) understood the concept integration as used in this study. Phrases such as "integration of skills, classes and groups" (HOD), "good for constructivism" (Editing lecturer), "enhance their language skills throughout the different subjects" (Editing lecturer), "integrated subjects" (English lecturer) and "draw from all the experiences that are available, including methodologies, various ways of teaching…" (English lecturer) indicated their comprehension.

Although the Applied English lecturer (AEL) expressed some degree of enthusiasm about the intervention in the words, "It is a good way of approaching and teaching a subject", the enthusiasm that emanated from both the responses and body language of the HOD and Editing lecturer (EL) were overwhelming. The HOD believes the integrated approach is the "ultimate way of learning". While the Editing lecturer (EL) expressed her complete approval in the words "[This is the] only way to go", she added, "It is extremely important for integration to be utilized as soon as possible and in the long term".

Sustainability

While the HOD revealed that he believed the integrated approach was sustainable and that he "definitely…prefer[ed] it to be sustainable", the EL was of the opinion that there is no other way than the integrated way and that the time for separating subjects into "different compartments" had long since passed. The AEL added that he hoped that the department would "be able to sustain it" because it "shows a link" to what is being done in schools and is part of the "new innovative method" of education prescribed by the South African government.

This unambiguous enthusiasm on the part of the lecturers who took part and the HOD unquestionably promotes sustainability because the method based on the intervention cannot be sustained without their unequivocal support. Apart from the enthusiasm that the EL had already expressed, she affirmed her eagerness to take part in any future iterations of this study. The AEL also affirmed that he would be willing to support such an initiative if he were still employed by the institution at such a time.

Ease of adoption

Because the attitude of the lecturers would have a fundamental effect on the ease of adoption of the integrated approach, they were asked to give their opinions about this matter. The EL declared that the intervention had been “not at all” disruptive to her classes. The AEL, by contrast, indicated that the intervention had only been disruptive in the sense that some of his class time had been taken up by the writing of the pre-test. But he added that that had not been a great problem because he could always “make up for it”. His slightly less than enthusiastic attitude might have been influenced by the fact that he had not been asked to contribute very much to the setting of the test (a matter that will definitely be rectified in future iterations of the intervention). It is important for the test to contain this lecturer’s input and in future whatever items and constructions he wishes to be tested at the time when an iteration is being compiled, will be included in the tests.

Cost-effectiveness

When he was asked whether he believed the integrated approach to be cost-effective, the HOD said that he believed it was because the intervention had not required “extra resources” and had instead skilfully utilised a combination of resources “to deal with more than one group”. The EL was of the opinion that if the intervention had in fact made a “difference”, it would “indeed prove very cost-effective” because “students’ skills will be honed” and “the pass rate” would improve. The AEL felt that the cost effectiveness of the intervention would depend “on the material that one has” (referring presumably to available resources). Since the intervention did indeed utilise and combine existing resources and since it did prove successful, it could be described as cost-effective.

Suggestions

The researcher felt that it was important to ask the interviewees for suggestions on how they thought the integrated approach might be made more effective in future. Although the HOD offered no specific suggestions, the two lecturers made some valuable suggestions. The EL recommended that “all the interested parties” be gathered together so that planning could be carried out one academic year before the time of the intervention. In this way, she suggested, the lecturers could be made “aware of contributions” they could make to such an initiative. She further added that it would be necessary for all lecturers to “understand the

concept" of integration as it was applied in the intervention. The AEL touched on this same point. He agreed that all lecturers would not only have to understand clearly what integration involved, but would also have to be trained to apply integration in their teaching. He also made the valuable point that lecturers would find the integrated approach much easier to implement "if the approach [were] also used in schools and taught in [teacher] training colleges". It is the lecturer's belief that these valuable suggestions will prove indispensable to future iterations of the intervention.

Benefits for the department

Possible benefits to the department concerned may be extrapolated from the answers of both the HOD and EL. The HOD believed that benefits to the department were discernible in improved student language skills and understanding and the low costs of the intervention. The EL concurred with this, and added that the integrated approach helps students to become "aware of how they learn". She also added that "the more integrated students can work, the more they will enhance all the skills they need".

These statements taken together suggest that the department would benefit from improved student knowledge, skills and meta-cognition at little or no extra cost than those already being incurred. Other envisaged benefits are that students would be better prepared by the intervention to perform those tasks for which they were being trained, and that those who employ such students would approve of the standard of the skills that graduates display. A noticeable superiority in the performance of graduates of the university might serve to attract a better quality of student to enrol at TUT, and increased enrolment figures would ultimately result in increased funding and subsidisation of the university by the government.

5.3.5 From the Research Diary

In the research diary, the researcher recorded various issues that surfaced during the course of the intervention. These issues concerned both the problems that were encountered as well as thoughts on how the intervention might be improved for future iterations.

Ease of adoption and sustainability

The reality of the classroom situation exerted an undeniable strain on both the lecturer-researcher and her assistant and these factors induced both stress and exhaustion. The unpleasant reality with which the lecturer had to contend included apathy and lack of commitment on the part of many learners who either arrived late or did not arrive at all. These fundamental difficulties were aggravated by the fact that the lecturer and her assistant had to manage and control two or three groups performing different activities simultaneously at various times. During such sessions the lecturer had to regulate the flow of activity, provide assistance to learners who requested it, and make field notes, all of which together proved challenging and stressful. The long duration of the sessions further added to the strain. Both the facilitators and the learners felt fatigued and overextended before the end of each session.

Problems with regard to resources and support further added to the strain. The computer virus temporarily crippled one session when stability was most needed, and the situation was aggravated when the computer laboratory technicians sent word that they would not be able to provide immediate assistance. Another problem was that the dictionary function did not form part of the version of MS Word that had been loaded onto the laboratory computers. An computer laboratory technicians was able, however, to solve the problem very quickly by connecting a laptop (which had an appropriate version of MS Word including the dictionary facility already installed on it) to the network.

Although these problems were stressful and a source of concern at the time, they were the kind of problems that might be expected under the circumstances, and they did not prevent the intervention from being a success. But because such problems and obstacles might negatively affect the ease of adoption and sustainability of the integrated approach, it is necessary for such problems to be anticipated and addressed. The researcher therefore recorded various thoughts on how such difficulties might be resolved in her research diary while or soon after they happened.

In the first place, the researcher felt that other lecturers from the department might have been more closely involved in the setting up and execution of the intervention and that they might also have provided additional insight, support and assistance. In the second place, the researcher felt that it would have been a good idea to book the computer laboratory

technicians in advance so that they would have been available to sort out any computer or network problems that arose. It would have been a good idea if the computer laboratory technicians had thoroughly checked the system before each session of the intervention. In the third place, the researcher thought that the sequence of events might be improved. She felt that it would have been a good idea to stretch the intervention out over a longer period of time and that it would have been better to “chunk” the activities into smaller units. This chunking would have ensured that both the cognitive burden placed on the learners and the strain endured by the lecturers would have been significantly reduced. In addition to this, the efforts to motivate students may be increased to ensure that learners show up for classes. The researcher believed that such changes would positively affect the ease of adoption and sustainability of the integrated approach.

Cost

Apart from the cost of a few extra photocopies, the intervention did not add to the regular running costs of the department. Because existing resources, class time and lecturers were effectively incorporated in an integrated manner, no additional financial outlay was necessary.

5.4 CORRELATION OF FINDINGS

Since this investigation utilised both a mixed-mode approach (quantitative and qualitative) and a variety of measuring instruments, it is possible to compare the findings between instruments or approaches. The results of such a comparison might either indicate discrepancies or provide corroborating evidence of a correlation between the findings. Because correlation adds to the reliability of the results, it increases the value of the research.

Both the questionnaire and the field notes from the observation provided data about the enjoyment experienced by the students at various points. Both quantitative and qualitative data was collected on the dependent variable *enjoyment*. The quantitative and qualitative data both indicated that students had in fact enjoyed the integrated approach to teaching in spite of various and avoidable difficulties and problems. The correlation between the data from the questionnaires and the field notes also demonstrated that students had enjoyed the integrated approach. Other correlations between data obtained from the questionnaires

and data obtained from observations in field notes confirmed that *enjoyment* was promoted by the encouragement and assistance of the lecturer, the novelty of the computer functions and the interest that students showed in these functions, the relevance of the content of the intervention to regular subject content and to the future careers to which the students aspired, the level of engagement and cooperation demonstrated by the students, and the nature of the tasks that the students had been required to perform.

The quality of the final writing product and the editing post-test, together with the field notes from the observation, provided information about the amount of effort that the students had put into their work. The data from all three of these sources confirmed that the students had in fact put a considerable amount of effort into their contribution to the intervention. The results from both the post-tests confirm that they did indeed work hard at what they were required to do. The data from the observations and the editing post-test also revealed that when a student was tired, frustrated and felt no sense of urgency about the task in hand, his or her effort decreased noticeably. The low editing post-test marks of student M, for example, confirmed that these factors exerted an appreciable influence on the amount of effort that she was prepared to put into her work.

The variables *content knowledge* and *skills* were measured both quantitatively and qualitatively by means of an analysis of the pre- and post-tests. The data from the quantitative analysis confirmed that of the qualitative analysis. Both sets of data showed that students significantly improved their content knowledge and skills.

The researcher's research diary as well as the semi-structured interviews recorded information about systemic issues. Although the lecturers and HOD were enthusiastic about the approach and believed that it was sustainable (and had a definite wish that it should be sustainable), the research diary entries describe various improvements that would be necessary in any future iteration. The suggestions made by the lecturers did in fact show that they were aware that it was necessary for all the lecturers to be informed about the approach and for them to be more closely involved in future.

The research diary shows that the intervention had placed a considerable strain upon both the researcher-lecturer and to a lesser extent on the learners, and the Applied English lecturer had noted that the intervention had been slightly disruptive. Both these observations implied that various improvements needed to augment ease of adoption in the

future. While the research diary entries had revealed that managing the intervention had been stressful, the approach might still plausibly be regarded as a success ─ and that problems of the kind experienced during the intervention are problems that are bound to arise in similar circumstances. The correlations of the data on cost-effectiveness all revealed that because it (the intervention) had required no additional resources or outlay, the intervention had been very cost-effective indeed.

5.5 RELATION TO RESEARCH QUESTIONS

These results may further be depicted in terms of the cognitive, affective and systemic elements of the intervention. While the influence of the integrated approach on the **cognitive aspects** at work in the classroom was obtained from an evaluation of the data on the dependent variables *content knowledge* and *skills*, the influence of the integrated approach on the **affective aspects** of the learners was obtained from data on the climate variables *engagement*, *cooperation*, *enjoyment*, *effort*, and the learning variable *dispositions* of the learners. In addition to this information, the data on the *ease of adoption*, *sustainability* and *cost of the intervention* provided information about the **systemic aspects** of the integrated approach. One may therefore say that the research questions posed by the researcher in chapter 1 were cogently answered by the study.

In this chapter, the researcher presented the results of the intervention, beginning with a processual exposition and progressing towards a variable-oriented characterisation. In addition to this exposition of the results, the researcher pointed out various areas of correlation between findings obtained from the different approaches and instruments. Lastly the researcher had pointed out how the results of the research related to the research question that was initially posed in chapter 1 of this report. In the final chapter (chapter 6) of the report, the researcher offers the conclusions drawn from the findings and makes recommendations for possible future research.

6.1 INTRODUCTION

What follows in this chapter is a summary of the main ideas of the research in the form of an overview of each chapter. In addition to this, the researcher reviews these ideas and offers various insights into what may be gained from this study. The chapter concludes with recommendations about present practice and future research. Because this chapter distils the essence of the research, it provides an overview of the main phases of the investigation and its results.

6.2 SUMMARY

The initial inspiration for this research came from a contemplation of the extremely poor written language skills displayed by students at the Tshwane University of Technology (TUT) in South Africa, and more especially by first-year students enrolled for courses in languages at the Department of Applied Languages. Chapter 1 outlined how these students were actually failing language-related subjects in great numbers. Of those who had enrolled for the subject Applied English, 43% failed in 2005 (MIS, 2006a) while 80% of those who had enrolled for the subject Editing in the same year had failed (Howse, 2006). The possibility that students might somehow reach the required standard to pass because of remedial teaching applied towards the end of the year was a vain hope because their lecturers, themselves overwhelmed by the demands of the syllabuses, simply did not have the time during regular scheduled lecturers or after hours to teach the necessary basic skills. While supplementary language courses were also not, for various reasons, a viable proposition, the academic support programmes themselves were unable to accommodate all the students who wanted to enrol for such courses.

Once the researcher had realised the extent of the need of the students to improve their written language skills, the researcher decided to investigate the kind of innovative integrated system that might deliver the teaching that these students needed with the university's available resources in funding and personnel. After further reading and investigation, the researcher decided that the main question that would be addressed by means of the research would be one that focused on the cognitive and affective effects that the application of an integrated approach might have on a representative sample of the students under classroom conditions. The researcher further envisioned that the results of this investigation could offer the university a cost-effective solution for improving students'

written language skills and thus delivering a higher pass rate. The researcher also envisaged that students who were able to operate in an integrated manner might make more desirable post-tertiary employees, and that the South African government's strategy of integrating learning might, at least, in part, be realised by technique that had been researched in both theory and practice at the Tshwane University of Technology's Department of Applied Languages.

In chapter 2 the researcher reported on her review of all the literature relevant to the research problem. The researcher also extracted guidelines from the literature for use in framing and structuring the research project. The literature indicated that an integration of subjects, approaches and elements was found to be valuable for improving the language skills of students with similar backgrounds as those at TUT. The literature further indicated that:

- content and language development should happen simultaneously
- teaching materials and learning tasks should be authentic and relevant
- students might learn best if the process approach to writing were adopted as the pedagogical method
- students should interact with peers and be involved in peer assessment and computer-assisted language learning (CALL)
- word processors should be used to enhance the written language skills of students.

These recommendations and the indications that the researcher derived from the literature directly influenced the development of the kind of integrated approach that the researcher later applied in the intervention. The strategy that the researcher devised on the basis of these indicators consisted of interdisciplinary teaching together with a combination of various methods to enhance the knowledge and skills of students related to the written English language.

Because the researcher-lecturer believed that the approach needed to be tested within the regular classroom environment at the university with a view to making improvements with each successive implementation year, the researcher adopted an iterative design-based research approach that was appropriate for "messy classroom situations" (Brown, 1992) as the platform for her investigation (chapter 3). This relatively new approach was of special interest to the researcher because the design allows linkages to be made between theory

and practice and also because it allows the researcher to study both the utility of the design and the ecology of the learning that takes place (Brown, 1992; Cobb et al., 2003; Collins, 1999:15). The design-based approach further allows for a combination of both quantitative and qualitative modes (Bielaczyc, Collins & Joseph, 2004; Brown, 1992; Squire, 2004) as well as the incorporation of various data collection instruments. This combination of method and instrument would allow for a strengthened triangulated collection of results. The researcher's methodology also took cognisance of other related factors such as credibility, dependability, confirmability and transferability so as to ensure the trustworthiness of the findings.

Because the creators of the design-based approach placed a great deal of emphasis on a thorough description of the intervention and the setting in which it is implemented, the researcher included a fourth chapter that she devoted solely to the description of broad structure as well as the details of the intervention. This chapter included specific details about the preparation, documentation, intervention sessions, the pre- and post-tests, and the assessment practices applied during the intervention. In order to prepare for the intervention, the researcher compiled various writing and editing exercises (with rubrics to assess the exercises) in consultation with the subject lecturers. The lecturer also taught the students how to use those functions of the word processor that language practitioners find useful beforehand so that they would be familiar with those functions when asked to apply them during the intervention. The students were then given some of these exercises as editing and writing pre-tests in their respective subject classes.

In the first session in the computer classroom students peer assessed each others' writing exercises and applied the applicable functions of the word processor to an electronic copy of the editing pre-test. After this session had been completed, the students were asked to type their own letters (from the writing exercise mentioned in the previous sentence) onto the word processor and to apply the functions of the word processor to these exercises. While these improved letters served as the writing post-test, the students completed a second editing exercise for the editing post-test. These exercises were then marked according to the rubrics that the researcher had previously devised.

The *independent* variables that influenced the outcome of the intervention consisted of the combination of methods that were applied (namely, peer assessment, authentic learning, a process approach to writing, constructionism, CALL and motivational strategies), as well as the setting, the learners, the facilitators and researchers who took part, the resources, the

support, and the sequence of the implementation activities. The *dependent* variables described were the *climate* variables (effort, engagement, cooperation and enjoyment), the *learning* variables (content knowledge, and the skills and dispositions of learners), and the *systemic* variables (ease of adoption, sustainability and cost of the approach).

Chapter 5 began with a process-oriented exposition of the research findings, which was followed by a variable-oriented exposition of the results. In the process-orientated exposition, the researcher included a sequential description of what had actually taken place during each session of the intervention, whereas in the variable-oriented exposition, the researcher offered deductions about the relationships between the variables and explanations of how they worked. The researcher organised the variable-oriented exposition in terms of each of the data collection instruments as well as in terms of the dependent variables that were influenced. The researcher further pointed out the correlations between the findings from the different measuring instruments and approaches. The researcher concluded the chapter with an explanation of how the findings provided specific answers to the research questions.

The researcher in this chapter discusses the lessons that could be learned from this research. Apart from a methodological reflection, this section includes a substantive reflection and a scientific reflection on the results that had been obtained.

6.3 DISCUSSION

6.3.1 Methodological Reflection

As was noted above, the design-based approach involves conducting research in the “messy classroom environment” (Brown, 1992). During the course of this investigation, the researcher obtained first-hand experience of what this “messiness” involves. To begin with, some of the students arrived late for sessions while others did not arrive at all. This meant that the researcher-lecturer had to repeat the introduction to the sessions a number of times for the benefit of latecomers before hastily handing out the resources that the students required – while not neglecting those students who had arrived in time and were already involved in the tasks at hand. Because of the non-attendance of some of the students at the two earlier sessions, the researcher arranged a third session so that she would be able to provide these students with a last opportunity to complete the intervention. In the second

session the computers began to malfunction because of a virus and the computer laboratory technicians were unavailable to rectify the problem. This caused a great deal of additional stress. Apart from such challenges, the researcher-lecturer had to balance her own provision of assistance to students with the need to take detailed field notes during each session. The literature on design experiments (Bielaczyc, Collins & Joseph, 2004) does in fact suggest that an experiment of this kind should be undertaken by a large team. Because this was only a pilot study, the researcher persevered with the intervention even though her team was very small. In the end, the problems and challenges that had arisen did not prevent the intervention from being a success. The researcher drew the conclusion that a design-research methodology was suitable for future iterations of this project.

The design-based approach, in which both quantitative and qualitative data may be collected (Squire, 2004), allowed for both an objective view as well as a more subjective view of the findings. The quantitative data could therefore provide confirmation of those findings from the qualitative data and vice versa. Correlating data in this way adds to the reliability of the findings. The sets of data from this research project did in fact correlate with one another to a significant extent.

Design research requires a focus on multiple variables. The researcher addressed three different groups of dependent variables by means of this study. This provided an almost complete picture of the research, and gave the researcher deeper insight into the factors that had played a role – not only in the intervention itself but also with the view on possible future iterations that might be undertaken.

It is the firm belief of the researcher that design research should provide the methodological underpinning of any future iterations of this project. The advantages of design research are that it gives the researcher an extraordinary ability to study a problem from multiple perspectives, to construct a suitable design and then study its implementation, and to collect data from multiple sources and approaches and study the implementation of the design in a natural classroom setting. Design research also delivers thick, layered and rich data of the kind that is useful for analysis and interpretation.

6.3.2 Substantive Reflection

The results of this investigation confirmed various findings from previous research. It should be noted, however, that although they are dealt with separately below, each of the elements mentioned here was incorporated as part of an integrated approach. It is important to keep this fact in mind when interpreting these results or when incorporating such elements into future research.

This study confirmed a number of the points made in the literature cited in chapter 2. One such point was that knowledge and skills are fashioned through the process of constructing an artefact that is relevant to the learner (Rüschoff & Ritter (2001). During the course of this intervention, the students produced a polished letter as an artefact.

The results of the investigation also substantiated an earlier research finding that the process approach to writing offers ample opportunities for intervening in the students' writing. This approach also provided the practice that students needed to augment their skills and increase their understanding and therefore produce work of a superior quality (Trupe, 2001). The intervention was able to prove that the improvement in students' skills was the result of, firstly, the contextualised way in which the learning took place and, secondly, the assistance that the lecturer offered the students as well as the way in which they had been motivated to work on their skills (Dison, 1989:114).

The effective incorporation of the word-processor in the implementation of the integrated approach attested to the fact that students can improve their written language skills while learning computer skills (Cook, Goldberg & Russell, 2003; Collett, 1994:77; Jeffery, 2001:129 & 142). The questionnaires provided further evidence that students enjoyed using the computer and understood the relevance of using the computer in this manner (Ayres, 2002).

The results of this research further verified that authentic tasks that are combined with "low-key experiences" (in this case, the use of the word-processor and paper-based materials only) and which students find relevant, when implemented in the classroom, exert a positive influence on the learning process (Bastiaens, Gulikers & Martens, 2005). It was also noted that when the students were given to understand that the writing and editing tasks in which they were engaged were very similar to those tasks performed by a language practitioner,

they began to work even more intensively and apply even greater efforts to their writing tasks (Bremer & McGeehan, 2006; Mims, 2003; Moore and Tweddle, 1992:12).

The results obtained from the intervention confirmed evidence that students do regard peer assessment as relevant and important (Admiraal, Pilot & Van den Berg, 2003). The investigation also confirmed that merely providing students with tasks that require interaction does not mean that they will automatically interact with one another. A teacher is still required to encourage the students and facilitate interaction (Egbert, 1999:27).

The research also suggested that student motivation is increased by active and collaborative learning, interaction with lecturers (Hawkins & Oblinger, 2005) and interdisciplinary teaching (Bremer & McGeehan, 2006). The study revealed that most students regard the classroom environment and support as more powerful motivating factors than learning with computers (Ayres, 2002).

6.3.3 Scientific Reflection

Apart from confirming the findings of previous research in this area, the research project delivered some interesting findings of its own. Not only did the integrated approach have an effect on the cognitive aspects of learning operating in the classroom; it also had an effect on the affective aspects of learning, as may be seen from the following paragraphs.

The integrated approach as a whole proved to be effective for enhancing students' written language skills and knowledge and all the students demonstrated a highly significant overall improvement in their writing. The qualitative analysis confirmed this overall improvement and revealed the following specific areas of improvement: format, capitalisation, style, spelling, sentence structure, detail, word choice, language usage, tense, verbosity, spelling, (making) sense, message structure, punctuation, concord and additional language-related errors. Although three students showed no improvement between the editing pre- and post-tests, their average improvement was nevertheless noteworthy and demonstrated a significant overall improvement in spelling and concord.

Apart from knowledge and skills gained, the students in the sample seemed also to have gained in understanding of writing as a skill. Some students, for example, indicated that they had realised that one can always improve on a previous effort, that one requires good

editing skills for all language related tasks, and that it is not possible to edit properly without a thorough understanding of the text.

All the students indicated in the questionnaires that they believed that they had learned a great deal from the intervention. While the students believed that they had improved their language-related knowledge and skills, the students were also of the opinion that they had improved their computer skills, their editing skills and their writing skills. Some of the interesting points raised by students were that they felt that they had gained confidence, and that they had also learned to work within the time constraints, follow instructions and think for themselves. The students believed that the reasons for this improvement had been (in order of frequency) the incorporation of the computer in the process, the availability of the lecturers' knowledge and assistance, the repetition and revision, the exercises that resulted in the creation of artefacts, the relevance and authenticity of the tasks, their interactions with fellow students and the lecturer, and their own willingness to learn. Together all these factors constitute the integrated approach.

Other important changes effected by the study were that the disposition or attitude of students towards their subjects changed for the better and that students understood for the first time the interrelatedness of the subjects for which they were enrolled. Student B, for example, wrote that she believed that what she had learned during the intervention was a "legacy" and that it would stay in her mind as she had been inspired through this approach to "keep using" that which she had learned to the best of her ability.

The students further indicated that they had enjoyed the integrated approach for the following reasons (listed in descending order of frequency): improved knowledge and skills, relevance to their studies and future careers, the assistance and commitment of the lecturer, the novelty of the computer functions and their interest in them, and the interaction and cognitive influence generated by peer assessment. The researcher was able to make observations that confirmed the fact that the enjoyment of the students increased once they had comprehended the relevance of a task, understood what it was that they were expected to do, felt a sense of ownership about the task in hand, and were making intelligent use of novel and interesting resources (such as the computer and highlighters). The researcher also observed that the enjoyment of the students diminished considerably when the computers became infected with a virus and when the students themselves were very tired.

The researcher's observational field notes show that students needed first to undergo an initial preparation phase before they could become truly engaged and put in more effort. This preparation phase required an explanation of the task and its relevance, suggestions about how they should proceed, interaction between peers and the lecturer, time to study the instructions and try them out, and explicit encouragement from the lecturer. The researcher also noted that when a task was particularly unfamiliar to students or when they encountered resource problems, they required even more encouragement than usual.

The authenticity of the task and the level of ownership experienced by students both had a significant influence on the level of engagement and degree of effort that the students demonstrated. Other influential factors that created a fluctuation in effort and engagement was the difficulty or urgency of a task. Further significant factors that exerted an indisputable influence on the amount of effort that students were prepared to put into their work were preparation, peer interaction, the professional development of the lecturer, internal and external motivation, a sense of urgency and level of cooperation among students and between students and the lecturer.

Although the nature of the task itself was found to have some influence on the level of cooperation, encouragement and suggestions offered by the lecturer were found to have a much greater influence. It was further apparent that once students had experienced the positive effects of interaction with the researcher-lecturer and had realised how helpful her input could be, they sought this interaction much more often. The incorporation of the computer also exerted a very positive influence on the interaction, and it was noted that when fewer students were present, the levels of interaction with the lecturer greatly increased.

This brief summary of the results clearly shows that an integrated approach such as was implemented in this research, has the potential significantly to improve the written language skills of students, and that it also exerts a noticeably positive effect on the cognitive and affective experience of students in such situations. In the following paragraphs, the researcher summarises the findings with regards to the systemic factors of the intervention.

If a project is to be sustainable, it is imperative for the key role-players in the project to have a positive attitude towards the project itself and to participation in it. In addition to this, the project should be cost-effective and relatively easy to implement in practice. It was with

these factors in mind that the researcher collected data about the ease of adoption, sustainability and the cost of the intervention in the pilot study.

The lecturers and Head of Department, when interviewed, all expressed their enthusiasm for the integrated approach and expressed that they would prefer the approach to be sustainable, because they believed that integration of learning is the only way forward and that this integration is in the best interest of the students. Another reason provided in this regard, was that integration of learning had been prescribed by the South African government for all educational institutions. The two lecturers concerned also confirmed that they would be willing to take part in any future iterations of this study.

Although the lecturer in Editing declared that the integrated approach had not in any way disturbed her or disrupted her classes, the lecturer in Applied English did hint that his regular class time had been taken up with the intervention. He did, however, add that it had not been a big problem and that he could always make up for such disruptions.

Entries from the researcher's research diary indicate that the intervention had proved exhausting and that it was a source of stress because the research team who had to managed the intervention had been very small. In addition to this, many learners had not shown an adequate degree of commitment, and there had also been difficulties with resources and support. The researcher believes that these problems were not exceptional or unprecedented and that they could be solved if a few extra precautions were to be taken.

The head of department stated that he believed that an integrated approach was cost-effective because it did not require any extra resources. The lecturer in Editing also felt that such an intervention would indeed be cost-effective if the approach proved to be a success. The lecturer in Applied English believed that the cost-effectiveness would depend on the materials that were used.

The research diary entries indicate that apart from a few extra photocopies that were made and paid for, no additional resources were required. The intervention thus only made use of existing resources, class time and lecturers *in situ* who kindly volunteered both their time and assistance.

This systemic analysis makes it clear that, apart from a few small problems that can easily be accommodated, the integrated approach is cost-effective, sustainable and relatively easy to adopt. The researcher further concludes that the integrated approach was largely effective and that it had exerted a positive influence on both the cognitive and affective experience of the students in the classroom. In the section that follows, the researcher makes recommendations for possible future practice, policy, development and research.

6.4 RECOMMENDATIONS

The recommendations made in this final section of the report flow directly from the results and execution of the intervention. The recommendations made here concern policy and practice, further research, and further development work.

6.4.1 Policy and Practice

It is recommended that the integrated approach be incorporated in the language courses of language departments, such as the Department of Applied Languages at Tshwane University of Technology in South Africa. The researcher believes that the benefits that would flow from an integrated approach would be extremely advantageous to the students, the lecturers and the university administrators who all operate under the restrictive conditions that currently prevail throughout South Africa in higher education.

All the lecturers in such language departments should be briefed about the advantages of the integrated approach and should, in addition, be empowered by means of workshops to make optimal use of such an approach. Lecturers at TUT should be officially encouraged to be involved in future iterations of the approach and to continue its implementation in the university system. It is important that planning for this kind of systematic intervention needs to commence an academic year before it is implemented in practice.

There is also a need for collaboration and consultation between secondary and tertiary education institutions so that teachers in both sectors can become aware of such new developments that will affect the goals and processes of education in both sectors. In addition to such collaboration between educational institutions, partnerships with the industry are required so that lecturers may understand what is expected from graduates and determine what the academic outcomes of future iterations of the project should be.

Computer laboratory technicians and other support personnel should be booked in advance and brought into the discussion so as to ensure, as far as is humanly possible, that all possible risks, difficulties and opportunities will have been rationally assessed beforehand. The computer laboratory technicians should also be asked beforehand to check the reliability and usability of all technology so that it will be in good working order when the intervention is taking place.

It is further recommended that future iterations consist of shorter sessions so as to ensure that the cognitive load on the learners and the measure of strain on the lecturers are minimised. Stronger motivational techniques should also be applied to the students so that more learners will feel sufficiently interested to complete the intervention.

6.4.2 Further Research

Because this pilot study has shown that the integrated approach does indeed exert a positive effect on students and that it is systemically viable, it is recommended that full-scale research on a larger scale into the effects of an integrated approach on learning should be undertaken and that such research should include various future iterations and a larger research team. It is further suggested that a greater focus be put on cognition and meta-cognition in future iterations.

The influence of the integrated approach should also be studied with a stronger emphasis on the biographical data of students. Information about gender, age and the background of students who show an improvement as a result of the integrated approach, might provide some useful insights and correlations.

Future studies may provide information about an integrated approach that incorporates additional methodologies to those used in this research. The different elements of the integrated approach should also be studied in a more discrete and separate way so that the researcher will be able to obtain more detailed information about the specific relation or contribution of each element to the outcomes of the integrated approach.

6.4.3 Further Development Work

Educational practitioners and researchers in other fields who see potential in the integrated strategy may wish to develop similar approaches in their own specific areas of interest. Even those in radically different circumstances, such as those who work with privileged students or in adult education, might wish to incorporate an integrated approach into their pedagogical repertoire.

The findings and information contained in this report are susceptible to a great number of permutations, developments, applications and extensions. It is the lecturer's hope that educationists, teachers, lecturers, policymakers and others might make extensive use of this research to improve the lives of students in South Africa and elsewhere.

6.5 CONCLUSION

Inspired by the need of the first-year students at TUT to radically improve their written language skills, the researcher set out to put together a workable programme that would enable students to improve their language-related skills in an integrated approach to learning. The extant literature provided the necessary insight with relation to those methods that had proven to be successful previously. The researcher therefore developed an approach that entailed making use of interdisciplinary teaching with a combination of CALL, a process approach to writing, constructionism, peer assessment, authentic learning and various motivational strategies. The researcher then followed the design research approach to implement and test this innovative approach and the results indicated a highly significant improvement in the written language skills of the students as well as a noticeable improvement in their editing skills. The researcher also found that the integrated approach was relatively easy to adopt and that it could be both cost-effective and sustainable in the constrained circumstances of South African education.

The researcher therefore concludes that the aims of the investigation had been fulfilled through this study, and that it provided insight into the effect of an integrated approach on the cognitive and affective dimensions of learning in the classroom. It is further believed that apart from the benefits that the intervention brought into the lives of the students who participated in the research at TUT, this research could provide a sound basis for improving the learning experiences of learners in similar circumstances and that teachers of language

in South African institutions stand to gain enormous benefits from the incorporation of such methods of integrated learning into teaching in their institutions. Although this research represents only a pilot cycle, it provides solid grounds for optimism and for the implementation of research on a far more ambitious scale in the future.

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