THE DEVELOPMENT AND IMPLEMENTATION OF E-ASSESSMENT AS COMPONENT OF WIL: A CASE STUDY

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DECLARATION

I, MARIUS PIENAAR, solemnly declare this thesis entitled: THE DEVELOPMENT AND IMPLEMENTATION OF E-ASSESSMENT AS COMPONENT OF WIL: A CASE STUDY is original and the result of my own work. It has never, on any previous occasion, been presented in part or whole to any institution or Board for the award of any degree. I further declare that all information used and quoted has been duly acknowledged by means of complete reference.

Signature: _____ Date:_____

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This thesis is the conclusion of a long period of hard work. It has been a humbling journey and in many ways an accomplishment beyond my comprehension. It is in this context that I thank God for His abundant grace and unwavering love, and for giving me good health which has carried me through this journey.

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DEDICATION

I dedicate this thesis and give special thanks to my wife, Marietjie, for her remarkable patience, encouragement and unwavering love and support, and my wonderful children, Ruan and Ockert, for their believe in me throughout the entire study.

SUMMARY

Title: The development and implementation of e-assessment as component of WIL: a case study

Key words: Assessment, e-assessment, Work Integrated Learning, modern technologies.

Considering the point that existing WIL programmes are somewhat amorphous and do not optimally utilise available technologies, the TUT decided to embrace a technology-based WIL framework for improving its WIL programmes. Inspired by the fact that assessment is fundamental to the success of any WIL programme, the researcher wanted to attend to e-assessment within the context of WIL. Hence, this study intended to identify and examine the factors that should be included in the development of e-assessment as component of WIL. In addition, it was also aimed at determining the resultant experiences, emanating from the determined factors, of the implementation of e-assessment as component of WIL.

By conducting a literature and an empirical study, the purpose of the study was realised. Based on the literature study, the importance and relevance of WIL as authentic learning experience was described, while e-assessment was explained, discussed and justified within the context of WIL. For the empirical study, a sequential, embedded mixed-methods research design, anchored in an exploratory case study, was executed in two phases. In Phase 1, the factors that should be included in the development of e-assessment as component of WIL were determined by means of individual interviews with institutional WIL coordinators and a document study of relevant TUT documents. From the data obtained in this phase of the study, a prototype of e-assessment as component of WIL was developed and implemented. In Phase 2, online questionnaires and online individual interviews, supplemented by face-to-face focus group interviews, were used to uncover the experiences of workplace mentors and WIL students of the implementation of the prototype of e-assessment as component of WIL.

The key findings of the empirical study confirmed that assessment is fundamental to the success of WIL. Although optimism about the implementation of e-assessment

was revealed, the empirical data further indicated that a variety of factors needs to be considered for its successful implementation. Amongst others, it was suggested that e-assessment should be institutionally driven; that special care should be taken to ensure access to and availability of appropriate technology; that all stakeholders should be subjected to proper orientation and training regarding e-assessment, and that collaboration between the workplace and the academic institution should be improved. It was furthermore suggested that assessment tasks should meaningfully relate to the realities of the workplace; that the development of assessment tasks should be meticulously done and that such tasks should be regularly revised and that attention should be given to constructive feedback to enable student growth and development. By considering the experiences regarding the implementation of the prototype of e-assessment, a more sophisticated version was proposed.

The study concluded by indicating its limitations and suggested areas for further research. In the final analysis it was resolved that this study laid the foundation for exploring e-assessment in the context of WIL more vigorously, since e-assessment shows remarkable potential to benefit students, academic departments and workplace environments.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

CDS	Curriculum Development and Support
CHE	Council on Higher Education
CV	Curriculum Vitae
DCE	Directorate Cooperative Education
DCME	Department of Chemical and Metallurgical Engineering
DoE	Department of Education
DVD	Digital Video Disc
ECSA	The Engineering Council of South Africa
EL	Experiential Learning
FEBE	Faculty of Engineering and the Built Environment
HEDS	Directorate Higher Education Development and Support
HEI	Higher Education Institution
HEQC	Higher Education Quality Committee
HoD	Head of Department
ICT	Information Communications Technologies
IM	Instant Messaging
ITS	Integrated Tertiary Software
JISC	Joint Information Systems Committee
LMS	Learning Management System
LO	Learning Outcome
MCQ	Multiple Choice Question

NQF	National Qualifications Framework
PC	Personal Computer
PoE	Portfolio of Evidence
PoLE	Portfolio of Learning Evidence
PPT	PowerPoint presentation
QA	Quality Assurance
SAQA	South African Qualifications Authority
SASCE	Southern African Society for Cooperative Education
SDS	Student Development and Support
SMS	Short Message Service
TLwT	Teaching and Learning with Technology
TUT	Tshwane University of Technology
UoT	University of Technology
VoIP	Voice over Internet Protocol
WIL	Work Integrated Learning

CHAPTER ONE
ORIENTATION AND MOTIVATION OF THE STUDY

1.1 INTRODUCTION AND RATIONALE

According to Gresham and Andrulis (2002:1-21), many employers believe that potential employees are lacking the necessary skills to be able to fully integrate with the current workforce. It is therefore not only imperative to prepare students to participate and function confidently in the context of a rapidly changing world of work (Bolani *et al.*, 2007:v), but potential employees need to be properly educated and trained to enable them to be effective in the workplace and to fulfil their responsibilities skilfully. According to Birenbaum *et al.* (2006:62), progress and current day challenges demand better prepared students from higher education institutions (HEIs) for the workplace. Moreover, this appeal is underscored by the Council on Higher Education (CHE) (CHE, 2011:3), when stating that qualification programmes need to promote students' successful integration into the world of work after their studies and should enable students to make meaningful contributions as future employees. HEIs are therefore compelled to implement innovative curricular, teaching, learning and assessment practices to ensure that students are suitably prepared for the workplace. In addition, the CHE (2011:3) includes the dimension of Work Integrated Learning (WIL) and emphasises its importance to assist students to make the transition as future employees into communities of work. It is maintained that "programmes that include WIL offer opportunities for students to prepare for, and learn from the workplace, to transfer discipline-based theory and a wide variety of skills learned in their formal education to an authentic context as a colleague and employee, with all the responsibilities and expectations such a role entails" (CHE, 2011:6).

Related to the aforementioned, it is believed that students learn more effectively from supportive teaching programmes, high quality feedback, challenging but not over-heavily workloads, and clearly-stated goals and standards to direct their learning (Lemckert, 2003:417). For these reasons WIL has a history of implementation as part of the formal teaching strategies at South African Universities of Technology (UoTs). However, existing WIL programmes are often somewhat amorphous and lack significant evidence of success in terms of contributing towards students'

preparedness and development to enter the workplace. Moreover, despite Lombardi's (2007a:15) argument that technology promises to expand the range of authentic learning experiences exponentially, together with Herrington and Kervin's (2007:219-220) statement that technology presents opportunities to employ powerful cognitive tools that can be used by students in authentic learning, available technologies are not optimally utilised within existing WIL programmes.

In an attempt to address the mentioned shortcomings, and guided by the CHE's recent position on the significance of WIL, the Directorate Higher Education Development and Support (HEDS) of the Tshwane University of Technology (TUT) initiated plans to propose new directions for improving WIL at this institution. In this regard it was stated that there is a need to achieve and maintain institutional buy-in and commitment to WIL at all the TUT levels, and by achieving this, excellence in WIL should enable the TUT to differentiate itself from its competitors (HEDS, 2012:1). The HEDS directorate consists of four directorates, namely the Directorate Teaching and Learning with Technology (TLwT), the Directorate Cooperative Education (DCE), the Directorate Student Development and Support (SDS) and the Directorate Curriculum Development and Support (CDS). Under the auspices of the DCE it was decided to embrace a technology-based WIL framework for the TUT.

While it is essential to adopt innovative ways of WIL, Lombardi (2007b:9) advises that assessment strategies should be adjusted accordingly. This is supported by Collis (2010:15) who states that the dialogue on revising or developing WIL must include a focus on assessment. In this regard, Buzzetto-More and Alade (2006:251) are of the opinion that the use of information technologies can provide efficient and effective means of assessment since it not only offers new measures for assessing learning, but it could also yield rich sources of data to expand the ways in which educators understand both learning mastery and teaching effectiveness. Derived from the aforementioned, the researcher was of the opinion that e-assessment as a WIL component can also augment instruction and conventional assessment to allow students to work with course content in ways that would encourage authentic learning. Hence, it was imperative to attend to e-assessment as an integral and vital component of WIL.

1.2 PURPOSE STATEMENT

On the one hand, this study intended to identify and examine the factors that should be considered for the successful development of e-assessment as component of WIL. Related to this purpose, the study also aimed to determine the resultant experiences emanating from the factors determined earlier, of the implementation of e-assessment as component of WIL.

1.3 RESEARCH QUESTIONS

1.3.1 Primary research question

From the brief discussion above, it is apparent that not enough is known or done to incorporate e-assessment effectively as a WIL component at the TUT. This reality prompted the following two-pronged primary research question:

(a) What factors should be considered for the successful development of e-assessment as component of WIL?

(b) What are the resultant experiences emanating from the factors determined and applied in (a) of the implementation of e-assessment as component of WIL?

1.3.2 Secondary research questions and objectives of the study

The primary research question of this research was encapsulated in the following secondary research questions:

- What is the nature and value of WIL in the context of quality higher education?
- What is the significance of e-assessment within the contexts of assessment, modern educational technology and WIL?
- How can e-assessment within a WIL programme advance authenticity and augment instruction and conventional assessment?
- What are the fundamental elements to consider for ensuring the successful development and implementation of e-assessment as component of WIL?

Following the respective secondary research questions, the related objectives of the study were expressed as follows:

- To describe the nature and value of WIL in the context of quality higher education.
- To determine the significance of e-assessment within the contexts of assessment, modern educational technology and WIL.
- To uncover how e-assessment within a WIL programme may advance authenticity and augment instruction and conventional assessment.
- To identify and describe the fundamental elements to consider for ensuring the successful development and implementation of e-assessment as component of WIL.

1.4 CONCEPTUAL FRAMEWORK

The study was conceptualized in terms of concepts such as **assessmen**t, **e-assessment**, **modern technologies** and **WIL**. These concepts also served as primary keywords to search for relevant literature.

1.4.1 Assessment

Assessment is a generic term for a set of processes that measure the outcome of students' learning. According to Smit (2008:2), assessment is about the collection of evidence of students' work so that judgements about their achievements or non-achievements can be made to award a qualification. Assessment is also an integral part of teaching and learning on which students' and lecturers' decisions about the effectiveness of the teaching and learning process can be based. Pratt (1980:195-198) and Gibbs (cited by Surgenor, 2010:2) summarise the functions of assessment as follows: to capture students' time and attention spent on a task; to generate appropriate student learning activities; to inform students of their attainment of outcomes; to diagnose areas of strength and weakness; to guide decisions about students' future; to inform interested agencies of student competence; to provide feedback into the instructional system; to provide an operational target for students; to licence candidates for a profession or occupation, and to promote minimal educational equality. These functions are underscored by the South African Qualifications

Authority (SAQA) (2001a:16) which defines assessment as “a structured process for gathering evidence and making judgements about an individual’s performance in relation to registered national standards and qualifications”. Broadfoot (2000:ix) contends that “educational assessment has developed rapidly to become the unquestioned arbitrator of value, whether of […] achievements, institutional quality or national educational competitiveness”. Sainsbury (2006:14) foregrounds the importance of assessment in teaching and learning when concluding: “assessment has always been at the heart of all education”.

Although assessment can serve a variety of purposes, the performance and authentic purposes of assessment were especially relevant to this study.

Performance assessment is closely aligned with real world skills that students require. It is visible when students carry out specified activities under the watchful eye of a lecturer who observes performance and makes judgments on the quality of demonstrated achievement (Stiggins, 2004:2). Performance assessment tasks are usually broken down into component abilities required to perform certain tasks (Elsmore, 1994:421; Experiential Continuum, 2010). In performance assessment tasks students are required to evaluate real world situations and create original answers or products by applying higher order thinking skills (Tung, 2010:2). Tung (2010:4) further states that “performance assessments provide students with more ways to show what they know and can do, allow students with different learning styles more opportunity to succeed, and engage students more in their own learning and interests, because they include reflection and demonstration of thinking processes”.

When education prepares students for real or genuine tasks they may encounter in a real-world setting, such tasks are considered to be authentic. **Authentic assessment** means that the assessment is based on student activities that replicate real world performances as closely as possible. According to Newmann (1997:363), Palm (2008:4-5) and Brush and Saye (2014:41-42) authentic assessment displays three characteristics that can be summarized as the use of prior knowledge, in-depth understanding and the ability to use elaborated communication to express conclusions. Geyser (2004:102) concludes that authentic assessment refers to the assessment of complex performances and higher order skills in real-life contexts. Authentic assessment not only involves real life or authentic tasks and contexts, but

also provides for multiple assessment moments and methods to reach a profile score for determining student learning or development. Authenticity of an assessment task has a positive influence on student learning and motivation. Moreover, authentic assessment tasks are likely to produce a great deal of transfer from the classroom to the real world. Svinicki (2005:27) also holds the opinion that authentic assessment with clear, concrete targets, allows students to assess their own progress more readily during learning.

1.4.2 e-Assessment

There is a trend towards e-assessment as computers, notebooks and the Internet increasingly become part of the higher education environment (Campbell, 2005:531). This trend is confirmed by Sainsbury (2006:14) who indicates that since the beginning of the 21st century, assessment has made progress in terms of technology and computer-assisted assessment. He and Tymms (2005:419) also express the opinion that the rapid development of computers and other technology resulted in the fact that information and communications technologies (ICT) are more frequently used in education at various levels. According to Aojula *et al.* (2006:229), e-assessment has many advantages for students in higher education. Elaborating on this view, Walker *et al.* (2008:221-222) state that e-assessment has the potential to motivate student learning, increase the provision of feedback to students and remove concerns associated with marking such as to ensure consistency. Other advantages of e-assessment include its immediateness, fairness, its accurate scoring and feedback, efficiency, proven security and convenient administration (He & Tymms, 2005:419-421). Haughton and Keil (2009:276) conclude that technology supported assessment provides a multitude of benefits that could support learning improvement at all levels.

1.4.3 Modern technologies

Grabe and Grabe (1996:10) and Daggett (2010:7, 11) assert that it is important to understand that students encounter a rapidly changing world and will need different tools and skills to function effectively in the modern workplace. According to Grabe and Grabe (1996:26) and Daggett (2010:1-2) activity-oriented uses of technology emphasize additional learning goals and the variety of learning experiences for students. Activity-oriented uses of technology also places the emphasis on other

factors such as asking critical questions, creating personal knowledge and effective communication (Grabe & Grabe, 1996:26). Amongst others, relevant modern technologies include the following:

- **Learning Management Systems (LMSs).** According to Dias and Diniz (2014:307) LMSs are primarily used to manage teaching and learning activities in an online setting. It includes software applications for the administration, documentation, tracking and reporting of training programmes, classroom and online events, e-learning programmes and training content. Examples of a LMS are Blackboard and MOODLE.
- **E-mail** is a method of exchanging digital messages across the Internet or other computer networks. E-mail servers accept, forward, deliver and store messages.
- **Video conferencing** where networked personal computers (PCs) share video and audio signals. An example of video conferencing is Skype.
- **Internet forums** are also known as message boards or discussion boards, blogs, electronic journals and wikis. Internet forums such as discussion boards, blogs, electronic journals, and wikis are regarded as important tools to use as part of e-assessment in WIL.

1.4.4 Work Integrated Learning (WIL)

Du Pré (2009:89) maintains that WIL focuses on the application of theory in an authentic, work-based environment, by addressing "specific competencies identified for the acquisition of a qualification which relate to the development of skills that will render the student employable". As such, WIL assists in developing students' cognitive and skills domains as well as work related competences. WIL mainly considers actual tasks, personal competency dispositions and work domains as relevant contextual information for deriving current learning needs (Ulbrich *et al.*, 2006:525). WIL is akin to authentic learning because authentic learning experiences assist students to develop appropriate and effective understandings. In authentic learning environments, students take on apprentice-type roles under the guidance and supervision of people in a particular workplace (Lave & Wenger, 1991; Camilleri *et al.*, 2012:50). WIL has the potential to ease students into the workplace by providing opportunities to engage in real workplace activities without expecting them to fully bear

the consequences. The WIL environment is authentic in that it is a real work situation and the learning experience is authentic because the workplace and support provided by mentors allow the learning experience to be personally real for the students (Lave & Wenger, 1991; Camilleri *et al.*, 2012:13, 43, 48, 51). Authentic learning implies that learning is accomplished by the students and that academic work extends beyond the mere collection and storage of information (Grabe & Grabe, 1996:8).

1.5 RESEARCH METHODOLOGY

1.5.1 Research Paradigm

A research paradigm serves as an organising principle by which reality is interpreted (Nieuwenhuis, 2007a:48). This study applied a hybrid research paradigm of Interpretivism and Positivism since the study was approached from qualitative and quantitative angles. According to Nieuwenhuis (2007a:58-60), the Interpretivist paradigm is used to understand a phenomenon. On the other hand the Positivist paradigm is used to explain a phenomenon (Nieuwenhuis, 2007a:53-56). Considering the purpose of this research, Pragmatism was considered to be most appropriate since the research was concerned with applications or working solutions to an identified problem. Pragmatism also allows for the use of multiple research methods and different forms of data collection and analysis to enable the researcher to understand the research problem better (Creswell, 2009:10). According to Creswell and Plano Clark (2011:41), Pragmatism also focuses on the consequences of the research.

In this study, combined qualitative and quantitative research designs were used to collect and analyse both text and numerical data to address the two-pronged primary research question from different angles. Consequently, the research results were used to inform the development and implementation of e-assessment as component of WIL.

1.5.2 Research Design

The research design comprised a literature study and an empirical study.

1.5.2.1 The literature study

The researcher consulted international and national primary and secondary sources to obtain information for addressing the purpose of the study. Recently published articles, books, dissertations, theses and official documents which are relevant to the field of study were studied. Relevant literature was accessed from the Internet, using, amongst others, EBSCOhost, Sabinet and ERIC as search engines. In addition to the primary keywords already mentioned (*cf.* 1.4), the following key terms assisted in the search for literature: educational technology, cooperative education, experiential learning (EL), service learning, internship and in-service learning. The purpose of the literature study was to gather theoretical information to understand the research phenomenon better and to position the study within existing literature. It also provided the theoretical support for the empirical research.

1.5.2.2 The empirical study

The empirical study is outlined below. The outline includes the empirical research design, the strategy of inquiry, the population and sampling, data collection methods, data collection process, the role of the researcher, data analysis, quality criteria and ethical considerations.

1.6 EMPIRICAL RESEARCH

1.6.1 The empirical research design

This study used a mixed-methods design (or a combination of quantitative and qualitative research approaches) in order to add greater strength to the findings (Maree & Van der Westhuizen, 2007:34). In this particular study an embedded mixed-methods design (Creswell & Plano Clark, 2011:123) was used. In more particular terms, the research design can be described as a sequential, embedded mixed methods design since the research was done in phases. The first phase of the study was qualitative in nature and included interviews and a document study to gather data

to guide the development of e-assessment as component of the particular WIL programme. Embedded in Phase 1 of the study, the second phase of the study was concerned with experiences regarding the implementation of e-assessment as component of WIL and was approached from a combined quantitative and qualitative angle, using a questionnaire and interviews.

1.6.2 Strategy of inquiry

Creswell (2009:11) describes strategies of inquiry as "types of qualitative, quantitative, and mixed methods designs or models that provide specific direction for procedures in a research design". In addition, Creswell (2009:14, 15) distinguishes three general strategies of inquiry in mixed-methods research: sequential, concurrent and transformative. As described in 1.6.1, this study followed a sequential strategy of inquiry because the combination of qualitative and quantitative methods in a sequential manner has the potential to improve the quality of the research, since it captures the best of both approaches (Mouton, 1996:39; De Vos, 2002:363; Creswell *et al.*, 2003:209). Ivankova *et al.* (2007:267) and Creswell (2009:95) also assert that embedded mixed-methods designs are used when a researcher needs to answer a research question that is different from, but related to, another research question.

In the context of this study, it can be concluded that a sequential, embedded mixed-methods design, which is anchored in an exploratory case study was used. An exploratory case study is described by Rule and John (2011:8) as a study that examines a phenomenon that has not been investigated before and which can lay the basis for further studies. For Phase 1 of the empirical study, which focused on the factors impacting on the development of e-assessment as component of WIL, qualitative data were collected by means of individual interviews with staff concerned with WIL, located in the different departments in the Faculty of Engineering and the Built Environment (FEBE) as well as the DCE in the HEDS directorate of the TUT. In addition, a document study of institutional, faculty and departmental documents related to WIL and assessment was done. For Phase 2 of the study, a semi-structured online questionnaire was used for the collection of quantitative data from external stakeholder respondents who accommodated Chemical and Metallurgical Engineering students from the Department of Chemical and Metallurgical Engineering (DCME) for WIL. For the qualitative part of Phase 2 of the study, data were collected from third

and fourth year students from the DCME of the TUT by means of online open-ended questionnaires supplemented by face-to-face focus group interviews.

1.6.3 Population and sampling

The population for this study comprised staff members and students who were directly involved with WIL at programme level at the TUT, as well as external stakeholders who accommodated students of the TUT for WIL. However, it was not possible to include the whole population in the research due to time, financial and logistical constraints, as well as the intensive nature of the WIL component in students' studies. As a result, a sub-group of the population was earmarked to participate in the research. Based on the researcher's involvement as Instructional designer in the HEDS directorate, he was approached by the DCE to initiate the development of a technology based programme for WIL (*cf.* 1.1). The FEBE was identified by the DCE for piloting such a programme. Non-probability, purposeful sampling was applied throughout the study to select potential research participants and documents. The choice of this sampling method was based on McMillan and Schumacher's (2006:126, 310) statement that purposeful sampling allows one to select research participants (and documents) on the basis of being "informative" about the research topic. Staff members involved in and having experience of the WIL programme in the FEBE (the DCME and other departments) and the DCE was included in the sample for Phase 1 of the study. In addition, documents related to WIL and assessment on institutional, faculty and departmental level were identified for analysis. Third and fourth year students of the DCME and external stakeholders accommodating Chemical and Metallurgical Engineering students for WIL formed part of the second phase of the research. The researcher decided to include third and fourth year students in the research because they were familiar with the status quo of assessment and were able to draw a comparison between the previous mode of assessment and the proposed e-assessment. Based on the same argument, external stakeholders were included in the study. Two criteria, namely sufficiency of data and saturation of information (Greeff, 2005:294) were used to determine the sample size of the respective research participants and documents that were analysed.

1.6.4 Data collection methods

Both qualitative and quantitative data were collected and this was done by means of individual interviews, a document study, an online questionnaire, online open-ended questionnaires and face-to-face focus group interviews.

1.6.4.1 Qualitative data collection methods: individual interviews and document study (Phase 1)

Greeff (2005:292, 299) differentiates between individual interviews and focus group interviews. Individual interviews are further classified as unstructured interviews, semi-structured interviews, open-ended or guided interviews and ethnographic interviews (Greeff, 2005:292). For the first phase of the study individual interviews, composed of semi-structured questions to allow the pre-determined questions to "define the line of inquiry" (Nieuwenhuis, 2007b:87), were used to collect data. Interview questions were derived from the literature study and guiding questions were prepared by the researcher beforehand. The individual interviews were conducted with the sampled participants from the different departments in the FEBE as well as the DCE in the HEDS directorate of the TUT. Although sufficiency of data and saturation of information (*cf.* 1.6.3) determined the number of research participants from these entities, the anticipated number of participants approximated one from each entity (n=8). This means that a total of eight research participants were envisaged to be interviewed.

By using an interview guide, the researcher ensured that the questioning order and consistent phrasing of questions were maintained. Forty minutes were allowed as time frame for each interview. The purpose of the interviews was to generate qualitative data on factors that should be considered for the successful development of e-assessment as component of WIL. In addition, a non-interactive qualitative approach (McMillan & Schumacher, 2006:26) was applied to study purposefully selected documents. According to McMillan and Schumacher (2006:27), non-interactive approaches are sometimes also referred to as analytical research and are mostly used to analyse documents. Because Henning *et al.* (2004:99) argue that documents are "valuable sources of information", a document study of sources

relevant to assessment in the context of WIL, such as institutional, faculty and departmental documents, was done to enlighten this part of the study.

1.6.4.2 Quantitative and qualitative data collection methods: online questionnaires and online open-ended questionnaires (supplemented by face-to-face focus group interviews) (Phase 2)

For the second phase of the study, an online, self-generated questionnaire which was informed by the literature study and which primarily contained close-ended questions was administered. The questions included a variation of question types (Maree & Pietersen, 2007:161-165) to generate useful information regarding the success level of the implementation of e-assessment as component of WIL. For the construction of the questionnaire, guidelines provided by Struwig and Stead (2004), Cooper and Schindler (2006), McMillan and Schumacher (2006) and Leedy and Ormrod (2005) were observed. The questionnaire was constructed to allow for approximately 15 to 20 minutes for completion. It was envisaged that the questionnaire would obtain relevant data from the sampled external stakeholder respondents who accommodated Chemical and Metallurgical Engineering students for WIL. Though sufficiency of data and saturation of information was again observed (*cf.* 1.6.3), it was anticipated that at least ten percent (10 of a possible 101) of these external stakeholders would be included in the sample.

In addition, third and fourth year students of the DCME were interviewed by means of a number of online open-ended questionnaires which were supplemented by face-to-face focus group interviews (*cf.* 4.6.4). Although a researcher has little control over the time for completing an online interview, care was taken that the face-to-face focus group interview sessions did not exceed 40 minutes. To enable the researcher to generate useful information regarding the success level of the implementation of e-assessment as component of WIL, it was important for students to participate in the research and special efforts were made to include as many as possible students in the sample. Regrettably, only 12 online individual interviews were conducted. To supplement this method of data collection to still yield valuable information, the same interview questions were used to conduct the focus group interviews. Eventually, two focus group interviews, each consisting of three students, were conducted. The data obtained in this phase of the study, assisted the researcher to elaborate on the

qualitative data of Phase 1 and to provide more refined, detailed views and opinions regarding the implementation of e-assessment as component of WIL.

1.6.5 Data collection process

For the first phase of the study, data which could inform the successful development of e-assessment as component of WIL were collected. This was followed by the data collection for the second phase of the study, concerning the implementation of e-assessment as component of WIL. Where staff and students were concerned, provision was made to accommodate these research participants at less active times on the institution's academic calendar (e.g. not during assessment periods such as test weeks or examinations). In the case of the external stakeholders who accommodated Chemical and Metallurgical Engineering students for WIL, ample time for the completion of the online questionnaire was allowed. The study, being a sequential, embedded mixed-methods exploratory case study, included the following stages of data collection:

- Permission was obtained in writing from the DCME in the FEBE as well as the DCE in the HEDS directorate to conduct the research within the respective units and institution (*cf.* **Appendix B** & **C**).
- A sub-group of the population was selected to participate in the research. Non-probability, purposeful sampling was applied in selecting potential research participants and documents throughout the study. Six research participants from the FEBE and the DCE were interviewed on a one-to-one basis during suitable times of the 2013 academic year. Data analysis continued until data saturation was attained.
- A document study on assessment in the context of WIL was done of documents that were physically obtained from the TUT or downloaded from the TUT's website, to also inform the first phase of the study.
- Based on the findings obtained in Phase 1 of the study, the factors which should be considered for the successful development of e-assessment as component of WIL were identified.

- After the development of a prototype of e-assessment was completed, this prototype was implemented at the beginning of 2014 for the first six months during a particular WIL period.
- Online questionnaires were administered to external stakeholders in industry in 2014 to gage their experiences regarding the implementation of e-assessment.
- Online individual interviews, supplemented by face-to-face focus group interviews were conducted with purposively selected WIL students to gather their experiences of the implementation of e-assessment as component of WIL.

1.6.6 Role of the researcher

McMillan and Schumacher (2006:344) describe the role of the researcher as "a relationship acquired by and ascribed to the researcher in interactive data collection". In this study the researcher ensured that the necessary protocols were followed to gain entry to the research participants and relevant documents for analysis (Creswell, 2009:177). The researcher constructed the individual interview guide, the online questionnaire and the online individual interview/focus group guide. All interviews and the questionnaire were administered by the researcher. In addition, a document study on assessment in the context of WIL was done of documents that were physically obtained from the TUT or downloaded from the TUT's website. Since the researcher was alert that his position as employee of the TUT at the time of the study may have impacted on the research results, he was especially thoughtful with regard to his personal conduct towards potential research participants at all times. The researcher was mindful of factors such as biases that may have interfered with the data collection process or the interpretation of findings (Creswell, 2009:177). Furthermore, the researcher observed the protection of the rights of the TUT and its staff and students, including those of the external stakeholders who accommodated Chemical and Metallurgical Engineering students for WIL. In addition, the welfare of each individual research participant was respected. These matters were dealt with in an ethically responsible manner.

1.6.7 Data analysis

1.6.7.1 Qualitative data analysis

Verbatim transcriptions of all interviews were created. By organising, structuring and subsequently analysing the qualitative data, the researcher also interpreted and summarised what has transpired during the interviews (Nieuwenhuis, 2007a:47; 2007b:85; 2007c:100). The analysis and interpretation of all the interviews, was dealt with in a deductive manner by means of identifying *a priori* categories (Nieuwenhuis, 2012:99). After having transcribed the obtained information, codes were assigned to the research participants' responses. Struwig and Stead (2004:169) define codes as "labels that assign units of meaning to the information obtained". With the coding process the data were organised, structured and condensed. The codes were then clustered into *a priori* categories. Through constant comparison, data were checked for distinctive elements and to establish generalities within categories. This process, which is described in more detail in chapter four, continued until the researcher was satisfied that no new issues were observed (Dawson, 2006:117). Since the purpose of qualitative analysis is to obtain a deeper understanding of the researched phenomenon, the researcher constantly engaged with the collected information obtained through the document analysis and interviews.

1.6.7.2 Quantitative data analysis and interpretation

The set of data gathered through the quantitative process as outlined in 1.6.5 was analysed separately and independently. Thereafter, the qualitative data and the quantitative data were merged for comparative purposes and interpreted to the extent to which the two data sets related to each other to gain a better understanding of the research question. For the purpose of quantitative data analysis, the researcher made use of descriptive statistics (Ivankova *et al.*, 2007:256) to analyse and interpret the collected data for general tendencies. Due to the relatively small sample, the researcher utilised the quantitative data obtained from the questionnaires to calculate frequencies and percentages for the various measurements (Babbie & Mouton, 2001:459; Jansen, 2007:19) and made use of visual representations and graphical techniques to identify patterns in the analysis of the data. According to Leedy and Ormrod (2005:30) descriptive statistics summarize the general nature of the data. The

researcher ensured that data were accurate, uniformly entered, complete and ready for coding (Cooper & Schindler, 2006:441).

1.6.8 Quality criteria

For the development of the data collection instruments, the researcher focused on reliability for obtaining consistent and stable measurement of data (Delport & Roestenburg, 2013:177) and on validity to ensure that the "instrument actually measures the concept in question, and that the concept is measured accurately" (Delport & Roestenburg, 2013:173). The researcher promoted reliability by checking that the questionnaire and all interview items were carefully worded to ensure that their meaning would be the same for all participants; that there would not be leading questions which could influence participants to respond in a particular way or that there would be no "double-barrelled" questions which could compromise the reliability of the data (Maree & Pietersen, 2007:160). Internal validity was ensured by checking that all questions, whether part of the questionnaire or interviews, were related to the focus of the research; therefore applying face and content validity (Delport & Roestenburg, 2013:173-174). Multiple data sources assured external validity or the extent to which the conclusions drawn from the research relate to other contexts (Leedy & Ormrod, 2005:99; McMillan & Schumacher, 2006:134). Moreover, external validity was also attempted by conducting the study in a real life setting (Leedy & Ormrod, 2005:99).

By conducting a pilot study prior to the actual research with willing participants in the DCE and the FEBE of the TUT, reflecting sameness to the actual research participants, the research instruments were audited for reliability and validity.

To ensure the trustworthiness and accuracy of the qualitative parts of the study, **credibility** (De Vos, 2005:346) was ensured by recording the responses of the research participants during the interviews and asking the participants to check and verify whether the interview transcripts provided a true account of what they said. **Dependability** (Schurink *et al.*, 2013:420-421) was ensured by a research process that was "logical, well documented and audited" by examining the documentation, such as the interview notes and interpretations made by the researcher to secure accuracy. For **confirmability** (De Vos, 2005:347) or for ensuring unbiased findings, the researcher based all interpretations solely on the raw data gathered from the

recordings and made use of a knowledgeable colleague in the field to verify the verbatim transcripts and the findings to ensure that the researcher based all interpretations only on the data in an unbiased manner. **Transferability** (De Vos, 2005:347) of the research findings was also observed since multiple data collection methods and multiple research participants formed part of the empirical study.

1.6.9 Ethical aspects

All professionals are guided by a code of ethics and therefore all parties in research should exhibit ethical behaviour. According to Cooper and Schindler (2006:116) the goal of the code of ethics is that no one is harmed or suffers adverse consequences from research activities. Based on the guidelines provided by Creswell (2009:90-91), Thomas (2009:149-150) and Strydom (2013a:115-129), the researcher adhered to the following ethical principles when conducting the research, namely: confidentiality, anonymity, privacy, informed consent from participants and the principle of full disclosure of information about the research. This study considered and was guided by a range of ethical matters which included the following (*cf.* 4.11):

- The researcher obtained ethical clearance from the Ethical Committee of the North-West University, Vaal Triangle Campus (*cf.* **Appendix A**).
- Permission to conduct the research at the TUT was requested from the management structures of the relevant units within the TUT (*cf.* **Appendix B** & **C**).
- Informed consent was obtained from all the research participants to participate in the research. An informed consent form was designed and given to participants to assure them of the adherence of this study to ethical behaviour. The purpose of the research, the identity of the researcher and his contact details were on this form, together with the ethical principles that were observed (*cf.* **Appendix D, E** & **F**). With regard to the latter, the following were listed:
    - Participants were made aware of the nature of their involvement in the study, that their participation was voluntary and that they could stop their participation at any time that they wished to do so. In addition, permission was sought from participants to record the interview sessions.

- Participants were assured of their physical and emotional security. The participants' well-being was not in any way compromised during data collection. Participants were reminded that should they wish to, they could at any time during data collection suspend their involvement if they felt any physical or emotional strain as a result of their involvement in this study.
- Participants were assured of the observance of confidentiality and anonymity. The researcher pledged to keep in the strictest of confidence any confidential information that could be divulged by participants. The researcher also maintained the anonymity of all participants. The identity of any participant was not divulged in the study and direct references to any participant's contribution were presented in an anonymous manner in order to protect the identities of the participants. Research participants who formed part of the focus group interviews were made aware that their responses would be shared within a focus group situation.
- In addition to the fact that participants were informed that the research results will primarily be used for research purposes to obtain a PhD-degree, they were also notified that the results of the study would be made available to them and the management structures of the relevant units of the TUT.
- The research was based on sound data and findings, obtained from the actual empirical study in a scientific manner, and the researcher avoided at all costs the falsifying or invention of findings, as this is regarded as scientific misconduct (Creswell, 2009:92).

1.7 DELIMITATIONS OF THE STUDY

Delimitations refer to the restrictions imposed on the study by the researcher (Best & Kahn, 2003:37). A major delimitation of the intended study was that it was confined to one faculty and eventually one department within one institution (TUT). However, it was argued that the research has the potential to serve as thrust for similar research in other contexts or to improve assessment in existing WIL programmes. The

delimitations related to the generalizability of the research results should thus be observed very carefully when reporting data.

1.8 POSSIBLE CHALLENGES OF THE STUDY

Individuals sometimes have negative attitudes toward studies conducted in their institutions. The researcher, however, took precautions to convince such possible individuals about the value of the research towards improving assessment of WIL at the TUT. Other potential challenges were that questionnaires may not be completed fully or the unwillingness of participants to participate in the interviews. The researcher also predicted time constraints, and logistical challenges where the vast majority of the WIL students are situated at distant workplaces across the whole of South Africa and the fact that the students will not return to the TUT at the end of their WIL period, to have a pertinent effect on the collection of data. In addition, the small samples were seen as a challenge since it could affect the range and depth of the data.

It was envisaged that the researcher shall attempt to deal with these challenges by explaining the purpose and importance of the research and by personally administering the data collection process.

1.9 SIGNIFICANCE AND POSSIBLE CONTRIBUTIONS OF THE STUDY

The study aimed to inform the development and implementation of e-assessment as component of WIL. The study is therefore relevant to HEIs in South Africa by making WIL practitioners and lecturers aware of how assessment practices can contribute to bridging the gap between the classroom and the workplace. In addition, it raises awareness of changing assessment practices into electronic assessment (e-assessments), in order to contribute more effectively towards WIL. The research study foregrounds description of the practices, challenges and outcomes, providing tentative conclusions which could serve as hypotheses for future studies.

1.10 LAYOUT OF THE RESEARCH

The report on the research unfolded as follows:

Chapter One: Orientation, description of the problem and purpose of the study, overview of the research methodology, theoretical framework and the research outlay.

Chapter Two: Literature review: Contextualising Work Integrated Learning.

Chapter Three: Literature review: Assessment in WIL.

Chapter Four: Overview of the empirical study.

Chapter Five: Data analysis and interpretation.

Chapter Six: Findings, conclusions and recommendations.

1.11 CONCLUSION

In this chapter, a brief overview of the study was given to serve as orientation to the research. Aspects that were covered included an outline of the rationale for the study, the purpose of the study, the research questions, the conceptual framework as well as the research methodology. Possible delimitations of the study, the significance of the study and possible contributions as well as anticipated challenges were also presented. The chapter concluded by delineating the structure of the research.

In the next chapter, WIL will be contextualised.

CHAPTER TWO
CONTEXTUALISING WORK INTEGRATED LEARNING

2.1 INTRODUCTION

The intention of this study is twofold, namely to identify and examine the factors that should be included in the development of e-assessment as component of WIL and to determine the resultant experiences emanating from these factors of the implementation of e-assessment as component of WIL. Therefore, the researcher deemed it paramount to position WIL within the context of this study. Consequently, it is the aim of this chapter to address the following secondary research question (*cf.* 1.3.2):

- What is the nature and value of WIL in terms of the provision of quality higher education?

The discussion that follows will provide pertinent background information regarding WIL, after which the phenomenon will be conceptualised. This will be done by defining WIL by looking at WIL as a learning experience and by indicating advantages and challenges associated with WIL. This will be followed by describing the WIL cycle and by indicating a number of possible WIL strategies. The nature and value of authenticity in WIL will also be discussed and an in depth view of WIL at the TUT will be provided. The chapter will be concluded by indicating how each of the abovementioned notions is evident in the WIL programme of the DCME.

2.2 BACKGROUND

While professionals enter the workplace, Aurangzeb (2008:57) and Forsythe (2012:3) argue that requisite competencies for gainful employment such as relevance of knowledge and applicability of skills for job-ready graduates, are increasingly becoming important determinants of employment. Forsythe (2012:6) further asserts that employers recognise the importance of a qualified and well-trained workforce as a critical factor for sustained growth and competitiveness. Kaliyamoorthy and Sridevi (2011:5) maintain that gaining employment experience while still being a student, provides for learning and training opportunities to acquire skills and competence

relevant to the workplace. Choo (2007:186) draws attention to the fact that today's society places a strong demand on the development of competence to be absorbed in the workforce. Derived from the aforementioned, along with the fact that in a rapidly changing world where new work patterns impact on people, it is becoming ever more important to reconsider the role UoTs play in helping students prepare for the complexities of the 21st century (Peach & Matthews, 2011:227). Traditional instruction at a UoT will not be able to effectively bring students to the expected level of workplace competence because, as explained by Peach and Matthews (2011:227, 228), it is topic-based and usually involves teaching all the prerequisites before introducing the real-world tasks for students to work on. One of the weaknesses of traditional instruction is the assumption that it will enable students to apply the acquired knowledge to solve real-world tasks. According to Choo (2007:186), traditional instructional practice could result in students who lack the flexibility to function well or be able to transfer learning to the workplace. Therefore, it is apt to state that industry should be more involved in WIL to address issues such as skill shortage concerns (Staehr *et al.*, 2014:1).

Kaliyamoorthy and Sridevi (2011:1-2) and Sattler *et al.* (2011:1) state that pedagogical approaches that combine WIL and classroom-based learning offer promising instructional alternatives to deliver the skills needed for the workplace. Supporting this statement, Forbes (2006:1) notes that the aim of combining WIL and classroom-based learning should be to enhance the knowledge base and applied competencies of students in an attempt to narrow the gap between knowledge creation at the UoT and the transfer and application of this knowledge into appropriate skills and competencies in the workplace. However, according to Kneale (2009:99) "students are unlikely to engage with teaching that focuses on their future employability in a deep learning manner without there being a tangible and reasonably immediate benefit. […]". Kneale (2009:99) further mentions that "without academic intervention and support, student awareness of employability […] is unlikely to increase". These statements are reiterated by Forsythe (2012:5) who argues that by simply studying towards a chosen career, students expect to be employed in their chosen occupation. Implied in these assertions is the aspect of assessment, which should also be seriously considered (Kneale, 2009:107; Kaliyamoorthy & Sridevi, 2011:8), since assessment could impact

on students' future careers in terms of lifelong learning skills and deep learning (Forbes, 2004:49).

All of the above arguments create opportunities to focus on WIL as a co-operative education strategy for applied learning (*cf.* 2.7). Aurangzeb (2008:55) and Kaliyamoorthy and Sridevi (2011:6-7) elaborate this point by maintaining that students need to develop knowledge, skills and attitudes that can enhance their employability profile. It is furthermore claimed by Forbes (2004:49) that HEIs, in line with the objectives of the National Qualifications Framework (NQF) and the principles embedded in an outcomes-based approach to teaching and learning, have an obligation to review their curricula and the implementation thereof. This is to ensure that the integration of academic and WIL programmes prepare students successfully for the workplace which could also benefit professions, industries and communities (CHE, 2011:3). This claim is underscored by Collis (2010:9) and Coll and Zegwaard (2012:44) who maintain that HEIs need to ensure integration of academic and work-based learning in their curricula. According to Groenewald (2004:17-25), three essential interrelated components contribute to work-based learning; one being structured learning in the workplace; the second being the provision of appropriate and relevant on-the-job learning opportunities, and the third being the identification and provision of relevant off-the-job learning opportunities. It is thus evident that programmes which promote graduates' successful integration into the workplace to make meaningful contributions, require innovative curricular, teaching, learning and assessment practices (Jenkins, 2012:124).

UoTs are career focussed in their vision and mission. This focus includes links with industry, applied research, entrepreneurship, co-operative education and technology transfer (Forbes, 2004:50). Ideally speaking that is why the integration of theory and practice in student learning should occur through WIL. The Southern African Society for Cooperative Education (SASCE) (2007:3) also states that WIL facilitates and consolidates the learning progression between theory and practice and emphasises technology transfer and exchange toward applied competence and knowledge production in this regard. Higher education needs to equip students to enter the professional world by delivering knowledge and skills by means of relevant training, coupled with on-the-job experience. WIL is therefore a crucial aspect of any course

that requires experience of the workplace (Aurangzeb, 2008:56; Shircore *et al.*, 2013:126).

Forbes (2006:2), Choy and Delahaye (2011:157), Kaliyamoorthy and Sridevi (2011:5), Forsythe (2012:6) and Lyckhage and Pennbrant (2014:67) state that the development of a WIL curriculum relies on a number of contributing factors. Amongst others, these factors include genuine partnerships for co-operation and collaboration between UoTs, external stakeholders in industry and the community. Another factor relates to pedagogies to support learning in the workplace, which obviously also includes assessment.

2.3 CONCEPTUALISING WIL

The researcher is in agreement with Lyckhage and Pennbrant (2014:62) that concepts can be seen either as linguistic models of reality or as analytical tools enabling a deeper understanding of the world and explaining its different phenomena. As many concepts are essential for the development and advancement of excellence, it is imperative that concepts embody a common and shared meaning. Lyckhage and Pennbrant (2014:62) further state that the meaning of a concept must be discussed continuously to elaborate a definition, accept and use it to detect and study the common. For this study it is thus important that the concept of WIL should be clarified in order to use it relative to the purpose of this study.

2.3.1 Defining WIL

It is common knowledge that we live in a rapidly changing world and modern businesses by default operate in this rapidly changing environment. Because of this precipitousness, continuous learning is an essential ingredient in order to stay competitive in such environments. While students can study the theoretical component of their academic coursework, the higher education environment cannot replicate the wealth of experiences, practical applications and learning opportunities available within the reality of this precipitous environment. For this reason, UoTs have instigated WIL programmes as part of their formal teaching and learning strategy. When the aforesaid programmes are combined with supportive teaching that addresses clearly-stated goals and standards, feedback and effective workloads, students would learn effectively (Lemckert, 2003:417). WIL succeeds in

“supplementing existing methods of learning by creating the opportunity for a more self-driven, reflective approach” (Forsythe, 2012:2). Therefore, WIL is a tool that enables UoTs to proactively and productively engage with the workplace to structure skills development programmes (Aurangzeb, 2008:57; Freudenberg *et al.*, 2011:79).

In terms of curricular, pedagogic and assessment practices, WIL is an approach to career-focused education by integrating formal and workplace learning whereby all parties involved could benefit (CHE, 2011:4). Literature shows that there is a proliferation of definitions of WIL. Coll and Zegwaard (2012:43) even go as far as to suggest that this proliferation appears to be growing. In essence, all definitions of WIL appear to be focusing on the application of theory in an authentic, work-based environment by addressing specific competencies which relate to the development of skills that will make the student employable (Aurangzeb, 2008:57). The researcher deems it necessary to look at some of the most used definitions of WIL to arrive at a common understanding of the term before defining it in the context of this study.

The widespread understanding of WIL, is that it is a strategy of applied learning (learning integrated with work), which involves a structured educational programme that combines relevant work experience with academic study and critical reflection in an authentic, work-based context. Jenkins (2012:125) argues that critical reflection by a student against defined competencies, should be seen as an important aspect of any WIL programme, because by reflecting the student becomes aware of his/her own knowledge, skills and limitations within a professional context. This relates to Dewey and Moon’s (cited by Leong, 2012:153) opinion that reflection takes place when students cognitively learn from experiences through inquiry and collaboration. Lucas (2012:163-166) states that critical reflection is an essential WIL component that is dependent on a partnership between all the parties involved. Furthermore, Lucas (2012:166) and Lyckhage and Pennbrant (2014:67) mention that by reflecting, students are encouraged to query, explore and appraise as they engage with workplace activities and by so doing develop personal competence. Therefore, Lucas (2012:166) asserts that when students use journals, reports and oral presentations, it provides them the opportunity to apply critical reflective writing (*cf.* 3.3.8).

Groenewald (2004:17) notes that WIL is “a structured strategy integrating classroom studies with learning through productive work experiences in a field related to a student’s academic or career goals.” This definition implies that WIL provides experiences in integrating theory and practice where there is a partnership among students and all parties involved, with specified responsibilities for each party. According to Burton (2009:4), WIL entails working and learning in an authentic workplace that assumes student knowledge and skills and the ability of the work environment to exchange to the student tacit knowledge and skills. Burton (2009:4) further argues that WIL improves “professionals’ engagement and motivation, knowledge and understanding, performance and action, reflection and critique, judgment and design, commitment and identity”.

Closely related to the aforementioned definitions, Sattler *et al.* (2011:4) assert that "Work Integrated Learning refers to the process whereby students come to learn from experiences in educational and practice settings and integrate the contributions of those experiences in developing the understandings, procedures and dispositions required for effective professional practice”. Derived from the above definitions, it can be concluded that WIL is a “powerful method of learning and represent a significant and valuable feature in the higher education landscape” (Jancauskas *et al.*, 1999:1). It provides students with relevant work experience by developing specific skills and competencies identified for the acquisition of a qualification, which will make a student employable (Orrell, 2004:1-2; Du Pré, 2009:25, 89).

2.3.2 WIL and learning experiences

Although the relation between WIL and authentic learning will be discussed later in this chapter (*cf.* 2.7), it is necessary to relate WIL to learning experiences in general. Forbes (2006:3) argues that the factor that distinguishes WIL from pure work-based or Experiential Learning (EL), is the role the following aspects play:

- Negotiation between the HEI, the student and the employer.
- The attainment of achievable learning outcomes (LOs) which are meaningful and challenging to the student.
- The attainment of achievable LOs which are relevant to the employer and have academic credibility within the institution.

- The attainment of achievable LOs which are aligned to the programme outcomes.

Choy and Delahaye (2011:157-158) argue that WIL learning experiences need to be based on the demands of work to reflect real work circumstances that unequivocally add to the business outcomes. Students engaged in WIL are not only required to demonstrate an understanding of new knowledge but must also apply that knowledge in ways that perceptibly benefit the industry. Choy and Delahaye (2011:158) further states that, inevitably, WIL requires a partnership between all stakeholders where learning in the workplace is appropriately designed and facilitated. All of the aforesaid parties would contribute own knowledge and expertise to the WIL curriculum.

According to Forbes (2004:51) the WIL experiences should be outcomes-based and in line with the NQF. By so doing, specific outcomes pertaining to a qualification could effectively be achieved in the workplace (Forbes, 2004:52). Aurangzeb (2008:60) elaborates on this by explaining that an outcomes-based approach places the primary focus on the outcomes of learning and moves away from the traditional content driven objectives. Within an outcomes-based approach a WIL programme should create a setting where students engage in responsible, proactive and interactive learning activities to successfully attain the LOs in the workplace.

With regard to learning experiences the importance of both practical and fundamental learning in WIL is thus emphasised. Whereas fundamental learning is concerned with theoretical learning, Assan (2014:301) state that practical learning happens in WIL when students learn from and in practice.

2.3.3 Advantages and challenges of WIL

Although WIL is now defined and its relation to learning experiences highlighted, it is also necessary to distinguish a number of advantages and challenges of WIL.

2.3.3.1 Advantages of WIL

The principal advantage of WIL is that, while studying, students gain workplace experience, and when entering the workplace after graduating, their acquired knowledge is immediately relevant. Understood in this way, Sattler *et al.* (2011:28) refer to “real world exposure” where theory is applied to practice in real workplace

settings. By exposing students to real work environments, WIL enhances students' practical knowledge of the industry whereby new skills are gained and new competencies developed, allowing students to gain more from their academic programme (Sattler *et al.*, 2011:28). Therefore, the role of WIL in students' career development and its impact on their employability, are perceived to be the most compelling advantages to student participation in WIL programmes (Sattler *et al.*, 2011:28). Furthermore, during WIL students are provided the opportunity to advance in their chosen fields and to experience personal growth (Du Pré, 2009:26). As a consequence WIL can develop students' career management skills as they are prepared for the workplace (McIlveen *et al.*, 2011:35). Collis (2010:5) states that WIL could have a positive impact on students' professional attitudes, students' employability, the relevance and currency of industry for the academic institution and cost-effectiveness for industry.

There is a growing demand for graduates who are already familiar with the workplace before they are offered employment since a great number of employers do not always have the capacity and the means to put towards in-service training (Du Pré, 2009:26). Therefore another advantage of WIL is that companies may retain students who were placed in the workplace for WIL after the learning period. The skills of the students are known to the employer and likewise, students already know the company, its policies, work methods and the jobs (Aurangzeb, 2008:58). The employability rate of students would then increase (Abeysekera, 2006:7).

The opportunity for students to enhance their Curriculum Vitae (CV) by including their WIL experience and position and to gain contacts and develop a network of professionals to provide references for future employment during the WIL period, are also benefits of WIL (Sattler *et al*., 2011:28). WIL allows students to enter the workplace with suitably required professional and marketable skills and experiences that are relevant to the workplace, including the ability to use the required technologies and the ability to effectively communicate and collaborate in the workplace (Sattler *et al.*, 2011:28-29).

WIL also harnesses the importance of the ethical aspects of being a professional in the workplace. In this regard Campbell and Zegwaard (2011:1; 2012:20-23) argue that students undertaking WIL are exposed to and benefit from the ethical nature of

their chosen workplace. The students knowingly and unknowingly develop and acquire professional attributes, including understandings of proper and ethical conduct expected of them in their chosen workplaces, implying that they would be mindful of their conduct in the workplace. Campbell and Zegwaard (2011:3-5; 2012:24) conclude that WIL students experience three phases of socialisation into the workplace: "the first phase being the process of 'getting in' (i.e., recruitment and job preparation); the second phase being 'breaking in' (i.e., orientation, establishing relationships, etc.); with the final phase being 'settling in'." During the third phase the students undergo personal change and would appreciate being accepted in the workplace. It is within this third phase that Campbell and Zegwaard (2011:3-5) argue that the prior learning and experiences of the student come to the fore in the interpretation and understanding of the ethical practices in the workplace.

Although a lack or shortage of people efficiency in the workplace may encourage new approaches to programmes seeking to develop the workplace skills of graduates (*cf.* 2.4 (iv)), Freudenberg *et al.* (2010:480-481) and Leong (2012:156) argue that people's efficiency is a critical factor in skills development, and that WIL programmes can improve this efficiency. In WIL, efficiency can positively influence career competency because, as pointed out above, WIL benefits student learning in terms of personal development, professional skills, improved attitudes and behaviour towards work-readiness. This can lead to greater task performances and career developments by students. WIL can also assist students in achieving the required skills to positively improve their efficiency in the workplace.

All of the above-mentioned positive attributes of WIL are suitably clustered by Atkinson *et al.* (2005:38) and the CHE (2011:6) into academic, personal, career and work skills development benefits and include attributes such as increased discipline thinking, increased team work and cooperation, improved career identity, increased employment, increased competence and the development of positive work values and ethics.

Pertaining to this study it can be said that the advantages of WIL include a wide range of workplace experience during students' academic studies. This workplace experience allows students to become familiar with their future workplaces, afford

them the opportunity to begin their working life with relevant, practical and ethical knowledge and skills.

2.3.3.2 Challenges of WIL

It must be noted that WIL also has its challenges. According to the CHE (2011:7) programmes that traditionally include practical components, internships, and other forms of workplace experience have unaligned or ill-aligned curricular and pedagogic practices. This implies that what is taught in the classroom does not necessarily align with what is expected of the students in an authentic work environment.

The CHE (2011:7) is also of the opinion that the innovative practices offered by the inclusion and use of modern web-based technologies and social media in WIL can be seen as additional educational and logistic challenges and opportunities that need to be addressed.

Although WIL can develop students' career management skills as they are prepared for the workplace (*cf.* 2.3.3.1), it should be noted that these skills are not necessarily addressed in WIL programmes (McIlveen *et al.*, 2011:40).

Habel and Habel (2010:330-331) and Freudenberg *et al.* (2010:479) found that WIL may not always have the positive effects on students' efficiency in the workplace that might be expected. Whereas Leong (2012:156) describes people's efficiency as people's positive beliefs, thoughts and feelings about their personal capabilities, it is also pointed out that unless students' efficiency in the workplace is developed and assessed, WIL will not realise their full potential (Leong, 2012:156).

Another challenge to take into consideration in WIL, is that of the workload of academics. Bates (2011) conducted research into this matter and argues that many WIL programmes take up a lot of staff time without rightfully acknowledging, rewarding or recognising the staff. If a WIL programme is to be effective, institutional managements need to provide the opportunity for staff to become much more aware of the tasks and the time required to complete the tasks (Bates, 2011:114). The researcher wishes to add that the aforementioned could just as well be applicable to industry. Bates (2011:117) continues the argument when she says that the academic teaching of a WIL course, which could include students and workplace mentors demands a range of activities because of its contextualised nature which requires lots

of staff time. In addition, Bates (2011:117) believes that staff are frequently involved with assisting students who experience difficulties while in the workplace. These difficulties include varied personal, professional and workplace supervision issues (Bates, 2011:117). In each of the mentioned situations, the academic staff member is teaching problem-solving and other strategies on an individual basis, and is frequently required to provide a high level of support to students. Moreover interactions with workplace mentors are also critical for securing on-going relationships, the reputation of the academic institution and the WIL programme.

Bates (2011:117, 118) also refers to another important issue which relates to the provision of discipline-specific career advice and the development of professional literacy. When it is argued that the lecturer is frequently identified as an expert by both students and colleagues and, as a result, represents the first point of contact to provide individual career, behavioural and professional advice, such a lecturer should be competent in handling such tasks.

Last, but not least, poorly resourced and poorly managed WIL programmes can have a significant, long-lasting negative impact on the reputation of an academic institution and its students and can also filter through to the industries in which graduates are employed (Bates, 2011:118). According to Bates (2005:22) there are three possible challenges emanating from workplace mentors. Firstly, student/mentor relationships could contribute to conflict, making attending work for the student unpleasant. Secondly, workplace mentors could experience stress when having to assess students. This could also lead to reluctance on the mentor's part to provide negative feedback that will impact on a student's results. Thirdly, insufficient support from the workplace and the academic institution to workplace mentors may result in feelings of isolation and pressure. With regard to WIL challenges applicable to the industry or workplace mentors, Harrison (2012:3) also alludes to the costs involved to host WIL students and the accompanying shortage of host employers.

Related to the mentioned challenges, the following are peculiar to WIL in the TUT environment:

- The DCME does not optimally utilise modern web-based technologies in its WIL programme.
- The researcher has realised, in working with the WIL coordinator of the DCME and other academic departments, that the workload of WIL staff is huge.

2.4 THE WIL CYCLE

It is important to note that WIL doesn't happen in a vacuum. Processes should be in place to manage the whole WIL experience. These processes are encapsulated in the WIL cycle. A basic WIL cycle is used by all UoTs involved with WIL. Forbes (2004:55-58; 2006:13-15), SASCE (2007:9) and the HEDS (2012:35-37) have identified five phases in the basic WIL cycle. Orientation and work preparedness is the first phase of the cycle, while the placement process, followed by the learning programme phase are representing phases two and three. The fourth phase comprises visitation, monitoring and communication. The WIL cycle ends with the fifth phase which is assessment. These aforementioned phases will be discussed in more detail below.

(i). Orientation and work preparedness

During the orientation phase of WIL students receive instructions to prepare them for the workplace. Over a period of time students are introduced to and are taught various skills that may include CV writing skills, how to apply for a job, presentation skills, interview skills, time management skills and communication skills.

The employability officer of the academic institution would generate activities and tasks which will allow students to demonstrate knowledge and competence across a range of learning areas that will prepare them to apply the generic skills regarded as critical for the preparation for the workplace.

(ii). The placement process

The placement process does not only entail the administrative exercise of allocating students to companies or to assist students find suitable employment. Placement is meant to be a learning experience for the students where they have to apply acquired knowledge, skills and competencies to secure their own placement. This implies they have to go through the process of applying for a job, experience the short-listing and go for the interview before being appointed. The aforesaid implies that the placement process requires specific outcomes and assessment criteria to measure the students' performance in securing a placement. Aurangzeb (2008:61) is of the opinion that placement of students in industry requires considerable thought and effort on the part of the employability officer and lecturer in charge of placement, because it is imperative that students are placed in accredited companies where they can gain optimal experience. All role players from the academic institution and industry should ensure that the placement experience is rewarding and fruitful to students. The implicit understanding here is that students first acquire knowledge and skills in classroom settings and then learn to apply these in practice (Abeysekera, 2006:8-9; Sattler *et al.*, 2011:4-26; HEDS, 2012:3-4).

(iii). Learning programme

In this third phase of the WIL cycle, outcomes and assessment criteria, specific to a particular WIL programme, are documented to provide guidance to everybody involved in the WIL programme. Students are guided on how the learning experiences should be integrated and recorded. Assessment criteria and evaluation timeframes are documented and clarified. In developing a WIL curriculum, the intended LOs, teaching and learning activities and the assessment tasks and criteria should be prevalent (CHE, 2011:13-15). The LOs should be relevant and meaningful and need to be clarified by all stakeholders. Teaching and learning activities and assessment tasks should be authentic and meaningful activities and should be designed to achieve enhanced and integrative learning. By using interpretative and reflexive activities to encourage students to interpret and reflect on the WIL experience and how knowledge is transferred from the academic to workplace context (and vice versa), should be at the heart of the teaching, learning activities and assessment tasks (CHE, 2011:15). By considering the above when developing the WIL curriculum, it will be easier to

manage the WIL programme, and it will ensure that students' learning will focus on the integration of theoretical knowledge and practice.

Although the learning programme and student obligations are clarified during the orientation and work preparedness phase, the student has to be supported in the learning environment. Students experiencing problems associated with interpretations of the learning programme, student and industry expectations, and actual workplace conditions, need to be supported so that valuable time is not lost or morale dampened which could negatively impact on the learning experience.

(iv). Visitation, monitoring and communication

The fourth phase of the WIL cycle is where the lecturers visit students to ensure that their learning experience meets the required expectations as stipulated in the LOs and assessment criteria. The visitation is a requirement of the Higher Education Quality Committee (HEQC) (HEDS, 2012:36). The purpose of the monitoring process, is to assess the achievement of LOs, to facilitate the acquisition of critical cross field outcomes and the general progress of the student in terms of workplace skills (HEDS, 2012:36). In this phase of the WIL cycle, students, workplace mentors and lecturers usually meet to discuss a student's progress. Logbook entries, presentations or any other agreed evidence, portfolios of evidence (PoE) or artefacts may be used to assess student progress. [Since a PoE is a compilation of learning evidence, for the remainder of the study the researcher will refer to it as portfolios of learning evidence (PoLEs)]. If any problems are identified, a meeting between the workplace mentor and the student is facilitated by the lecturer.

(v). Assessment

Assessment could be performed by means of debriefing sessions by workplace mentors, academic staff members or even external examiners. The debriefing is conducted in the form of a discussion between the student, lecturer and workplace mentor, and could entail a presentation by the student. Employer feedback may accompany the student's debriefing session whereby the mentor provides feedback on the student's performance and contributions during the WIL programme (HEDS, 2012:37). During the assessment phase, students should also be afforded the opportunity to reflect on their learning by providing feedback on WIL to the mentor and

academic staff member (HEDS, 2012:37). Feedback by students and workplace mentors can serve as a quality assurance and quality control tool for review and improvement, and according to Kaliyamoorthy and Sridevi (2011:8) it should be a robust process. In addition, logbooks, assignment reports, projects, presentations or any other agreed artefacts or PoLEs may be used to assess and evaluate students' WIL learning. Burton (2009:3) also mentions that 'real-life' tasks, exhibitions, interviews, journals, observations, oral presentations, performances, patchwork texts and simulations could be included. Marks, credits or records of competence may be used to reflect student success and attainment of LOs. In an outcomes-based WIL programme, LOs and assessment criteria must relate to the nature of the knowledge, skills and competences for the progressive development of the students as they move through the work integrated experience.

2.5 WIL STRATEGIES

Whereas the WIL cycle could assist in the planning of WIL, WIL strategies are indicative of how WIL will be approached. The use of a particular WIL strategy would largely depend on the culture and size of the HEI, the nature of the academic programmes, the nature and structure of the faculties, and the level of support from senior management (Wessels, 2014:3). Lemckert (2003:417-418) broadly classifies these strategies as traditional sandwich strategies, cognitive apprenticeship and cooperative education.

In addition, the CHE (2011:16-19) and the HEDS (2012:3-4) also explain four other WIL strategies, namely work-directed theoretical learning, problem-based learning, project-based learning, and workplace learning. Abeysekera (2006:8-9), Kaliyamoorthy and Sridevi (2011:2), Sattler *et al.* (2011:4-26) and the HEDS (2012:3-4) also differentiate between the following WIL strategies: internship, service learning, field experience, professional practice and simulation. A brief explanation of these strategies follows below.

2.5.1 Traditional sandwich strategy

Within a traditional sandwich strategy, work experience is viewed as a separate component from classroom learning, since the student takes time off from class attendance to undertake workplace training. There is little, if any, integration between what is learned in the classroom and the industry (Lemckert, 2003:417).

2.5.2 Cognitive apprenticeship

The cognitive apprenticeship strategy gives students the opportunity to observe and absorb the organisational culture of the workplace. This strategy is mostly evident in the concept of apprenticeship in a professional practice where the student is exposed to new learning experiences, and after reflecting on them, in time, puts them into practice (Lemckert, 2003:418).

2.5.3 Cooperative education

There has been a renewed interest in cooperative education as a strategy that will enable students to gain authentic work experience (Wessels, 2014:1). According to this strategy a student's academic studies are formally integrated with work experience, and provides the industry partner with the opportunity to capitalise on the accumulated expertise of both the student and academic staff, and vice versa (Lemckert, 2003:418; Wessels, 2014:1-2). Cooperative education programmes enable students to gain relevant work experience while applying and refining the knowledge and skills acquired in the classroom. According to SASCE (2007:6) this strategy is appropriate when qualifications are designed to incorporate or integrate periods of required work with classroom study, or when WIL is directed at the attainment of professional or occupational LOs.

The cooperative education strategy is best defined by Du Pré (2009:86) when asserting that cooperative education is a "philosophy of learning that promotes the concept of enhanced learning based on cooperation between educational institutions and industry, commerce and the public sector. When selecting this strategy, it is important to note that learning environments should be designed to include cooperation as a key element to enable students to attain authentic learning experiences. Cooperation with the workplace can be established and students

properly prepared to step into the workplace with confidence, knowing what is expected.

Wessels (2014:1-4) further asserts that cooperative education can either be centralised, desentralised or integrated. Centralised cooperative education is where there is a central unit within an academic department with cooperative education coordinators and support staff. Cooperative education is desentralised when WIL lecturers and coordinators are located in academic departments. Integrated cooperative education is where there is a central cooperative education unit with academic and WIL coordinators located in the various faculties, in which all role players are involved in cooperative education. All these strategies have the potential of involving academic institutions and the workplace as joint owners of a WIL programme (Engelbrecht, cited by Wessels, 2014:6).

2.5.4 Work-directed theoretical learning

All WIL programmes should include theoretical components that should be aligned with the practice-based components. In this strategy, theoretical learning based on the academic discipline's demands, is aligned with workplace relevance. Hence, this strategy is strongly focused on theory.

2.5.5 Problem-based learning

According to the CHE (2011:16-19) and the HEDS (2012:3-4), the main objective of problem-based learning is the acquisition of an integrated knowledge base that is readily recalled and applied to the analysis and solution of problems in the WIL programme. This encapsulates the notion of problem-oriented learning, which involves the inclusion of real world scenarios for problem-based activities, assignments and projects. Problem-oriented learning enhances the development of effective and efficient problem-solving skills, self-directed learning skills and team skills.

2.5.6 Project-based learning

The CHE (2011:16-19) and the HEDS (2012:3-4) explain that project-based learning involves learning through projects located in the workplace. Such projects generally involve elements of research and the supervision by both an academic supervisor and

a workplace mentor. The problems could be simulated, where the learning takes place in the academic institution (with some input from industry). Non-simulated problems involve learning through practice in a work context, as in-service-learning or through a university-industry collaborative research project. In project-based learning students are engaged in complex, work-related issues through which they develop and transfer skills and knowledge.

2.5.7 Workplace learning

In workplace learning, where students are placed in work environments for the purpose of learning, students are actively involved in the planning, and implementation of activities. During their involvement with the activities, students are also required to reflect on and evaluate the activity and make subsequent adjustments for future action (CHE, 2011:16-19 and HEDS, 2012:3-4).

2.5.8 Internship

The internship strategy differs from other strategies in that it has an intentional learning agenda that the student brings to the workplace. An internship is any carefully monitored work or service experience in which a student has intentional learning goals. Reflection on what is being learned throughout the experience is also important. Internships are offered in professional fields, with workplace mentors acting as mentors. Internships engage students in meaningful work, but can also include job shadowing. Stated by Abeysekera (2006:8-9), CHE (2011:16-19), Kaliyamoorthy and Sridevi (2011:2), Sattler *et al.* (2011:4-26) and HEDS (2012:3-4), the internship strategy has two objectives: firstly, for students to understand the organisational structures within a professional workplace, and secondly, to provide students with an opportunity for professional development in a professional workplace.

2.5.9 Service learning

Another WIL strategy is Service Learning or community service performed through the HEI. Service learning is any carefully monitored service experience in which students are required to attain intentional learning goals by reflecting actively on what is being learned throughout the learning experience. It is intended to provide equal benefits to both the student and the community in a reciprocal partnership, while ensuring equal

focus on both the service being provided and the learning that is occurring (Abeysekera, 2006:8-9; Kaliyamoorthy & Sridevi, 2011:2; Sattler et al., 2011:4-26; HEDS, 2012:3-4). The primary goal of service learning is the attainment of positive civic and academic outcomes, such as the engendering of a sense of civic responsibility in students and enabling them to share the knowledge, skills and attitudes they have learnt (Forbes, 2006:3). Service learning aims at developing students' life skills and awareness of personal, social and cultural values and respect for and understanding of others; thus leading to more responsible citizens. Service learning is not an add-on to students' course of study, but is integrated into the learning programme. Service learning includes high-quality services intended to meet the goals defined by the community in which they are provided.

2.5.10 Field experience

Field experience focuses on the integration of theory and practice and includes placements and other work-related experiences that prepare students for professional or occupational fields. Field experience does not involve direct supervision of students by academic staff, but may involve periodic site visits whereby student performance is evaluated. Field experience can also include simulated work experiences that provide innovative opportunities for students to apply acquired knowledge and skills as well as for testing concepts and theories.

2.5.11 Professional practice

Professional practice is a strategy that includes any professional practice-based arrangements that are necessary for a professional qualification. The work is typically drawn from the range of work contexts students may be expected to encounter. Professional practice is assessed by workplace mentors and academic staff.

2.5.12 Simulation

A simulation is when non work-based WIL is successfully performed in a simulated environment that is fully equipped to simulate the learning experience applicable to the reality of the workplace.

2.6 WIL AND AUTHENTIC LEARNING

Since the prominence of authenticity within the framework of WIL is striking, it is necessary to elaborate further on authenticity and authentic learning and its significance to WIL and this study.

2.6.1 Authenticity

Andersson and Andersson (2005:423) reason that the notion of authenticity is central to discussions on contextualised and constructivist approaches to learning, where students are challenged to construct deep and meaningful knowledge rather than to reproduce surface knowledge. Doyle (cited by Andersson & Andersson, 2005:424) argues that the term authenticity can be understood as having three different parts. These include authenticity in terms of a learner's perspective; implying that the focus is on the learner's genuine and meaningful experiences of content. Student-centredness is thus fundamental. A second part would include subject orientation, where the task is associated with the current topic. In the third instance, authenticity is connected to student participation in real situations with real activities. Andersson and Andersson (2005:424) conclude that these central parts of authenticity put forward the idea of tying authenticity to lifelong learning, as adult learning in everyday activities is often situated.

2.6.2 Authentic learning

According to Lave and Wenger (1991) authentic learning suggests that students take on apprentice-type roles under the guidance and supervision of people in a particular workplace. This method eases students into the workplace and provides them opportunities to engage in the real activities of the workplace, without expecting them to fully participate. The environment is authentic in that it is a real work situation, while the learning experience is also authentic because the workplace and support provided by the workplace mentor allows the experience to be personally real for the student (Lave & Wenger, 1991). Grabe and Grabe (1996:56) and Lombardi (2007b:2-3) argue that authentic learning encompasses more than just content, but also includes various disciplines and perspectives, ways of working, and habits of mind. Grabe and Grabe (1996:57) continue by stating that authentic learning experiences assist students to engage with reality and to develop appropriate and effective understandings of the

real world. Stein *et al.* (2004:239) note that authentic learning experiences are those that are personally relevant from the students' perspectives and which are situated within appropriate social contexts. In terms of institutional teaching and learning this implies that the activities undertaken by the students should reflect similarity to those activities undertaken in the workplace beyond the institution (Stein *et al.*, 2004:240).

According to Singh and Mahomed (2013:1373), authentic learning denotes the creation of an environment by mentors in which students can be trained to be productive and be able to excel when employed. Lombardi (2007a:2; 2007b:3-4) further elaborates on authentic learning by highlighting the following:

- Learning activities should be closely matched with workplace activities.
- Learning activities should be relatively undefined and students should be able to interpret them in various ways to achieve the tasks at hand.
- Learning activities should be investigative, challenging, complex, ambiguous and multifaceted.
- Learning activities should allow students to approach them from both theoretical and practical perspectives to distinguish between relevant and irrelevant information and where a variety of resources are permissible.
- Learning activities should for allow reflection, self-assessment and performance review.
- Learning activities should embrace teamwork and collaboration.
- Learning activities should allow students to make contributions that are valued by fellow students, lecturers and employers.
- Assessment of authentic learning should be integrated with the learning activities and be indicative of real-world evaluation processes.

2.6.3 Authentic learning and technology

Authentic learning can be achieved through collaboration, by posing questions, by simulating situations and by using authentic material and authentic assessment. Lombardi (2007b:6) even states that the benefits of authentic learning can be realized through careful design of Web-based learning environments to help students collaborate with one another in sharing and constructing knowledge. This is underscored by Grabe and Grabe (1996:9, 67) who state that the use of technology can enhance interaction among students, which in turn, will ensure active learning.

WIL programmes should employ technology in delivering knowledge and skills at a distance. Commenting on how modern technology assists in distance education delivery, Parmaji (cited by Quan-Baffour, 2009:3-4) states: "The greatest contribution of media in distance education is that media have widened the frontiers of education available to the public. Supplemented by an effective, auxiliary face-to-face interpersonal network, media effect is tremendous and entire societies can be changed and modernised in a short span of time."

Lombardi (2007a:15) states it very clearly that technology promises to expand the range of authentic learning experiences exponentially. This point is further argued by Herrington and Kervin (2007:219-220) who maintain that technology presents the opportunity to employ powerful cognitive tools that can be used by students in authentic learning. Hillis (2008:87, 89) also argue the same point by saying that authentic learning and multimedia together, create a powerful medium for learning, and that student learning is enhanced when new technologies bring together critical (thinking) skills in a multimedia environment. Gulikers *et al.*, (2005:509-513), Choo (2007:188-196), Herrington and Kervin (2007:221-232) and Slepkov (2008) all believe that useable knowledge is best gained in learning environments where, amongst others, technology is used and incorporated in achieving authentic learning.

The researcher thus concludes that academic institutions should be places that support and promote authenticity from both the student and workplace perspectives (Stein *et al*., 2004:241). One also needs to take cognisance of the fact that the student and the workplace are bound together and both influence each other. Furthermore, what is relevant to the real world today may not be important tomorrow and thus the notion of authenticity needs to be fluid over time to adapt to changing educational and workplace needs. Consequently, authenticity in WIL can be ensured through carefully designed Web-based learning environments where activities match the workplace tasks as closely as possible. In such Web-based environments, workplace activities and implicit authentic web-based assessment tasks should also be encapsulated.

2.7 WIL IN THE DCME

At the TUT, the DCE is responsible at institutional level for strategic leadership on WIL and is operationally responsible for employability at institutional and faculty level (*cf.* 1.1) (Wessels, 2014:12).

Because the focus of the study is on WIL in the DCME, further discussion directed at the aforesaid academic department's WIL programme is necessary. However, it needs to be noted that all other academic departments of all the faculties involved with WIL is subjected to the same WIL outcomes and guidelines as described by the HEDS (2012), with adaptations applicable to each discipline and field of study.

The importance of WIL has long been recognised by the DCME. The model of WIL implemented in the DCME is based on the integration of theory and practice by following the cooperative education strategy, where the relevant industry is the preferred and authentic site for learning. Prior to graduation, students of the DCME are expected to provide evidence of relevant experience in the workplace. This WIL experience is expected to provide opportunities for exposure to the industry and to help the students develop confidence, skills and capabilities as emerging professionals. To this end, the students of the DCME are expected to:

- Keep an accurate and comprehensive daily work log and reflective journal of their workplace learning activities and experiences.
- Plan, manage and reflect on the implementation of a range of workplace learning experiences while they conduct themselves professionally.
- Report on aspects of professional practice, conduct and other aspects of their workplace experience relevant to their development as a professional.

Exposing chemical and metallurgical engineering students to practice with opportunities to engage with industry and to develop an understanding of the workplace, are important goals of the DCME's WIL programme. Students at the DCME are required to aggregate at least two work placements (P1 and P2) of six months each of practical experience in the workplace during their third and fourth years of study. Both the work placements must be undertaken in an engineering industry relevant to their course. These placements are intended for students to understand and comprehend all aspects of their chosen field of work, strengthen their CV, and to build professional networks in the Engineering field.

During their workplace visits, students are expected to complete the WIL logbook and report on the WIL tasks. These are then mailed, couriered or hand-delivered to the WIL coordinator. The WIL coordinator or lecturers assess the tasks after which the student is debriefed and declared competent.

2.8 CONCLUSION

In answer to the secondary research question on what the nature and value of WIL in terms of the provision of quality higher education is, the researcher conceptualised WIL by defining the concept, relating it to learning experiences and by indicating its challenges. The WIL cycle and WIL strategies were discussed after which WIL was related to authentic learning. At the end of the chapter a brief overview of WIL in the DCME was provided.

In the next chapter, assessment in WIL will be discussed.

CHAPTER THREE
ASSESSMENT IN WIL

3.1 INTRODUCTION

This study intends to consider the factors that should be included in the development of e-assessment as component of WIL and to determine the resultant experiences of the implementation of e-assessment as component of WIL. Therefore, in this chapter, it is necessary to focus on e-assessment by addressing the following secondary research questions:

- What is the significance of e-assessment within the contexts of assessment, educational technology and WIL?
- How can e-assessment within a WIL programme advance authenticity and augment instruction and conventional assessment?

3.2 BACKGROUND

There is a growing need to evaluate and improve current WIL assessment practices (Dean *et al.*, 2012:102). According to Lombard (2010:32), it is no longer sufficient to have assessment in place for improving throughput and pass rates, but also to improve on the quality of teaching and learning in order to promote successful and self-regulated students. Grabe and Grabe (1996:10) state that students will encounter a rapidly changing world and will need different tools and skills to function effectively in the modern workplace. In response to the growing demand for graduates to be "work-ready" (Aurangzeb, 2008:57; Forsythe, 2012:3), students should be proficient in complex skills such as problem-solving and critical thinking in order to meet demanding societal, economic and technological challenges. This proficiency should also be prevalent in WIL; hence, current WIL assessment practices need to be refined, amended or reformed with the aim of advancing learning.

McDowell and Sambell (2003:71) contend that a broader range of assessment approaches may provide more accurate representations of students' knowledge and understanding and that alternative assessment approaches may be more appropriate to the kinds of abilities now demanded of graduates in the workplace. Underscoring

this viewpoint, Burkšaitienė and Teresevičienė (2008:155) assert that alternative assessment approaches have several learning, instructional and assessment advantages for students and lecturers. In addition, Lombard (2010:33) mentions that lecturers should be able to employ "assessment manoeuvrability" by making provision for both conventional and alternative assessment approaches. With this in mind, the researcher argues that e-assessment constitutes an alternative assessment approach which also allows for assessment manoeuvrability. Guided by the secondary research questions stated in section 3.1, e-assessment will be further examined.

3.3 THE FUNDAMENTAL ELEMENTS OF ASSESSMENT

In order to deal with the fundamental elements of assessment, it is necessary to define the concept by also considering the assessment process. This section will continue with a discussion on the purposes of assessment and the principles applicable to quality assessment

3.3.1 Defining assessment

In the literature there is a multitude of definitions of assessment. Huba and Freed (2000:21) stipulate that assessment constitutes the understanding of what students know, understand and can do with their knowledge as a result of their educational experiences to subsequently improve their learning. According to SAQA (2001a:16), assessment is "a structured process for gathering evidence and making judgements about an individual's performance in relation to registered national standards and qualifications." Allen (2004:3) asserts that assessment involves the use of empirical data on student learning to refine programmes and improve student learning. For McMillan (2007:5, 8), assessment is "the gathering, interpretation, and use of information" to aid decision making to improve student learning. Assessment is also described as "a broad term defined as a process for obtaining information about students; curricula, programs, and schools; and educational policy" (Nitko & Brookhart, 2011:3).

From this selection of definitions, it becomes evident that assessment is a concept that encompasses *measurement* and *evaluation* that lead to decision making. Geyser (2004:102) states that when a student's response is *measured*, information relative to a predetermined standard, such as a scoring scale, is collected. It can thus be

deduced that when a scoring scale is applied, a quantitative value is attached to a student's response. This deduction is confirmed by McMillan (2007:9) who maintains that measurement "has traditionally been defined as a systematic process of assigning numbers to behaviour or performance". Incorporated in measurement, is differentiation (McMillan, 2007:9), since a quantitative scale serves as a yardstick which enables one to differentiate or distinguish between poor and excellent performance. Qualitative analysis of student learning by means of appropriate qualitative criteria may serve as an alternative for measurement of student learning in a quantitative way. *Evaluation* involves an interpretation of what has been gathered through measurement (McMillan, 1997:10; Geyser, 2004:100-101). Oosterhof (2009:10) describes evaluation as "the outcome of measurement after value has been added". According to Lombard (2010:33), evaluation literally implies engagement of a lecturer in the process of making judgements about the worth of a student's work. In corroboration, Nitko and Brookhart (2011:6) assert that evaluation is a process of making value judgements about the worth of a student's product or performance.

It can be concluded that assessment is "an umbrella concept" (McMillan, 2007:5) which incorporates measurement and evaluation. Furthermore, assessment could be described as a mechanism which serves to inform students of their attainment of the learning outcomes and level of competence; diagnoses areas of strengths and weaknesses in students' work and confirms the licencing of students for a profession or occupation (Pratt, 1980:195-198; McMillan, 1997:5; SAQA, 2001a:16; Alant & Casey, 2005:185; Smit, 2008:19).

3.3.2 The assessment processes

Closely related to the definition of assessment, is the assessment process. It is important to note that assessment should not be seen as a linear, but rather as a cyclic process. In this regard, assessment represents a continuous process; the reason being that despite its nature, assessment should always contribute towards student growth and development. Derived from the definitions in 3.3.1 and by envisioning a typical assessment episode, it can be resolved that assessment consists of incidents such as the collection, analysis, interpretation, recording, reporting and using of information related to students' accomplishments. Adopting Lombard's (2010:34-36)

understanding of the assessment process, the classical assessment process could be sequentially outlined as follows:

1. Information is collected to provide evidence of students' knowledge or understanding of a given task, or their ability to perform a given task.
2. The collected evidence is analysed (or measured) against predetermined criteria to determine student performance.
3. After the evidence has been analysed, the outcome of the analysis must be interpreted (or evaluated or judged) to determine the success level of student performance. In other words, sense is made of the students' level of performance.
4. The students' performance levels are recorded as documentary proof of their achievement against set standards.
5. The students' performance levels, expressed in either quantitative or qualitative values, are reported and communicated to the students and other concerned parties.
6. The students' achievements are used as a point of departure to diagnose any barriers to learning, or to move learning forward.

3.3.3 The purposes of assessment

Derived from the literature, it appears as if the purposes of assessment can be explained in at least two ways. The first explanation relates to the fact that assessment is performed for a variety of reasons, while the second explanation is associated with the intended use of the assessment results. Understood in this way, the reasons why assessment is performed could include the following [Grégoire (1997:10); Brown (2001:17); Geyser (2004:108-109); Crisp (2007:27); Abrami *et al.* (2008:10); Lombard (2010:46-51; 133); Scaife & Wellington (2010:138); Leong (2012:155)]:

- **Screening**: to identify students' aptitudes or needs.
- **Diagnosis**: to identify students' strengths and weaknesses; current knowledge and skills levels, or to determine why a student experiences a specific barrier to learning.
- **Record-keeping**: to record student achievement for possible verification.

- **Feedback**: to provide timely, relevant, understandable, detailed and meaningful information about students' progress to serve as motivation for performance improvement.
- **Grading**: to allocate grades to levels of learning achievement related to predetermined standards, that informs the judgement about students' performance.
- **Measurement/Scoring**: to indicate quantitative information relative to a predetermined standard such as a scoring scale, which includes instruments such as rubrics.
- **Progression**: to decide if a student satisfies the requisite criteria to continue to the next level of learning.
- **Certification**: to provide a student with a unit standard or qualification, signifying that a certain level of competence has been reached.
- **Selection**: to assist students in their decision-making about further studies.
- **Programme evaluation**: to decide on the quality or merits of a particular programme of learning.

As indicated earlier, the second explanation of the purposes of assessment is associated with the intended use of the assessment results. To clarify this explanation further, it can be said that if the assessment results are intended to be used for determining students' entry level into a specific learning programme, it is most likely that such assessment will be conducted with a baseline purpose in mind. The results of baseline assessment will thus be used to "inform one about where to begin the teaching and learning process" (Dreyer, 2008:17). Other than baseline assessment, the following can be classified under this second explanation of the purposes of assessment: informal assessment, formal assessment, diagnostic assessment, formative assessment, summative assessment, continuous assessment, authentic assessment and performance assessment. According to SAQA (2001a: 26) these purposes of assessment are representing assessment forms. Since authentic and performance assessment are especially significant to this study (*cf.* 1.4.1), more attention will be given to these purposes of assessment, while the other purposes will be briefly considered.

3.3.3.1 Informal assessment

With informal assessment, the intended use of the assessment results is to inform the teaching and learning process. Informal assessment does not require "structured testing procedures" (Nieman, 2008:82) and the results are not recorded, since informal assessment "happens on the spur of the moment" (Oosterhof, 2009:6). The DoE (cited by Lombard, 2010:49) states that informal assessment implies the daily monitoring of students' progress.

3.3.3.2 Formal assessment

The intended use of the assessment results of formal assessment is to officially reflect student performance. Formal assessment constitutes assessment which is "deliberately scheduled and fully developed in advance" (Oosterhof, 2009:2). The Department of Education (DoE) (cited by Lombard, 2010:49) concludes that formal assessment is intended to "provide lecturers with a systematic way of evaluating how well students are progressing". The aforementioned implies that formal assessment follows structured procedures of which the results should be recorded.

3.3.3.3 Diagnostic assessment

The results of diagnostic assessment are used to identify which learning targets are not mastered by the student and to determine the possible causes of this non-attainment (Nitko & Brookhart, 2011:131). By means of diagnostic assessment, students' strengths can also be identified.

3.3.3.4 Formative assessment

Formative assessment is described as "a planned process in which assessment-elicited evidence of students' status is used by teachers to adjust their ongoing instructional procedures or by students to adjust their current learning tactics" (Popham, 2008:6). It is thus evident that the assessment results of formative assessment are used to improve both teaching and learning.

3.3.3.5 Summative assessment

Summative assessment results are final results of student performance, reflecting their achievement of predetermined learning goals. Oosterhof (2009:7) contends that summative assessment occurs at the end of an instructional cycle to certify student achievement for promotional purposes.

3.3.3.6 Continuous assessment

The results of continuous assessment yield comprehensive and reliable information about students' attainment of learning outcomes (Killen, 2007:340). According to Geyser (2004:101), continuous assessment is characterised by the integration of teaching and assessment, the use of feedback from each assessment to inform further teaching and the construction of the next assessment and a combination of different assessment methods to collect evidence. Hence, continuous assessment suggests a balance between informal and formal or formative and summative assessment and allows for scaffolding of learning.

3.3.3.7 Authentic assessment

Authentic assessment results reflect a student's ability to perform an assessment task in circumstances replicating reality. Geyser (2004:102), Gulikers *et al.* (2004:69) and Burton (2009:2) state that authenticity in assessment is achieved when the assessment tasks resemble and are closely aligned with activities that take place in real world settings. Oosterhof (2009:159) maintains that authentic assessment "involves a real application of a skill beyond its instructional context". While authentic assessment is associated with comprehensiveness, higher-order thinking, reflection and complex behaviour (Merckel & Van der Merwe, 2010:112), Nitko and Brookhart (2011:246/247) stress the fact that it should present students with tasks "that are directly meaningful to their education instead of indirectly meaningful". Wiggins (cited by Lombard, 2010:53-54) argues that assessment should conform to the following six characteristics in order to qualify as authentic assessment:

- Assessment that is realistic and reflects the way knowledge and skills would be used in "real" situations.

- Assessment that requires judgement and innovation, and which is based on students' ability to make informed choices.
- Students are required to "do" something by following the same procedures as will be required in the real situation.
- Assessment is done in situations reflecting similarity to the real context.
- Assessment that requires students' ability to demonstrate a wide range of knowledge and skills.
- Assessment that allows for feedback, practice and second chances.

3.3.3.8 Performance assessment

Performance assessment is applicable when a student carries out a specified activity under the watchful eye of a person who observes performance and makes judgment as to the quality of achievement demonstrated (Stiggins, 2004:2). Performance assessment sets forth expectations for students and require them to create an original answer or product, use higher order thinking skills, demonstrate thinking processes, and evaluate real world situations (Tung, 2010:2). Tung (2010:4) further states that "performance assessments provide students with more ways to show what they know and can do, allow students with different learning styles more opportunity to succeed, and engage students more in their own learning and interests, because they include reflection and demonstration of thinking processes. Performance assessments are more closely aligned with real world skills that students will need". Oosterhof (2009:159) alludes to the fact that although authentic assessment and performance assessment are remarkably the same, not all performance assessment tasks can be equated to authentic assessment.

3.3.4 The principles of quality assessment

Assessment literature is adamant that quality assessment is governed by certain principles and a range of these principles is documented. For the purpose of this study, a collection of the most prominent principles found in the literature will be alluded to. These include constructive alignment, reliability, validity, meaningfulness, integration, fairness, transparency, practicability, balance, cognitive complexity and transferability.

3.3.4.1 Constructive alignment

Almost considered as a basic standard for quality assessment, is Biggs' (2003) theory of constructive alignment. This theory has two dimensions. The first dimension is strongly founded on Constructivism and refers to the engagement of students during teaching and learning events in order to enable them to construct meaning from learning experiences (Biggs & Tang, 2007:52). The success of this dimension is dependent on the second dimension of ensuring the compatibility between outcomes, teaching and learning activities and assessment procedures – also known as alignment (Biggs & Tang, 2007:52). Therefore, the CHE (2004:124) urges that assessment methods and tasks should be aligned with the taught content and skills and that care should be taken to ensure that assessment activities relate to the specified LOs. Within Biggs' (2003) theory of constructive alignment "deep learning" or students' desire to understand the underlying principles of the learning task (Smit, 2008:20; Leong, 2012:154) is anticipated. This is in contrast with "surface learning" which is characterised by low-level cognitive skills and passive students (Smit, 2008:20).

3.3.4.2. Reliability

According to the CHE (2004:134), Geyser (2004:96), Le Roux (2004:60) and Crisp (2007:140), an assessment task is considered reliable if the assessment results yield "sameness" even though the assessment was done in different ways. Furthermore, reliable assessment produces the same results if repeated under the same conditions (SAQA, 2001a:18; Popham, 2003:52). An assessment task is also considered reliable when the assessment results of two independent assessment activities are compared to determine the consistency of results or even where different assessors would make the same judgement for the same assessment activity, i.e. inter-rater reliability, (SAQA, 2001a:18). Noteworthy, is that assessment tasks that use an evidence-centred design focus, will improve the reliability of the assessment (Crisp, 2007:169).

3.3.4.3. Validity

According to the CHE (2003:113; 2004:134), Geyser (2004:96), Le Roux (2004:60), and Smit (2008:25), it needs to be ascertained that what is intended to be assessed

is indeed assessed and that the intentions are justifiable. It could therefore be said that validity is concerned with the quality of an assessment task in terms of its congruence with intended LOs (Crisp, 2007:139). When an assessment task is also evidence-centred it will improve the validity of the assessment (Crisp, 2007:169). Crisp (2007:139) and Lombard (2010:40) differentiate between face, content, criterion, construct, predictive and concurrent validity which are briefly outlined below:

- *Face validity* is applicable to determine as to whether the assessment task appears as if it assesses what it intends to be assessing.
- *Content validity* is applicable to determine as to whether an assessment task represents the intended scope or field of learning.
- *Criterion validity* is applicable to determine the extent to which the construction of one assessment task is informed by, or is based upon other, more or less similar assessment tasks.
- *Construct validity* refers to the extent to which an assessment task measures something which is difficult to observe directly, but which could be inferred from other indirect but related measurements.
- *Predictive validity* is concerned with the extent to which a student's past performances are predictive of the same student's future performances in a particular area of learning.
- *Concurrent validity* is when there is a correlation between the result of one assessment task compared to that of another assessment task that focused on the same outcome in the same area of learning, and which was completed at about the same time.

3.3.4.4 Meaningfulness

Learning is seen as a process of constructing personal understanding and meaning. In this sense, assessment forms part of learning, in that it should evoke learning. This means that an assessment activity should provide for a meaningful or worthwhile learning experience for students (Lombard, 2010:45).

3.3.4.5 Integration

Smit (2008:19-20) states that students' perceptions of the assessment procedures are the single most important influence on student learning. This would mean that a lecturer's assessment strategies could influence the way in which the students approach their learning. This relates to what is called the "backwash" effect of assessment on student learning (*cf.* 3.3.7). Integration implies that lecturers should ensure that the curriculum is unbiased and effectively reflected in the assessment tasks. If teaching and assessment are aligned and integrated, the learning that takes place would be intensified by the assessment thereof (Amory *et al.*, 2008:5). Assessment should thus not be viewed as an add-on to a learning activity.

3.3.4.6 Fairness

Fairness in assessment specifies that no student is disadvantaged or privileged in the assessment process. Matters such as inequality of opportunities, resources, ethnicity, gender, age, disability, race and social class could influence judgements of students' performance (SAQA, 2001a:16) and should be eliminated. According to Geyser (2004:97) and Le Roux (2004:61), fairness of an assessment task implies that it should be unbiased and that it should provide all students with equal opportunities to demonstrate their achievement. SAQA (2001a:17) and McMillan (2007:76) also state that assessment is fair and reasonable when students are informed about the assessment process and when they are provided with time and opportunities to prepare for the assessment.

3.3.4.7 Transparency

Related to fairness, is the principle of transparency. According to Geyser (2004:97) and Bushney (2005:65), transparent assessment would include informing students in advance about expectations, the provision of clear guidelines and supporting students prior to the assessment.

3.3.4.8 Practicability

"Practicability refers to ensuring that assessment takes into account the available financial resources, facilities, equipment and time" (SAQA, 2001a:19). Assessment should thus be feasible. For this reason assessment should be cost and time effective in terms of its in-puts (e.g. preparation) and in terms of its out-puts (e.g. attainment of expected outcomes).

3.3.4.9 Balance

The principle of balance in assessment can be interpreted in various ways. To differentiate between balance in cognitive demands and balance related to other aspects, Lombard (2010:42) classifies balance in cognitive demands under the principle of cognitive complexity. Balance should therefore be understood as the symmetry between the allocated time for completion of the task and the difficulty of the task and the inclusion of a variety of items in an assessment task (Lombard, 2010:42).

3.3.4.10 Cognitive complexity

Although quality assessment should make provision to accommodate lower-order and higher-order thinking, the cognitive complexity of an assessment task should be appropriate to the levels of the National Qualification Framework (NQF) (SAQA, 2001a:8-14). Various taxonomies are used to assist in determining as to whether an assessment task complies with the principle of cognitive complexity. Among others, these include Bloom's Taxonomy (1956), Bloom's revised taxonomy (Anderson & Krathwohl (2001), Webb's (2002) four levels of "depth of knowledge" (Oosterhof, 2009:34), Barrett's Taxonomy (1976) and the SOLO Taxonomy (Biggs & Collis, 1982).

3.3.4.11 Transferability

According to Lorrie (2000:11), genuine understanding of a concept promises the transferability of such a concept to other situations. Therefore, Lombard (2010:45) suggests that the outcome of an assessment task should be transferable to other applicable situations. This implies that a student should be able to apply obtained knowledge and skills to other contexts beyond the one of assessment.

3.3.5 Conducting assessment

Whereas the purposes of assessment are representative of a variety of assessment forms (*cf.* 3.3.3), SAQA (2001a: 27, 29) also differentiates between assessment methods and assessment instruments. Assessment methods are seen as the activities in which the assessor engages to assess the student, while assessment instruments refer to the nature of an assessment task. Understood in this way, assessment instruments include assignments, tests and examinations, to name just a few. As the focus of this study is on e-assessment, some of the instruments which are specifically applicable to e-assessment will be discussed in the section.

AL-Smadi *et al.* (2011:626) assert that it is sometimes necessary to adapt assessment instruments for e-assessment to foster learning which is reflective, experiential and socio-cognitive in nature. Amongst others, interactive videos, serious games, simulations and virtualised collaborative learning represent e-assessment instruments (AL-Smadi *et al.,* 2011:627). Along with AL-Smadi's *et al.* (2011) understanding of serious games, Ritterfeld *et al.* (2009:xiii, 10-11) see serious games as game-based simulations or interactive media that blend enjoyment with serious content that contributes to, and assess deep learning experiences. Furthermore, serious games allow for exploration, experimentation and problem solving. Whereas games do not always have "real-world ethics" (Jones, 2013:13), Jones (2013:7, 9, 21) asserts that a key distinction between games and simulations is that simulations are interactive events that incorporates features of the real world where the participants actively participate in issues or problems and where the participation in solving the issues or problems, are assessed. Illustrative of virtualised collaborative learning instruments, are the "Co-Writing Wiki" or wiki (*cf.* 1.4.3), discussion forums (*cf.* 1.4.3), the chat tool (AL-Smadi *et al.*, 2011:627-630) and electronic multiple choice assessment instruments (*cf.* 3.4.2).

Additional e-assessment instruments that will be further highlighted include report-writing, practical work, PoLE, presentations, vivas, rating/scoring scales and rubrics.

3.3.5.1 Report-writing

Race (1995) mentions that report-writing has the following advantages:

- it provides for a medium in which specific skills relevant to professional activity in the workplace can be addressed,
- it provides secondary evidence that activities, like practical work, have been successfully or unsuccessfully completed, and
- it allows students to display their talents and individual strengths.

However, report-writing can also have disadvantages (Race 1995):

- students may spend too much time writing reports at the expense of getting to grips with the workplace in a way which will ensure that they succeed in other forms of assessment, and
- it can become increasingly difficult for assessors to find time to mark reports and maintain the quality and quantity of feedback given to students about their work.

Neumann and Hood's (2009) research indicates that report-writing skills can be enhanced by using a wiki as part of a blended learning approach where students work collaboratively on a report. Using a wiki could produce higher student engagement with peers as well as higher cognitive engagement.

3.3.5.2 Practical work

Research done by Abrahams and Millar (2008:1946) suggests that students find practical work useful, effective and enjoyable, compared to other teaching and learning activities. Practical work is learning-by-doing, and is considered to be a broad category that encompasses activities of a wide range of types and with differing aims and objectives (Abrahams & Millar, 2008:1947). Race (1995) and Abrahams and Millar (2008:1953-1964) warn, however, that it is often problematic to assess practical work since it is difficult to assess the processes and skills involved, whereas it is easier to assess the end-product of practical work. It can also be difficult to agree on assessment criteria for practical skills, because there may be several ways of performing a task depending on the discipline and field of study. Students may also be inhibited or distracted when their performance is being observed by an assessor.

To do justice to practical work, students should understand that the processes and skills involved, are just as important as reaching a defined end-point (Race, 1995). Students should also be guided to reflect on their practical work for future improvement. In this way self-awareness, self-regulation and self-directedness can be nurtured by facilitating it electronically.

3.3.5.3 PoLE

For practical work, keeping a PoLE is an important aspect of the assessment process since it encompasses the other instruments of assessment in one document. According to Buzzetto-More and Alade (2006:254), a PoLE encourages students and lecturers to examine skills that may not be otherwise accessed. A PoLE is useful to employers in that it can reflect much more about students' skills, attributes, development, attitudes, values and knowledge (Race, 1995; Buzzetto-More & Alade, 2006:258-259). Burzetto-More and Alade (2006:258) also state that the skills required in the creation of a PoLE, help students to understand, collect, evaluate, assemble, reflect upon and use information in order to learn and inform problem-solving and decision making. These skills are crucial to lifelong learning that is dependent on the ability to engage in critical and reflective thinking.

Race (1995) cautions that because of its individual nature, a PoLE is harder to assess objectively. Therefore, Race (1995) is of the opinion that it is advisable to couple the assessment of a PoLE with other instruments of assessment such as an oral defence or an interview to authenticate the ownership of the material. The intended outcomes of the PoLE, its nature, and the range and extent of the evidence to be collected and included should be specified clearly. This will help students to plan, organise and manage their work effectively. Interim assessment opportunities before submitting the final PoLE should also be provided to enable students to improve their work. This implies formative and summative assessment opportunities.

3.3.5.4 Presentations

Since a presentation entails a public performance (Davis *et al.*, 2012:7), students will normally ensure that their presentation is well-organised and well-delivered. Davis *et al.* (2012:9) also believe a presentation allows the presenter to be creative, but at the

same time an element of control should be exercised to keep to the purpose of the presentation.

Race (1995) also names a few drawbacks of using presentations when he asserts that students may find giving a presentation very traumatic. Race (1995) also mentions that the evidence provided in a presentation is temporary and that there may be limited evidence available to reconsider the merit of a particular presentation. Moreover, since a presentation cannot be delivered anonymously, it may be difficult to eliminate subjective bias.

3.3.5.5 Vivas

A viva can take the form of an interview or oral examination. In this instance, students are interrogated about selected parts of the work to verify students' learning and performance compared to other assessment opportunities. In this way, ownership of evidence and fairness is ensured. Race (1995) highlights an important disadvantage of a viva in that it doesn't necessarily measure how well students have learned and understood the content as a whole, since it usually focuses on a particular aspect of the content. It is further important to de-brief a viva immediately after a presentation, to capture the essential findings on which conclusions should be based (Race, 1995).

3.3.5.6 Rating/Scoring scales

A rating/scoring scale is a measurement instrument by which an assessor uses certain benchmarks that serve as standards for allocating quantitative marks to students' responses (Lombard, 2010:33).

3.3.5.7 Rubrics

The provision of assessment and e-assessment guidelines using a grading rubric is a constructive way of engaging workplace mentors in the implementation of valid assessment (Kilgour *et al.*, 2014:23). According to Weigle (cited by Beyreli & Ari, 2009:107-108), there are three types of rubrics:

- Primary trait rubric: is used in assessment of basic writing skills relating to special writing tasks.
- Holistic rubric: is used to indicate a score in line with determined properties and to define different levels of performance.

- Analytic rubric: is used to analyse the sub-skills in samples of students' writing, scoring the components that constitute the writing.

3.3.6 Assessment referencing sources

An assessment referencing source is used as a benchmark for appraising student achievement. This is done by comparing a student's achievement with another relevant source of information and to use that information to arrive at a final judgement (Lombard, 2010:51). Sources that can be used for comparing and appraising students' achievements include norm-referenced, criterion-referenced and ipsative-referenced sources.

In **norm-referenced assessment**, the students' performances are compared with that of their peers, which represents the norm group. This allows lecturers to rank-order their students in order to distinguish between better and poorer performers (Crisp, 2007:24; Smit, 2008:23; Lombard, 2010:52). However, norm-referencing provides very little information about an individual student's actual performance and abilities in relation to the predetermined LOs.

In **criterion-referenced assessment**, predetermined criteria or standards are used for the judgement of a student's performance (CHE, 2004:134; Crisp, 2007:24). Lombard (2010:52) believes that criterion-referenced assessment fosters the notion of individual student success, since it challenges the individual to achieve the predetermined LOs. Crisp (2007:24) states that criterion-referenced assessment is often used for competency-based and benchmarking standards. Smit (2008:24) elaborates that criterion-referenced assessment tends to be more transparent due to its explicitly stated criteria.

Ipsative-referenced assessment is a form of self-assessment or reflection. It supports the idea that one should take responsibility for one's own learning. According to Lombard (2010:53), ipsative-referenced assessment "could be applied within a specific area of learning, where performances across subsections are compared without focusing on the overall performance or it could be applied by comparing performances over a period of time". This implies that students can compare their own performance over a period of time or in different assessment activities (Crisp, 2007:24).

3.3.7 Assessment and learning

In recent years the constructivist view of learning is eminent in education. According to this view, successful learning depends on the active involvement of students to gather information and to construct meaning. Based on Crisp's (2007:31) argument that assessment is most effective when it reflects an understanding of learning as multidimensional, it is necessary to attend to the relation between assessment and learning. In this regard, it is important to consider how assessment supports student engagement to promote learning (Lombard, 2010:50). This brings about a distinction between *assessment **of** learning*, *assessment **for** learning* and *assessment **as** learning*.

*Assessment **of** learning*, which is equal to summative assessment (Bennett, 2009:5), refers to strategies to confirm what students know, to demonstrate whether students met the outcomes or goals, to certify ability and to make future programme decisions. During *assessment **of** learning* the focus is on the gathering and interpretation of evidence about students' attainment of the LOs as proof of their competence, indicating accountability (Crisp, 2007:24). Coherence between the curriculum and assessment is therefore evident. Stiggins (2004:7) states that *assessment **of** learning* cannot diagnose students' needs during learning and therefore cannot keep the lecturer informed about how to support the student to achieve better results.

During *assessment **for** learning,* which occurs throughout the teaching and learning process, the focus is on the advancement of learning. Students are involved in the teaching and learning events and they are engaged in the learning process (Grosser & Lombard, 2005:45; Arter, 2009:4). *Assessment **for** learning* therefore acknowledges that feedback informs the learning and teaching process (Crisp, 2007:24). Formative assessment and *assessment **for** learning* are usually regarded as synonymous.

During *assessment **as** learning,* the focus is on the students' ability to critically analyse, monitor and evaluate their own learning (Afflerbach, 2002:99). This clearly indicates the importance of reflective thinking skills which are seen as an instrument through which student development can be effected and monitored (Grosser & Lombard, 2005:45). During *assessment **as** learning* it is important to cultivate the

reflective capabilities of students to enable them to initiate and regulate their own learning (Grosser & Lombard, 2005:55). Lecturers will therefore need to be mindful to design assessment tasks that will allow students to think about and to monitor their own learning.

Although the above discussion accentuates the relation between assessment and learning, Biggs and Tang (2007:169) also refer to the effect of assessment on learning. In this regard the "backwash" effect is mentioned (*cf.* 3.3.4.5). According to Biggs and Tang (2007:169), backwash in the context of assessment, refers to the extent that assessment instead of the curriculum, determines what and how students learn. This implies that students "learn to the test" and not for enriching themselves through their learning experience. To avoid this negative implication, assessment should be aligned to what students should be learning. Said differently, assessment which shows alignment between the LOs and assessment criteria is most likely to have a durable learning effect.

3.3.8 Assessment and reflection

Essentially, assessment is a complex process. To make it even more complex, is the constructivist expectation that assessment should encourage enrichment through reflection (Dean *et al.*, 2012:104; Sim *et al.*, 2013). In terms of assessment, Frederikson and White (cited by McMillan, 2007:143), refer to reflection as "reflective assessment" while Biggs and Tang (2007:150) associate reflection with "informed self-direction". It could be said that reflective assessment or informed self-direction, centres on self-assessment which is founded on self-monitoring, self-evaluation, strategic planning and the application of metacognitive skills. It therefore comes as no surprise that Biggs and Tang (2007:151) claim that self-assessment is as much a learning activity as it is an assessment activity. Confirming the aforesaid, McMillan (2007:143) advocates that reflection encourages students to learn how to use assessment information to set performance goals, to make decisions about how to improve, to differentiate between work of good or poor quality, and to communicate their progress towards the attainment of the LOs. Conceivably, the principal value of reflection is founded on the testimony that it could develop students into self-directed learners who are motivated, engaged in their learning and who project a positive attitude towards learning (McMillan, 2007:144).

Through their exposure to authentic tasks in the workplace, WIL assessment activities provide for ideal conditions for reflection by students (Edgar *et al.*, 2013:147). However, Dean *et al.* (2012:106) caution that reflective assessment tasks need to be structured in such a way that it directs attention to ignite spontaneous reflection. Guidance to students about the purpose of the reflection assessment tasks is therefore essential, while the alignment of tasks with students' practical learning experiences and placement contexts should be considered for structuring effective reflective assessment tasks (Dean *et al.*, 2012:111-112).

3.3.9 Assessment and feedback

The link between feedback and assessment originates from the fact that assessment should stimulate student growth and development (*cf.* 3.3.2). Assessment, feedback and successful learning are thus interconnected (Brown & Glover, 2006:82). Feedback impact on students' knowledge and beliefs and has the potential, if correctly done, to cultivate students' self-regulation skills (Brookhart, 2008:3).

In order to keep students' focus on the intended learning, Brown *et al.* (1997:40) state that feedback should relate to the LOs and assessment criteria. According to Geyser (2004:109), effective feedback depends on how it is communicated. This implies that feedback should be communicated in a clear, constructive, detailed, descriptive, honest, realistic and positive manner to support students. Brookhart (2008:10, 12) adds that feedback should be timely and not overpowering. According to Hattie and Timperley (cited by Brookhart, 2008:20), different dimensions of feedback can be distinguished and include feedback about the task; feedback about the processing of the task; feedback about self-regulation, and feedback about the self as a person. Feedback about the self as a person could be risky as it focuses on the person and not so much on the task which is related to the attainment of the LOs.

In e-assessment feedback could be done online. Electronic instruments that could be used for feedback purposes include video-conferencing technology such as Collaborate and Skype, and other tools that include blogs, journals, discussion forums and questionnaires (*cf.* Table 3.1). In this regard e-assessment could result in more immediate and prompt feedback (*cf.* 3.4.1.2).

3.4 THE SIGNIFICANCE OF E-ASSESSMENT

3.4.1 The significance of e-assessment within the context of assessment

3.4.1.1 Background

As computers and the Internet are more accessible, an increase in the design, delivery and administration of assessment activities by means of technology is observable (Campbell, 2005:531; He & Tymms, 2005:419; Stowell & Lamshed, 2011:3). Although Crisp (2007:34) cautions that the use of technology will not necessarily improve student outcomes with respect to assessment, it is also admitted that e-assessment tasks are becoming increasingly appropriate and relevant (Crisp, 2007:52). In this regard JISC (2007:8) alludes to the fact that the use of e-assessment in the higher education sector increases, since a more sophisticated understanding is starting to develop of how learning and assessment can be effectively integrated into a flexible and supportive learning environment, enabled by technology.

Based on the aforesaid, the concept *e-assessment* describes any assessment activity which uses digital technology or Web-based methods as an integral part of the assessment procedure. In the broad sense of the word, e-assessment is thus mediated through the use of technology. For the purpose of this study, e-assessment can be defined as using any appropriate (educational) technology for assessment purposes where the assessment can be computer mediated, computer-based, or online using the Internet.

3.4.1.2 A comparison between conventional assessment and e-assessment

According to Crisp (2011:5), e-assessment allows lecturers to collect evidence of student learning in a much deeper and often more authentic way than has been possible with traditional paper-based assessment tasks. This consents to more systematic inferences and judgements about students' skills, knowledge and capabilities, and affords an opportunity to reallocate resources more efficiently in order to improve learning (Crisp, 2007:39, 40). Compared to conventional assessment procedures, Buzzetto-More and Alade (2006:251) contend that the use of information technologies and e-learning strategies can provide an efficient and effective means of assessing teaching and learning effectiveness. According to JISC (2007:7), there are

several diverse e-assessment tools available, which implies that many conventional assessment tasks could be easily converted to an e-assessment format. In addition, Buzzetto-More and Alade (2006:251) assert that since technology offers new or alternative measures for assessing learning, e-assessment could yield richer sources of data and expand the ways in which lecturers understand both learning mastery and teaching effectiveness. It is also assumed that if e-assessment is used with skill and imagination, it can increase the range of what is supposed to be assessed (JISC, 2007:6). Furthermore, in contrast to conventional assessment procedures, e-assessment could result in providing more immediate feedback; therefore, identifying the support students require for further learning, more promptly (JISC, 2007:6, 7). In relation to current conventional assessment procedures, e-assessment could cater for wider accessibility and provide for more engaging assessment procedures (JISC, 2007:7).

3.4.1.3 Advantages of e-assessment in the context of assessment

According to Geyser (2004:106), He and Tymms (2005:419-421), Aojula *et al.* (2006:229), Walker *et al.* (2008:221-222), Whitelock and Watt (2008:152), Crisp (2011:7) and Stowell and Lamshed (2011:3-5), e-assessment, in the context of assessment, is advantageous in the following ways:

- it is more likely to be unbiased,
- it is more convenient to administer,
- inconsistent marking is decreased,
- It enhances student engagement in the assessment task,
- it enables direct linkages between assessment tasks and other online course material,
- it allows for a variety of procedures to collect appropriate evidence,
- it ensures flexibility in the timing of assessment,
- It allows for quicker processing of assessment evidence,
- It makes assessment moderation processes more efficient,
- It ensures more reliable procedures for the submission and storage of assessment evidence,
- it ensures greater variety and authenticity in the design of assessment tasks,

- it increases opportunities for students to act on feedback by reflection,
- it creates opportunities for self-assessment,
- it increases the capacity to provide remote access to assessment,
- it improves the capacity to clarify competency requirements,
- it enhances the capacity to validate assessment tasks with other stakeholders by using online forums and discussion groups, for example, and
- it allows for the sharing of assessment materials between assessors which may reduce unnecessary duplication.

According to Boyle *et al.* (cited by Crisp, 2007:153), the move from traditional forms of assessment to e-assessment, has also caused a reappraisal of the issues surrounding quality and standards in assessment.

3.4.1.4 Challenges of e-assessment in the context of assessment

Despite the general optimistic viewpoints regarding e-assessment in the context of assessment, concerns over the measurement of student participation, plagiarism, malpractice, security, connecting the assessment to the teaching and learning intent, and strategies (Crisp, 2007:50; JISC, 2007:8), are also raised.

A big concern with e-assessment is the susceptibility to digital cheating. Rogers (2006:207) says that the term “digital cheating” is used to describe students who find a way to cheat using computer technology. There are various forms of digital cheating, including plagiarism and e-cheating. Most academics are aware of e-plagiarism, but do not necessarily realise the rifeness of e-cheating. E-cheating is done in four ways: students accessing other websites, communicating with others via Instant Messaging (IM) tools and emails during examinations, seeding test computers with answers, and bringing in digital non-exam material containing solutions to exams (Rogers, 2006:207; Anderson & Murdock, 2007:49). According to Rogers (2006:207) digital cheating can be prevented by being aware of the problem, by the use of commercial security software, by having dedicated computer labs for e-assessments where students are isolated to the same computer for each exam, and by automatically marking and grading objective-oriented structured e-assessments by an expert system. However, Buzzetto-More and Alade (2006:256) argue that technology innovation not only

contributes towards the facilitation of e-assessment, but that it also supports the reliability, validity and security of e-assessment.

Another challenge is that the development of e-assessment is a painstaking process since e-assessment tasks should be appropriately designed to be fit for purpose. Crisp (2007:52) also mentions that e-assessment should consider the tools with which students are familiar to make provision for fairness. Alternatively, in the case of foreign tools, course objectives could include the use of the assessment tools themselves to familiarise students with these before attempting an e-assessment task.

3.4.2 The significance of e-assessment within the context of educational technology

According to Chalkley *et al.* (2000:240-241), it is fundamentally important to be able to work with a variety of technologies to ensure work success. For students, the use of educational technology could show positive gains in academic success (Eberhart, 2011:4). This prompts the researcher to understand that technology has become inextricably part of teaching and learning in the 21st century. Although it is agreed in the literature that technology should be integrated into curricula, Nicholls (2002) and Eberhart (2011:3) maintain that the most important aspect of technology in teaching and learning is to understand why it is used and to ascertain the best and most effective ways of using it to accomplish the educational goals, including the goals of assessment.

Assessment tasks based on the active use of educational technology provide opportunities for authentic assessment (Crisp, 2007:48). In e-assessment, computers and digital devices, including laptops and tablet computers, can be used to construct computer-based tasks, such as multiple choice, multiple answer and matching tasks, using formats such as text, audio, video and images (Crisp, 2001:5). Computers can therefore also be used to effectively deliver, grade, analyse and give feedback on e-assessment tasks (Crisp, 2011:5). E-assessment need not be computer-based only as it can also be done online and in a LMS. In a LMS, students can access the e-assessment tasks through a web browser any time and from any location. The assessment feature of a LMS enables authoring within the system and it allows for an integration of diagnostic, formative and summative assessment tasks (Crisp,

2007:68). A LMS also includes other tools that could be utilized for assessment purposes such as blogs, wikis and journals that could form part of an e-portfolio, enabling the use of simulations of reality.

With the introduction of digital technology into the higher education sector, the use of e-portfolios has expanded since it provides a medium and platform to document and assess evidence of completed tasks in electronic format (Dickinson and Mensinga, 2012:68; Edgar *et al.*, 2013:147). To show their achievement of the learning outcomes in an e-portfolio, students could collate and reflect on artefacts which would also enhance their learning (Dickinson & Mensinga, 2012:68). Underscoring this view, Buzzetto-More and Alade (2006:254, 258-259) and JISC (2007:32) assert that the e-portfolio is becoming the primary tool for students to demonstrate and reflect on their learning. Therefore, the researcher corroborates with Crisp (2007:42) who maintains that the inclusion of artefacts in an e-portfolio provides a richer representation of student learning. From the above it could be deducted that technology, such as the e-portfolio, could be utilised to effectively record, assess, provide feedback and document e-assessment tasks.

3.4.3 The significance of e-assessment within the context of WIL

Today's students require 21st century skills which could be described as a set of abilities to succeed in the information age. This set of abilities includes learning, literacy and life skills. In terms of literacy skills, 21st century students require information, media and technology literacy. These skills are closely related to those capabilities required for the successful performance in an authentic environment such as the workplace (Crisp, 2011:11). The researcher therefore postulates that assessment tasks related to these skills require a redesign of the current WIL curriculum and its associated assessment tasks. In this regard, e-assessment can offer new opportunities to assess the 21st century literacy skills in WIL through the design of creative and interactive assessment tasks that require Web 2.0 and Web 3.0 activities that encourage a user-centred approach in WIL programmes. In a WIL programme, lecturers and workplace mentors are expected to provide students with a variety of learning and assessment experiences; in other words a user-centred approach, since students are becoming more mobile and able to access their experiences in the workplace more effectively and ubiquitously (Crisp, 2007:229).

According to Crisp (2011), learning environments today are more dynamic and interactive where the roles and actions of the lectures and students are defined by the expected learning and assessment tasks.

3.4.3.1 E-assessment instruments applicable to WIL

To be successful, WIL students need to actively use educational technology in the workplace to complete assessment tasks. These tasks should reflect authentic learning in a real workplace environment (Buzzetto-More & Alade, 2006:257). There is a growing range of e-assessment instruments available and, according to Susilawati and Peach (2012:2), it would be beneficial to draw on as many of these instruments as possible, offered in a variety of formats, to give students a wider range of opportunities to evidence their skills development. According to Susilawati and Peach (2012:2), such assessment instruments need to be "relevant, integrated, practice-based, criterion-referenced and reliable".

In section 3.3.5 report-writing, practical work, PoLEs, presentations and vivas were discussed, representing probably the most suitable assessment instruments applicable to e-assessment in WIL. In Table 3.1 below, a summary of some other e-assessment instruments is given that could be added and incorporated into WIL assessment. In a technology-based WIL model, it is also necessary to adapt assessment instruments to become representative of authentic e-assessment. WIL would generally use a relatively small range of assessment instruments (*cf.* 3.3.5), such as reflective journals and student presentations, to assess student competence. However, more possibilities do exist and it is therefore necessary that more assessment instruments should be used in WIL to encapsulate the utilisation of e-assessment more effectively. These possibilities include blogs, wikis, journals and discussion boards that allow students to be active creators of content and to support different WIL activities (Dalsgaard, 2006:1; Crisp, 2011:12). The implication is that learning environments are becoming more blended in nature by adopting a mix of asynchronous and synchronous activities, including e-assessment tasks. The researcher considers that a WIL programme using e-assessment tasks, would assist academic staff and students whose workplaces are in disparate locations, to communicate assessment tasks and feedback on those tasks more effectively.

Table 3.1: E-assessment instruments (adapted from Crisp (2007:42-43; 2011:8); Stowell & Lamshed (2011:6-26))

Stage in the WIL assessment process	Reasons for using e-assessment instruments and materials	Example applications of e-assessment instruments and materials
Planning of WIL assessment	• Plan and design assessment materials • Validate assessment tasks with industry and other stakeholders	• Online interactive technologies to share information and facilitate discussions between lecturer and industry • Wiki to work on a shared document or web page • Document sharing
Gathering evidence	• Lecturers and students gather evidence of performance	• Online quizzes created within a LMS, to test students' knowledge • Voice over Internet Protocol (VoIP) such as Skype or virtual classrooms or discussion boards for questioning, interviews and discussions • Digital documents, images, video, blogs, journals, podcasts to demonstrate and record students' learning and skills development on real work tasks
Supporting the WIL student	• Provide support to the students • Provide feedback re support to students	• Submit assessment tasks in a LMS • Online feedback • Social networking tools that build collaborative learning and assessment spaces • Use of Short Message Service (SMS), micro blogging (e.g. Twitter) to support students

Table 3.1: E-assessment instruments (adapted from Crisp (2007:42-43; 2011:8); Stowell & Lamshed (2011:6-26)) (continued)

Stage in the WIL assessment process	Reasons for using e-assessment instruments and materials	Example applications of e-assessment instruments and materials
Making the assessment decision	• Processing and analysing evidence	• Speed up the processing of assessment evidence • Provide richer information which lecturers can use in making assessment decisions (e.g. student reflections in blogs
Providing feedback	• Clear, constructive feedback to students	• Feedback through e.g. Collaborate/Skype • Two-way feedback facilitated through blogs and journals • Self-assessment and personal reflection supported by artefacts that allow students to reflect on their own performance
Recording and reporting the assessment decision	• Record assessment outcomes • Complete assessment reporting procedures and inform students and other relevant parties	• Online communications, including email, SMS, micro-blogging and blogs, may be used to inform students and other relevant parties of assessment decisions
Reviewing the WIL assessment process	• In consultation with students and other relevant parties with a view to improving future practice	• Discuss assessment processes, outcomes and areas for improvement using web-conferencing systems, e.g. Collaborate/Skype • Gather student feedback on assessment process using online discussion forums and questionnaires • Promoting self-reflection on assessment practice using reflective tools such as online journals, blogs • Sharing assessment materials using cloud computing, wikis and document sharing

3.4.3.2 Assembling e-assessment evidence in WIL

If WIL students are to master the aforementioned 21st century skills, lecturers will need to set appropriate assessment tasks so that students can collect evidence of their capabilities and skills development in the workplace. According to Le Roux (2004:61-62), students can collect assessment evidence in three ways:

- Direct evidence is obtained by observing the WIL students' performance directly in a workplace situation in the execution of specific tasks.
- Indirect evidence is collected by means of simulations and projects as well as the assessment of products or services.
- Supplementary evidence can be obtained to determine as to whether the WIL students can perform in a variety of circumstances. In this case, evidence can be provided in various forms such as written or oral examinations and reports from workplace mentors, fellow colleagues, or clients.

In addition, e-assessment evidence could also include reflective reports, in which students reflect on their workplace learning. Reflective reports can be supplemented by artefacts which could include text documents, photos, video clips and PPTs. All the evidence is then recorded in the LMS as documentary proof of the WIL students' competence. A PoLE would also be appropriate for e-assessment, since it encourages an iterative building of evidence of competency (Crisp, 2007:200; Susilawati & Peach, 2012:2). Presentations, vivas, interviews and journals could also be used to assemble e-assessment evidence for WIL (Susilawati & Peach, 2012:2).

3.4.3.3 E-assessment feedback in WIL

According to Haughton and Keil (2009:276), technology supported assessment provides a multitude of benefits that support student improvement at all levels. Therefore, instant feedback is regarded as an important matter in the e-assessment process (Crisp 2007:229). Reporting and communicating the WIL students' achievements form part of feedback, which is crucial for resolving any problems related to workplace learning timeously. "By coupling e-assessments accessed by mobile or wireless technologies with appropriate feedback to students, a powerful learning and assessment environment can be created" (Crisp, 2007:229). For

feedback to be effective, it is important for assessors to know that the assessment criteria must be made explicit. Race (1995) also states that students must be guided in understanding the balance between the marks for their reports' structure, the contents of the reports and the level of critical thinking and analysis captured in the reports. Generally speaking, feedback in e-assessment serves the same purposes as were mentioned in section 3.3.8.

3.5 E-ASSESSMENT: ADVANCING AUTHENTICITY WITHIN A WIL PROGRAMME

Crisp (2007:52; 2011:13) states that students require an authentic environment to test their skills and resources in a productive manner. This authentic environment should therefore be representative of "constructivist tasks" (De Villiers, 2007:13-14) and problem-based learning (Buzzetto-More *et al.*, 2007:222). In such an authentic environment, assessment should push students' thinking toward the use of activities that call for multiple modalities that reflect the goals of a course (Alleman & Brophy, 1997:338; Crisp, 2007:52; Crisp, 2011:13).

Buzzetto-More and Pinhey (2007:202-203) explain that authenticity in teaching and learning is obtained by interaction and feedback, instructional materials, multimedia usage, course design and course management. Buzzetto-More and Pinhey (2007:202) believe that interaction and feedback is essential because the e-assessment tasks should facilitate interaction such as online discussion forums, vivas and other communication and collaboration tools that demonstrate content mastery and the ability to incorporate content into higher level thinking. Also, for e-assessment to be authentic, Buzzetto-More and Pinhey (2007:203) and Buzzetto-More *et al.* (2007:218) assert that using rubrics in e-assessment tasks would constitute more authentic assessment as rubrics articulate standards by which to assess and communicate expectations and performance to the student. It would also be possible to use assessment centres, which are not physical venues in nature, but sets of exercises (mostly in electronic format) designed to replicate real life tasks and require students to engage in simulations, to ensure authentic assessment (Buzzetto-More *et al.*, 2007:219). Buzzetto-More *et al.* (2007:218, 224-225) mention that e-portfolios can also be used as assessment instruments to advance authentic assessment since it reflects on tasks that are representative of students' culmination of learning. Buzzetto-

More *et al.* (2007:224-225) are of the opinion that e-portfolios can support a greater variety of artefacts, allow for greater learner expression, are dynamic and multimedia driven, are easy to store and can be used to promote a student. Buzzetto-More *et al.* (2007:231-233) also assert that oral presentations, case studies and simulations can advance authentic e-assessment.

When implemented innovatively in the workplace, assessment activities are deemed as authentic (De Villiers, 2007:13; Burton, 2009:1). In terms of WIL, Forbes (2004:64) suggests that the complexity of WIL assessment has to be acknowledged and assessment based on multi-model assessment has to be negotiated. Such a multi-model assessment approach in WIL could include all of the aforementioned approaches and instruments that display students' reflective understanding and the integration of work experience with academic learning. Therefore, it can be deduced that a multi-model e-assessment approach would allow students to critically reflect on the way in which they have met a prerequisite set of competencies (Jenkins, 2012:127; Susilawati & Peach, 2012:3). This critical reflection can be achieved by incorporating some, if not all, of the aforementioned approaches and instruments. These could comprise interaction (online discussion forums, vivas and other communication and collaboration tools), rubrics, assessment centres that comprise mostly authentic electronic exercises and simulations, portfolios, case studies and simulations.

Derived from the above, the researcher believes that technology could effectively enable authentic assessment. As a result of modern (educational) technologies, lecturers, WIL coordinators and workplace mentors will have greater access to authentic student work that will initiate more authentic e-assessment tasks. In WIL, authentic e-assessment is not only likely to produce a great deal of transfer from the classroom to the real world, but will also stimulate reflection since "authentic assessment allows the students to assess their own progress more readily during learning" (Svinicki, 2005:27). By making assessment tasks more authentic, WIL students will view the assessment tasks as part of the learning process and not as separate and subsequent processes to learning (Crisp, 2007:233). With regard to this study, e-assessment could advance authenticity within a WIL programme by means of integration, application and reflection.

3.6 E-ASSESSMENT: AUGMENTING INSTRUCTION AND CONVENTIONAL ASSESSMENT

For the 21st century students who use technology as an integral part of their everyday lives, and for whom the use of computers, mobile phones and the Internet is an obvious activity, it is important to use technology and educational technology for their teaching, learning and assessment. Crisp (2007:228) is of the opinion that electronic learning and assessment activities will expand as universities' ability to implement educational technologies and their engagement with such technologies improve. According to Bennett (cited by Buzzetto-More and Alade, 2006:251), information technologies and e-learning can be effectively used to assess teaching and learning.

E-assessment has the potential to augment instruction and conventional assessment in a number of ways. Buzzetto-More and Alade (2006:253) contend that e-assessment allows for easier access by a wider audience of users, while e-assessment also provides for the use of international benchmarked assessments (JISC, 2007:5, 19). According to Walker *et al.* (2008:225-228), e-assessment opens up more possibilities for assessment options. A fundamental discovery by research conducted by Amelung *et al.* (2011:162-174), suggests positive changes in learning environments and students' learning processes with the phasing out of conventional instruction and assessment and simultaneous phasing in of e-assessment. Amelung's *et al.* (2011:171) research has further shown that e-assessment have higher expectations of students since it increases the intensity of work required for the assessment tasks. As a consequence, students' motivation increased. A contributing factor to this positive result is that students mostly get immediate feedback regarding their e-assessment performances.

According to Crisp (2007:230) instant feedback allows for determining students' progress and for timeous assistance and intervention when and if required; therefore it could be claimed that instant feedback augments instruction. Furthermore, the positive outcome of student motivation could be ascribed to the fact that students know that their assessment tasks are actually assessed, while in conventional assessment this might not have been the case (Amelung *et al.*, 2011:171). Walker *et al*. (2008:232) assert that improvements to the ways in which e-assessment is done, are much swifter than is the case with conventional assessment. According to Amelung *et al.*

(2011:171-172) it is very advantageous to use a LMS as the basis for managing students' e-assignments compared to the conventional paper-based assignments since the handling and assessment of electronic assignments are much easier and reduces the administrative burden of both lecturers and students (Amelung *et al.*, 2011:172).

Based on the premise that (educational) technology improves and becomes simpler and easier to use, e-assessment in the workplace will become more sophisticated and ubiquitous. WIL students will increasingly be required to present evidence of their skills and competence in electronic format. It could further be assumed that the intensity of work required to complete e-assessment tasks such as the e-portfolio, will be a motivating factor for the students to compile their PoLE with much rigour and dedication.

3.7 CONCLUSION

In response to the two secondary research questions (*cf.* 3.1), the fundamental elements for ensuring effective assessment were discussed. This was followed by an investigation of the significance of e-assessment within the contexts of assessment, educational technology and WIL. The chapter concluded with discussions on how e-assessment advances authenticity within a WIL programme and how e-assessment augments instruction and conventional assessment.

In the next chapter an overview of the empirical study will be provided.

CHAPTER FOUR
OVERVIEW OF THE EMPIRICAL STUDY

4.1 INTRODUCTION

The purpose of this chapter is to outline the empirical study for the development and implementation of e-assessment as component of WIL. The literature study in chapters two and three enabled the researcher to understand the research phenomenon better and provided the theoretical support for the empirical study. The primary research question of this study is two-pronged and can be stated as follows:

(a) What factors should be considered for the successful development op e-assessment as component of WIL?
(b) What are the resultant experiences emanating from the factors determined and applied in (a) of the implementation of e-assessment as component of WIL?

Since the above stated questions require an investigation of empirical nature, this chapter will provide an overview of the empirical study to indicate the procedures and processes which were followed to gather information relevant to the purpose of the study. Matters that will be discussed include the research paradigm, the empirical research design, the strategy of inquiry and the population and sampling. In continuation, the data collection methods, the principles considered for constructing and administering the data collection methods, the quality criteria, the pilot study, the role of the researcher and ethical considerations will also be entertained. The chapter will be concluded by explaining the data collection process.

4.2 RESEARCH PARADIGM

“Paradigms are patterns of beliefs and practices that regulate inquiry within a discipline by providing lenses, frames and processes through which investigation is accomplished” (Weaver & Olson, 2006:460). This definition of a paradigm unequivocally states how research could be guided by the researcher’s adoption of a certain view of reality. Underscoring the aforesaid, Kuhn (cited by Terre Blanche & Durrheim, 2010:5) explains that a paradigm is a system of understanding that consists of an endorsed scientific method and questions it considers to be legitimate. Taylor

et al. (2007:5) are of the opinion that a paradigm is “a broad view or perspective of something”. Nieuwenhuis (2007a:47) and Durrheim (2010:40) state that a researcher works within a certain paradigm and therefore uses particular methods of data collection, data analysis and data interpretation. Coherent research can thus be achieved by making sure that the research question and methods that the researcher wants to use fit within the paradigm. A paradigmatic framework implies that the focus of the research is on the research question and that different methods may be employed to answer the question (Creswell & Garrett, 2008:327). A paradigm also serves as an organising principle by which reality is interpreted (Nieuwenhuis, 2007a:48).

The above implies that knowledge generated by investigating the research problem can either be viewed inductively when trying to understand the subjective worlds of the research participants (Interpretivism) or by using objective measures to establish the existence of definite social facts (Positivism) (Terre Blanche & Durrheim, 2010:8). These aforesaid paradigms exist simultaneously which could allow a researcher to draw on more than one paradigm although most researchers would only work in one paradigm (Terre Blanche & Durrheim, 2010:9).

This study applied a hybrid research paradigm of Interpretivism and Positivism since the study has a qualitative and a quantitative approach. According to Nieuwenhuis (2007a:58-60), the Interpretivist paradigm, which is synonymous with the qualitative research design, is used to understand a phenomenon, to give perspective on a phenomenon and to gain insight into the way people construct meaning and explain their worlds. On the other hand, the Positivist paradigm, which is synonymous with the quantitative research design, is used to explain a phenomenon by using observable, verifiable and empirical facts that can be generalised to human activity within historical and cultural contexts (Nieuwenhuis, 2007a:53-56). When the Interpretivist and Positivist research paradigms are used in a combined manner it is known as the Pragmatic research paradigm (Ivankova *et al.*, 2007:263). Characteristic of Pragmatism is the belief that the truth lies in “what works best” to address the research question and “justifies the combination of different methods within one study” (Ivankova *et al.*, 2007:263; Creswell, 2009:10).

Therefore, and considering the purpose of this research, the researcher argues that this study is founded on the Pragmatist research paradigm (*cf.* 1.5.1) since it is concerned with applications or working solutions to the research problem. Creswell and Plano Clark (2011:41) also state that Pragmatism enables the researcher to focus on the consequences of the research. Hence, combined qualitative and quantitative research designs were applied to collect and analyse both text and numerical data to address the two-pronged primary research question from different angles. Consequently, the research results were used to inform the development and implementation of e-assessment as component of WIL.

4.3 RESEARCH DESIGN

In the literature there is a vast number of descriptions of what a research design entails. The researcher is of the opinion that all the definitions can be summarised in terms of two main functions. The first function considers the identification and/or development of a plan or procedures that will be needed to conduct the research and to ensure that quality procedures, e.g. validity, objectivity and accuracy are accounted for when conducting the research (Kumar, 1999:72). The second function encompasses the identification of a research design as a strategy for a study and the plan by which the strategy is to be carried out, by specifying the methods and procedures for the collection, measurement and analysis of data (Cooper & Schindler, 2006:159). Durrheim (2010:34-36) sees a research design as a strategic framework or plan that bridges the research questions and the execution or implementation of the research in a particular sequence of activities during an iterative process from which valid conclusions can be drawn.

Three common research designs can be distinguished when researchers utilise different data analysis techniques and base their conclusions on different kinds of information, namely qualitative, quantitative and mixed-methods research designs. Durrheim (2010:47) define *qualitative research* as the collection of data in the form of written or spoken language or where observations are recorded in language and where the data is analysed by identifying and categorising themes. Qualitative research allows researchers “to study selected issues in depth, openness, and detail as they identify and attempt to understand the categories of information that emerge from the data” (Durrheim, 2010:47). This implies that the design of the research

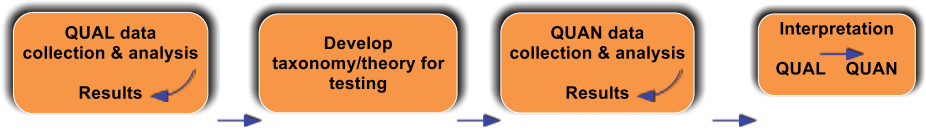
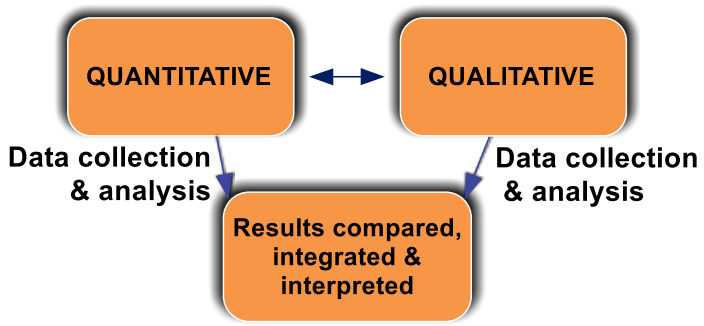
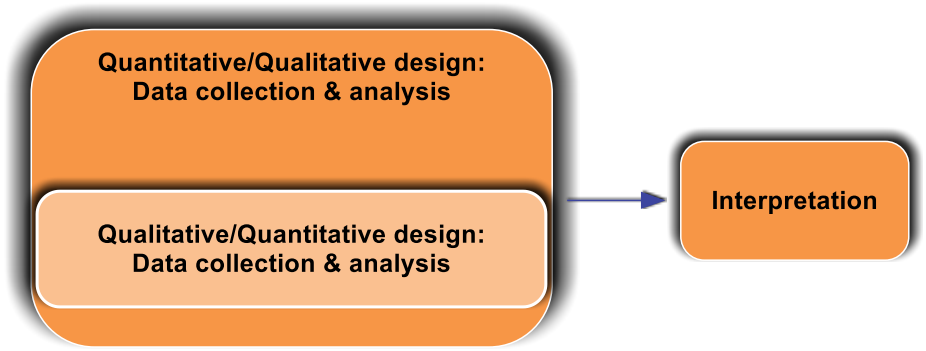
develops as the research progresses. It is usually a naturalistic, holistic and inductive investigation where the researcher could use instruments such as interviews and participant observations to attempt to assemble a detailed picture of the studied themes (Durrheim, 2010:47; Fouché & Delport, 2013:64). More people-orientated research calls for a more qualitative research approach since the emphasis would be more on people's perceptions about the world and events. The aim of qualitative research is therefore to study humans within unique and meaningful situations or interactions. Therefore, in qualitative research the scope of the research is less defined and the procedures followed are not as formal and explicated as in quantitative research. As far as sampling is concerned, research participants could be selected purposefully and not necessarily at random.

Struwig and Stead (2004:4) define *quantitative research* as "a form of conclusive research involving large representative samples and fairly structured data collection procedures". A quantitative research design represents the traditional scientific approach to research where data are collected in the form of numbers and where statistical types of data analysis are used to study phenomena without manipulation (Durrheim, 2010:47). In this regard Fouché and Delport (2013:63) assert that in a quantitative research design the variables are isolated and numerical data are collected, using standardised procedures. By using statistical procedures, conclusions drawn from the data, usually ends with the confirmation or the disconfirmation of hypotheses. The aforesaid implies that quantitative research is more dependent on deductive reasoning, beginning with certain premises followed by logical conclusions (Fouché & Delport, 2013:63). Although quantitative research could include more research participants than qualitative research, the side-effect is limited interaction with research participants which could sacrifice in-depth information.

When deciding whether to use a qualitative or quantitative research design the researcher has to realise that it has consequences for sampling, data collection and analysis (Durrheim, 2010:47). Therefore it might be necessary to combine the qualitative and quantitative research designs to conduct a particular research. This combined research design is known as *mixed methods* research (Delport & Fouché, 2013:434, 435). A mixed methods design could add greater strength to the research findings (Ivankova *et al*., 2006:9; Maree & Van der Westhuizen, 2007:34; Fouché &

Delport, 2013:66), since it enables the researcher to understand a research problem more completely and in-depth (Fouché & Delport, 2013:66). Delport and Fouché (2013:440-443) provide an overview of four commonly used types of mixed methods research designs. Table 4.1 differentiates between these four types by means of visual representations.

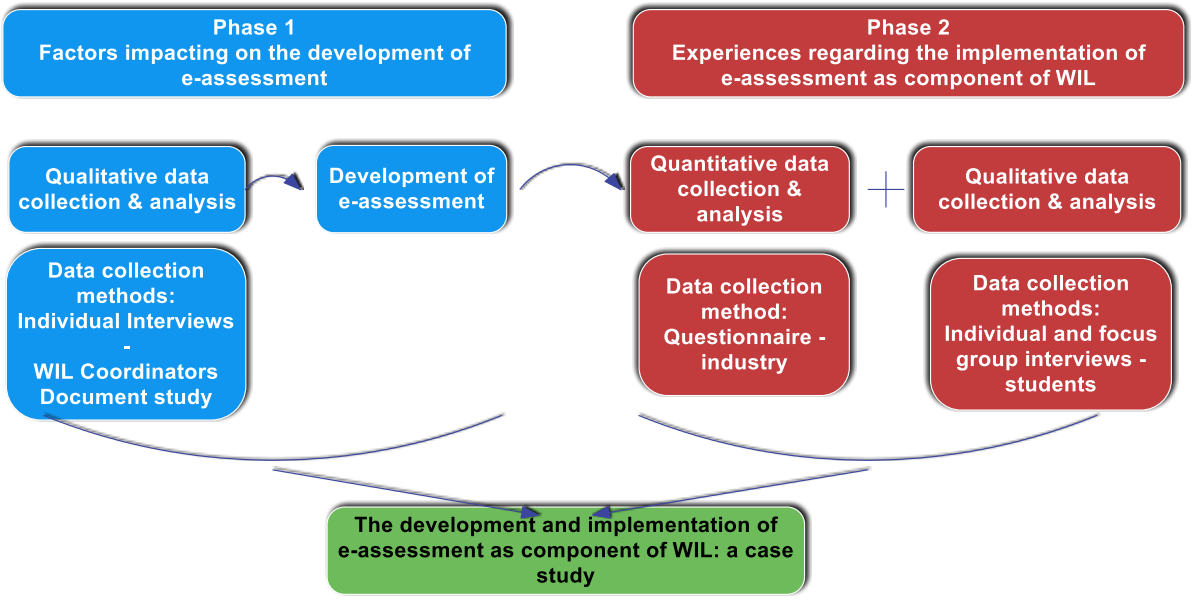
Table 4.1: Types of mixed methods research designs (adapted from Delport and Fouché (2013:440-443))

Exploratory mixed method design	
Explanatory mixed method design	
Triangulation mixed method design	
Embedded mixed method design	

In addition to the above, Creswell and Plano Clark (2011:181-183) also differentiate between convergent, transformative and multiphase mixed methods designs, while Ivankova *et al.* (2006:5) also describe a sequential mixed methods design.

This study adopted a mixed-methods design or a combination of qualitative and quantitative research approaches in order to add rigor to the findings (Maree & Van der Westhuizen, 2007:34). It was also argued that the incorporation of both qualitative and quantitative research designs would increase the credibility of the data. In this particular study an embedded mixed-methods design (Creswell & Plano Clark, 2011:123) was used. In more particular terms, the research design adopted for this study can be described as a sequential, embedded mixed methods design since the research was done in two distinct phases. According to Ivankova *et al.* (2006:5) a sequential mixed methods design has distinct quantitative and qualitative phases. The first phase of this study was qualitative in nature and included interviews and a document study to gather data to guide the development of e-assessment as a component of the selected WIL programme. The second phase of the study was concerned with experiences regarding the implementation of e-assessment as component of WIL and was approached from a combined quantitative and qualitative angle, using a questionnaire and interviews. It can be said that the primary focus of the research concerned the factors that should be considered for developing e-assessment as component of WIL (Phase 1) and the secondary focus concerned experiences regarding the implementation of e-assessment as component of WIL (Phase 2). Approached in this way, Phase 2 (combined quantitative and qualitative data) was embedded within Phase 1 (qualitative data). The research design of this study is illustrated in Figure 4.1.

Figure 4.1: The study's research design



4.4 STRATEGY OF INQUIRY

Creswell (2009:11) describes strategies of inquiry as "types of qualitative, quantitative and mixed methods designs or models that provide specific direction for procedures in a research design". In addition, Creswell (2009:14, 15) distinguishes three general strategies of inquiry in mixed-methods research: sequential, concurrent and transformative. This study followed a **sequential** strategy of inquiry (*cf.* 1.6.2) because the combination of qualitative and quantitative methods in a sequential manner has the potential to improve the quality of the research, since it captures the best of both approaches (Mouton, 1996:39; De Vos, 2002:363; Creswell *et al.*, 2003:209). Ivankova *et al.*, (2007:267) and Creswell and Plano Clark (2011:95) also assert that **embedded** mixed-methods designs are used when a researcher needs to answer a research question that is different from, but related to, the primary research question.

In the context of this study, it can be concluded that a sequential, embedded mixed-methods design (*cf.* 1.6.1), which is anchored in an exploratory case study as strategy of inquiry was used. A case study intends to explore a bounded system in-depth (Plano Clark & Creswell, 2010:242). Whereas a system could refer to a programme, event or activity, bounded implies that the research is conducted within the boundaries

of a specific place. In this study, the bounded system relates to assessment in WIL at the TUT.

McMillan and Schumacher (2014:371) differentiate between intrinsic, instrumental and collective case studies, while Yin (2003) in Rule and John (2011:8) also refer to exploratory, explanatory and descriptive case studies. An exploratory case study is described by Rule and John (2011:8) as a study that examines a phenomenon that has not been investigated before and which can lay the basis for further studies. With reference to this study, e-assessment pertaining to WIL at the TUT is a new initiative (*cf*. 1.1). For Phase 1 of the empirical study, which focused on the development of e-assessment as component of WIL, the exploratory case study was used to collect qualitative data in the form of individual interviews with the TUT staff located in several departments, including the DCME, within the FEBE and the DCE in the HEDS directorate. In addition, a document study of institutional/faculty/departmental documents related to WIL and assessment was done. For Phase 2 of the exploratory case study, a semi-structured questionnaire was used for the collection of quantitative data from external stakeholder participants who accommodated Chemical and Metallurgical Engineering students for WIL in the past. For the qualitative part of Phase 2 online individual interviews supplemented by focus group interviews were used to collect data from third and fourth year students located in the DCME.

4.5 POPULATION AND SAMPLING

Population is a term that sets boundaries on the units to be studied and refers to all the cases in the universe who possess specific, identified characteristics (Strydom, 2013b:223). A population is further defined as the totality of persons, events, organisation units, case records or other sampling units with which a specific research problem is concerned (De Vos, *et al.*, 1998:76). Since the population is often too large and logistically unmanageable to study directly, obtaining research information from a selected sample is more practical, easier and accurate (Strydom, 2013b:223). In the case of this study the population comprises academic staff members and students who are directly involved with WIL at programme level at the TUT, as well as external stakeholders accommodating Chemical and Metallurgical Engineering students for WIL. From this population sub-groups were selected to participate in the research.

Kumar (1999:148) describes such sub-groups as a sample of the population that the researcher is interested in.

Sampling means ‘’taking a portion or a smaller number of units of a population as representative […] of that total population” (Strydom, 2013b:223). According to Plano Clark and Creswell (2010:183), sampling is performed by applying sampling strategies by differentiating between probability and non-probability sampling. According to Strydom (2013b:228), probability sampling is based on the notion of random selection of research participants which assures that each individual of the population is given an equal chance of being selected for the research. Furthermore, probability sampling offers the opportunity to generalise the research findings to the population of interest (Cooper & Schindler, 2006:406). Strydom (2013b:228-231) describes that simple random sampling, systematic sampling, stratified sampling, cluster sampling and panel sampling are suitable probability sampling methods. According to Struwig and Stead (2004:111) and Strydom (2013b:231), non-probability sampling entails a process where the chances of being selected as research participant are uncertain; meaning that each individual of the population does not have the same chance of being considered for the study. Strydom (2013b:232-234) identifies the following non-probability sampling methods: accidental sampling, purposive sampling, quota sampling, dimensional sampling, target sampling, snowball sampling, sequential sampling, spatial sampling and key informant sampling.

Based on the DCE’s decision to embrace a technology-based WIL programme for the TUT (*cf.* 1.1), and the identification of the FEBE for piloting such a programme (*cf*. 1.6.3) the researcher applied non-probability, purposeful sampling for selecting potential research participants for the purpose of this study. This sampling method was motivated by considering McMillan and Schumacher’s (2006:126) assertion that purposeful sampling allows for the selection of research participants that can convey informative information about the research topic. Moreover, Maree and Pietersen (2012:178), also refer to the fact that purposive sampling is appropriate and done with a specific purpose in mind to understand something in-depth. By means of purposeful sampling staff members involved in and having experience of the WIL programme in the DCME and in other departments of the FEBE, and staff of the DCE were selected to form part of Phase 1 of the study. For Phase 2 of the study, the purposeful sample

consisted of external stakeholders who accommodated Chemical and Metallurgical Engineering students for WIL in the past and third and fourth year students of the DCME. The researcher decided to include third and fourth year students in the research because they are familiar with the status quo of assessment and were able to draw a comparison between the previous mode of assessment and the proposed e-assessment. Based on the same argument, external stakeholders were included in the study. Two criteria, namely sufficiency of data and saturation of information (Greeff, 2005:294) were used to determine the sample size of the respective research participants (*cf*. 1.6.3). As a result six individual interviews were conducted, and 15 documents were analysed in Phase 1 of the study. In Phase 2, 10 online questionnaires were completed and 12 online open-ended questionnaires and two focus group interviews were conducted.

4.6 DATA COLLECTION METHODS

The qualitative and quantitative data were collected by means of interviews, a document study, and questionnaires. By using a combination of these methods, the researcher was able to more easily validate and cross-check the research findings whereby the strengths and weaknesses of each of the procedures compensated for each other (Strydom & Delport, 2005:314).

4.6.1 Qualitative data collection method: individual interviews (Phase 1)

The literature lists various types of interview. These include individual interviews which Greeff (2005:292) classifies as unstructured, semi-structured, open-ended or guided and ethnographic interviews. Nieuwenhuis (2007b:87, 90) also mentions structured interviews and focus group interviews. McMillan and Schumacher (2006:351-352) further differentiate between informal conversation, key informant, career and life history interviews.

For the first phase of the study, semi-structured individual interviews, composed of pre-determined questions that "define the line of inquiry" (Nieuwenhuis, 2007b:87), were used to collect data. Interview questions were derived from the literature study and eight guiding questions were prepared by the researcher beforehand (*cf.* **Appendix G**). Individual interviews were eventually conducted with six of the envisaged eight sampled participants (*cf.* 1.6.4.1; 4.5; 5.2.1.1); five from different

departments in the FEBE, and one from the DCE in the HEDS directorate of the TUT. Two invitees to the interviews declined the invitation to be interviewed. However, the researcher was convinced that the data obtained from the six individual interviews would yield sufficient information required for this part of the study. The interviews took place during working hours at pre-scheduled times, and at less active times on the institution's academic calendar. By using a detailed semi-structured interview guide, the researcher ensured that the questioning order and consistent phrasing of questions were maintained. However, provision was made for probing and clarification of answers (Mertler & Charles, 2011:113). Forty minutes were allowed as time frame for each interview. The purpose of the individual interviews was to generate qualitative data on factors that should be considered for the development of e-assessment as component of WIL.

4.6.2 Qualitative data collection method: document study (Phase 1)

McMillan and Schumacher (2006:26, 27) stipulate that a non-interactive qualitative approach is often used in a document study. This aforesaid approach was applied to uncover the reference to WIL assessment in past and current TUT documentation (*cf.* 1.6.4.1).

Bowen (2009:27, 29) mentions that a document is any substance that gives information about the investigated phenomenon in that it elicits meaning and empirical knowledge to discover insights relevant to the research problem. In elaboration of this viewpoint, Henning *et al.* (2004:99) maintain that documents are "valuable sources of information". Four types of documents are distinguished by Strydom and Delport (2013:378-379): personal documents (e.g. personal letters, diaries), non-personal or official documents (e.g. minutes of meetings, policies), mass media documents (e.g. newspapers, websites) and archival documents (e.g. preserved material intended for research purposes). Yin (2009:103) asserts that for case studies, "the most important use of documents is to corroborate and augment evidence from other sources". This is underscored by Blaxter *et al.* (2010:186), who suggest that a document analysis is an invaluable methodological tool in any research. Therefore, a document analysis can be described as the study of existing documents to understand its content or to illuminate deeper meanings within the documents (Strydom & Delport, 2013:377).

A document study of sources relevant to assessment in the context of WIL, such as institutional, faculty and departmental documents, was done to enlighten this part of the study. It can thus be concluded that non-personal or official documents available in hard copy or electronically were used for conducting this study.

Following the suggestions by Bowen (2009:29-30), the document analysis in this study served the following purposes: it provided supplementary data to the individual interviews in the first phase of the study and it served as a tracking device for determining how WIL assessment developed during the past couple of years.

By using a set of seven predetermined questions (*cf.* **Appendix H**), a detailed content and textual analysis (Strydom & Delport, 2013:380-381) of the documents was undertaken. The formulation of the predetermined questions was guided by the following set of questions proposed by Blaxter *et al.* (2010:230), with regard to the analysis of documents:

- Where was the document produced?
- When was the document produced?
- Why was the document produced?
- What were the underlying assumptions of the document?
- What did the document say?
- What did the document not say?
- How did the document relate to other documents?

From the search for documents it became evident that the documents could not be selected on face value only, but needed to be evaluated based on the research purpose of this study (Blaxter *et al.*, 2010:231). Based on the aforementioned and the criteria of data sufficiency and saturation of information (*cf.* 1.6.3), 15 documents were eventually analysed (*cf*. 4.5; 5.2.2.2).

The data collection methods used in Phase 1 of the empirical study informed the development of e-assessment as component of the DCME's WIL programme. After the implementation of the developed prototype e-assessment, Phase 2 of the empirical study was aimed at the collection of data as described in the following sections.

4.6.3 Quantitative data collection method: online questionnaire (Phase 2)

According to Tuckman (1994:216), a questionnaire is ultimately dependent on the purpose of the study. It was argued that a questionnaire was appropriate to gather data for this phase of the study in that it could elicit relevant information about factors applicable to the respondents' experiences related to the implementation of e-assessment in a WIL programme. The suitability of the use of an online questionnaire was further based on the premise that it could obtain relevant information from the sampled external stakeholder participants who accommodated Chemical and Metallurgical Engineering students for WIL in the past. For the purpose of this study, a self-developed, online questionnaire was used for gathering data. Questionnaire items were primarily informed by the literature study, although some of the items were derived from the researcher's interactions with other relevant material. By following the suggestions provided by Struwig and Stead (2004), Leedy and Ormrod (2005), Cooper and Schindler (2006) and McMillan and Schumacher (2006) the researcher followed a thorough process in the design of the questionnaire.

The questionnaire items consisted primarily of closed questions. Whereas open-ended questions allow participants to express their opinions, it also allows the researcher to gain multiple perspectives on particular matters (McMillan & Schumacher, 2006:198), although the aforementioned question types are difficult to code and analyse (Fraenkel & Wallen, 2008:396). As far as closed questions are concerned, Fraenkel and Wallen (2008:396) caution that these could limit the depth of participants' responses. Despite this, Delport and Roestenburg (2013:198) maintain that closed questions can ascertain the degree, frequency and comprehensiveness of a phenomenon quite meaningfully. In the case of this study, this implies that respondents' experiences of the implementation of e-assessment as component of WIL could be ascertained. Closed questions were mainly presented in the form of a four-point Likert scale (Maree & Pietersen, 2007:167). These questions can be regarded as structured-undisguised questions since they could alleviate participants' difficulty in replying to questions and contribute towards more reliable data (Churchill & Iacobucci, 2002:271).

The questionnaire was constructed in such a way that it would allow participants between 15 and 20 minutes to complete. It comprised of three sections dealing with

biographical information, the implementation of e-assessment as component of WIL and additional information (*cf.* **Appendix I**). Eventually 10 external stakeholder participants who accommodated Chemical and Metallurgical Engineering students for WIL in the past, completed the online questionnaire (*cf.* 1.6.4.2; 4.5; 5.4.1.1).

4.6.4 Qualitative data collection method: online individual interviews supplemented by face-to-face focus group interviews) (Phase 2)

As part of the second phase of the study, the researcher planned to conduct online individual interviews to collect data from third and fourth year students in the DCME after being exposed to the implementation of the prototype of e-assessment in their WIL programme. Flick (2014:233) contends that online interviews could be used when research participants are difficult to reach in person, but easier to reach by e-mail or the Internet. Organised in an asynchronous form (Flick, 2014:234) the students were e-mailed to inform them to complete the online questionnaire survey on the SurveyMonkey online platform. Interview questions were derived from the literature study and the researcher's curiosity about how students experienced e-assessment. Seven guiding questions were prepared by the researcher beforehand (*cf.* **Appendix J**). The questions relied on the participants' truthfulness and recall accuracy (Greenbaum, 1993:121). Being mindful of Nulty's (2008:302) advice that online data collection methods usually yield lower response/participation rates and after several reminders to potential participants, only 12 online questionnaires were completed (*cf*. 4.5).

In an attempt to increase the participation rate, this method of data collection was amended. Without sacrificing the reliability of the research by changing the form of the questions, the same questions were used to conduct focus group interviews. Greenbaum (1993:45-49) as well as Denzin and Lincoln (1994:126-129), define a focus group interview as a focused discussion where a moderator leads a group of participants, usually ranging from five to 12 people, through a set of questions on a particular topic. Focus groups are often used to gather or to obtain feedback about users, processes, concepts, tasks, strategies and environments. Focus groups can also be used to obtain consensus about specific issues (Greenbaum, 1993:45-49). Greeff (2013:360) suggests that through focus group interviews, a researcher can gain a better understanding of how people think about a particular issue, product or service.

The researcher was convinced that the amended method would still yield valuable information to assist in the elaboration of the data obtained in Phase 1 of the study and to obtain detailed views and opinions regarding the implementation of e-assessment as component of WIL. It was envisaged that the focus groups would consist of no more than five students per interview and that interview sessions should not exceed 40 minutes. Two focus group interviews were personally conducted by the researcher. However, the focus groups eventually consisted of three students each. These interviews took place at the work place and at a less active time as arranged with the participants.

After the two focus group interviews, the researcher judged that data saturation was attained, which made him to believe that his expectation regarding the use of the amended method was realised.

4.7 PRINCIPLES CONSIDERED FOR CONSTRUCTING AND ADMINISTERING THE DATA COLLECTION METHODS

4.7.1 Individual interviews

The construction of the set of eight questions that formed the individual interview guide (*cf*. **Appendix G**), was based on the following guidelines provided by Nieuwenhuis (2007b:88-89), Bryman (2012:473) and Lemke (2012):

- a variety of questions were included and ranged from explanation, experience and value-based questions,
- questions were grouped according to related topic areas,
- questions were associated with the purpose of the research,
- questions were contextual,
- it was ensured that the language in which questions were phrased were comprehensible,
- the language of the interviews were transposable from the interview to the analysis thereof,
- leading questions were avoided, and
- “double-barrelled” questions were avoided.

During the administering of the individual interviews, the researcher was mindful of the following guidelines provided by Greeff (2005:294, 295, 297):

- Appointments for individual face-to-face interviews were arranged with the participants,
- care was taken that the interview venue was free as possible from any disturbances and interferences,
- participants were welcomed and made to feel at ease,
- the purpose of the interview was explained,
- the participants were reminded about the ethical principles, e.g. the nature of their involvement in the research, that their participation was voluntary, and that they were free to withdraw from the research at any time,
- it was explained to the participants that the interviews would be recorded,
- before commencing with the interview, the set of eight questions was given to the participants to familiarise themselves with the nature and order of the questions, and
- while conducting the interviews, the researcher carefully maintained interest and responded by listening attentively without any interruption, and asked secondary probing questions.

4.7.2 Document study

To help the researcher to decide on the appropriateness of the documents to be used for the purpose of the study, the researcher applied criteria proposed by Bowen (2009:29-33) and Strydom and Delport (2013:380), including credibility/authenticity (*cf.* 4.8.1), representativeness, completeness and meaning. *Representativeness* relates to availability of the totality of relevant, representative documents with regard to the phenomenon under study (Bowen, 2009:33). For *completeness* of the documents studied, the researcher considered the comprehensiveness of the documents in terms of the extent to which it covers the research problem (e.g. complete or selective covering) (Bowen, 2009:33). In terms of *meaning* of the documents studied, the researcher was concerned with the following two dimensions of understanding the documents:

- Literal understanding, which implies to actually read the documents and understand it in terms of its linguistic forms.

- Interpretative understanding, which implies the relation between the literal meanings and the contexts in which they were produced, is assessed in order to determine the meaning of the text as a whole (Bowen, 2009:32, 33).

Guided by the practical steps suggested by Leedy and Ormrod (2005:141) and Strydom and Delport (2013:381,382), the researcher adopted the following procedures for conducting the document analysis:

- Documents were requested from the DCME and the DCE or were accessed through the TUT's website to enable the researcher to generate an archive of material.
- Seven questions, based on the suggested questions for analysing documents (Blaxter *et al.*, 2010:230), were formulated to guide the critical reading, coding and analysis of the documents. These seven questions also served as categories within which the results of the document analysis are reported (*cf.* 5.2.2.1).
- By means of the constant comparative method, the researcher moved back and forth between the analysed data and the collection of new emerging evidence from the documents. By applying this method, the reliability of the document analysis was also enhanced.
- In conclusion, the researcher reflected on the analysed material, recorded the final findings and interpreted the results.

4.7.3 Questionnaire

A self-developed questionnaire was distributed online to external stakeholders who accommodated Chemical and Metallurgical Engineering students for WIL in the past. According to the guidelines provided by Leedy and Ormrod (2005:190-193) and Delport and Roestenburg (2013:192), the following principles guided the construction of the online questionnaire:

- the questionnaire was thoroughly prepared, formatted and edited to reflect professionalism,
- clear instructions for completing the questionnaire were provided,
- questions were formulated in a brief, unbiased and comprehensible manner,

- it was ensured that no “double-barrelled” questions were used, without suggesting any responses,
- questions were categorised and sequenced in such a manner as to ensure logical and structured thinking,
- each question was formulated with the aim of informing the overall purpose of the study, and
- all the questions were verified and quality assured by means of a pilot study (*cf.* 4.9).

The online questionnaire was accompanied by a cover letter, aimed at orientating the respondents to the questionnaire. A reasonable timeframe for submitting the questionnaire was set and the purpose of the questionnaire was briefly clarified. Although respondents were supposed to complete the questionnaire in their own time, provision was made for about 15 to 20 minutes for completion. The questionnaire as well as the relevant information was made available to respondents on the SurveyMonkey online platform.

4.7.4 Online open-ended questionnaires (supplemented by face-to-face focus group interviews)

The construction of the online individual and focus group interviews (*cf*. **Appendix J**), were based on the same guidelines as for the individual interviews (*cf.* 4.7.1). Whereas the literature is not very specific about the administering of interactive and synchronous online interviews that are done by means of Skype, etc., the guidelines of Greef (2005:294, 295, 297) (*cf.* 4.7.1) were adapted for an online environment. As far as administering of the focus group interviews is concerned, the same guidelines were observed.

4.8 QUALITY CRITERIA

Since the study envisaged yielding conclusive results, specific quality criteria applicable to the respective research designs were considered for the development of the data collection instruments. The following descriptions of applicable quality criteria are offered to magnify how the researcher attempted to infuse quality criteria in the research.

4.8.1 Quality criteria applicable to the qualitative research design

4.8.1.1 Credibility

When the results of the research are believable and the data collection focussed on what it was supposed to focus, it is deemed to be credible. This implies that the research participants' contributions to the research and the researcher's reconstruction and application of these views should match (Schurink *et al.*, 2013:420). According to Terre Blanche and Durrheim (1999:61), credibility depends on the richness of the gathered information, and not its amount or volume. To ensure the trustworthiness of the qualitative aspects of the study, credibility was ensured by the use of a variety of data collection methods. During interviews, participants' responses were recorded. The participants also checked and verified the interview transcripts to establish as to whether it provided a true account of what they said (De Vos, 2005:346). For the document study, credibility (authenticity) of the documents was confirmed by scrutinising the content of a variety of official documents (*cf.* 4.6.2). Each document was considered by ensuring it was indeed the product of the TUT and by establishing its relevance in terms of references to WIL assessment.

4.8.1.2 Dependability

For dependability the researcher should attempt to account for changing conditions in the research to ensure that the research findings are consistent and that it could be repeated (Schurink *et al.*, 2013:420-421). In this research all processes followed in the individual interviews, document study, online interviews and focus group interviews are encapsulated in the detailed report to secure accuracy of the findings. This detailed report furthermore contains convincing evidence that the findings did indeed occur as stipulated in the report. All these details would enable other scholars to repeat the inquiry and most likely obtain similar results (Schurink *et al.*, 2013:421).

4.8.1.3 Confirmability

Confirmability provides evidence of objectivity and disciplined subjectivity, i.e. disciplined understanding and shared insight (Brown, 2009:83), and whether the research findings can be confirmed by another (Schurink *et al.*, 2013:421). This implies that the data can "speak for itself". Since the researcher's neutrality and

unbiasedness towards the emerging research results are imperative, confirmability was assured by reporting findings which are clearly supported by the collected data. In this study confirmability was augmented by involving a knowledgeable colleague who verified the interview transcripts, document analysis and the coding of the emerging data independently to ensure that the researcher's interpretations are beyond doubt and to ensure an audit trail.

4.8.1.4 Transferability

Transferability refers to the possibility that the research findings can be transferred or generalised to another context (Schurink *et al.*, 2013:420). Although the generalisation of qualitative findings are usually problematic, the theoretical framework on which a study is based as well as triangulation, are two proven procedures which can be applied for improving the transferability of a study's findings (Schurink *et al.*, 2013:420). In the case of this research, the researcher ensured that the focus of the study centres on concepts such as assessment, e-assessment, modern technologies and WIL (*cf.* 1.4). Transferability was further guaranteed by means of triangulation in the sense that multiple participants and respondents (*cf.* 1.6.3 & 4.5) and several data collection methods (*cf.* 1.6.4 & 4.6) formed part of the empirical study (De Vos, 2005:347).

4.8.2 Quality criteria applicable to the quantitative research design

The researcher focussed on reliability by obtaining "consistent and stable measurement of data" (Welman *et al.*, 2005:9) and on validity to ensure that the research is "representative of what the researcher is investigating" (Welman *et al.*, 2005:9).

4.8.2.1 Reliability

Reliability denotes the consistency, accuracy and stability of research results, should the research be replicated (Salkind, 2003:113; Struwig & Stead, 2004:130; Cooper & Schindler, 2006:321; Swart *et al.*, 2006:88; Mertler & Charles, 2011:109). This implies that, according to McMillan and Schumacher (2006:188), uniform conditions for collecting data would enhance the reliability of the research. In the case of this study the items of the online questionnaire aimed at the respondents from industry were

checked and verified for consistency of meaning by conducting a pilot study (*cf.* 4.9) (Maree & Pietersen, 2007:160). The items of the online open-ended questionnaires (which was supplemented by focus group interviews) intended for WIL students were checked and verified by the co-promoter of this study who also acts as faculty WIL coordinator.

4.8.2.2 Validity

According to Salkind (2003:115), Struwig and Stead (2004:138), Cooper and Schindler (2006:318) and Pietersen and Maree (2007:217), validity refers to whether the chosen instrument measures what it is supposed to measure. With regard to this research, internal validity that ensures accurate research conclusions (Leedy & Ormrod, 2005:97), was accomplished by applying content validity (Delport & Roestenburg, 2013:173). Content validity (Pietersen & Maree, 2007:217) was ensured by means of a careful evaluation of the data collection instruments by the researcher. This evaluation was applied to determine the extent to which the instruments covered the matters relevant to the purpose of the study. In addition, content validity of the instruments was also confirmed by the pilot study.

To honour external validity, which implies the extent to which research results can be generalised (Leedy & Ormrod, 2005:99), the researcher utilised multiple data collection methods. Furthermore, the researcher attempted to include representative samples in the sense of involving people from different sectors (staff; external stakeholders and students) in the research.

4.9 PILOT STUDY

“Pilot studies are preliminary studies on small samples that help to identify potential problems with the design, particularly with the research instruments” (Van der Riet & Durrheim 2010:94).

In addition to the researcher’s preliminary check on the items of both the interview guide intended for the WIL coordinators, and the questionnaire intended for the industry, it was desirable to carry out a pilot study on these instruments before using it in the research. For the pilot study the questionnaire and interview items were respectively checked by one staff member of the DCE and two willing WIL coordinators

from other departments in the FEBE. The researcher argued that these individuals reflect potential sameness to the respondents in the actual research. In order to improve the questionnaire and interview items, the pilot respondents were requested to comment on both the instruments in terms of their length and clarity of items. The pilot study responses revealed that only a few minor grammatical changes needed to be applied to the questionnaire and interview items.

4.10 ROLE OF THE RESEARCHER

In this study the researcher ensured that the necessary protocols were followed to gain access to the research participants (Creswell, 2009:177). Since the researcher was alert that his position as employee of the TUT at the time of the study may impact on the research results, he was especially thoughtful with regard to the following:

- his personal conduct towards potential research participants,
- the protection of the rights of the TUT, its staff and students,
- the protection of the rights of external stakeholders who accommodated Chemical and Metallurgical Engineering students for WIL in the past.

In addition, the researcher constructed and administered the data collection instruments himself. The researcher was also mindful of factors such as biases that may interfere with the data collection process or the interpretation of findings (Creswell, 2009:177). In order to arrive at reliable conclusions and recommendations, Strydom (2007:249) asserts that a researcher has to emanate self-confidence. Therefore, the researcher ensured that he was adequately skilled to undertake the proposed research, by studying publications related to the selection of appropriate research methods and the application thereof to this study.

4.11 ETHICAL CONSIDERATIONS

All parties involved in research should exhibit ethical behaviour. Cooper and Schindler (2006:116) state that ethics are “norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others”. Strydom (2013a:114) defines ethics as “a set of moral principles which is suggested by an individual or group, is subsequently widely accepted, and which offers rules and behavioural expectations about the most correct conduct towards experimental subjects and

respondents, employers, sponsors, other researchers, assistants and students". Jankowicz (2007:62) points out that the aforementioned ethical code is deliberately adopted as the correct and appropriate way of conducting research. According to Strydom (2002:62) and Cooper and Schindler (2006:116) the objective of ethics is to ensure that no one is harmed or suffers bad consequences from research activities and that data are not acquired at the expense of the research participants. It could therefore be concluded that participants in a research project should clearly understand the nature of the study and must be willing to participate (Leedy & Ormrod, 2005:144).

Based on the guidelines provided by Babbie (2008:66-79) and Strydom (2013a:115-129), the ethical aspects discussed below were adhered to in this particular study.

- The researcher obtained ethical clearance from the North-West University, Vaal Triangle Campus (*cf.* **Appendix A**).
- Permission to conduct the research at the TUT was requested from the management structures of the relevant units within the TUT (*cf.* **Appendix B** & **C**).
- An informed consent form, containing the researcher's particulars, together with the purpose of the study and the appropriate ethical principles, was designed and made available to the research participants to assure them of the researcher's adherence to correct and appropriate ethical behaviour (*cf.* **Appendix D, E** & **F**). Only after obtaining the necessary consent from the approached participants, were these participants absorbed into the study. Potential participants were notified of the following:
  - The study, and the nature of the participants' involvement in the study, were thoroughly explained to all participants (Strydom, 2002:64; Leedy & Ormrod, 2005:101). The participants were also informed that they could terminate their participation at any time (Strydom, 2013a:116). In addition, permission was sought from participants to record the individual interview sessions for data-analysis purposes only.
  - The participants' well-being was not in any way compromised during data collection and at no stage subjected to undue stress or embarrassment. Participants were reminded that should they wish to,

they could at any time during data collection suspend their involvement if they felt any physical or emotional strain as a result of their involvement in this study.

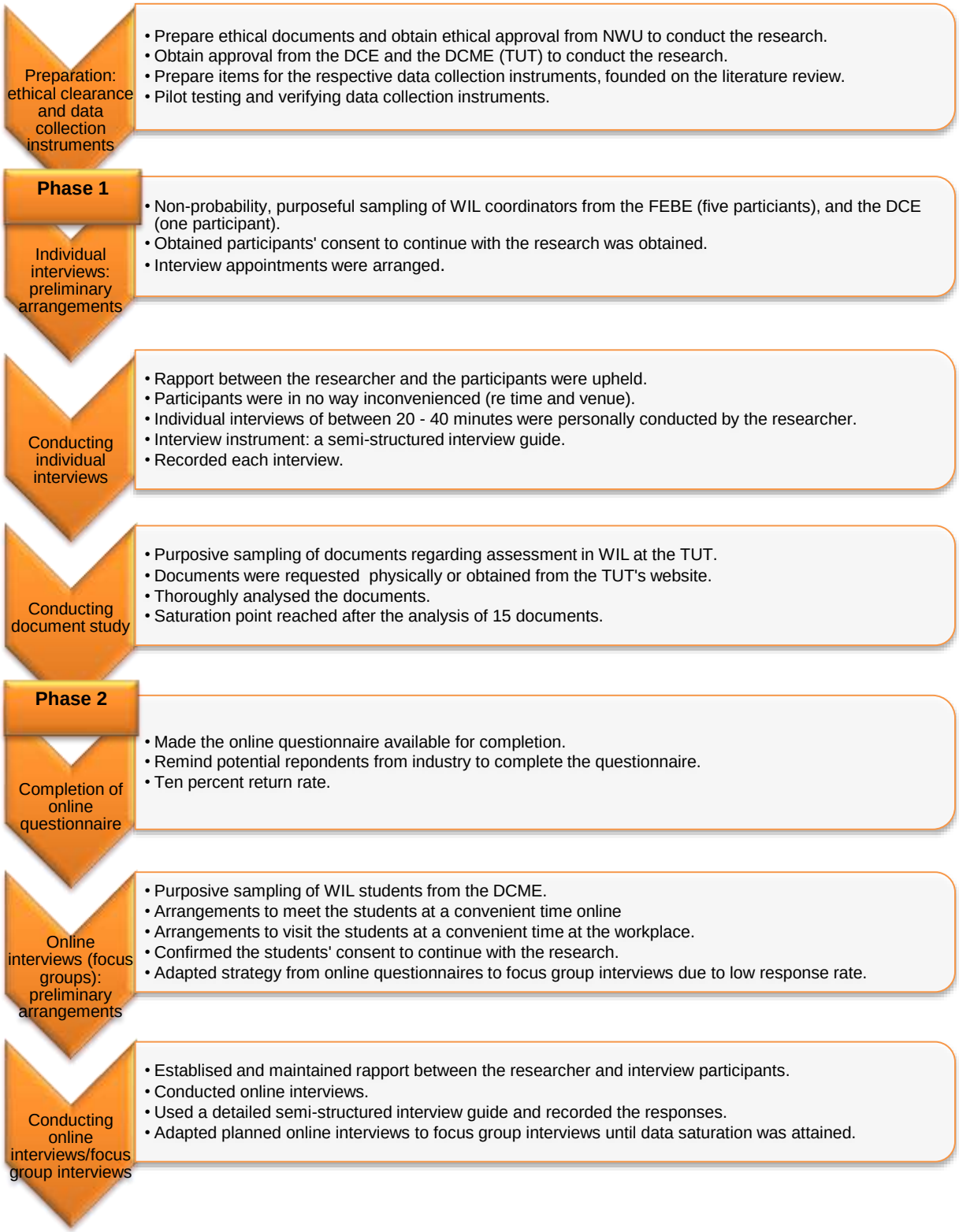
- The participants were assured that none of their confidential information would be divulged, implying also their anonymity. Any direct references to any participant's contribution were presented in an anonymous manner in order to protect the identities of the participants. Research participants who formed part of the focus group interviews were made aware that their responses would be shared within the focus group only.
- Participants were informed that the research results will only be used for research purposes and that the results of the study would be available to them on request. Furthermore, the results will be made available to the management structures of the relevant units of the TUT.

- The research data and findings were obtained from the actual empirical study in a scientific manner and the researcher avoided at all costs the falsifying or invention of findings, as this is regarded as scientific misconduct (Creswell, 2009:92). The researcher also strived to document all results and findings objectively, completely, with accuracy and without any bias.

4.12 DATA COLLECTION PROCESS

The data collection process is represented in Figure 4.2 on the following page. The study, being a sequential, embedded mixed methods design, included the following stages of data collection:

Figure 4.2: Data collection process



4.13 CONCLUSION

This chapter presented an overview of the empirical study. The research paradigm, design, strategy of inquiry, sampling, data collection instruments and the principles which were considered in developing and administrating the instruments were outlined. In addition, attention was also given to the quality criteria, the pilot study, the role of the researcher, ethics and the data collection process as elements of the study. The next chapter will present the analysis and interpretation of the data obtained from the two phases of the research.

CHAPTER FIVE
DATA ANALYSIS AND INTERPRETATION

5.1 INTRODUCTION

Chapter four provided an overview of the empirical study to indicate the processes and procedures which were followed to gather information relevant to the purpose of this study (*cf.* 1.2). This chapter reports on and interprets the empirical findings of the study obtained through the two phases of the sequential, embedded mixed methods research design (*cf.* 1.6.1; 4.3). The chapter will thus enlighten the primary two-pronged research question (*cf.* 1.3.1):

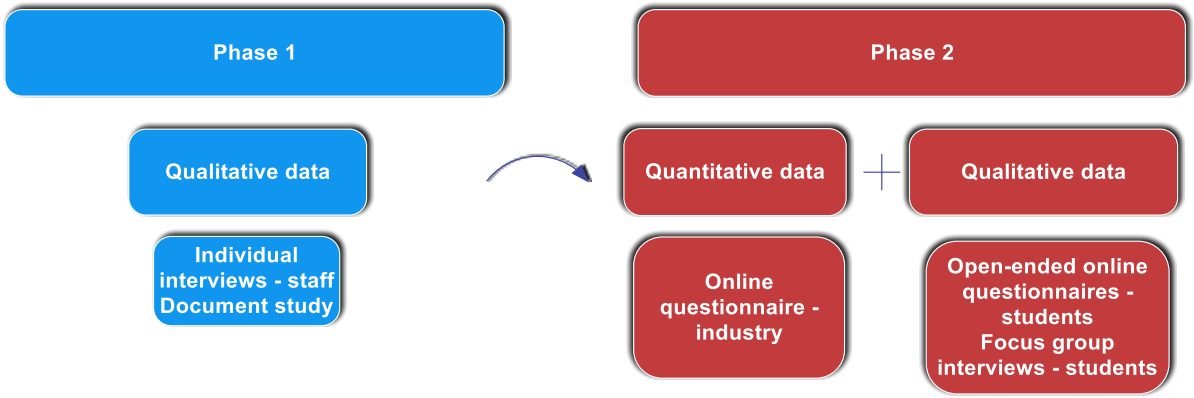
(a) *What factors should be considered for the successful development of e-assessment as component of WIL?*

(b) *What are the resultant experiences emanating from the factors determined and applied in (a) of the implementation of e-assessment as component of WIL?*

Infused in this two-pronged question, the secondary research questions will also be informed further.

As depicted in Figure 5.1, the data analyses and interpretations will be sequenced in the same order as the data collection process (*cf.* 1.6.5; 4.12).

Figure 5.1: Sequence of data analyses and interpretation



5.2 QUALITATIVE DATA ANALYSIS AND INTERPRETATION (PHASE 1)

This section deals with the analysis and interpretation of the qualitative data obtained through the use of individual interviews (*cf.* 1.6.4.1) and a document study (*cf.* 1.6.4.1).

5.2.1 Individual interviews

5.2.1.1 Background information

The individual interviews took place according to each staff member's availability during office hours. A time frame of 40 minutes was allowed for each interview, which was personally conducted by the researcher. The interview guide (*cf.* **Appendix G**) consisted of eight self-developed, semi-structured items which determined the line of inquiry. Eventually, six participants, selected by means of non-probability, purposive sampling (*cf.* 4.5; 4.6.1), partook in the interviews. The purpose of the interviews was to generate qualitative data on factors informing the development of e-assessment as component of WIL (*cf.* 4.6.1).

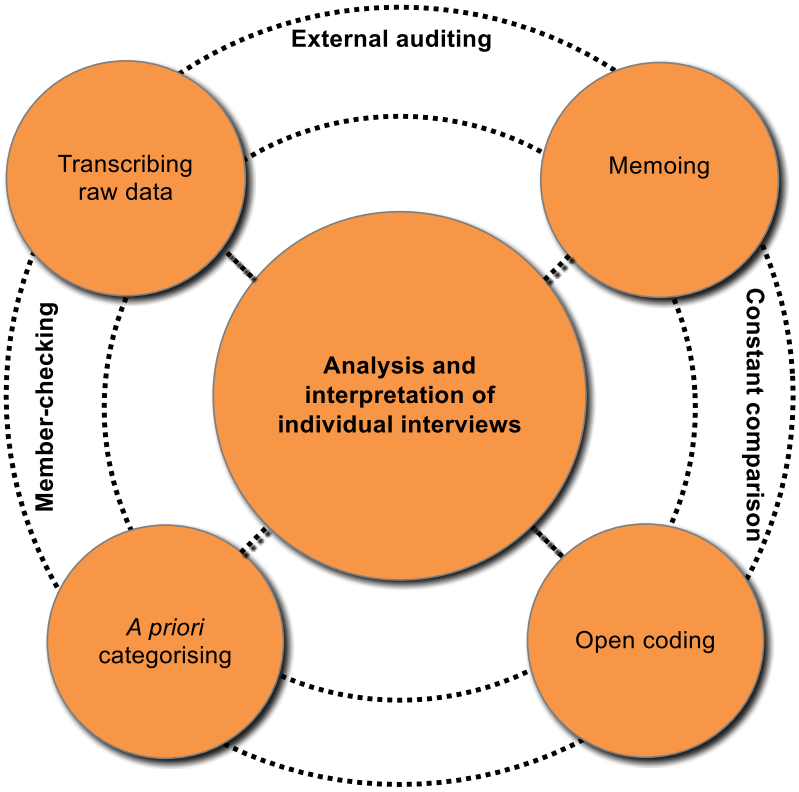
5.2.1.2 Analysis and interpretation of individual interviews

The recorded data obtained through the six individual interviews were transcribed by the researcher. By transcribing the interviews, the researcher meticulously engaged with the raw data by also applying "memoing" (Nieuwenhuis, 2007c:104) in an attempt to reveal any possible covert information. Hereafter, the transcribed data were sorted by means of open codes (Nieuwenhuis, 2007c:105; Schurink *et al.*, 2013:412). By applying this coding process, the researcher managed to organise, structure and condense the raw transcribed data. The open codes were then clustered into the *a priori* categories (*cf.* 1.6.7.1) which were derived from the literature study and which assisted in formulating the interview questions.

The credibility of the data analysis (*cf.* 4.8.1.1) was confirmed by employing "member-checking" (Plano Clark & Creswell, 2010:287) of the interview transcripts by the research participants. The confirmability of the data analysis (*cf.* 4.8.1.3) was ensured by means of an "external audit" (Plano Clark & Creswell, 2010:287) by one knowledgeable colleague. Through constant comparison, the researcher also checked the data for distinctive elements or to establish generalities within the *a priori*

categories. This process was continued until the researcher was satisfied that no new issues emerged (Dawson, 2006:117). Represented visually, the data analysis of the individual interviews encompassed the following (Figure 5.2):

Figure 5.2: Iterative process of individual interview data analysis and interpretation



5.2.1.3 Presentation of coded interview data

Following the responses of the interviewed sample, the coded forms of the raw transcribed data are presented in Table 5.1 through to Table 5.21. The researcher used the same order in which the questions appeared in the interview guide (*cf.* **Appendix G**) to indicate the main elements or open codes derived from the respective participants' responses. For the purpose of data analysis and interpretation of the interviews, the interview questions were numbered from 1 to 7, and sub-sections to questions were numbered with an alphabetic value [e.g. a), b), c)]. Cryptograms (e.g. RP1 – RP6) were used to identify the respective research participants.

Table 5.1: Length of WIL involvement (Q1a)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP 4)	Participant 5 (RP 5)	Participant 6 (RP 6)
• 20 years	• 7 years	• Not stated	• 4-5 years	• 5 years	• More than 15 years

Table 5.2: Nature of WIL involvement (Q1b)

Participant 1 (RP 1)	Participant 2 (RP 2)	Participant 3 (RP 3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• WIL programme leader • Acknowledged by companies as central figure in WIL • Responsible for solving WIL problems	• WIL coordinator • Create employer database • Networking with industry • Arrange student employment	• WIL coordinator • Manually marking and signing of WIL reports • Organise lecturer visits to companies • Administrate WIL results	• Lecturer involved in WIL programme • Periodically act as WIL coordinator due to rotation of coordinators	• Initially departmental WIL coordinator • Subsequently, faculty WIL coordinator • Address WIL related issues • Pursue WIL changes and ideas	• On programme level WIL faculty coordinator • Senior manager: the DCE • Advancement of WIL on institutional level

Table 5.3: Current WIL assessment procedures (Q2)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Students get logbook that includes training plan and mentor control form • Lecturer visits students in the workplace • Lecturer completes a monitoring questionnaire on the WIL site • Lecturer marks WIL reports on site • Students submit monthly WIL reports to academic department and prepare a final WIL report • Workplace mentor signs student's final report • Workplace mentor submits a final WIL performance report with mark to academic department for capturing on ITS	• Visit students twice during each work placement (P1 & P2) • 1st visit in either work placements: establish that student is working and share mutual expectations • 2nd visit in either work placements: assess student • Assessment Section 1: paper-based test • Assessment Section 2: PoLE	• Students keep logbook of workplace activities • Look holistically at student's logbook (hard copy) • Timesheet describing student activities in the workplace signed by workplace mentor and student	• Students submit three different PoLEs providing evidence that workplace exposure is linked to theoretical knowledge for each of their core subjects • Students keep logbook of workplace activities (hard copy)	• Initiating electronic WIL assessment as pilot project • Initial hard copy logbook formatted to electronic version on *my*TUTor • Students attend induction course on using *my*TUTor for WIL • Students submit five monthly WIL electronic reports • Students' final WIL report is submitted in both hard copy and electronic format (hard copy provides visual proof that document was signed)	• Each department's WIL programme is unique in its own assessment (i.e. assessment tools and mechanisms) • Effective assessment is key in any successful WIL programme • For Quality Assurance (QA) purposes there should be assessment criteria

Table 5.4: Reliability of current WIL assessment (Q3a)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Based on trust between the WIL coordinator, mentor and student • The marks on the log sheet and the marks on the final report should correlate	• There should be parallels between the opinions of the mentor and the lecturer • These parallels reveal students' positive and/or negative experiences of WIL	• Reports reflect student's own work and not that of others	• Student's report submitted as hard copy makes it difficult to determine reliability in terms of own work or copied work • Electronic submissions could enhance reliability	• Reports are more reliable when students are evaluated by lecturers • WIL coordinators cannot really say what is happening in the industry • Reliability of evaluation by industry mentors is therefore problematic	• May differ from programme to programme

Table 5.5: Validity of current WIL assessment (Q3b)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• 100% valid • Study guide (WIL guide) has guidelines in it • 100% modality although companies' training differ	• In this department lecturers know what students are supposed to be doing • Students know what is expected of them • Employers know what is expected of students • WIL is based on employers' needs and determine if students are employable	• Not all students are visited due to large student numbers and lecturers' work-load • Try to visit at least 75% of students	• To a certain degree when lecturers record conversations formally in writing • Valid, depending on the calibre and integrity of students and employers	• No discrepancies yet • To prevent students from forging mentors' signatures, monthly reports are verified by mentors	• May differ from programme to programme

Table 5.6: Fairness of current WIL assessment (Q3c)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Yes it is fair • Fairness depends on the allocation of marks and not merely using indicators such as competent/not yet competent • Marks obtained in the industry and from the lecturer don't differ much, thus making it fair	• It is fair • Student knows assessment outcome immediately • Both lecturer and employer see the student and an average mark is given	• Not fair • Logbook serves as a guideline without indicating assessment details • Student dishonesty with mentor's "approval" • Consistency regarding the completion of assessment tasks between various industries • Discrepancy between the expectations of industry and the WIL programme of the department	• Fair to a degree • Incongruity between ideal workplace settings and reality may impact negatively on students' overall WIL performance	• (No comments)	• Depends on the ways in which WIL is assessed • Fairness is determined by the quality of the intended WIL objectives and assessment criteria • Fairness depends on the qualitative or quantitative nature of an assessment task

Table 5.7: Authenticity of current WIL assessment (Q3d)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• (No comments)	• The standard assessment template doesn't work for this department since assessment consists of a written part and a drawings part with an oral presentation thereof • Drawings and oral presentations are regarded as authentic	• There is a degree of authenticity	• Not confirming the originality of a student's work influences the authenticity of the assignment • The department cannot decide who should visit the students to determine the originality of their work • Good to check who the WIL people are	• Yes, assessment is authentic • Students provide proof of work done every month • The monthly evaluation and signing off reports contribute towards authenticity	• May differ from programme to programme

Table 5.8: Adequacy of current WIL assessment (Q3e)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• P2 students should be exposed to more research-based tasks • Project Management should be incorporated	• Try to improve on assessment tasks every year • Creating a database of more practice-oriented questions • Adequacy is determined by allowing students to rate the WIL programme • The presentation component is adequately addressing WIL assessment in this department	• WIL tasks are vague • Tasks are holistic without specifying sub-tasks • There is a definite need to generate exact tasks	• WIL assessment appears to be adequate; however, three assignments might prove to be inadequate • Students are not visited frequent enough to validate their EL • Guidelines for preparing a PoLE might be inadequate	• Documentation is in place to adhere to the accreditation of the professional body concerned • Insufficient number of visits to students in the workplace is a concern	• WIL assessment procedures are adequate • WIL assessment procedures vary from programme to programme

Table 5.9: Feedback in current WIL assessment (Q3f)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Students are contacted to get feedback on problems detected on marked reports • Student's responsibility: obliged to give feedback on WIL problems • At end of WIL student gets email and SMS with final result	• Immediate verbal feedback on presentations • Verbal feedback supplemented by marks in writing	• When visiting student, student completes feedback form on: • Curriculum: how WIL was experienced • Practical: sufficiency of WIL programme • Not always reliable feedback on the WIL programme since not all students are visited	• Oral feedback on assessment tasks by panel of three staff members	• Feedback after marking each monthly WIL report • Check for mentor's queries and comments • Then write an email back to student to provide feedback consisting of marks and comments	• May differ from programme to programme

Table 5.10: Recommendations to improve current WIL assessment (Q4)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Electronic WIL guides and placed on *my*TUTor • All reports to be electronic; students are at a distance and couriering documents is problematic • ITS marks system is problematic; need solutions	• Looking at feedback from industry to improve assessment • By improving, a comprehensive assessment that's acceptable to everybody can be achieved	• Electronic assessment to allow for faster and more detailed assessment • Electronic assessment to improve communication to industry and students	• Implement a three-way electronic system where students, lecturers and employers are all in the loop • Paperless trail; electronic copies of documents • Student access to online platform is important, however, *my*TUTor has access restrictions	• Use e-marking to mark reports since it eases feedback, saves on storage space of documents and makes finding a report easy	• At institutional level assessment policy should be improved • Individual programme assessment procedures have to improve

Table 5.11: Opinions on e-assessment (Q5)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Everything on *my*TUTor • Will make processes quicker, especially marking • A dedicated WIL server could be made available to upload electronic documents to • To realise e-assessment the functionality of the current online platform should be reconsidered	• Due to their nature, e-assessment will not be practical in all courses	• E-assessment will ease the assessment administration and management for the institution and the industry • E-assessment will allow for more regular assessment	• E-assessment would entice students to do WIL beyond the borders of RSA to broaden their exposure • E-assessment could allow for more often assessment, different assessment, richer assessment • E-assessment would allow for more flexibility in terms of administration and management • To accomplish effective e-assessment all study programmes should be converted to electronic format	• E-assessment is the way to go • Students are already geared for it: laptops, tablets. • Students prefer working online and favour things in electronic format • Already piloted e-assessment in WIL programme • E-assessment features include swiftness, simplicity, flexibility	• E-assessment could be an effective mechanism • E-assessment appears to be an universal tendency • Hurdle: not all students have access to technology • Intermediate solution: parallel mechanisms - hard copies and e-assessment with same assessment criteria and methodologies

Table 5.12: Recommendations regarding e-assessment of WIL (Q6)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Fully go the e-assessment way • Condition: allows for smooth transition from current assessment procedures to e-assessment procedures	• E-assessment must complement current assessment procedures • Some courses require assessment by means of hard copies (i.e. drawings, presentations)	• Replace all the current assessment procedures with e-assessment • E-assessment should not be an add-on since this will increase the assessment administration • E-assessment will allow for more detailed assessment tasks	• Students must be informed about and should understand changes in assessment procedures • E-assessment should not substitute current assessment procedures • Current assessment procedures should be supplemented by e-assessment to accommodate students at a distance • Ensure authenticity of e-assessment procedures	• E-assessment should be added to existing assessment procedures since existing procedures are already in place and new procedures still need to be developed • Although students are familiar with using various electronic technologies they would require training in terms of e-assessment	• At institutional level adjustments are required in terms of e-assessment • Rather add e-assessment to the existing assessment procedures

Table 5.13: Implementation of e-assessment: orientation of stakeholders (Q7a)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• For lecturers not a huge problem, they are used to *my*TUTor environment • Although most companies want things electronically, they should be orientated towards e-assessment	• (No comments)	• Orientation of stakeholders is imperative • Orientation through meetings where the Engineering Council of South Africa (ECSA) is also present • Orientation through online platforms	• Ideal: all stakeholders should be involved • Coordinate meetings according to geographical areas • Orientation through Skype, or video-conferencing, or tele-conferencing	• Training day for students in soft skills (CV writing, dress code, etc.) and using *my*TUTor • Stakeholders: should receive training to be informed about *my*TUTor and e-assessment • Lecturers are already trained on using *my*TUTor	• Vitally important to orientate all stakeholders • Lecturers need to be orientated about the role of WIL coordinators

Table 5.14: Implementation of e-assessment: people involved (Q7b)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• All lecturers • Industry mentors • An all-encompassing advisory committee	• WIL coordinator • All lecturers • Stakeholders from industry	• Lecturers of WIL • Departmental WIL administrators • WIL coordinator • Institutional WIL officers	• All lecturers • WIL coordinators • Departmental WIL administrators • Employer • Academic Head of Department (HoD)	• Lecturers	• Lecturers • WIL coordinators

Table 5.15: Implementation of e-assessment: planning, development of tasks (Q7c)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Parallel system • Paper-based system that phases out, and *my*TUTor system that phases in • Overlapping of systems until phasing out and in is completed	• (No comments)	• Lecturers should be involved in the planning and development of tasks • The departmental subject groups should plan and develop WIL tasks	• Department could align and streamline WIL tasks to a dedicated company's processes • Consider creative ideas from departmental staff • Planned and developed tasks should be piloted	• Improving *my*TUTor • Implement new developments at the beginning of an academic year as to not confuse students • Upgrade e-assessment tasks regularly with new information, programmes, documentation	• Planning and development processes should consider both institutional and programme levels • Align planning and development of tasks with institutional policies, departmental guidelines and industry requirements

Table 5.16: Implementation of e-assessment: kinds of tasks (Q7d)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Current paper-based assessment tasks can be converted to electronic version • Video and/or Digital Video Disc (DVD) with questions • Demonstrations	• Theoretical tests • Oral presentations via Skype	• Electronic reports	• Free online course as part of an assignment • Essays • Multiple Choice Question (MCQ) tests • Online presentations	• Problem-solving scenarios	• *my*TUTor assessment tasks are adequate

Table 5.17: Implementation of e-assessment: variety of tasks (Q7e)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Test on safety procedures when working on machines • Components of machine • Tool modelling/designing • Fault finding using computer	• Electronic sketching • Online meetings • Presentation while drawing	• Skype and/or blogs to share ideas • PowerPoint presentation • Electronic journals	• Wiki and/or blog to share ideas • Electronic journals • Discussion groups	• (No comments)	• Depends on the specific discipline and programme

Table 5.18: Implementation of e-assessment: number of tasks (Q7f)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Five monthly reports (short, showing what you are busy with) that include hand skills (bench work), turning, milling, electrical and welding • Final report (explain what you have really done step-by-step) • Total of six tasks	• Number of drawings/designs	• One "light environment" task per week over a period of 24 weeks = 24 tasks • One "heavy environment" task to complete within a duration of two to four weeks over 24 weeks = approximately six tasks	• At least five tasks over a period of six months which form part of the PoLE • These five tasks could vary in form (e.g. MCQs, reflective journal entries)	• Depends on intensity of task (number of hours) • Not so intense tasks should be done monthly and should form part of the monthly report (six tasks) • Alternatively, one task over a period of six months • Prefer less intense assessment tasks over a shorter period of time than a single one over six months	• Difficult to say • Assessment methodology and tasks depend on a specific discipline • Consequently, the number of assessment tasks depends on the specific discipline

Table 5.19: E-assessment: feedback on tasks (Q7g)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Indicate problems/issues directly on report • Print report and email the report back for corrections • On-screen marking is better (no printing required) • Marked documents are always electronically available and storage problems are also solved	• Draft presentations are assessed and feedback given for improving final product	• Feedback on monthly reports are given which form part of final feedback • Electronic feedback is preferred i.e. on-screen marking and oral feedback via Skype, etc. • Request students to give feedback on the relation: curriculum vs workplace	• Face-to-face conversations using Skype • Have an intermediate session before rundown session of performance • After having assessed all the evidence, send formal feedback report electronically	• On-screen marking with immediate feedback • After WIL period student completes an electronic questionnaire on the WIL programme and e-assessment	• Two forms of feedback: during assessment process (formative) and at the end of assessment (summative) • Feedback for informative purposes (during the assessment process) is regarded as important

Table 5.20: E-assessment: evaluation of tasks (Q7h)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Constant improvement is necessary • Tasks should be updated every two to three years • Updates could be informed by students and workplace mentors	• (No comments)	• Promote online evaluation • Make electronic documents, reports and marks available to ECSA for inspection and evaluation of programme and assessment tasks	• Look at current trends, best practices, and uptake of technology • Look at what experts and faculty say and explore that • Comment on departmental initiatives	• Evaluation done by lecturers, WIL coordinators, maybe even students • Evaluation at end of semester of students' experiences, WIL documentation, reports, etc.	• Lecturer or the WIL coordinator's responsibility • Collaborate with workplace mentor on it • Responsibility of university; cannot be relegated to industry

Table 5.21: Additional comments on e-assessment (Q8)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)
• Start as quickly as possible • More mobility in terms of marking of reports on a computer	• None	• E-assessment is way to go • Many advantages such as saving space, ensuring reliability and fairness, bringing about adequacy, improving feedback • Evaluation of e-assessment system will be easy • Easier for external bodies to evaluate the e-assessment system • Evidence is online	• Need to foster a closer relationship with employers to make e-assessment feasible • Implementation of e-assessment would be easier if all departments are changing platforms collectively	• E-assessment is not making workload less • Increase workload in the beginning until settled and accustomed • Need tools like tablet computers, etc. for versatility and mobility • The sooner it could be implemented the better; it's the way forward	• This is the way to go for the future in terms of the current assessment procedures

5.2.1.4 Interpretation of individual interviews according to a priori categories

As stated above (*cf.* 5.2.1.2), *a priori* categories guided the analysis and interpretation of the data obtained through the individual interviews. The eight interview questions were associated with and clustered according to the *a priori* categories as shown in Table 5.22.

Table 5.22: *A priori* categories according to interview questions

Interview questions	*A priori* categories
1. Please provide the following biographical information:	WIL programme involvement
a) For how long have you been involved in the WIL programme?	
b) Explain the nature of your involvement in the WIL programme.	
2. Describe the assessment procedures currently used in the WIL programme.	Current WIL assessment procedures
3. Evaluate the assessment procedures currently used in the WIL programme in terms of the following:	
a) reliability	
b) validity	
c) fairness	
d) authenticity	
e) adequacy	
f) feedback	
4. If you are required to improve on the assessment procedures currently used in the WIL programme, what will your recommendations be?	
5. What are your opinions on e-assessment?	Opinions on e-assessment
6. To add value to current WIL assessment procedures, what suggestions would you make in as far as e-assessment of WIL is concerned?	Recommendations on e-assessment in terms of current assessment procedures
7. If e-assessment is to be included as component of WIL, how would you like the following to be addressed?	Suggestions on the implementation of e-assessment
a) Orientation of stakeholders in terms of e-assessment (Stakeholders include students, lecturers, and external stakeholders)	
b) People to be involved in e-assessment in a WIL programme	
c) Processes to be followed in the planning and developing of e-assessment tasks in a WIL programme	
d) Possible kinds of e-assessment tasks to be included in a WIL programme	
e) Variety of e-assessment tasks to be included in a WIL programme	
f) Ideal number of e-assessment tasks to be included in a WIL programme	
g) Feedback on e-assessment tasks in a WIL programme	
h) Evaluation of e-assessment tasks in a WIL programme	
8. Additional comments	Additional comments

5.2.1.4.1 WIL programme involvement (Q1a & Q1b)

The participants' **involvement** (*cf.* Table 5.1) in WIL programmes covers a timespan of four to 20 years. RP1 and RP6 are involved in WIL programmes for more than 15 years, while three participants (RP2, RP4, RP5) indicated that they are involved in WIL programmes for less than 10 years. RP3 has not stated any years of involvement in WIL.

In as far as the **nature** (*cf.* Table 5.2) of their involvement in WIL is concerned, all participants indicated that they coordinated WIL at some or other stage in their careers. In this capacity the participants revealed that they are responsible for solving general problems related to WIL (RP1), creating employer databases, networking with industry (*cf.* 2.5.3; 2.7; 3.4.3.1), assisting students with finding employment (RP2) (*cf.* 2.3.3.1), marking student reports, organising workplace visits [*cf.* 2.4 (iv); 2.5.10], administrating WIL results (RP3), addressing all WIL related issues and pursuing WIL changes and ideas (RP5). RP6 is responsible for the advancement of WIL on institutional level.

The data obtained in the two questions relating to involvement and the nature thereof, show that the participants are experienced and conversant with all aspects related to WIL. Consequently, their inputs could make a valuable contribution towards the attainment of the purpose of this study.

5.2.1.4.2 Current WIL assessment procedures (Q2, Q3 a-f, Q4)

Table 5.3 reflects that although departmental WIL programmes follow unique **assessment procedures** (RP2, RP4, RP5, RP6), assessment is acknowledged as key to a successful WIL programme since it contributes to the quality assurance of a specific WIL programme (RP6) [*cf.* 2.4 (v)]. However, a concern is expressed that clear assessment criteria are not always evident (RP6). The participants' description of the current WIL assessment procedures suggests that students are provided with a logbook (RP1, RP5) which is made available in either hard copy or electronic format [*cf.* 2.4 (iv); 2.4 (v); 2.7]. The logbook contains all the necessary information pertaining to the students' particular WIL programme and should be used to record workplace activities (RP3, RP4). In one case (RP5) students are exposed to an induction

programme that explains the assessment procedures. Lecturers visit workplaces for monitoring students (RP1, RP2), for marking students' WIL reports (RP1), for assessing students (RP2) and for sharing mutual expectations with employers (RP2). Workplace mentors ensure that students' final reports are signed and submitted to the relevant academic department (RP1, RP3). Students' assessment tasks are either compiled in the form of successive reports (RP1, RP5) or as PoLEs (RP4) which are finally assessed and the marks captured by the respective academic departments [*cf.* 2.4 (iv); 2.4 (v); 3.3.5.3; 3.4.3.1; 3.4.3.2; 3.6].

The research participants' understanding of reliability hinted towards the trustworthiness of students work. Understood in this way, ensuring the **reliability** (*cf.* Table 5.4) of current WIL assessment appears to be a concern (RP1, RP4, RP5). Some research participants alleged that reliability is largely dependent on trust (which is merely intuitive in nature) between the WIL coordinator, student and mentor (RP1, RP5) and one participant indicated that submissions by means of hard copies complicate ascertaining the reliability of a student's work (RP4).

Most of the participants (RP1, RP2, RP4, RP5) were quite confident that WIL assessment reflects an acceptable degree of **validity** (*cf.* Table 5.5). However, it was mentioned that validity of student performance is reliant on lecturer visits to students (RP3) and students' integrity when completing the assessment tasks (RP4).

Table 5.6 includes a statement that the **fairness** of WIL assessment depends mainly on the quality of the stated WIL objectives, the assessment criteria and the nature of the assessment tasks (RP6). However, only one participant (RP2) concluded that students have clarity on what are expected of them, while RP3 and RP4 indicated inconsistency in the expectations expressed in the WIL programme and that of industry. With regard to the fairness of the allocation of marks for assessment tasks, there appears to be some consistency between various stakeholders (RP1, RP2).

Varying degrees of **authenticity** (*cf.* Table 5.7) of current WIL assessment is reported (RP3, RP5) (*cf.* 2.3.1; 2.3.3.2; 2.5.3; 2.6; 3.3.3; 3.3.3.7; 3.3.5.3; 3.4.1.2; 3.4.2; 3.4.3; 3.5). To ensure authenticity, assessment tasks are tailored in accordance with departmental foci (RP2) and by visiting the responsible people in the workplace (RP4).

Although there appears to be general agreement to the fact that current WIL assessment procedures are adequate (RP2, RP4, RP5, RP6) (*cf.* Table 5.8), the following views were expressed: assessment can be expanded to include more research based tasks (RP1) and more specific, practice-oriented tasks (RP2, RP3). The **adequacy** (*cf.* Table 5.8) of assessment could further be improved by requesting students' feedback on assessment tasks (RP2), by arranging more frequent visits to students (RP4, RP5) and by providing clearer guidelines for preparing a PoLE (RP4).

Feedback (*cf.* 2.3.1; 2.4 (v); 3.3.3; 3.3.7; 3.3.9; 3.4.2; 3.4.3.3; 3.5; 3.6; Table 5.9) in current WIL assessment apparently differs from one WIL programme to another (RP6). In some cases (RP1, RP5) electronic feedback is provided on students' WIL performance, while in other cases verbal (RP2, RP4) and written (RP2) feedback is given. Feedback is sometimes given in the form of marks (RP2, RP5) and comments (RP5) and are sometimes provided at the end of (RP1), or during (RP2, RP5) the WIL period. It is also evident that some research participants attach value to students' feedback with regard to their WIL experiences and the WIL programme (RP1, RP3).

The research participants' **recommendations to improve current WIL assessment** (*cf.* Table 5.10) included the following: more inputs from industry, more comprehensive assessment and the improvement of WIL assessment policies and procedures (RP2, RP6). Yet, the overall recommendations point to a general consensus on the implementation of e-assessment (RP1, RP3, RP4, RP5). One of the main reasons mentioned by some participants, is that e-assessment will assist in keeping contact with students and the industry (RP1, RP3, RP4). To substantiate their views regarding e-assessment further, e-marking, easier feedback and a solution to storage problems (RP1, RP4, RP5) were also added.

5.2.1.4.3 <u>Opinions on e-assessment (Q5)</u>

Related to their recommendations to improve current WIL assessment, the research participants' responses signalled positive **opinions towards e-assessment** (*cf.* Table 5.11). To substantiate their optimism, the following reasons were provided: e-assessment will centralise WIL assessment (RP1); it will make the assessment process swifter (RP1, RP5); it will ease the administration and management burden normally associated with assessment (RP3, RP4), and it will result in more regular,

richer and flexible assessment (RP3, RP4, RP5) (*cf.* 3.4). In addition, one participant alluded to the benefits e-assessment will hold for students since it will no longer restrict students to do their WIL within South African borders (RP4). Another participant alleged that students favour working online and in electronic format (RP5). However, the research participants cautioned that the successful implementation of e-assessment is dependent on the following: functionality of a reliable online platform (RP1); that the nature of specific courses should be considered (RP2); that the conversion of all WIL programmes to e-assessment should be a gradual process (RP4, RP6) and that the availability of technology to all students should be investigated (RP6).

5.2.1.4.4 Recommendations on e-assessment in terms of current assessment procedures (Q6)

Despite the positive opinions about e-assessment expressed in 5.2.1.4.3, the research participants were somewhat divided with regard to their **suggestions on how e-assessment could add value to current assessment procedures** (*cf.* Table 5.12). The strongest sentiment is that e-assessment should be implemented in conjunction with the current assessment procedures (RP2, RP4, RP5, RP6). This outlook is motivated by the fact that it will ensure a smooth transition from the current procedure to the other (RP1, RP6); that students will be allowed time to get familiarised with e-assessment (RP4, RP5), and that it will allow for the proper development of e-assessment (RP5).

5.2.1.4.5 Suggestions on the implementation of e-assessment (Q7a-h)

Almost all of the participants agreed that **stakeholder orientation** (*cf.* Table 5.13) towards e-assessment is essential (RP1, RP3, RP4, RP5, RP6). Orientation of lecturers does not seem to be a major concern (RP1, RP5), but one participant said that lecturers still need to be better informed about the role of the WIL coordinator (RP6). The majority of participants indicated that orientation is required for industries, professional bodies and students (RP1, RP3, RP5, RP6), and two participants said that orientation should preferably be provided by means of electronic delivery (RP3, RP4). Without exception, all participants agreed that the **people involved** (*cf.* Table 5.14) in the implementation of e-assessment should include lecturers. The majority of

the participants said that other involved parties should be the WIL coordinators (RP2, RP3, RP4, RP6), some referred to stakeholders from industry (RP1, RP2, RP4), two referred to departmental and institutional WIL administrators (RP3, RP4) and one participant to academic HoDs (RP4).

According to one participant, the processes to be followed in the **planning and development** (*cf.* Table 5.15) of e-assessment tasks should constitute a gradual phase out/phase in procedure (RP1) which, according to another participant should, ideally, commence at the beginning of an academic year (RP5). Two participants said that departmental staff should be involved in the planning and development of e-assessment tasks (RP3, RP4). Two participants recommended that care should be taken that tasks are aligned with the workplace (RP4, RP6) (*cf.* 2.3.2; 2.5.4; 3.3.3.7; 3.3.4.1; 3.3.7; 3.3.8) and another that they are aligned with departmental and institutional requirements (RP6). One participant recommended that tasks be piloted (RP4) and another that it should be regularly revised (RP5).

Possible **kinds of e-assessment tasks** (*cf.* Table 5.16) could include current tasks which can be converted to electronic format (RP1, RP6). Kinds of tasks mentioned by the participants could include videos or DVDs with questions and demonstrations (RP1), theoretical tests and presentations (RP2, RP4), reports (RP3) and problem-solving scenarios (RP5) (*cf.* 3.4; Table 3.1; 3.5).

RP6 summarised the participants' viewpoints by indicating that the **variety of e-assessment tasks** (*cf.* Table 5.17) depends on a specific department's WIL programme. This variation of tasks is clearly reflected in those mentioned by a majority of participants (RP, RP2, RP3, RP4). One participant indicated that the ideal **number of e-assessment tasks** (*cf.* Table 5.18) to be included in a WIL programme, needs to be determined by each department (RP6). However, instead of one major task (as recommended by RP5), there appears to be a preference for an assortment of approximately six smaller tasks, evenly distributed over the WIL period (RP1, RP3, RP4, RP5).

With regard to **feedback** (*cf.* Table 5.19) on e-assessment tasks, continuous feedback, which includes formative and summative assessment tasks, was suggested by two participants (RP2, RP6). Some participants recommended that feedback could

include on-screen marking with the provision of immediate electronic feedback to students (RP1, RP2, RP5) and two others referred to oral, face-to-face feedback via an electronic medium such as Skype (RP3, RP4). One participant mentioned that electronic feedback has the advantage that it would solve document storage problems (RP1). Encouraging is the fact that some participants also regarded student feedback on the effectiveness of the WIL programme and e-assessment as important (RP3, RP5).

In order to constantly improve e-assessment tasks, one participant mentioned that the **evaluation** (*cf.* Table 5.20) of such tasks should be done frequently (RP1) while two others indicated that evaluation should be done by WIL coordinators, lecturers and even students (RP5, RP6). Three participants also recommended that evaluation of e-assessment tasks should be guided by inputs from professional bodies and industry (RP3, RP4, RP6).

5.2.1.4.6 Additional comments (Q8)

None of the research participants rejected the implementation of e-assessment as the majority of them expressed the opinion that e-assessment is the way forward (RP1, RP3, RP5, RP6). Moreover, two participants also suggested that the sooner e-assessment is implemented, the better it would be (RP1, RP5). Two participants substantiated their positive views towards e-assessment by reiterating a range of advantages (RP1, RP3). However, two participants also cautioned that a number of factors should be considered for the successful implementation of e-assessment. These include better relationships with industry, an institutional change towards e-assessment in WIL (RP4), the availability of technological tools and the initial workload required to introduce e-assessment (RP5) (*cf.* Table 5.21).

5.2.1.5 Preliminary conclusions

From the individual interview data, the following can be extrapolated:

(i). Though assessment procedures may differ between departments, assessment is recognised as fundamental to the success of WIL (*cf.* 5.2.1.4.2).

(ii). View holistically, it appears as if current WIL assessment procedures can be characterised by a number of stages which include the provision of information to students, lecturer visits to students in the workplace, students' completion of assessment tasks which are mainly in the form of reports or a PoLE, verification of students' work by workplace mentors and the recording of WIL assessment results (*cf.* 5.2.1.4.2).

(iii). E-assessment is viewed positively since it will centralise assessment, make the assessment process swifter, ease assessment administration and result in more regular, richer and flexible assessment (*cf.* 5.2.1.4.3).

(iv). For the successful implementation of e-assessment, certain crucial matters should be considered. These include reliability, validity, fairness, authenticity, adequacy, feedback, clarity of assessment criteria, a functional online platform, student access to technology and relationships with industry (*cf.* 5.2.1.4.2; 5.2.1.4.3).

(v). The implementation of e-assessment for WIL should be institutionally sanctioned and should be a gradual process, starting at the beginning of an academic year. This will ensure a smooth transition from the current assessment approach to e-assessment and will provide an opportunity to all parties to become acquainted with the new assessment approach (*cf.* 5.2.1.4.5).

(vi). Although the nature and number of e-assessment tasks for WIL is considered to be a departmental matter, preference is given to a number of smaller tasks which are evenly distributed throughout the WIL period (*cf.* 5.2.1.4.5).

(vii). E-assessment tasks for WIL should be developed by lecturers in consultation with industry and should be regularly evaluated and revised by also considering the opinions of students, professional bodies and the industry (*cf.* 5.2.1.4.5).

5.2.2 Document Study

5.2.2.1 Background information

The research data for the document study were obtained by means of a non-interactive, qualitative research design. The document study was a complementary data collection procedure in support of triangulation (*cf.* 4.8.1.4) and theory building on factors informing the development of e-assessment as component of WIL (*cf.* 1.6.4.1). A set of seven guiding questions were formulated (*cf.* **Appendix H**) to assist with the reading, coding and analysis of the documents. These questions were derived from the suggested questions for analysing documents (Blaxter *et al.*, 2010:230) (*cf.* 4.6.2) and proposed criteria for document analysis (Bowen, 2009:29-33; Strydom & Delport, 2013:380) (*cf.* 4.7.2). The questions also served as a guide to categorise the analysed results (*cf.* 4.6.2). By means of the constant comparative method, the researcher moved back and forth between the analysed data and the collection of new emerging evidence from the documents. The analysis and interpretation of the data obtained through the studying of 15, purposefully selected documents, are presented below.

5.2.2.2 Analysis of documents

The documents that were studied and the cryptograms that were used to identify the respective documents, are listed in Table 5.23. D1 to D15 are representative of official documents related to WIL and assessment on institutional, faculty and departmental levels (*cf.* 4.6.2) accessed in either hard copy or electronic format.

Table 5.23: Documents that were studied

Document cryptogram	Document
D1	TUT: Policy on Co-operative Education
D2	TUT: Policy on Curriculum Development
D3	TUT: Policy on Learning Guides (Undergraduates)
D4	TUT: Policy on student registration for Experiential Learning
D5	TUT: Policy on student registration for Work Integrated Learning (WIL)
D6	Technikon Northern Transvaal: Work Book: Assignment Manual: Medical Technology (Microbiology)
D7	Technikon Northern Transvaal: Log Book: Experiential Training: Architecture Level II
D8	Technikon Pretoria: Department of Chemical and Metallurgical Engineering, Faculty Natural Science, Chapter 3, Writing a Report
D9	TUT: Faculty of Engineering, Department of Chemical and Metallurgical Engineering Logbook Experiential Training I & II
D10	TUT: First Work Integrated Learning P1 Experiential Training Log Book (completed example)
D11	TUT: Faculty of Engineering and the Built Environment, Department of Chemical and Metallurgical Engineering: WIL Guide for *my*TUTor
D12	ITS: Delivering solutions for your environment
D13	TUT: Faculty of Engineering and the Built Environment, Department of Chemical and Metallurgical Engineering: Questionnaire form
D14	TUT: WIL – Proof of Visit form
D15	EXP2ECH: Experiential Learning II: Chemical Engineering

The researcher used the order of the seven guiding questions (*cf.* **Appendix H**) to indicate the main elements derived from the respective documents and to guide the further analysis and interpretation of the document data.

Table 5.24: Place of document creation (Q1)

D1	D2	D3	D4	D5	D6	D7	D8
• TUT	• TUT	• TUT	• TUT	• TUT	• Technikon Northern Transvaal	• Technikon Northern Transvaal	• Technikon Pretoria
D9	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	
• TUT	• TUT	• TUT	• Integrated Tertiary Software (ITS) (TUT)	• TUT	• TUT	• TUT	

Table 5.25: Date of document creation (Q2)

D1	D2	D3	D4	D5	D6	D7	D8
• 2005 – 2007	• 2005 - 2007	• 2005 - 2006	• 2005 - 2007	• 2005 - 2007	• 1992	• s.a.	• 2000(?)[1]
D9	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	
• 2009(?)	• 2013	• 2011	• 2011	• 2009(?)	• 2009(?)	• 2011	

[1] Date is not explicitly mentioned, therefore an estimated date of document creation is provided which is based on the date on which the electronic file was created.

Table 5.26: Purpose of document (Q3)

D1	D2	D3	D4	D5	D6	D7	D8
• Decisions and outcomes on co-operative education as part of teaching and learning strategy	• Decisions and outcomes on improving teaching and learning	• Decisions on learning guides	• Guide in terms of EL • Completion requirements for EL	• Guide in terms of WIL • Completion requirements for WIL	• Assignment manual and work book	• Logbook containing detail of practical work to be done in EL	• Assistance to WIL students regarding report writing skills and techniques
D9	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	
• Guide and logbook for EL	• Guide and logbook for WIL	• Guide and logbook for EL	• Presentation of ITS system solution for the DCE and WIL	• A questionnaire for determining the relevance and success of WIL	• A questionnaire to prove that student was visited and evaluated	• Comprehensive guide and logbook for WIL	

Table 5.27: Underlying assumptions of WIL assessment (Q4)

D1	D2	D3	D4	D5	D6	D7	D8
• WIL assessment contributes towards competence related to skills and employability	• WIL assessment ensures achievement of LOs and associated assessment criteria which certify applied competence	• The appropriateness of WIL assessment relies on well-defined outcomes, objectives, activities, resources and assessment opportunities	• WIL assessment processes need to be clearly stipulated to ensure monitoring of students	• WIL assessment processes need to be clearly stipulated to ensure monitoring of students	• Workplace mentors and academic staff are capable to certify student competence	• Workplace mentors are reliable assessors	• Developing students' report writing skills
D9	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	
• Ensures that students are exposed to many aspects of engineering practices	• Ensures that students portray acceptable levels of technical skills	• Ensures that workplace experiences will benefit students in developing a wide variety of performance skills	• The ITS system can handle WIL assessment procedures effectively	• None	• None	• WIL assessment addresses diverse aspects of students' competence related to the workplace and enable them to report on it	

Table 5.28: Assessment in WIL (Q5)

D1	D2	D3	D4	D5	D6	D7	D8
• Assess EL • All stakeholders involved in assessment • HoDs apply QA	• None	• Learning guides should provide details on assessment • WIL assessment not explicitly mentioned	• Approved EL assessment guidelines • Preparation of EL assessment documents • EL assessment process	• Approved WIL assessment guidelines • Preparation of WIL assessment documents • WIL assessment process	• Assessment process clarified in terms of explanation of tasks, certification of work, submission of logbook and assessment review	• Assessment process clarified in terms of practical work, completion of monthly report, mentor appraisal and certification	• Assessment tasks in experiment format
D9	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	
• Lecturer/ mentor evaluates and supervises EL • Assessment process clarified in terms of maintaining logbook, submission of reports and student visits	• Lecturer/ mentor evaluates and supervises EL • Assessment process clarified in terms of maintaining logbook, submission of reports and student visits	• Lecturer/ mentor evaluates and supervises EL • Assessment process clarified in terms of maintaining logbook, submission of reports and student visits	• Outcomes of workplace evaluation recorded • System can record number, submission dates and weightings of assignments • Submitted documents can be recorded	• None	• None	• Assessment process clarified in terms of employer, lecturer and student responsibilities • WIL syllabus included	

Table 5.29: Silence about assessment in WIL (Q6)

D1	D2	D3	D4	D5	D6	D7	D8
• Doesn't specify how competences should be assessed	• Doesn't specify how assessment tasks should be assessed	• None	• No mention of any assessment criteria and assessment methods	• No mention of any assessment criteria and assessment methods	• Does not clarify: ○ the examiner ○ how tasks should be assessed ○ different types of assessment tasks ○ use of technology for assessment purposes	• Does not clarify: ○ how tasks should be assessed ○ different types of assessment tasks ○ use of technology for assessment purposes	• No mention of assessment criteria
D9	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	
• Does not clarify: ○ how tasks should be assessed ○ different types of assessment tasks ○ feedback on assessment tasks	• Does not clarify: ○ examiner ○ assessment methods ○ use of technology for assessment purposes	• Does not clarify: ○ roles of assessors ○ purposes of assessment ○ different types of assessment tasks ○ feedback on assessment	• Does not mention assessment criteria	• Does not clarify: ○ different types of assessment tasks ○ Use of technology for assessment purposes	• Does not clarify: ○ different types of assessment tasks ○ methods of assessment	• Does not state assessment criteria • No indication of how tasks should be assessed • No evidence included in monthly reports that work was actually done • Discussion board not utilised	

Table 5.30: Relation to other documents referring to WIL assessment (Q7)

D1	D2	D3	D4	D5	D6	D7	D8
• Related to documents on work-based learning, application of theory in authentic contexts and skills development	• Related to documents on work-based learning, application of theory in authentic contexts and skills development	• No relation	• Guidelines for monitoring the EL process	• Guidelines for monitoring the WIL process	• Assignment manual and logbook	• Assignment manual and logbook	• No relation
D9	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	
• Assignment manual and logbook	• Assignment manual and logbook	• Assignment manual and logbook	• No relation	• Instrument to gather data on WIL	• Instrument to gather data on WIL	• Logbook and other documentation in electronic format on the LMS • Repository of reports	

5.2.2.3 Interpretation of the document study

Derived from the data in Table 5.24 to Table 5.30, the interpretation of the data obtained through the respective questions is set out below.

5.2.2.3.1 Where was the document produced? (Q1)

The majority (12) of the documents originated from the TUT. However, some documents were produced by the former Technikon Pretoria and others by the former Technikon Northern Transvaal. The reason for the inclusion of documents from these two institutions is based on the fact that they were amalgamated as the TUT in 2004, following the restructuring of the higher education landscape instituted by the Department of Education (Ministry of Education, 2002). All the studied documents are therefore pertinent to the purpose of this study.

5.2.2.3.2 When was the document produced? (Q2)

Two documents (D6, D8) appear to be rather dated, while the majority of documents (D1, D2, D3, D4, D5, D9, D13, D14) were created between 2005 and 2010. Between 2011 and 2014 only four documents (D10, D11, D12, D15) were produced, with D10 the most recent one (2013). Hence, it can be reasoned that revision of the studied documents does not occur frequently. This reasoning correlates with the views expressed by two of the interviewees (*cf.* Table 5.10) regarding the updating of WIL assessment policies and procedures.

5.2.2.3.3 Purpose of the document (Q3)

In some or other form, all the documents are relevant to the purpose of the study. Some of the documents are concerned with general matters related to the support and improvement of teaching and learning, which understandably also includes WIL (D1, D2, D3). All the other documents are more specifically aimed at WIL; whether about its completion requirements (D4, D5), information about the completion of assignments (D6, D7, D9, D10, D11, D15), assistance to students with regard to report writing (D8) [*cf.* 2.3.1; 2.4 (v); 2.7; 3.3.2; 3.3.5.1; 3.4.3.2], assessment of students' WIL experiences (D13) or proof of student visits (D14) [*cf.* 2.4 (iv); 2.7]. D12 is more particularly concerned with the accommodation of WIL on the ITS system of TUT.

5.2.2.3.4 Underlying assumptions of WIL assessment (Q4)

The documents reflect a diverse range of underlying assumptions related to WIL assessment. Six of the documents include that students benefit from WIL assessment in that it exposes them to a variety of workplace experiences which could enhance their knowledge and skills and contribute towards their competence (D1, D2, D9, D10, D11, D15) (*cf.* 2.3.3). It is also assumed in four documents that effective WIL assessment relies on clearly specified outcomes, criteria and processes (D2, D3, D4, D5) [*cf.* 2.4 (ii); 2.4 (iii); 2.3.2; 2.3.3; 3.3.1; 3.3.4; 3.3.7]. Two documents indicate that, to certify student competence, it is accepted that the judgments of workplace mentors and academic staff (D6, D7) are reliable.

5.2.2.3.5 Assessment in WIL (Q5)

With regard to assessment in WIL, it is clear from four of the documents that workplace mentors and lecturers should assume this responsibility (D1, D9, D10, D11), whilst one document indicates that HoDs should exercise quality control (D1). This information relates to the information obtained in the interviews (*cf.* Table 5.14). Whereas one document indicates that the learning guide should provide assessment details (D3), assessment guidelines, the preparation of assessment documents and the assessment process are clarified in eight other documents (D4, D5, D6, D7, D9, D10, D11, D15). In one document assessment methods are mentioned (D8) (*cf.* 3.3.5). Another document shows that recording of assessment is possible through the ITS system of TUT (D12).

5.2.2.3.6 Silence about WIL assessment (Q6)

The majority of documents (nine) are not explicit about the assessment methods to be used (D4, D5, D6, D7, D9, D10, D11, D13, D14). How tasks should be assessed, or the absence of assessment criteria, is common in 10 documents (D1, D2, D4, D5, D6, D7, D8, D9, D12, D15). Two documents do not refer to feedback (D9, D11) and the use of technology for assessment purposes are also overlooked in four other documents (D6, D7, D10, D13).

5.2.2.3.7 Relation to other documents referring to WIL assessment (Q7)

With the exception of three documents (D3, D8, D12), cross-referencing to other documents relevant to WIL assessment was possible. The most prominent of these documents, appear to be those documents that relate to the assignment manual and logbook (D6, D7, D9, D10, D11) [*cf.* 2.4 (iv); 2.7].

5.2.2.4 Preliminary conclusions

From the seven questions that guided the document study, the following can be deduced:

(i). Although the accessed documents are noticeably dated, a broad spectrum of WIL related information is covered in the documents without displaying detailed information concerning WIL assessment (*cf.* 5.2.2.3.3; 5.2.2.3.6).

(ii). It is acknowledged that WIL assessment contributes towards student competence, but that effective assessment is dependent on well-defined outcomes, criteria and processes (*cf.* 5.2.2.3.4; 5.2.2.3.5).

(iii). WIL assessment should be the responsibility of workplace mentors and lecturers since their judgements are considered to be reliable (*cf.* 5.2.2.3.5).

(iv). WIL assessment seems to be strongly guided by information contained in the assignment manuals and logbooks (*cf.* 5.2.2.3.7).

5.3 DEVELOPMENT OF E-ASSESSMENT AS COMPONENT OF WIL

5.3.1 Introduction

The preliminary research findings presented in this chapter thus far (*cf.* 5.2.1.5; 5.2.2.4) indicate the factors contributing to the successful development and thus the prospects for the implementation of e-assessment as component of WIL. In order to capitalise on these factors, the researcher visualised the development and implementation of e-assessment as far as the TUT's Learning Management System (LMS) allows for it. Guided by the preliminary research findings, the researcher also consulted with the WIL coordinator in the DCME, since this academic department sanctioned the researcher's brief to develop and implement e-assessment in the department's WIL programme (*cf.* 1.6.5; **Appendix B**). Occasional deliberations with the DCE were also arranged since this directorate is not only institutionally responsible

for WIL but also initiated the idea of a technology-based WIL framework for the TUT (*cf.* 1.1; 1.6.2; 4.4; **Appendix C**). To achieve this aim, the researcher had to ascertain what current WIL assessment within the particular department entails (*cf.* 5.3.2) in addition to the empirical data obtained in Phase 1 of the study. From this gained information, the researcher developed a prototype of e-assessment to be included in the aforesaid department's WIL programme (*cf.* 5.3.3).

5.3.2 Current WIL assessment procedure in the DCME

The current WIL assessment procedure in the DCME can be depicted as shown in Figure 5.3.

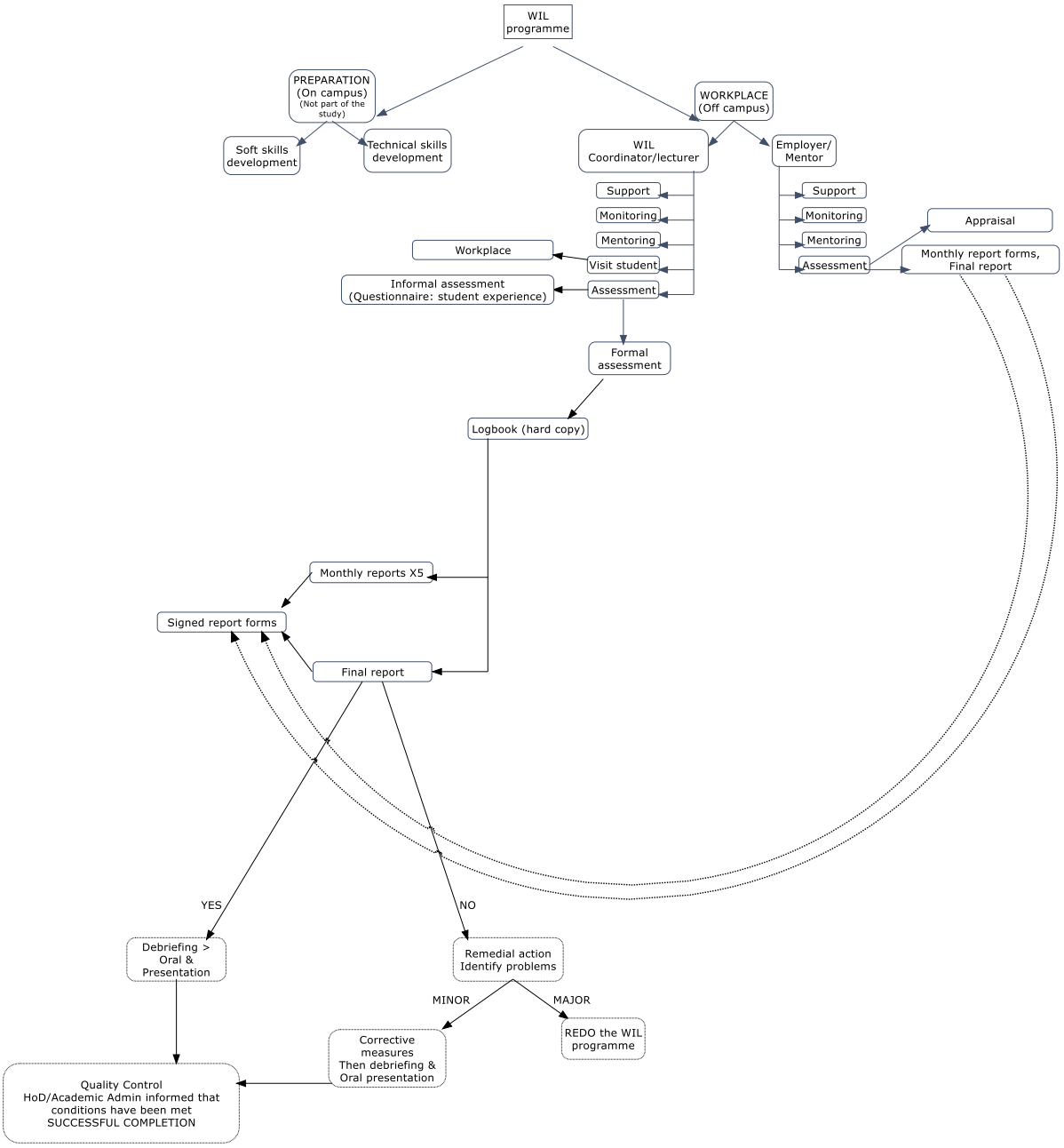
Before the students embark on their WIL programme they attend an on-campus preparation session where they are taught so called soft skills and technical skills. These are only implied in WIL assessment and fall thus outside the scope of the study. Soft skills are personal attributes that enhance an individual's interactions, job performance and career prospects. Unlike hard skills, which are about a person's knowledge, skills and ability (competence) to perform a certain type of task or activity, soft skills relate to a person's ability to interact effectively with co-workers and customers and are broadly applicable both in and outside the workplace. During the preparation session the students are also taught technical skills, i.e. CV writing and how to apply for a job.

In as far as off-campus or workplace procedures are concerned, students are mentored by the WIL coordinator and/or the lecturer, and the workplace mentor. It seems as if there are very little to no interaction between these two parties when mentoring the students. The functions of the WIL coordinator/lecturer are to support, monitor, mentor, visit and assess the students. Students are physically visited in the workplace where informal assessment is conducted in the form of the completion of a questionnaire to gather students' work-related experiences. Formal assessment of students' performance is done according to the logbook (in hard copy) in which the students have to complete five monthly reports and a final report. These reports include the completion of specific assessment tasks as well as general reflective notes on the students' WIL experiences.

The workplace mentor also supports, monitors, mentors and assesses students. Workplace mentor assessment entails the completion of a performance appraisal form, covering aspects such as quality of work, quantity of work, responsibility/reliability, theoretical knowledge, acquisition of practical skills, motivation, communication skills, human relations and work ethics, initiative/problem-solving, and report writing. The workplace mentor verifies the students' monthly and final reports by signing the documents before submission to the relevant academic department. The signing of the reports confirms that the workplace mentor has done a performance assessment of the student's work and contributions in the workplace.

After obtaining successful results in the assessment of the logbook reports, by the WIL coordinator/lecturer, students could be expected to attend a debriefing session arranged by the WIL coordinator/lecturer to do an oral or presentation to enlighten the reports further for quality control purposes. Hereafter, the HOD/Academic Administration is informed that a student has met all the requirements for the successful completion of the WIL programme. In cases where the assessment of the logbook reports reveals unsuccessful results, remedial action is taken. If the expected intervention is minor, corrective measures are taken and the student is allowed to participate in a debriefing session where an oral presentation is required. After successful completion, it is indicated that the student has met the required conditions of the WIL programme. If the expected intervention is proofed to be major, the student has to redo the WIL programme.

Figure 5.3: Current WIL assessment



5.3.3 Proposed prototype of e-assessment as component of WIL in the DCME

The current WIL assessment (*cf.* Figure 5.3) was altered to make provision for e-assessment in the WIL programme. This proposed prototype of e-assessment is shown in Figure 5.4 with supplementary information in Figures 5.5 to 5.7 and is discussed below.

Before the students embark on their WIL programme, they attend an in-person, on-campus preparation session where they are taught soft and technical skills (*cf.* 5.3.2). In addition, the students are also oriented regarding the LMS and how to use the available tools in this system. The students are guided on how to download the WIL guide and the relevant accompanying forms (*cf.* Figure 5.5) from the LMS and how to return the same in electronic format to the responsible WIL coordinator/lecturer. The processes of e-assessment should thus be thoroughly explained [*cf.* 2.6.2; 3.3.2; Table 3.1; 5.2.2.4(ii)].

In as far as workplace procedures are concerned, students are supported, monitored and mentored by the WIL coordinator and/or the lecturer, and the workplace mentor (*cf.* 2.3.3.2; 2.6.2). In the case of the WIL coordinator/lecturer, these functions can be executed my means of physical visits or by means of electronic communication (i.e. e-mail) to accommodate distanced students (*cf.* 5.2.1.4.3). Provision for interaction between the WIL coordinator/lecturer and workplace mentor is made in the form of face-to-face meetings, or by establishing electronic communication (i.e. Skype, Collaborate application). It is envisaged that these interactive sessions will improve the relationship between the academic department and the industry [*cf*. 5.2.1.4.6; 5.2.1.5. (iv)]. The interactive sessions will also underscore the joint responsibility of workplace mentors and lecturers in as far as WIL assessment is concerned [*cf.* 3.4.3; 5.2.2.4 (iii)].

With regard to assessment procedures, the stages resemble those of the current WIL assessment procedures [*cf.* 5.2.1.5 (ii)]. Informal assessment is done by the completion and submission of an online questionnaire by the student as well as by contributing to discussion forums in the LMS (*cf.* 3.3.5; 3.4.1.3; 3.4.3.1; Table 3.1; 3.5; Figure 5.7). These measures are intended to capture the students' work-related

experiences and to serve as indicators of their evaluation of the WIL programme [*cf*. 5.2.1.4.5; 5.2.1.5 (vii)]. This could also contribute towards determining students' views on the adequacy of assessment tasks [*cf.* 5.2.1.4.2; 5.2.1.5 (iv)]. Formal assessment of students' performance is done according to the students' completion of five monthly reports and a final report (*cf.* Figure 5.6). Assignment manuals and logbooks (in electronic format) remain indispensable for the purposes of WIL e-assessment [*cf.* 2.4 (iv); 2.7; 5.2.2.4 (iv)]. These reports are submitted in the LMS as scanned documents since it needs to be stamped, signed and verified by the workplace mentor. By following this procedure, authenticity [*cf.* 5.2.1.4.2; 5.2.1.5 (iv)] is likely to be guaranteed. In addition, the workplace mentor completes and submits an online student performance appraisal form, covering aspects such as quality of work, quantity of work, responsibility/reliability, theoretical knowledge, practical skills acquired, motivation, communication skills, human relations and work ethics, initiative/problem-solving and report writing. When assessing the students' reports the WIL lecturer also takes into account the assessment results submitted by the workplace mentor. These two sets of assessment results then comprise the final assessment of the students.

After obtaining the assessment results of the submitted reports, the same procedures are followed as with the current WIL procedure (*cf.* 5.3.2) to determine the successful or unsuccessful completion of the WIL programme. The proposed e-assessment procedure also proposes the early monthly interventions by the lecturers and is not left until the debriefing session at the end of the WIL programme. This allows for early detection of issues and problems in order to allow for the initiation of appropriate interventions.

Figure 5.4: Prototype of e-assessment as component of WIL

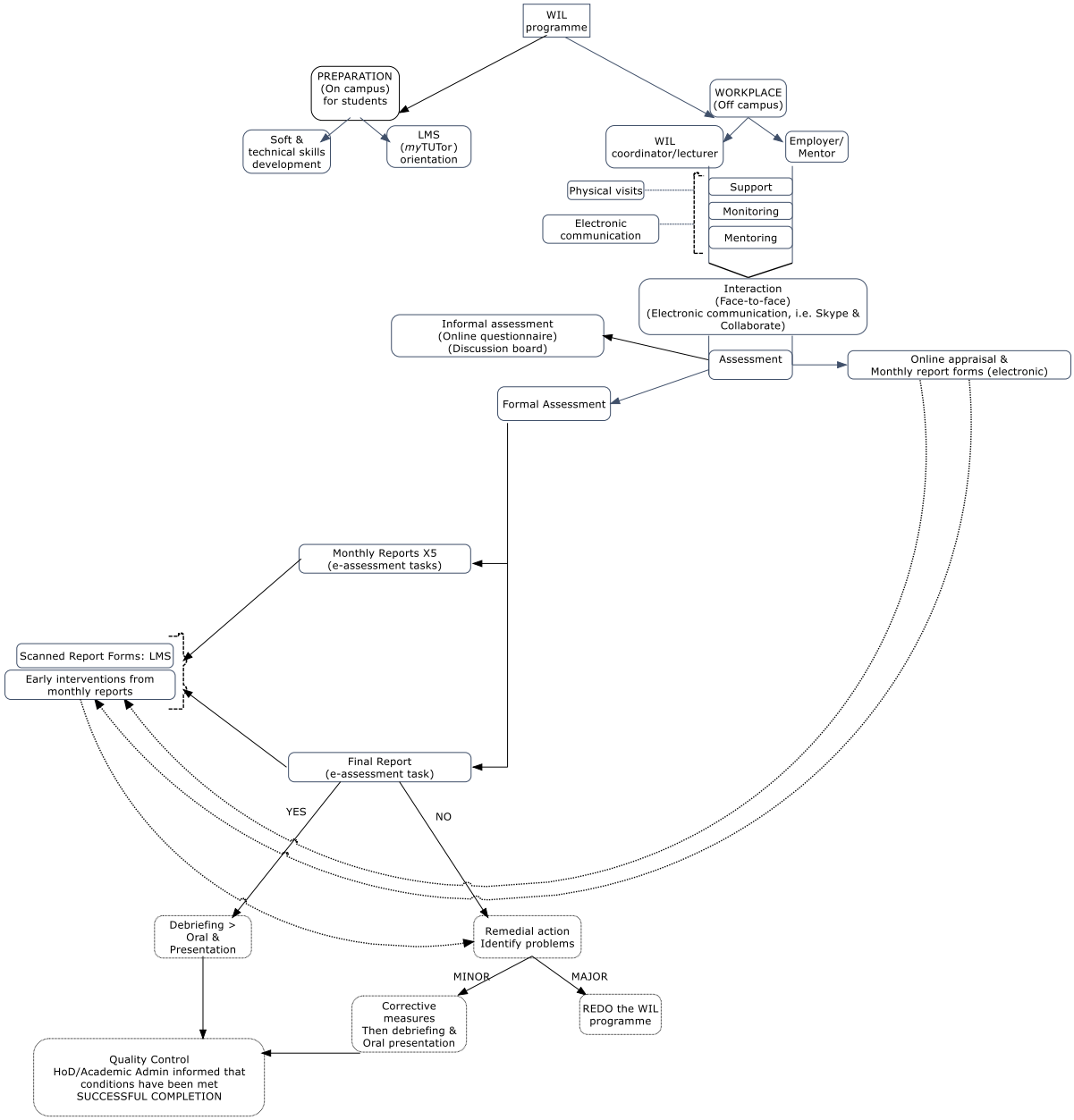


Figure 5.5: LMS (*my*TUTor) documents

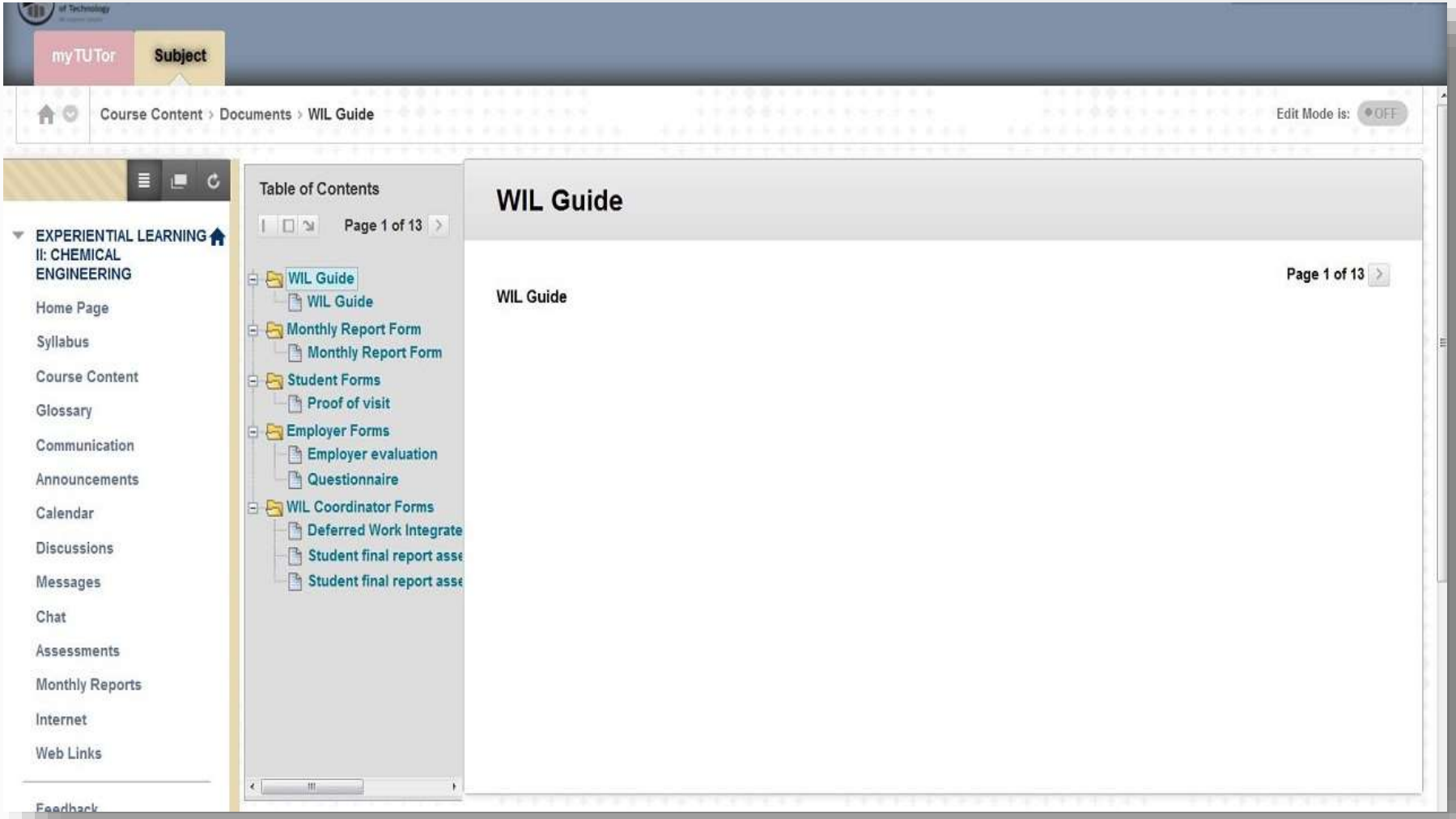


Figure 5.6: LMS (*my*TUTor) e-assessment tasks

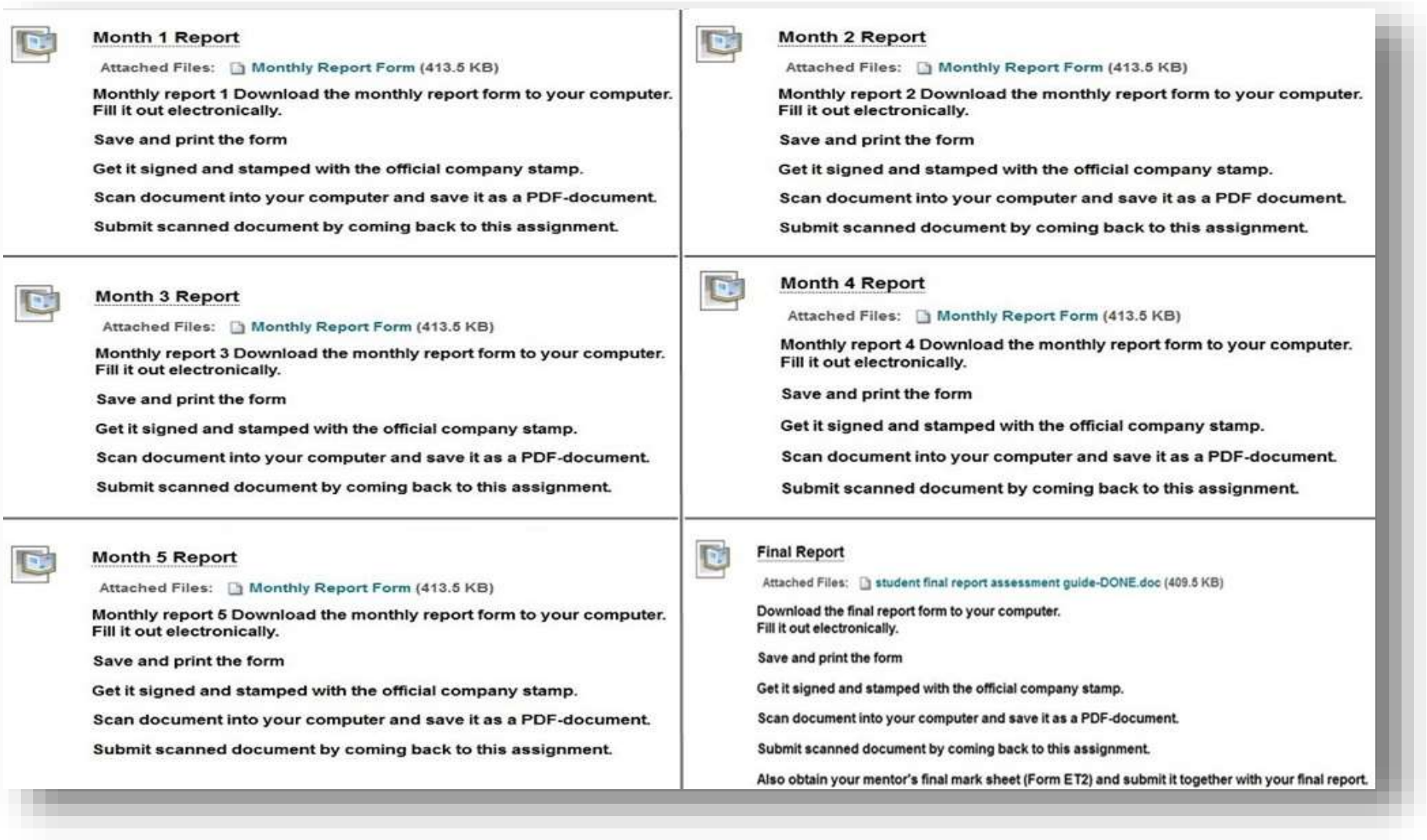
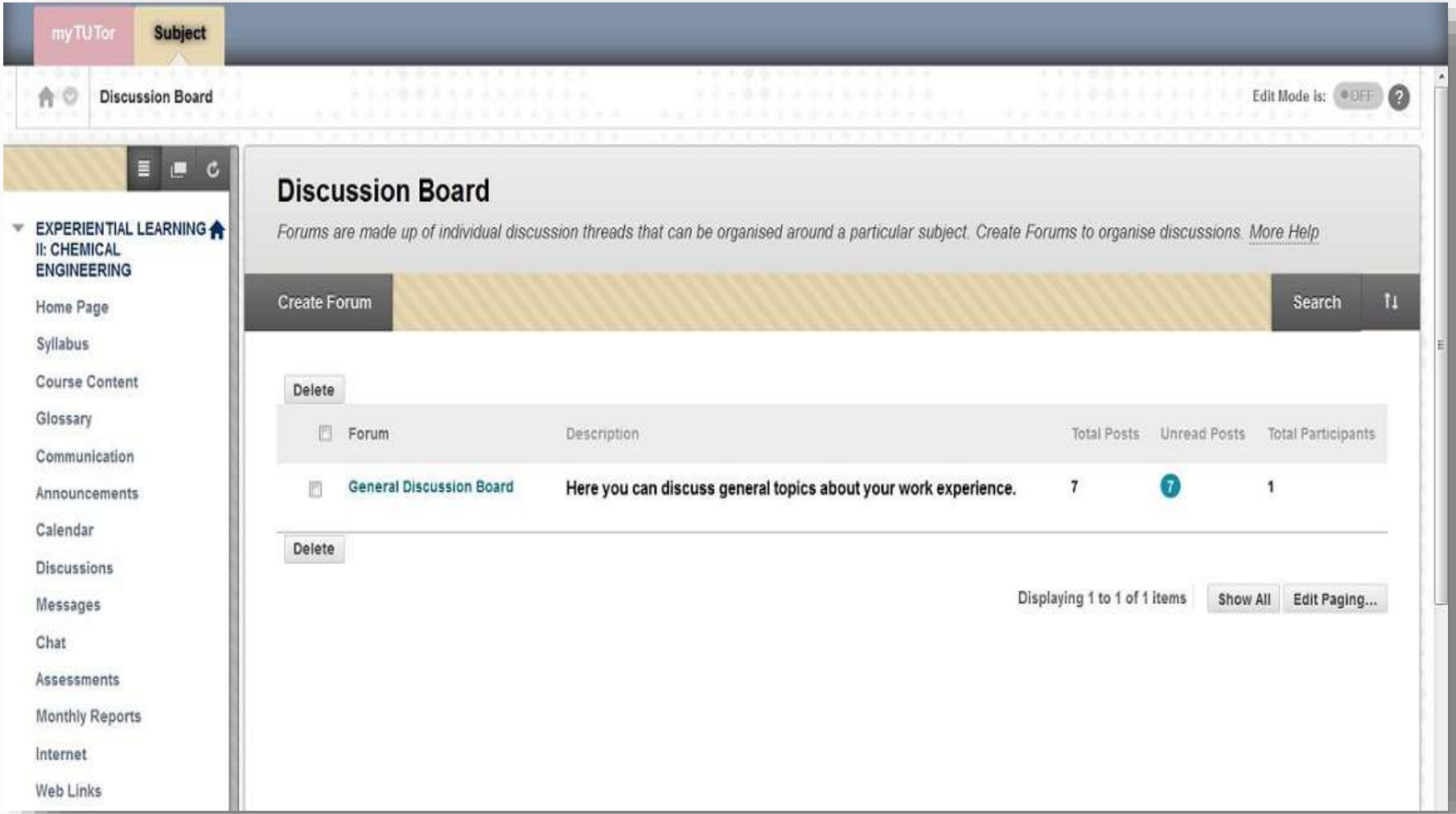


Figure 5.7: LMS (*my*TUTor) discussion board tool



5.3.4 Synopsis

Derived from the empirical data obtained in Phase 1 of the study (*cf.* 5.2), and by considering current WIL assessment procedures (*cf.* 5.3.2), the researcher proposed a prototype of e-assessment as component of WIL in the DCME (*cf*. 5.3.3). In so doing, the researcher attempted to reply to the question: *What factors should be considered for the successful development of e-assessment as component of WIL?*

In the next section, attention will be given to the question: *What are the experiences of workplace mentors and students regarding the implementation of the proposed e-assessment as component of WIL?*

5.4 QUANTITATIVE AND QUALITATIVE DATA ANALYSIS AND INTERPRETATION (PHASE 2)

The implementation of the prototype of e-assessment as component of WIL (*cf.* 5.3.3) informed this section of the data analysis.

5.4.1 Quantitative data analysis (online questionnaire: industry)

5.4.1.1 Background information

In this section the quantitative data as obtained by means of the self-developed, online questionnaire (*cf.* 1.6.4.2; 4.6.3), are analysed and interpreted in order to clarify the second part of the primary research question (*cf*. 1.3.1). Based on the sufficiency of data and saturation of information (*cf.* 1.6.3; 4.5), a total of 10 or 10% of the purposive sampled respondents from industry eventually completed the online questionnaire (*cf.* 1.6.4.2; 4.5) This low response rate is acceptable since an external survey will on average receive a 10% to 15% response rate (Sacks, 2010). The analysis and interpretation of the data obtained in this stage of Phase 2 of the study are presented according to the sections of the questionnaire (*cf.* **Appendix I**). The obtained data are analysed by using a descriptive approach in the form of frequencies, percentages and graphical techniques (*cf*. 1.6.7.2). Due to the small sample size of the research respondents who participated in this phase of the research, the researcher argued that the use of other statistical techniques will be redundant since it will not yield any meaningful information (*cf.* 1.6.7).

5.4.1.2 Analysis and interpretation of online questionnaire

5.4.1.2.1 Section A: Biographical information

(i) Gender composition (QA1)

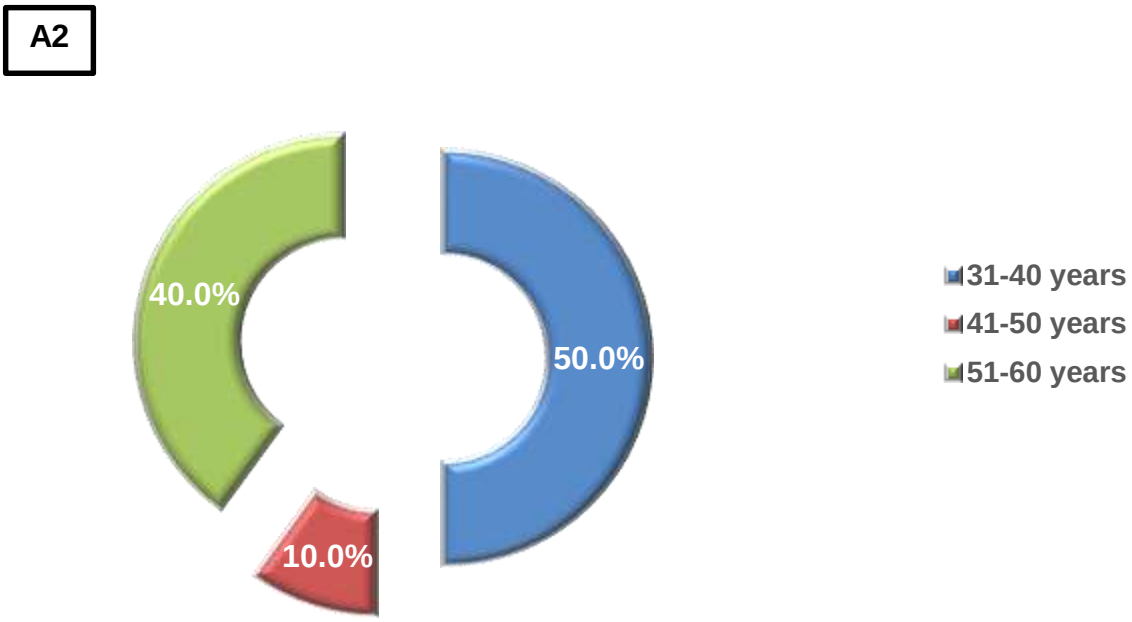
In Figure 5.8 the gender composition of the research respondents is reflected. Nine (90%) of the respondents were males, which not only suggests a strong presence of males in the field of Chemical and Metallurgical Engineering, but also in the involvement in this specific WIL programme.

Figure 5.8: Gender composition (QA1)

(ii) Age composition (QA2)

Figure 5.9 represents the age of the research respondents. With five (50%) of the respondents being between 31 and 40 years, one (10%) between 41 and 50 and four (40%) between 51 and 60, the average age of the majority of the respondents reflect respectable life experience. If life experience is considered to benefit students' WIL experiences, it could be assumed that the respondents, based on their age, could make a positive contribution in this regard (Martin & Hughes, 2009).

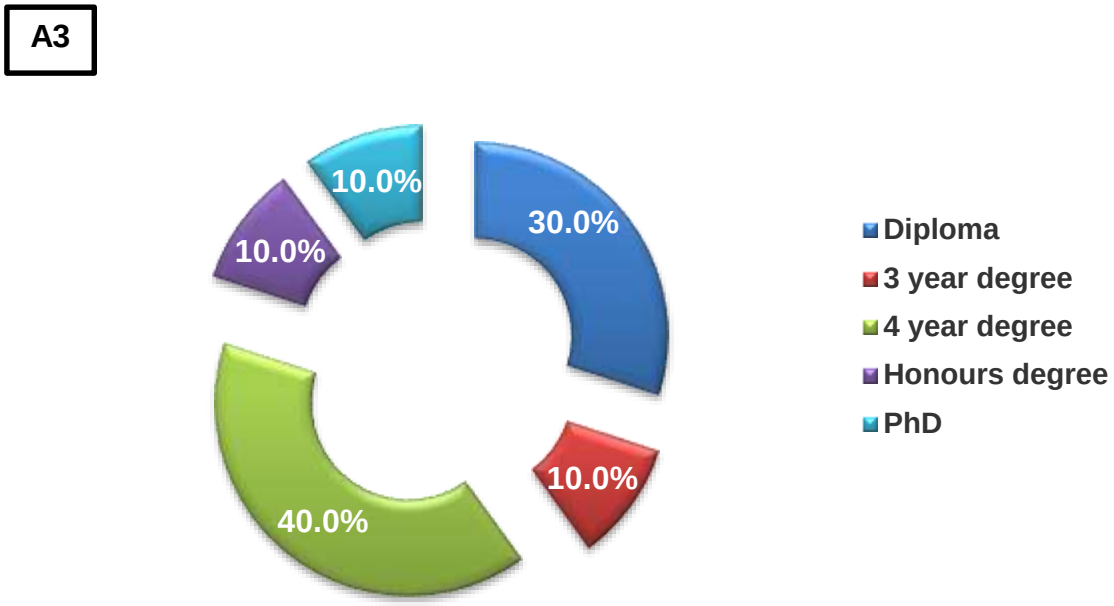
Figure 5.9: Age composition (QA2)



(iii) Highest higher education qualification (QA3)

According to the data represented in Figure 5.10, three (30%) of the respondents have a diploma, while four (40%) hold a four year degree. The remaining three respondents respectively hold a three year, an Honours or PhD qualification. Supposedly, all the respondents are to some extent qualified to assume the role of a WIL mentor.

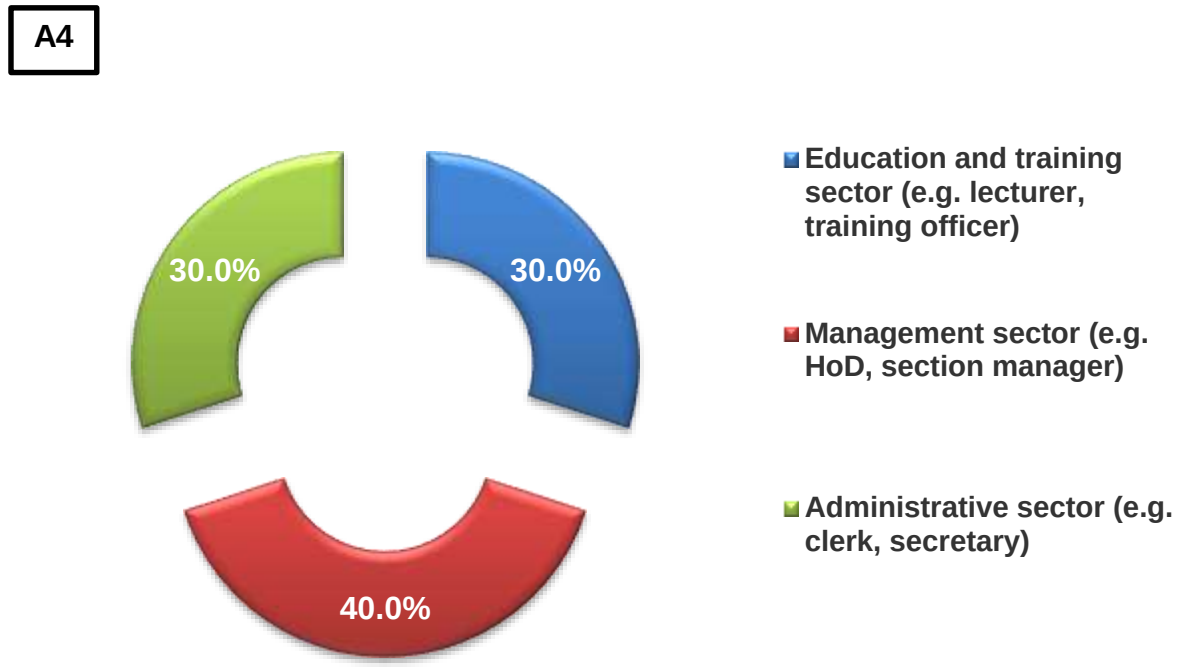
Figure 5.10: Highest higher education qualification (QA3)



(iv) Sector of position held (QA4)

As depicted in Figure 5.11, three (30%) of the respondents work within the education and training sector of their companies, whilst another three (30%) are employed in the administrative sector of the industry. Four (40%) of the respondents are occupied in the managerial sector. It is thus encouraging that in most cases the education and training and management sectors apparently take responsibility for the supervision/mentoring of WIL students. However, the researcher finds it extremely disturbing that people working in the administrative sector are, in some cases, assigned this task. This could possibly point to the fact that the significance of WIL is underestimated by some companies.

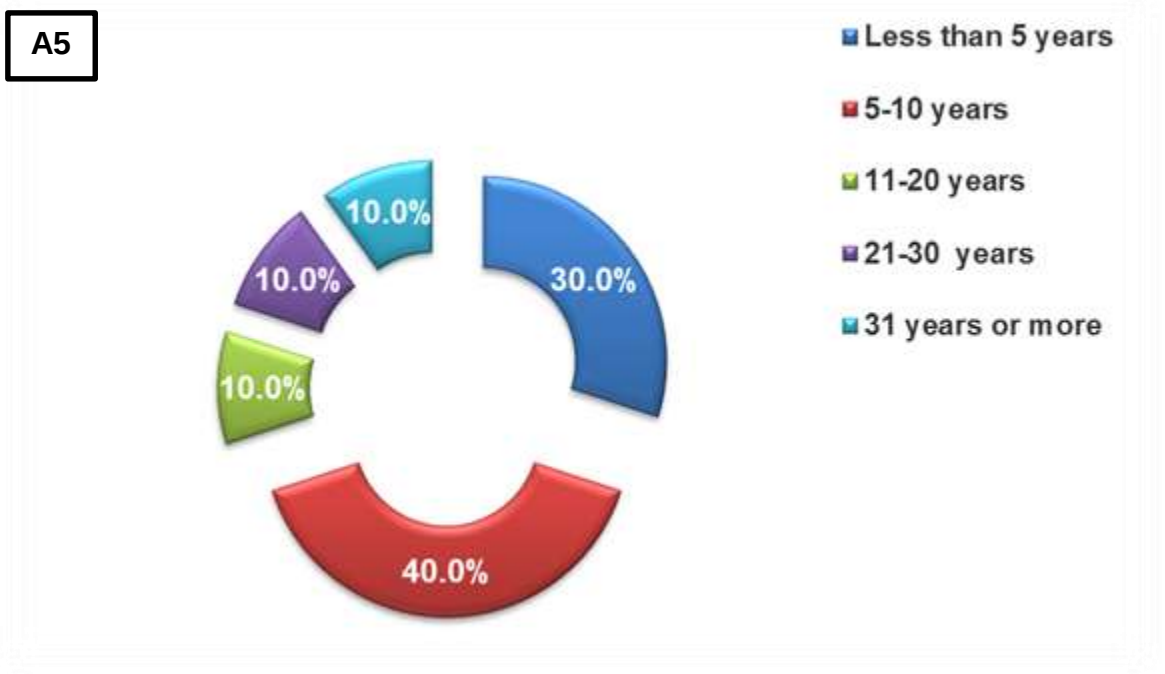
Figure 5.11: Sector of position held (QA4)



(v) Work-related experience (QA5)

Figure 5.12 shows that three (30%) of the respondents have less than five years' work-related experience in the sectors mentioned in (iv) above. Four (40%) have between five and 10 years' experience. Two (20%) respondents' work-related experience range between 11 to 30 years, while only one (10%) respondent's experience exceeds 30 years. From the data it can be deduced that although the respondents' work-related experience could be regarded as acceptable to assist the WIL students, this work experience may not necessarily be appropriate [*cf.* 5.4.1.2.1 (iv)] for supervising WIL students.

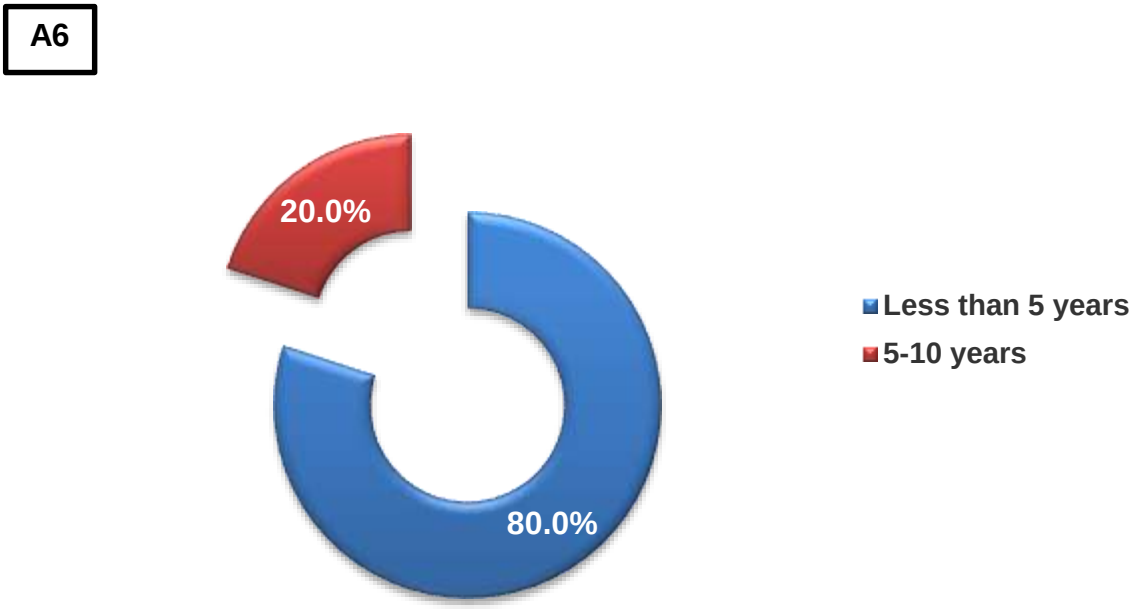
Figure 5.12: Work-related experience (QA5)



(vi) Years involved in WIL programmes of the TUT (QA6)

Figure 5.13 reveals that eight (80%) of the respondents have less than five years' involvement in the TUT's WIL programme, whilst the remaining two (20%) respondents have been involved in the TUT's WIL programmes for between five and 10 years. No respondents indicated that they are more than ten years involved in the TUT's WIL programme. In the context of this study, it is important to emphasise that the data relate to the existence of the TUT as a higher education institution (*cf.* 5.2.2.3.1).

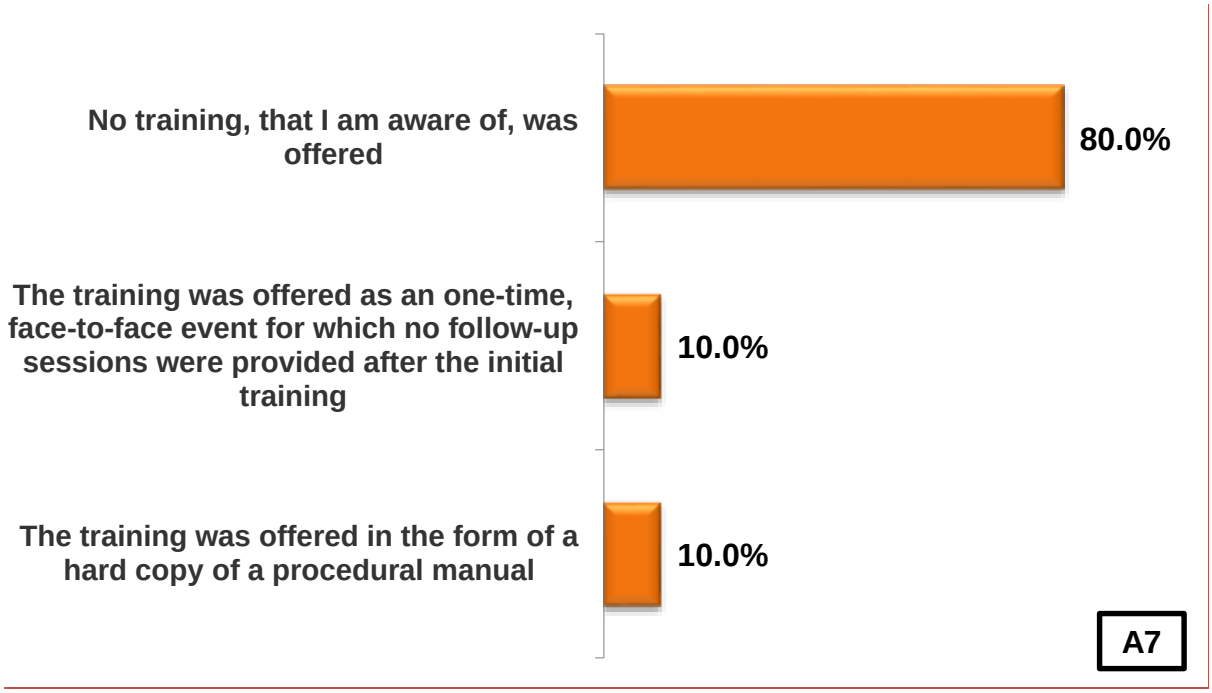
Figure 5.13: Years involved in WIL programmes of the TUT (QA6)



(vii) Nature of assessment training (QA7)

What is learned from the data represented in Figure 5.14, is that eight or 80% of the respondents have not received, or are not aware of any assessment training applicable to WIL. The remaining two respondents (20%) indicated that they were "trained" in WIL assessment by either reading a procedural manual or by attending a once off, face-to-face session. Thus, the data relevant to this question denote a deficiency in WIL assessment training among the respondents. The data also imply that WIL programmes are not regularly updated or revised for possibly improving assessment procedures and an insufficiency of contact between the institution and the workplace [*cf.* Table 5.10 & 5.2.2.4 (i); 5.2.1.4.6 & 5.2.1.5 (iv)].

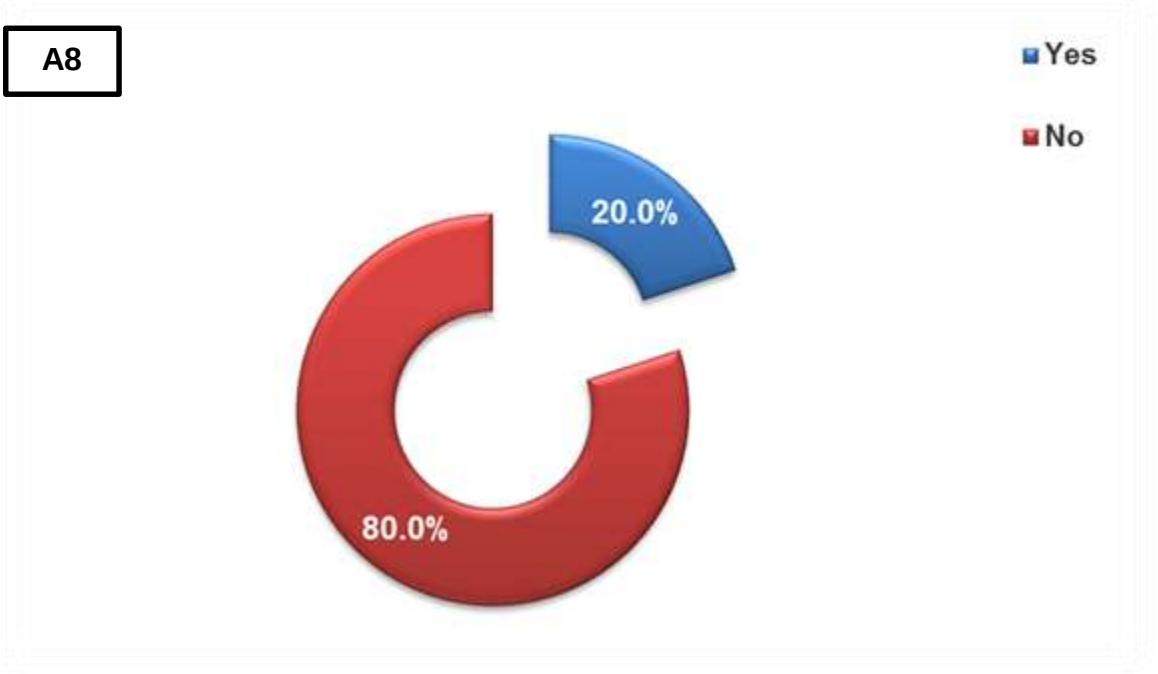
Figure 5.14: Nature of assessment training (QA7)



(viii) Certified assessor (QA8)

Eight or 80% of the respondents are not certified assessors (*cf.* Figure 5.15). This could impact negatively on the respondents' assessment methodology, guidance and skills, appropriate to the assessment of WIL, as they might not be suitably qualified to carry out assessment processes in the workplace (SAQA, 2001b:8-9) (*cf.* 2.3.2; 2.3.3.2). The data also show a strong relation to the preceding responses obtained from QA7.

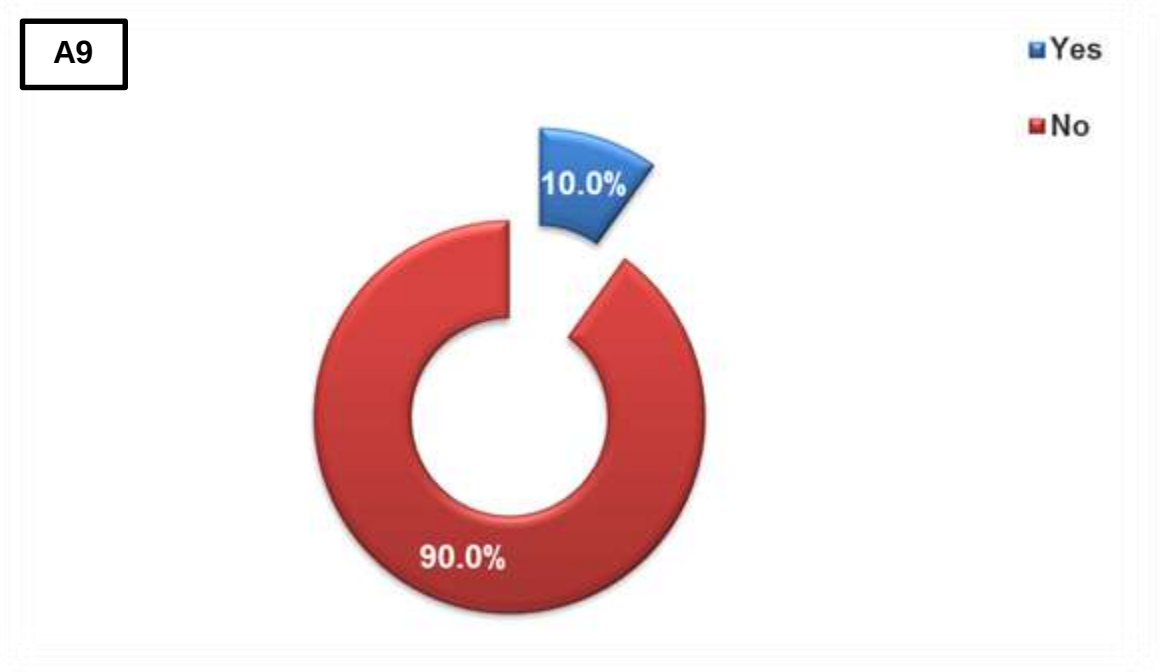
Figure 5.15: Certified assessor (QA8)



(ix) Certified moderator (QA9)

In relation to the data represented in Figure 5.16 the responses to this question reveal that the majority of the respondents (nine or 90%), are not certified moderators. This confirms the supposition that the respondents' assessment competence is suspect, as also revealed in QA7 and QA8.

Figure 5.16: Certified moderator (QA9)



5.4.1.2.2 Section B: The implementation of e-assessment as component of *WIL*

For this section, a four-point Likert scale, ranging from "Strongly disagree" to "Strongly agree" was used to determine the respondents' views on the implementation of the prototype of e-assessment as component of WIL (*cf.* **Appendix I**, Section B). In most cases the frequency of participants who either agreed or strongly agreed were combined to indicate agreement. The same was done with frequencies of disagree and strongly disagree.

(i) Instructions and guidelines (QB1)

Table 5.31 shows all the statements relating to section B1 of the questionnaire. According to the information captured in Table 5.31, the majority of the respondents (nine or 90%) either agreed or strongly agreed that the overall e-assessment guidelines were clear and easy to follow (B1.1), whereas eight or 80% shared the same sentiment with regard to the guidelines associated with the respective tasks (B1.2). However, there appears to be a sense among some respondents that the instructions in terms of e-assessment procedures (B1.3) and the respective tasks (B1.4) could be improved. Especially with regard to B1.4, where six (60%) of the

respondents indicated that instructions in terms of the respective e-assessment tasks are insufficient, improvement is required. The researcher ascribes the expressed need amongst respondents to the possibility that most of them are not certified assessors/moderators (A8; A9) [*cf.* 5.4.1.2.1 (viii); 5.4.1.2.1 (ix)] and that they may feel uncertain about how assessment should be done. Nevertheless, the responses require attention in order to refine e-assessment.

Table 5.31: Instructions and guidelines (QB1)

B1	Answer Options	Strongly disagree		Disagree		Agree		Strongly agree	
		n	%	n	%	n	%	n	%
B1.1	The overall e-assessment guidelines were clear and easy to follow	0	0%	1	10%	6	60%	3	30%
B1.2	The guidelines in terms of the respective e-assessment tasks were clear and easy to follow	0	0%	2	20%	5	50%	3	30%
B1.3	Sufficient instructions in terms of e-assessment procedures were provided	0	0%	3	30%	7	70%	0	0%
B1.4	Sufficient instructions in terms of the respective e-assessment tasks were provided	0	0%	6	60%	2	20%	2	20%

(ii) Processes (QB2)

Derived from the information pertaining to e-assessment processes in Table 5.32, the majority of respondents (eight or 80%) agreed that the e-assessment process is flexible (B2.1) and logically structured (B2.2). As indicated by seven or 70% of the respondents, the e-assessment process was not considered to be particularly time consuming (B2.3) or doubtful (B2.4). Eight (80%) of the respondents expressed the opinion that the e-assessment process made allowance for students to plan, perform and revise tasks where necessary (B2.5). In response to B2.6, the respondents were divided. Five (50%) either agreed or strongly agreed that the network availability and

Internet connection interfere with the e-assessment process on a frequent basis, while the others (50%) all disagreed with this statement.

Derived from the above analysis, it appears as if the e-assessment processes were in general, optimistically considered by the respondents. Regarding the mixed views concerning network availability and Internet connection, the researcher admits that the effectiveness of technology is unpredictable (Crew, 2012).

Table 5.32: Processes (QB2)

B2	Answer Options	Strongly disagree		Disagree		Agree		Strongly agree	
		n	%	n	%	n	%	n	%
B2.1	The e-assessment process acknowledged flexibility	0	0%	2	20%	8	80%	0	0%
B2.2	The e-assessment process was logically structured	0	0%	2	20%	8	80%	0	0%
B2.3	The e-assessment process was time consuming	1	10%	6	60%	3	30%	0	0%
B2.4	The e-assessment process was doubtful	1	10%	6	60%	3	30%	0	0%
B2.5	The e-assessment process made allowance for students to plan, perform and revise tasks where necessary	0	0%	2	20%	3	30%	5	50%
B2.6	Network availability and Internet connection interfered with the e-assessment process on a frequent basis	0	0%	5	50%	2	20%	3	30%

(iii) Tasks (QB3)

Based on the information pertaining to assessment tasks provided in Table 5.33, the majority of the respondents (nine or 90%) were of the opinion (i.e. agreed or strongly agreed) that e-assessment allowed for the accommodation of student diversity (B3.1). Although the relatively positive responses with regard to B3.2 to B3.5 are recognised, it is noteworthy that a number of the respondents revealed their scepticism about the

e-assessment tasks as related to engineering by disagreeing to the respective statements (the respective frequencies of disagreement were 40%, 50% 40%, 30% and 70%). This points to the fact that the nature of e-assessment tasks needs to be reconsidered. Probably accentuating their views on the preceding set of questions, a substantial number of respondents (seven or 70%) did not consider the difficulty level of the tasks as being too high (B3.6). The divided number of positive and negative responses (50:50) regarding the number and variety of e-assessment tasks (B3.7) also suggest that the e-assessment tasks should be reviewed. The respondents also seem to be divided (60:40) on the statement that the e-assessment tasks enhanced students' performance (B3.8). Considered in light of the aforementioned information, responses to this statement persuade the researcher even more that the e-assessment tasks need profound revision.

Furthermore, in B3.9, seven (70%) of the respondents disagreed to the statement that e-assessment tasks made provision for constructive feedback to enable student development. Thus, derived from the respondents' reaction to this statement, the critical matter of feedback warrants rigorous attention. It is heartening that the data indicate that seven (70%) of the respondents believed (by disagreeing with the given statement) that the e-assessment tasks did not promote copying and plagiarism, which shows the confidence of the respondents in this assessment procedure.

Table 5.33: Tasks (QB3)

B3	Answer Options	Strongly disagree		Disagree		Agree		Strongly agree	
		n	%	n	%	n	%	n	%
B3.1	The e-assessment tasks allowed for the accommodation of student diversity	0	0%	1	10%	5	50%	4	40%
B3.2	The e-assessment tasks contributed towards students' better understanding of matters related to the knowledge domain of engineering	0	0%	4	40%	5	50%	1	10%
B3.3	The e-assessment tasks contributed towards students' better understanding of matters related to the skills domain of engineering	0	0%	5	50%	4	40%	1	10%
B3.4	The e-assessment tasks contributed towards students' association with engineering as profession	0	0%	4	40%	4	40%	2	20%
B3.5	The e-assessment tasks were all relevant to the engineering profession	0	0%	4	30%	4	40%	3	30%
B3.6	The difficulty level of the e-assessment tasks were set too high	0	0%	7	70%	3	30%	0	0%
B3.7	The number and variety of e-assessment tasks were adequate	0	0%	5	50%	5	50%	0	0%
B3.8	The e-assessment tasks enhanced student performance	0	0%	6	60%	4	40%	0	0%
B3.9	The e-assessment tasks made provision for constructive feedback to enable student development	0	0%	7	70%	3	30%	0	0%
B3.10	The e-assessment tasks promote copying and plagiarism	2	20%	5	50%	3	30%	0	0%

(iv) Time (QB4)

Table 5.34 provides information about statements relating to time. It is noted in B4.1 and B4.2 of Table 5.34 that the majority of the respondents (eight or 80%) were almost certain that the time allocation set for students to complete the e-assessment tasks are realistic and that e-assessment also requires less of the respondents' time to be involved in students' WIL assessment. In terms of the latter, it could be inferred that e-assessment has the potential to reduce the administrative burden associated with WIL assessment (*cf.* 3.6).

Table 5.34: Time (QB4)

B4	Answer Options	Strongly disagree		Disagree		Agree		Strongly agree	
		n	%	n	%	n	%	n	%
B4.1	The time allocation set for students to complete the individual e-assessment tasks was realistic	0	0%	2	20%	8	80%	0	0%
B4.2	E-assessment required less of my time to be involved in students' WIL assessment	0	0%	2	20%	8	80%	0	0%

(v) Students' thinking (QB5)

Although the number of positive responses to the statements in this question is not undervalued, the data in Table 5.35, which relate to students' thinking, discloses that most of the respondents (50% to 70%) disagreed or strongly disagreed to statements B5.1 to B5.5. This indicates that the e-assessment tasks did not indisputably succeed to encourage higher order thinking; the ability to relate theory to practice; decision making capabilities; reflection and independent thinking. The respondents' line of argument in these statements is probably a reflection of their responses to B3.2 to B3.8 [*cf.* 5.4.1.2.2 (iii)], which signals, yet again, a relook at the nature of e-assessment tasks [*cf.* Table 3.3; 5.4.1.2.2(iii)]. Encouraging is the fact that the responses give the impression that the respondents realise the value of assessment tasks in terms of how such tasks contribute towards student growth and development (*cf.* 3.3.2).

Table 5.35: Students' thinking (QB5)

B5	Answer Options	Strongly disagree		Disagree		Agree		Strongly agree	
		n	%	n	%	n	%	n	%
B5.1	The e-assessment tasks encouraged students to apply higher order thinking such as problem-solving, critical thinking, creativity	0	0%	7	70%	3	30%	0	0%
B5.2	The e-assessment tasks stimulated students to relate theory to practice	0	0%	7	70%	2	20%	1	10%
B5.3	The e-assessment tasks challenged students' decision making capabilities	1	10%	6	60%	2	20%	1	10%
B5.4	The e-assessment tasks encouraged students to reflect	1	10%	5	50%	3	30%	1	10%
B5.5	The e-assessment tasks forced the students to think independently	1	10%	5	50%	3	30%	1	10%

(vi) The institution (QB6)

From the responses pertaining to institutional issues in Table 5.36, it is noted that seven (70%) of the respondents thought that e-assessment was well facilitated (B6.1) and well supported (B6.2) by the institution. However, although low in number (3 or 30%), it is also gathered from the negative responses that there is still room for improving institutional facilitation and support of e-assessment.

Table 5.36: The institution (QB6)

B6	Answer Options	Strongly disagree		Disagree		Agree		Strongly agree	
		n	%	n	%	n	%	n	%
B6.1	E-assessment was well facilitated by the institution	0	0%	3	30%	5	50%	2	20%
B6.2	The processes and procedures of e-assessment were well supported by the institution	0	0%	3	30%	7	70%	0	0%

(vii) Compliance (QB7)

According to the data relating to compliance issues in Table 5.37, seven (70%) of the respondents agreed to the statement that the e-assessment tasks comply with the learning outcomes envisaged by the institution and the profession (B7.1). In as far as the criterion of reliability (B7.2) is concerned (*cf.* 3.3.4.2), the majority of respondents (seven or 70%) agreed or strongly agreed that the e-assessment tasks have the potential to yield the same results in similar contexts (*cf.* 3.3.4.2). Although eight (80%) of the respondents either agreed or strongly agreed that the e-assessment tasks satisfy the criterion of validity (B7.3) (*cf.* 3.3.4.3), their responses to this statement could have focused on the argument that the assessment tasks measured what it was supposed to measure and ignored the appropriateness, usefulness and meaningfulness of the tasks to the engineering profession, as reflected in the responses to B3.2 to B3.5 and B3.8 [*cf.* 5.4.1.2.2 (iii)]. To substantiate the researcher's supposition with regard to validity further, the parallel between the responses to authenticity (B7.4) and those to B3.2 to B3.5 [*cf.* 5.4.1.2.2 (iii)] should be recognised (*cf.* 2.6.1; 2.6.2; 2.6.3; 3.5). In as far as the criterion of discrimination is concerned (B7.5), eight (80%) of the respondents agreed or strongly agreed that the assessment tasks distinguished between students who grasped the essence of the tasks and those who did not. These responses harmonise with those in B3.1 [*cf.* 5.4.1.2.2 (iii)] and suggest that the e-assessment tasks made provision for a range of academic abilities (*cf.* 3.4.1.2). With regard to accountability (B7.6), eight (80%) of the respondents regarded the e-assessment tasks as credible and above suspicion. Taking into account that many of the respondents did not consider the e-assessment process as doubtful (B2.4) [*cf.* 5.4.1.2.2 (ii)] together with the prevalent views that e-assessment satisfy academic and professional expectations (B7.1), the responses to the statement seem to be a true reflection of the respondents' views. The majority of the respondents (eight or 80%) agreed that the e-assessment tasks were feasible (B7.7). The responses to B2.3 and B4.2 [*cf.* 5.4.1.2.2 (ii); 5.4.1.2.2 (iv)] confirm the responses to this statement. Eight or 80% of the respondents agreed that the e-assessment tasks were fair (B7.8), which relates with the responses to B2.5, B3.1 and B4.1 respectively [*cf.* 5.4.1.2.2 (ii); 5.4.1.2.2 (iii); 5.4.1.2.2 (iv)]. The responses to B7.9 which reflect the generalizability and transferability of the e-assessment tasks, reveal that the respondents are somewhat divided (40:60) in their opinions. However, when

considering the responses to B3.2 to B3.5 and B7.4 [*cf.* 5.4.1.2.2 (iii); 5.4.1.2.2 (vii)], it can be inferred that the nature of the assessment tasks deserves attention in order to make clearer connections with the workplace. In terms of balance in e-assessment (B7.10), the respondents were again divided with five (50%) either disagreeing or strongly disagreeing and five (50%) agreeing to the statement that tasks made provision for some symmetry regarding time-on-task and complexity of tasks. Related to B3.6, B3.7 and B5.1 to B5.5 [*cf.* 5.4.1.2.2 (iii); 5.4.1.2.2. (v)], the responses to these sets of statements compare favourably, which conveys that e-assessment tasks should be amended to reflect better balanced tasks. Overall, the responses to this question disclose that e-assessment tasks should be improved to enhance compliance with the principles of quality assessment.

Table 5.37: Compliance (QB7)

B7	Answer Options	Strongly disagree		Disagree		Agree		Strongly agree	
		n	%	n	%	n	%	n	%
B7.1	The e-assessment tasks were aligned with the academic expectations (outcomes) as set by the institution and the professional expectations as set by the profession	0	0%	3	30%	7	70%	0	0%
B7.2	The e-assessment tasks satisfied the criterion of reliability (the assessment tasks have the potential to arrive at the same judgements should the tasks be done in the same or similar contexts)	0	0%	3	30%	4	40%	3	30%
B7.3	The e-assessment tasks satisfied the criterion of validity (the assessment tasks measure what it is supposed to measure in terms of the appropriateness, usefulness and meaningfulness of the tasks)	0	0%	2	20%	6	60%	2	20%
B7.4	The e-assessment tasks satisfied the criterion of authenticity (the assessment tasks require students to execute real-life tasks that are relevant and worthwhile)	0	0%	4	40%	6	60%	0	0%
B7.5	The e-assessment tasks satisfied the criterion of discrimination (the assessment tasks distinguished between students who grasped the essence of the tasks and those who did not)	0	0%	2	20%	6	60%	2	20%
B7.6	The e-assessment tasks satisfied the criterion of accountability (the assessment tasks were credible and above suspicion)	0	0%	2	20%	8	80%	0	0%
B7.7	The e-assessment tasks satisfied the criterion of feasibility (the assessment tasks were easy-to-work-with and considered factors such as time and finances)	0	0%	2	20%	8	80%	0	0%
B7.8	The e-assessment tasks satisfied the criterion of fairness (the assessment tasks were reasonable in terms of time allocation and difficulty levels, and treated all students equally)	0	0%	2	20%	8	80%	0	0%
B7.9	The e-assessment tasks satisfied the criteria of generalizability and transferability (the assessment tasks allowed students to make clear connections with the workplace)	1	10%	3	30%	6	60%	0	0%
B7.10	The e-assessment tasks satisfied the criterion of balance (balance was obtained between lower and higher cognitive tasks and time allocation and task complexity)	1	10%	4	40%	5	50%	2	20%

5.4.1.2.3 Section C: Additional information

(i) Additional information on e-assessment experiences (QC1)

Although only one respondent reacted to this open-ended question, the remark as indicated in Table 5.38 is worth considering. Viewed in light of the fact that hardly any of the respondents were exposed to assessor or moderator training (A7; A8; A9) [*cf.* 5.4.1.2.1 (vii); 5.4.1.2.1 (viii); 5.4.1.2.1 (ix)], this articulated need should be considered as to improve the assessment quality applicable to WIL.

Table 5.38: Additional information on e-assessment experiences (QC1)

C1	Response Text
1	Do you provide training for assessors i.e. moderation courses?

5.4.1.3 Preliminary conclusions

Drawn from the online questionnaire data, the following preliminary inferences are made:

(i). The workplace mentors are not necessarily "equipped" to assess WIL competently, which may skew WIL assessment results [*cf.* 5.4.1.2.1 (vii); 5.4.1.2.1 (viii); 5.4.2.1 (ix)].

(ii). E-assessment is regarded as a feasible way of conducting assessment, which also reduces the administrative burden normally associated with assessment [*cf.* 5.4.1.2.2 (iv)].

(iii). Although the e-assessment process could be well-facilitated and supported by the academic institution [*cf.* 5.4.1.2.2 (vi)], its success is largely dependable on a stable and reliable computer network [*cf.* 5.4.1.2.2 (ii); 5.4.1.2.2 (vi)].

(iv). E-assessment allows for flexibility and the accommodation of students in more than one way [*cf.* 5.4.1.2.2 (ii); 5.4.1.2.2 (v)].

(v). Although tasks apparently comply with the institutional and professional LOs, e-assessment tasks still need vigorous attention in terms of the following to optimize and stimulate student growth and development:

- Instructions could be refined [*cf.* 5.4.1.2.2 (i); 5.4.1.2.2 (iii); 5.4.1.2.2 (v); 5.4.1.2.2 (vii)].

- Relevance to the field of engineering should be revisited [*cf.* 5.4.1.2.2 (vii)].
- Opportunities for constructive feedback should be created [*cf.* 5.4.1.2.2 (iii)].
- A clearer connection to the workplace should be evident [*cf.* 5.2.1.4.5; 5.4.1.2.2 (vii)].
- Specific skills related to higher order thinking, decision making and reflection should be incorporated [*cf.* 5.4.1.2.2 (v)].

5.4.2 Qualitative data analysis (online qualitative questionnaires and face-to-face focus group interviews: students)

5.4.2.1 Background information

The qualitative questionnaire amongst students was supplemented by two face-to-face focus group interviews. Third and fourth year students were involved. The qualitative questionnaire was completed without a given timeframe, while care was taken to complete the face-to-face focus group interviews within a 40 minute timeframe. Only 12 students completed the online open-ended questionnaire (*cf.* 4.5; 4.6.4). To supplement this data collection method with another method which would still yield the required information, the same questions were used to conduct the face-to-face focus group interviews. Two face-to-face focus group interviews, which included three students each, were conducted. The purpose of the online questionnaire and interviews was to determine how students experienced the implementation of e-assessment as component of WIL.

5.4.2.2 Analysis and interpretation of online qualitative questionnaire responses and face-to-face focus group interviews

The recorded data obtained through the 12 completed online questionnaires and two face-to-face focus group interviews, were copied and/or transcribed by the researcher. With one exception, the processes followed to analyse and interpret the data, were exactly the same as for the individual interviews of staff involved in WIL (*cf.* 5.2.1.2). In this particular instance member-checking was not applied, due to the difficulties

experienced to get hold of students. However, memoing, open coding, categorising, external auditing and constant comparison were applied (*cf.* 5.2.1.2).

5.4.2.3 Presentation of coded online individual and face-to-face focus group interview data

The coded information obtained from the raw transcribed data from the student interviews, are presented in Table 5.39 through to Table 5.49. The researcher used the same order in which the questions appeared in the questionnaire guide (*cf.* **Appendix J**) to indicate the codes derived from the respective respondents' responses.

Table 5.39: Academic year (Q1a)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Third year	• Experiential training	• Third year	• Third Year	• Third year	• (Not answered)	• Experiential training
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• (Not answered)	• Third year	• Third Year	• Third year	• Third year	• Fourth year	• Fourth year

Table 5.40: Motivation for engineering studies (Q1b)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Love for practical work	• Love for Maths and Science • Striving to be future top engineer	• Appreciate innovation and technology • Hands on	• Love Math and Science • Appreciate the application of knowledge	• Love solving problems and challenges • Love Maths and Science	• Expand knowledge to improve technology • Solving problems • Contribute to improving recovery and mineral processing	• Passion for Science • Seeking solutions for the world's problems
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• To fill the shortage of engineers and technicians	• Passion, ambition and opportunities	• Love for mining, minerals and metals sciences	• Chemistry and techniques on extraction	• To fill the shortage of engineers • Love challenges	• Consider engineering as challenging and rewarding • Want to know about minerals and how to process it • Interested in knowing how nothing gets turned into something	• Want to be good engineers in the field • Want to contribute to South Africa's wealth • Engineers are important for the country

Table 5.41: Sufficiency of overall e-assessment guidelines (Q2)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Good guidelines, although some can be a bit vague	• All the information is available and accessible	• It is helpful • Always accessible at any given time	• Good	• Good	• No difficulty or confusion • User-friendly	• Sufficient
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• It is well	• Good and succinct • Easy to use • It helps with report writing	• Fair	• Good	• Good, but short	• Guidelines are sufficient: user-friendly	• Easy to understand and follow • The guidelines are informative

Table 5.42: Clarity of e-assessment task instructions (Q3)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• A bit vague	• Not easy sometimes	• Vivid enough	• Good	• Straight forward and well-understood.	• Clear to understand • Sometimes need more detail explanations	• Acceptable
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• Very good	• Clear and understandable	• Excellent	• Good	• Well-clarified	• Understandable, clear, easy to follow • Onscreen prompts are good • Initial *my*TUTor orientation also assisted in understanding	• Is vague here and there, but acceptable

Table 5.43: Quality of e-assessment process (Q4)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Slow feedback	• Good and of high expectations	• Understandable	• Good	• Fair	• Reasonably good • Clear to read and find	• Good but could be improved
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• Good	• Very good	• Quick and regularly updated	• Good	• Not bad	• Want pop-up message/notification as reminders when to do certain things • Don't want all the info all at once • Documents must become available when required	• Process mustn't be cumbersome • Fairly quick because of electronic media • Process is simple to follow

Table 5.44: Strengths of e-assessment tasks (Q5a)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Can be done anywhere anytime	• Able to compile reports according to standard • Able to handle pressure and too much work	• (Not answered)	• Good	• Helps to determine how much is acquired at workplace	• Keep students in touch with university • Help students gauge progress	• Keep up to date with reporting

Table 5.44: Strengths of e-assessment tasks (Q5a) (continued)

Participant 8 (RP8)	Participant 9 (RP9)	Participant 10 (RP10)	Participant 11 (RP11)	Participant 12 (RP12)	Focus group 1 (FG1)	Focus group 2 (FG2)
• It improves assessment of students • It improves communication between students and lecturer	• Good and helpful	• Quick and easy to access anywhere	• Good and challenging	• Easy to understand	• Monthly reports keep students constantly reminded • Reports inform of what has to be included in the final report • Keep students updated • Monthly reports help to reflect on the work done • Students' work always available on the LMS before and after submission • Can transfer own notes to computer after work was done • Can provide evidence (video, photo, audio clip, etc.) as part of report and is extra backup to remember what to put in report	• Set to high standard • Can be challenging from time to time • Make students wary of knowledge application in real work • Can be used as a gauge • Forces students to apply report writing skills • Assists in keeping track of progress • Reflection of work • Always available • Monthly reports help students prepare for the final report

Table 5.45: Weaknesses of e-assessment tasks (Q5b)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Fair amount of uncertainty in the work • Feedback takes very long	• Sometimes being shy to ask	• (Not answered)	• No weaknesses	• No feedback	• None	• No feedback comments for the submitted tasks
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• (Not answered)	• Internet access	• Does not show results of the assessment in detail	• Insufficient time to complete tasks	• None	• Not taught how to reflect and do reflective writing • Students and workplace mentor do not always know what to write when reporting or what to report on • If anything goes wrong with LMS students will not be able to get the information • Should additionally implement, for example, Google Drive, Dropbox etc. • Don't always see the workplace mentor to sign reports, which can delay report submissions	• Feedback is a problem • Not always sure what to reflect on • University should give students the technology to help complete WIL and reports

Table 5.46: Time allocation for e-assessment tasks (Q6)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Fair	• Allocated well according to the prescribed work • Allows extra time to do more research	• Not enough	• Fair	• Fair • Keeps student busy	• Well-planned • Enough time to do work in time and submit	• Slightly strenuous • Would be better to submit a report every two months
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• Very good	• Fair and reasonable	• Fair	• Not bad	• Too short	• Can submit reports any time when circumstances arise • With workload at work students can work at own pace and make sure tasks get submitted timeously	• Tasks are manageable after and during work hours • Adequate for what we do at work • Work at own pace and time periods • Enough time to submit to university

Table 5.47: Advantages of e-assessment tasks (Q7a)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• It helps to take more responsibility for own time management	• Gain more knowledge • Learn to work on a timeframe • Assists with keeping to deadline • It helps with how to do research or model a concept/project	• Understand and learn new things	• Helps with understanding what is necessary and required in the field of study	• It helps a student learn as much as possible	• To be able to electronically submit assessment tasks	• Keeping track of acquired skills • Keeps you updated
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• The ability to be able to communicate with fellow students about the assessment tasks at hand	• Being able to work electronically helps students stay up to date with workload	• (Not answered)	• It assists in understanding correlation between learning theory and practice	• It assists in understanding purpose of WIL programme	• Tasks assist with organising, familiarising and revision of knowledge/work done in workplace • Get pointers and assistance from the workplace mentor who keeps track of information captured in tasks	• Makes students enjoy doing the WIL tasks • Gain experience and knowledge • Helps students to reflect on and understand their work in WIL • Everything is electronic • Allows mentor to guide students

Table 5.48: Likes about e-assessment (Q7b)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Do it in own time • Can submit it wherever at any time	• Students can handle tasks their own way (being in control)	• (Not answered)	• The tasks are practically oriented	• It makes students realise how much knowledge is acquired during WIL programme	• Don't have to manually submit reports or visit university for any communication	• Easy to submit • No travel to university
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• (Not answered)	• Submit assignments without going to the lecturer	• Accessible anywhere, anytime • Available on phone and tablet computer	• Designing projects based on challenges faced by industries	• The tasks are easy to manage	• Feedback from lecturers and workplace mentors • Would prefer more frequent feedback	• Doing it online and electronically • Quick and effective

Table 5.49: Dislikes about e-assessment (Q7c)

Participant 1 (RP1)	Participant 2 (RP2)	Participant 3 (RP3)	Participant 4 (RP4)	Participant 5 (RP5)	Participant 6 (RP6)	Participant 7 (RP7)
• Feedback is poor	• Not being given the relevant information or tools to use	• (Not answered)	• No dislikes	• No feedback	• (Not answered)	• A bit strenuous to keep up with the deadlines
Participant 8 (RP8)	**Participant 9 (RP9)**	**Participant 10 (RP10)**	**Participant 11 (RP11)**	**Participant 12 (RP12)**	**Focus group 1 (FG1)**	**Focus group 2 (FG2)**
• (Not answered)	• Submission chances can be limited	• The layout of the tasks could be improved	• None	• None	• Downloading information and uploading tasks take long because of network • Don't have own Internet; use company's • Using the Internet could be problematic	• Don't always have computers to do the online work • Feedback is not always informative to learn from • Need more assortment of tasks

5.4.2.4 *Interpretation of online qualitative questionnaire survey and face-to-face focus group interviews according to a priori categories*

A priori categories (*cf.* 1.6.7.1) guided the construction of the online qualitative questionnaire survey guide which was also used to conduct the face-to-face focus group interviews. The seven questions were associated with and clustered according to the categories as shown in Table 5.50.

Table 5.50: *A priori* categories for the online qualitative questionnaire survey and focus group interviews

Questionnaire questions	*A priori* categories
1. Please provide the following biographical information: a) In which academic year are you with your studies?	Academic year
b) What prompted you to enrol for a qualification in engineering?	Motivation for Engineering studies
2. Comment on the sufficiency of the overall e-assessment guidelines	E-assessment guidelines and instructions
3. Comment on the clarity of the instructions of the respective e-assessment tasks	
4. Comment on the quality of the e-assessment process	Quality of e-assessment process
5. Comment on the e-assessment tasks in terms of the following: a) Strengths	E-assessment tasks
b) Weaknesses	
6. Comment on the time allocation for the respective e-assessment tasks	
7. Complete the following sentences: a) "The e-assessment tasks helped me to …"	
b) "What I liked the most about the e-assessment tasks was…"	Likes and dislikes about e-assessment
c) "What I disliked the most about the e-assessment tasks was…"	

5.4.2.4.1 Academic year (Q1a)

As it was the researcher's intention to involve third and fourth year students of the DCME doing their WIL in the study, it can be assumed that all the participants were part of these year groups. From the responses in Table 5.39, it therefore appears that there is an almost balance between participants being in their third or fourth year of study (although most are in their third year).

5.4.2.4.2 Motivation for Engineering studies (Q1b)

From the responses in Table 5.40, it is clear that almost all the participants study Engineering because they are keen about the particular area and what it offers. Some are curious (RP11, FG1) and others are ambitious (RP2, RP6, RP7, RP8, RP9, RP12, FG2). However, it appears that most of the research participants chose this field of study because of their interest in the field.

5.4.2.4.3 E-assessment guidelines and instructions (Q2; Q3)

Although there is still room for improvement (RP1, RP10, RP12), the research participants, taken as a whole, appear to be satisfied with the overall e-assessment **guidelines** provided (*cf.* Table 5.41). Some considered the guidelines to be accessible (RP2, RP3), some user-friendly (RP6, FG1) and some easy to follow (RP9, FG2).

The majority of the participants experienced the e-assessment **instructions** (*cf.* Table 5.42) positively. In one of the focus groups it was revealed that their initial orientation session and the incorporation of technology have something to do with their understanding of the instructions (FG1). However, this focus group as well as three participants indicated that the instructions could still improve as it is sometimes vague (RP1, RP6, FG1) or not easy to understand (RP2).

5.4.2.4.4 Quality of e-assessment process (Q4)

Considering the fact that the e-assessment process is still novel to the participants, the students' experiences of the e-assessment process varied (*cf.* Table 5.43), which came as no surprise. However, the researcher sensed from at least half of the

participants (RP1, RP3, RP5, RP6, RP7, RP12, FG1) that there is still room for improving the e-assessment process.

5.4.2.4.5 E-assessment tasks (Q5a; Q5b; Q6; Q7a)

According to most of the research participants, the **strengths of e-assessment tasks** (*cf.* Table 5.44) are situated in their versatility since it could be done anywhere (RP1, RP10, FG1, FG2); the tasks keep students in touch with the institution and the progress of their work (RP6, RP7, RP8, FG1, FG2); they enable students to reflect on their work (FG2) and complement their reports with appropriate evidence (FG1).

In as far as **weaknesses of e-assessment tasks** (*cf.* Table 5.45) are concerned, some students expressed their uneasiness with delayed, or absence of feedback (RP1, RP5, RP7, RP10, FG2). Uncertainty about instructions also appears to be a problem (RP1, FG1, FG2), which underscores the participants' disclosure in Q3 (*cf*. Table 5.42; 5.4.2.4.3) that instructions could still improve. Technology access and reliability (RP9, FG1) were also mentioned as possible weaknesses. The researcher found it rather disturbing that the participants focus group 1 mentioned that they experienced difficulty to get hold of the workplace mentor (FG1).

Time allocation for e-assessment tasks (*cf.* Table 5.46), was generally perceived as adequate by most of the participants. Welcoming factors reported were that students are afforded the opportunities to do more research (RP2) and to work at their own pace (FG1, FG2).

Advantages of e-assessment tasks reported by participants (*cf.* Table 5.47), relate to more responsible time management and organization of learning (RP1, RP2, RP4, RP9, FG1). In addition, e-assessment tasks are said to be directed at valuable learning experiences by some participants (RP3, RP5, RP7, RP11, FG2). Some of the participants also considered the advantages of technology, by indicating that it allows one to submit tasks timeously in electronic format, enables one to keep track of acquired skills (RP6, RP7, RP9) and eases communication between students (RP8).

5.4.2.4.6 *Likes and dislikes about e-assessment (Q7b, Q7c)*

Almost all the participants reiterated that what they **like** (*cf.* Table 5.48) about e-assessment was the flexibility of e-assessment (*cf*. Table 5.44; 5.4.2.4.5). Some of the participants reemphasized delayed, or absence of feedback (*cf.* Table 5.45; 5.4.2.4.5) as a **dislike** (*cf.* Table 5.49). Once more, it was suggested by some participants that instructions can be improved (RP2, RP10) (*cf.* Table 5.42; 5.4.2.4.3), while access to the Internet and technology was also identified as a problem (FG1, FG2) (*cf.* Table 5.45; 5.4.2.4.5). Interesting is the fact that the participants in focus group 2 regarded the tasks as monotonous since a larger variety of tasks is required (FG2).

5.4.3 Preliminary conclusions

Drawn from the data obtained from the online qualitative questionnaire survey and face-to-face focus group interviews with students, the following preliminary deductions are made:

(i) Although the sample size of the students involved in WIL was relatively small, third and fourth year students (as was planned for the research) expressed their experiences regarding e-assessment (*cf.* 5.4.2.1; 5.4.2.4.1).

(ii) The research participants were passionate about Engineering, which suggests that their responses could be considered reliable (*cf.* 5.4.3.4.2).

(iii) E-assessment guidelines are accessible, user-friendly and easy to follow, while the e-assessment process and instructions could still be improved (*cf.* 5.4.2.4.3; 5.4.2.4.4).

(iv) E-assessment is regarded as versatile, which is seen as a major strength by the students (*cf.* 5.4.2.4.5).

(v) Feedback and the reliability of, and access to technology, prove to be weaknesses of e-assessment (*cf.* 5.4.2.4.5; 5.4.2.4.6).

(vi) Time to complete e-assessment tasks is adequate, while tasks are regarded as providing for valuable learning experiences (*cf.* 5.4.2.4.5).

(vii) The incorporation of technology in WIL is beneficial to the students (*cf.* 5.4.2.4.5).

5.5 CONCLUSION

In this chapter, the data obtained from the sequential, embedded mixed methods research design, which was anchored in an exploratory case study, were analysed and interpreted. Preliminary conclusions, which revealed the most prominent findings emanating from the respective sets of data, were drawn.

In chapter six which follows, an overview of the study will be provided, the final findings of the research will be discussed and recommendations, based on the findings, will be made.

CHAPTER SIX
SUMMARY, FINDINGS AND RECOMMENDATIONS

6.1 INTRODUCTION

The purpose of this sequential, embedded mixed methods study (*cf.* 1.6.1; 1.6.2; 1.6.5; 4.3; 4.4) was to identify and examine the factors that should be considered for the successful development of e-assessment as component of WIL. Related to the aforesaid, the study also aimed to determine the resultant experiences emanating from the factors determined earlier, regarding the implementation of e-assessment as component of WIL. In addition to the overall purpose of the study (*cf.* 1.2), associated secondary questions and objectives were formulated (*cf.* 1.3). All the aforementioned were operationalized by means of a literature and empirical study.

In this chapter, a synopsis of the study will be put forward by relating the respective chapters to the applicable corresponding secondary research questions, objectives and ultimate purpose of the study. Thereafter, an account of the most prominent findings from the literature review and empirical research will be provided, after which recommendations to the findings will be suggested. Recommended amendments and improvements to the implemented prototype of e-assessment as component of WIL will also be included. This will be followed by acknowledging the limitations of the research and by proposing suggestions for further research.

6.2 OVERVIEW OF THE STUDY

This section presents an overview of the study against the background of the purpose and the related objectives of the study.

6.2.1 Chapter one

The intention of this chapter was to provide an orientation to the study. On the one hand, the study was justified by the decision of the DCE to embrace a technology-based WIL framework for the TUT. On the other hand, the amorphous nature of existing WIL programmes together with the supposition that available technologies are not optimally utilized within existing WIL programmes, warranted attention. The

researcher further argued that e-assessment as component of WIL could augment instruction and conventional assessment to encourage authentic learning (*cf.* 1.1). This prompted the researcher to identify and examine the factors that should be considered for the successful development of e-assessment as component of WIL. Related to the aforementioned, it was also envisioned to determine the resultant experiences emanating from the determined factors, of the implementation of e-assessment as component of WIL (*cf.* 1.2). Research questions and objectives were then formulated to guide the study (*cf.* 1.3). Hereafter, the study was conceptualized in terms of relevant key concepts to provide a theoretical base on which the study could be founded (*cf.* 1.4). An outline of the research methodology was given (*cf.* 1.5; 1.6), after which the delimitations of the study (*cf.* 1.7), possible challenges of the study (*cf.* 1.8) and the study's significance and possible contribution (*cf.* 1.9), were put into perspective. The chapter was concluded by delineating the structure of the research (*cf.* 1.10).

6.2.2 Chapter two

In this chapter WIL was contextualised. By studying the literature, the following secondary research question and accompanying objective directed this chapter.

Secondary research question:

- What is the nature and value of WIL in terms of the provision of quality higher education?

Objective:

- To describe the nature and value of WIL in terms of the provision of quality higher education.

General background information regarding WIL was provided (*cf.* 2.2), after which the phenomenon was conceptualised in detail (*cf.* 2.3). WIL was defined (*cf.* 2.3.1) and related to learning experiences (*cf.* 2.3.2). The advantages and challenges associated with WIL were also highlighted (*cf.* 2.3.3). Thereafter, the WIL cycle (*cf.* 2.4) and possible WIL strategies (*cf.* 2.5) were discussed. The chapter moved on to relate WIL to authentic learning (*cf.* 2.6) and concluded with an overview of WIL in the DCME (*cf.* 2.7).

6.2.3 Chapter three

Similar to chapter two, this chapter was also based on a literature study. The chapter investigated assessment in WIL by addressing the following two secondary research questions:

- What is the significance of e-assessment within the contexts of assessment, modern educational technology and WIL?
- How can e-assessment within a WIL programme advance authenticity and augment instruction and conventional assessment?

Guided by these two questions, the fundamental elements of assessment were discussed (*cf.* 3.3). These fundamental elements included the definition of assessment (*cf.* 3.3.1), the assessment process (*cf.* 3.3.2), the purposes of assessment (*cf.* 3.3.3) and the principles of quality assessment (*cf*. 3.3.4). This was followed by brief discussions on conducting assessment (*cf.* 3.3.5), assessment referencing sources (*cf*. 3.3.6), the relation between assessment and learning (*cf*. 3.3.7), assessment and reflection (*cf.* 3.3.8) and assessment and feedback (*cf.* 3.3.9). The significance of e-assessment (*cf.* 3.4) was highlighted in relation to assessment (*cf.* 3.4.1), educational technology (*cf.* 3.4.2) and WIL (*cf.* 3.4.3). The chapter concluded with discussions on how e-assessment could advance authenticity within a WIL programme (*cf.* 3.5) and augment instruction and conventional assessment (*cf.* 3.6).

6.2.4 Chapter four

This chapter provided an overview of the empirical study with regard to the processes and procedures which were followed to gather information relevant to the last secondary question in relation to the overall purpose of the study (*cf.* 1.2; 1.3.2).

It was explained that the research was situated within the Pragmatist paradigm which allows for both quantitative and qualitative research (*cf.* 4.2) and that it followed a sequential, embedded mixed methods research design (*cf.* 4.3). The strategy of inquiry for this research was identified as an exploratory case study (*cf.* 4.4). The population and sample were indicated by also providing an outline of the sampling procedure (*cf.* 4.5). This was followed by a description of the data collection methods

used in the respective phases of the empirical research (*cf.* 4.6). The principles which were considered for the construction and administering of the data collection methods were explained (*cf.* 4.7). The quality criteria (*cf.* 4.8), the pilot study (*cf.* 4.9) and the role of the researcher (*cf.* 4.10) were also presented. This was followed by expounding the ethical considerations that guided the research (*cf.* 4.11). The chapter was concluded by a graphical representation of the data collection process (*cf.* 4.12).

6.2.5 Chapter five

Based on the empirical processes and procedures outlined in chapter four, chapter five focused on the analysis and interpretation of the collected data in order to address the two-pronged, primary research question (*cf.* 5.1) in which the secondary questions (*cf.* 1.3.2), were infused.

The data analyses and interpretations were sequenced according to the same order which was followed in the data collection process (*cf.* 5.1). A detailed discussion on the analyses and interpretation of data obtained through the individual interviews (*cf.* 5.2.1) and the document study (*cf.* 5.2.2), were executed. This constituted Phase 1 of the empirical study which intended to identify and examine the factors that should be considered for the successful development of e-assessment as component of WIL. What followed was a deliberation on the development of e-assessment as component of WIL (*cf.* 5.3). The current WIL assessment procedure in the DCME was explained (*cf.* 5.3.2) and this was followed by a description of a proposed prototype of e-assessment as component of WIL in the DCME (*cf.* 5.3.3).

For Phase 2 of the empirical research, the data obtained through an online quantitative questionnaire directed at industry participants (*cf.* 5.4.1) and online qualitative questionnaire survey and face-to-face focus group interviews with WIL students of the DCME (*cf.* 5.4.2), were analysed and interpreted. These analyses and interpretations related to the resultant experiences emanating from the factors determined earlier, on the implementation of e-assessment as component of WIL. From the analyses and interpretations of all the sets of data obtained through Phase 1 and Phase 2, preliminary conclusions were drawn (*cf.* 5.2.1.5; 5.2.2.4; 5.4.1.3; 5.4.3) to complete this chapter.

6.3 FINDINGS OF THE RESEARCH

To accomplish the overall purpose of the study (*cf.* 1.2), the literature as well as the empirical study should be taken into account. In this section, the most prominent findings derived from these two sources are highlighted.

6.3.1 Findings emanating from the literature study

The literature study provided the theoretical framework for the empirical study. Therefore, the literature study has implications for the empirical study as it could clarify the empirical findings. With regard to WIL and e-assessment the following can be regarded as the most important findings from the literature study:

- WIL is a critical element in the education of students who require workplace experience, since it makes provision for the integration of theory and practice (*cf.* 2.2).
- WIL is a form of applied learning which exposes students to authentic learning opportunities (*cf.* 2.6) for enabling them to gain knowledge, skills, competencies and employment experience appropriate to their future careers (*cf.* 2.3.1).
- Since WIL requires fundamental and practical learning, cooperation between academic institutions and industry is required (*cf.* 2.3.2).
- Exposure to WIL could benefit students in a variety of ways since it advances academic, personal, career and work skills development (*cf.* 2.3.3.1).
- WIL could be challenging to students, the academic institution and staff, as well as to the industry and mentors (*cf.* 2.3.3.2).
- The development of successful WIL programmes is reliant on the application of a WIL cycle (*cf.* 2.4) and the adoption of appropriate WIL strategies (*cf.* 2.5) such as the cooperative education strategy in which the DCME operates (*cf.* 2.7).
- Successful assessment depends on the comprehension of a number of fundamental elements which serve as theoretical foundation for good practice and which are also applicable to e-assessment (*cf.* 3.3).
- Several proven advantages (*cf.* 3.4.1), fast-moving technological developments and the availability of technology (*cf.* 3.4.2), as well as the appropriateness of

WIL conditions (*cf.* 3.4.3), compel higher education institutions to consider the development and implementation of e-assessment.

- If well-planned and developed, e-assessment has the potential to advance authenticity (*cf.* 3.5) and augment instruction and conventional assessment (*cf.* 3.6).

6.3.2 Findings emanating from the empirical study

The primary research question (*cf.* 1.3.1) was two-pronged and was concerned with the factors that need to be considered for the successful development of e-assessment as component of WIL and the resultant experiences emanating from these determined factors of the implementation of e-assessment. Infused in this primary research question, were four secondary questions (*cf.* 1.3.2).

Approached as an exploratory case study which used a sequential, embedded mixed-methods research design (*cf.* 1.6.1; 1.6.2); the empirical study consisted of two phases. These phases were related to the two dimensions of the primary research question. Stemming from the mentioned approach, the main findings of the empirical study are presented below.

Phase one:

- Assessment is recognised as fundamental to the success of WIL and for ensuring student competence (*cf.* 1.4.1; 3.3.1; 3.3.3; 3.3.7; 3.4.3; Table 5.27).
- Although WIL assessment procedures are evident, inadequate information pertaining to these procedures prevails [*cf.* 5.4.1.2.1 (vii)].
- E-assessment is optimistically considered since it is likely to benefit the current WIL assessment process (*cf.* 3.4.3; 5.4.1.3; 5.4.2.4.5).
- The successful implementation of e-assessment as component of WIL is dependent on meticulous attention to well-defined outcomes and assessment criteria [*cf.* 3.3.4; 3.4.1; 3.4.2; 3.4.3; 5.4.1.2.2 (vii)]; the adherence to the principles of quality assessment [*cf.* 3.3.4; 5.4.1.2.2 (vii)]; unconditional attention to feedback [*cf.* 2.3.1; 2.4 (v); 3.4.1; 3.4.2; 3.4.3; 3.5; 3.6; 5.4.1.2.2 (vii); 5.4.1.3; 5.4.2.4.5; 5.4.2.4.6]; the provision of a functional online platform (*cf.* 5.2.1.4.2; 5.2.1.4.3; 5.2.1.4.5); guaranteed student

access to technology (*cf.* 5.2.1.4.3; 5.2.1.5; 5.4.1.2.2 (ii); 5.4.2.4.5; 5.4.2.4.6; 5.4.3) and the realisation of favourable relations with industry (*cf.* 2.3.3.1; 5.2.1.4.6; 5.2.1.5; 5.3.3).

- The implementation of e-assessment as component of WIL should be an institutionally driven effort which should be gradually phased in, starting at the beginning of an academic year (*cf.* 5.2.1.4.4; 5.2.1.4.5; 5.2.1.4.6; 5.2.1.5).
- Although WIL assessment is recognised as the responsibility of lecturers and workplace mentors (*cf.* 5.2.1.4.5; 5.2.1.5; 5.2.2.3.5; 5.2.2.4;. 5.3.3), their obligation should also include the development and regular revision of a variety of assessment tasks by also considering the inputs of students and professional bodies [*cf.* 5.4.1.2.2 (iii)].

Phase two:

- E-assessment is regarded as a feasible way of conducting WIL assessment for reasons such as the following: it reduces administration (*cf.* 3.4.1.1; 5.2.1.4.3), it is versatile (*cf.* 3.4.3; 5.4.2.4.5) and due to its technological nature, students find it appealing (*cf.* 2.6.3; 5.4.2.4.5).
- Essentially, the success of e-assessment depends on accessible and reliable technology (*cf.* 5.2.1.4.3; 5.4.1.3).
- Although the research participants generally viewed the implementation of the prototype of e-assessment optimistically, e-assessment tasks should be refined in terms of the provision of clearer instructions (*cf.* 5.4.1.2.2 (i); 5.4.2.4.3); establishing a stronger representation of the realities of the workplace [*cf.* 5.2.1.4.5; 5.4.1.2.2 (vii)]; the incorporation of more cognitive challenging tasks [*cf.* 2.3.2; 2.6.2; 5.4.1.2.2 (v)] which also requires reflection [*cf.* 2.6.2; 3.3.6; 3.3.8; 3.4.1.3; 3.5; 5.4.1.2.2 (v); 5.4.1.2.2 (vii)], and improved feedback (*cf.* 5.2.1.4.2; 5.2.1.4.5; 5.2.1.5; 5.4.1.2.2 (iii); 5.4.1.3; 5.4.2.4.5; 5.4.3).
- Better cooperation between lecturers and workplace mentors is required, especially with regard to the improvement of the mentors' assessment skills on which reliable assessment is dependent (*cf.* 2.3.2; 2.3.3.1).

6.4 RECOMMENDATIONS

6.4.1 Recommendations derived from the literature and empirical findings

Ensuing from the empirical findings and what transpired from the literature study, several recommendations are proposed in respect of the development and implementation of e-assessment as component of WIL. These recommendations are inventoried below.

(i). The adoption of e-assessment as component of WIL at the TUT should not be further delayed. Evidence emanating from the current study to substantiate this statement include the following:

- assessment is recognised as fundamental to the success of WIL and for ensuring student competence (*cf.* 5.2.1.5; 5.2.2.4; 6.3.2);
- initial steps in this direction are manifested in the decision of the DCE to embrace a technology-based framework for WIL (*cf.* 1.1; 4.5; 6.2.1), and
- e-assessment is optimistically considered for its reduction of administration, its versatility and its appealing nature to new generation students (*cf.* 1.4.2; 5.2.1.3; 5.2.1.4.3; 5.2.1.5; 5.4.2.4.5; 5.4.3; 6.3.2).

(ii). Institutional and departmental documents pertaining to WIL and the assessment of WIL, should be appraised and revised to illuminate relevant and detailed information regarding e-assessment as a component of WIL (*cf.* 5.2.1.3; 6.3.2).

(iii). To be able to successfully implement e-assessment as a component of WIL, institutional strategic funding should be allocated specifically for this purpose and for ensuring accessibility and reliability of technology (*cf.* 3.4.1.1; 3.4.1.3; 3.6; 5.2.1.3; 5.2.1.5; 5.4.2.4.6; 5.4.3; 6.3.2).

(iv). E- assessment as component of WIL should be gradually phased in at the start of an academic year reserved for this purpose, and the DCE should drive the initiative as an institutional effort (*cf.* 5.2.1.3; 5.2.1.5; 6.3.2).

(v). Because of its novelty and the fact that especially workplace mentors' assessment skills could be improved, e-assessment orientation and

training for all stakeholders involved (students, lecturers, WIL coordinators, departmental administrative staff, and workplace mentors) should be provided (*cf.* 2.4; 5.2.1.3; 5.2.1.4; 5.2.1.4.5; 5.4.2.4.3).

(vi). Collaboration between academic departments and places of work should be earnestly reconsidered since the initial implementation of e-assessment will require the joint development of meaningful assessment tasks representing the realities of the workplace (*cf.* 5.3.3).

(vii). To keep e-assessment tasks relevant, the collaboration for developing assessment tasks should be recurrent and extended to include students and professional bodies (*cf.* 2.3.2; 6.3.1).

(viii). E-assessment tasks should be founded on the principles applicable to quality assessment (*cf.* 3.3.4) and should be meticulously developed by specifically attending to the following:

- The provision of clear instructions (*cf.* 5.4.1.2.2; 5.4.1.3; 5.4.2.4; 5.4.2.4.3; 5.4.2.4.5; 5.4.2.4.6; 5.4.3; 6.3.2).
- The specification of learning outcomes and assessment criteria, showing alignment with the appropriate NQF level (*cf.* 2.3.2; 3.3.4.10).
- The inclusion of cognitive challenging tasks (*cf.* 2.3.2; 2.6.2; 5.4.1.2.2 (v); 6.3.2).
- The inclusion of tasks requiring reflection (*cf.* 1.4.1; 2.3.1; 3.3.3.7; 3.3.5; 3.3.7; 3.3.8; 3.4.1.3; 3.4.2; 3.4.3.1; 3.4.3.2; 3.5; 5.4.1.2.2 (v); 5.4.1.3; 5.4.2.4.5).

(ix). Feedback on e-assessment tasks should be treated more rigorously (*cf.* 2.4; 3.3.9; 3.4.1.3; 3.4.3.1; 3.4.3.3; 5.2.1.4.2; 5.2.1.4.5; 5.2.1.5; 5.4.1.2.2 (iii); 5.4.1.3; 5.4.2.4.5; 5;4;2;4;6; 5.4.3; 6.3.2).

(x). The prototype of e-assessment could still be refined to serve as basis for a more sophisticated version of e-assessment as component of WIL (*cf.* 5.3.3; 6.4.2).

6.4.2 A more sophisticated version of the prototype of e-assessment

A critical inspection and evaluation of the findings (*cf.* 6.3.1; 6.3.2) and recommendations (*cf.* 6.4.1) revealed that the developed and implemented prototype of e-assessment as component of WIL could be refined to represent a more sophisticated version. In response to 6.4.1 (x), an elaboration of the prototype of e-assessment, which is illustrated in Figure 6.1, follows below.

Before the students embark on their WIL programme, they attend an on-campus preparation session where they receive orientation and training in using the LMS for WIL purposes and how to address each of the e-assessment tasks. All other parties involved in the DCME's WIL programme should also be oriented and receive training on e-assessment as applicable to their respective roles. This is intended to familiarise all stakeholders, including students, with the e-assessment process and procedures and to furnish them with the relevant guidelines and instructions. It is envisioned that this on-campus preparation session will also stimulate cooperation between staff of the academic department and the workplace mentors (*cf.* 6.4.1).

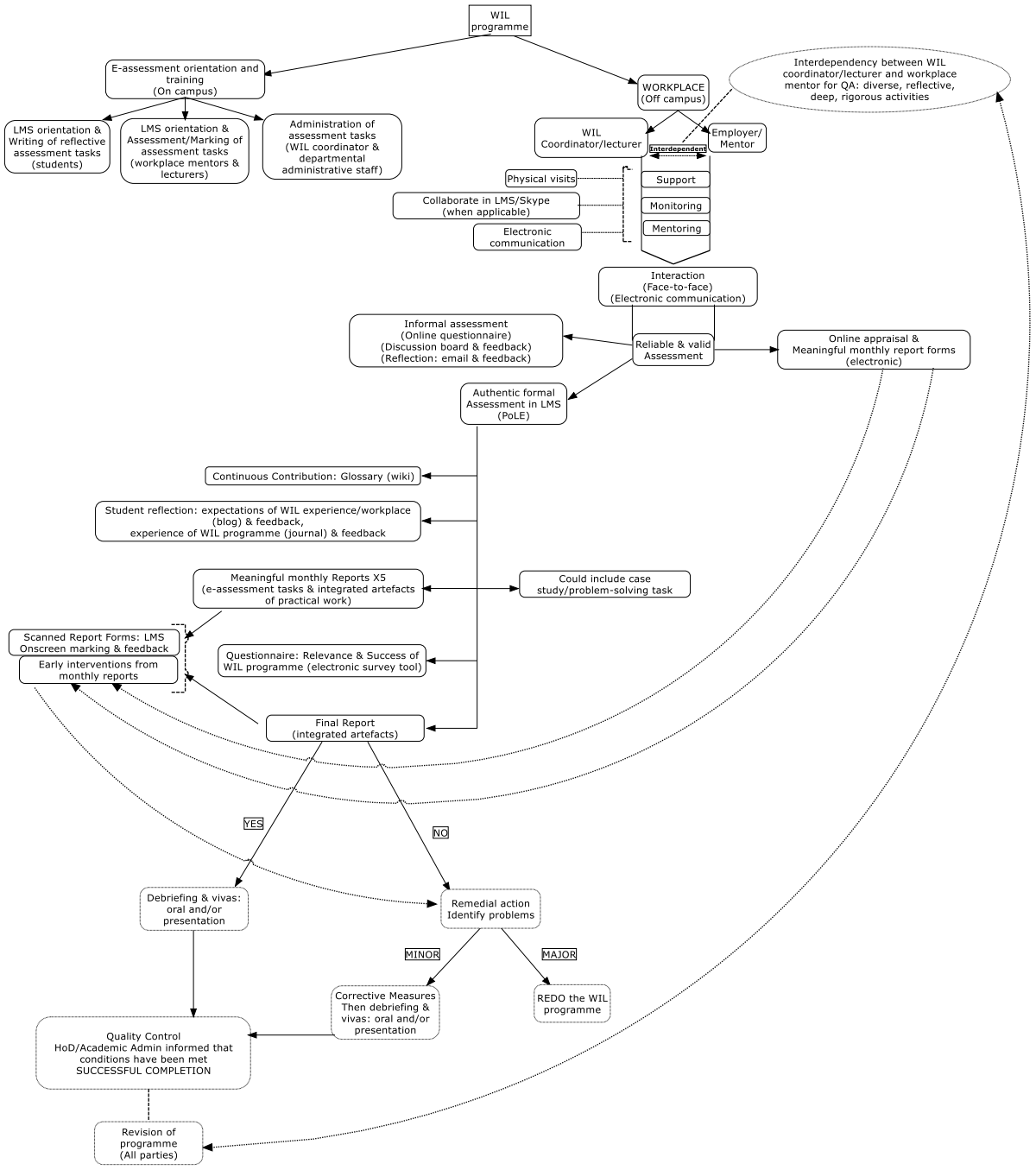
In as far as workplace procedures are concerned, the students would still be mentored by the WIL coordinator and/or the lecturer and the mentor from the employer. It is envisaged that there should be much greater interdependency between these two parties for improving the assessment competencies of mentors [*cf.* 6.4.1 (vii)]. In addition, this interdependency would allow for regular revision and quality assurance of the e-assessment tasks to ensure that tasks are representative of the workplace (*cf.* 3.3.4.1), diverse, cognitive challenging and reflective in nature [*cf.* 6.4.1 (viii); 6.4.1 (ix)]. This aforesaid interaction and interdependency should be in the form of face-to-face meetings or via electronic communication. By working closely together the relationship between the DCME and the industry will be strengthened and will reiterate their joint responsibilities in as far as WIL assessment is concerned.

Informal assessment should be done by the completion and submission of an online questionnaire; by contributing to discussion boards in the LMS and by reflective notes per email. Formal assessment of students' performance could comprise various electronic activities. Students could contribute to a glossary of terms used in their particular field of work by adding the terms to a wiki in the LMS. Students could also reflect on their expectations of their workplace (*cf.* 5.4.1.2.2 (v); 5.4.1.3; 5.4.2.4.5) in

a blog, as well as their workplace experiences in a private journal in the LMS. The students' completion of five indispensable monthly reports and a final report would still be a requirement. As part of each e-assessment task/report, students could submit accompanying artefacts in the form of video clips, photos or audio recordings (*cf.* 2.4; 3.4.2; 3.4.3.2; 3.5). These artefacts should be obtained in accordance with workplace policies and procedures, so not to divulge and/or compromise sensitive information. The artefacts would serve as proof and evidence to substantiate certain aspects of the assessment tasks. The students could also be given a case study or a problem-solving task to allow for higher order thinking skills to be applied in their assessment. The completed reports should then be submitted in the LMS as scanned documents since it needs to be stamped, signed and verified by the workplace mentor. It is suggested that the lecturer should use the onscreen marking tool to assess and comment on the submitted reports. In addition, the workplace mentor completes and submits an online student performance appraisal form that covers all the aspects indicated in 5.3.3.

Before the students submit their final reports, they must complete an online questionnaire in the LMS. The purpose of the questionnaire is to determine the relevance of WIL and to assist the DCME to evaluate the success of the WIL programme, including e-assessment. Instead of delayed feedback which is only done during the debriefing session, the refined e-assessment version proposes more regular feedback in the form of monthly interventions by the lecturers. This will allow for earlier detection of issues and problems which students can use for the improvement of assessment tasks. After obtaining the assessment results, the same procedures are followed as in the suggested prototype of e-assessment (*cf.* 5.3.3) to determine the successful or unsuccessful completion of the WIL programme.

Figure 6.1: Sophisticated version of the prototype of e-assessment



A structured form of the more sophisticated version of the prototype of e-assessment in the LMS is suggested in Figure 6.2 and explained in Table 6.1. Because of the restricted access to the TUT's LMS, an example of how this structure is operationalised in the LMS, is provided by using the online platform called CourseSites. CourseSites is a free version of the Blackboard Learn and Collaborate software, for which Blackboard provides hosting and support. **Appendix K** explains where and how to access this course.

Figure 6.2: Structure of e-assessment in the LMS

Table 6.1: Explanation of the structure of e-assessment in the LMS

Welcome page	• Entry point
Admin	• Flow diagram: explaining how to use the site • Course organisation: information on netiquette, plagiarism, explaining how the students are assessed, etc. • WIL coordinator/Lecturer information: contact details, contact times, etc. • First tasks: upload student information, upload directions & map to workplace, download letter to employer explaining what to teach the student, download WIL guide. • Impressions: email to lecturer/WIL coordinator explaining first impressions. • Download documentation: all forms required for the WIL period. • Grade centre: access to grades, marks and feedback.
FAQs	• Frequently updated by WIL coordinator/lecturer.
E-assessment tasks	• Glossary: students contribute to the glossary of terminology/acronyms to help them understand the content of their WIL programme/discipline (glossary tool/wiki) • Expectations of WIL programme: reflection tool (journal/blog) • Reports (monthly): submitted electronically and assessed by using onscreen marking tool and rubric • Case study/Problem-solving exercise: higher order thinking exercise, and assessed by using onscreen marking tool and rubric • Final report: submitted electronically to SafeAssign (check for plagiarism) and assessed by using onscreen marking tool and rubric • Questionnaire: *my*TUTor survey tool: determine relevance of WIL and to assist to evaluate the success of the WIL programme • Experience of the WIL programme: reflection tool (journal)
Web links	• Links to web sites of professional bodies, etc.
Communication tools	• Announcements • Discussion forums (assessed) • Blogs (assessed) • Email • Messages
WIL coordinator/Lecturer files	• Onscreen marking toolset
Help files	• E.g. Video files for students and lecturers

6.5 THE LIMITATIONS OF THE RESEARCH

The researcher acknowledges the shortcomings that could have impacted on the outcomes of this study. The identification of the deficiencies draws attention to the fact that the results of this research are only provisional. Hence, the following limitations were identified in respect of this study:

- Since the researcher was employed as an Instructional Designer at the TUT at the time of this study, he was known to some of the research participants. Such participants' responses, could have led to reactivity or the Hawthorne effect to impress the researcher (Leedy & Ormrod, 2005:98), which could have distorted some of the findings of the research.
- The researcher realised that his interview skills may have been inadequate in terms of prompting; taking into account that some responses required elaboration that could have yielded richer data to raise the quality of the research results and the conclusions.
- As this study was limited to one department (DCME) of the FEBE at the TUT, the results cannot be unconditionally generalised.
- The researcher did not take into account that some students might not have had access to a computer to attempt the e-assessment tasks in the implemented prototype of e-assessment.
- The research did not contain large samples in any of the phases. If it would have been possible to enlarge the samples, the data could have been richer.
- Due to the small sample size of the research respondents who formed part of the quantitative stage of this research, it was not possible to apply a larger range or more advanced statistical analyses to contribute towards more meaningful interpretations of the data.
- The TUT has not acquired the full bouquet of functionality of their LMS. Since the TUT LMS is the only officially recognised platform for the dissemination of course content, the researcher was bound by the limited functionality and availability of tools in the LMS. One such tool and functionality that is not utilised by the TUT is the LMS' portfolio building block. This lack of functionality limited the researcher to only utilise the available tools in the LMS.

6.6 SUGGESTIONS FOR FURTHER RESEARCH

This study only informed the development and implementation of e-assessment as component of WIL in one department of the TUT. It would therefore be appropriate to consider research prospects related to the development and implementation of e-assessment as component of WIL in a broader sense. In this regard, the following possibilities are mentioned that could inform a number of directions in which this research could be extended:

- The study could be replicated to include more HEIs, more research participants and a larger variety of academic programmes for which WIL is a prerequisite for the completion of a qualification.
- The attitudes of workplace mentors towards WIL and assessment of WIL in particular, warrants research.
- ECSA plays a pivotal role in advising UoTs on Engineering education in South Africa. As new developments and ideas in industry are constantly forth coming, it would therefore be advisable to conduct research in collaboration with ECSA into further assessment developments for WIL. This could pave the way to improvements to the e-assessment processes and procedures proposed by this study.
- The development of appropriate additional e-assessment instruments for implementation in WIL programmes and the effectiveness thereof, requires further research.
- Students' perspectives on the value of WIL in developing their knowledge, skills and competencies for a particular workplace, could be investigated.
- Action research on the development and implementation of e-assessment to suggest best practices, could be carried out.

6.7 FINAL CONCLUSION

Based on the findings as suggested in section 6.3, the researcher concludes that the purpose of this study was achieved. Although the development and implementation of e-assessment would differ from WIL programme to WIL programme, it can be concluded that the development and implementation of e-assessment as component of WIL advocated in this study, laid the foundation for exploring e-assessment in the

context of WIL more vigorously.

The researcher is convinced that the application of e-assessment in WIL is “the way to go”, since it was established that e-assessment has remarkable potential to benefit students, academic departments and workplace environments. It is envisaged that the successful development and implementation of e-assessment in WIL programmes would improve the quality of teaching and learning in WIL.

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APPENDIX A

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
VAAL TRIANGLE CAMPUS

Prof. Chrizanne van Eeden

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PO Box 1174, Vanderbijlpark
South Africa, 1900

4 April 2013

Dear Prof. B.J.J. Lombard,

ETHICS CLEARANCE APPROVED

This letter serves to indicate that your ethics application was approved by the VTC Ethics Sub-Committee for Social and Behavioural Sciences of the Faculty of Humanities:

Faculty application number:	FH-SB-2013-0003
Project Leader:	Prof. B.J.J. Lombard
Applicant:	M. Pienaar
Project title:	The development and implementation of e-assessment as component of WIL: A case study.
Meeting date:	11 March 2013

Kindly remember to forward outstanding documents (if applicable) to the chairperson of the ethics sub-committee. In the case of post graduate research, please remember to submit your proposal to Ms. D. Claasens (Ext: 103441) for approval and title registration by the Faculty Board.

The VTC Ethics Sub-Committee wishes you well with your research project.

Yours sincerely

Chrizanne van Eeden
Chair: VTC Ethics Sub-Committee: Social and Behavioural Sciences.

APPENDIX B

Tshwane University of Technology

11 October 2012

To: North West University
From: Department of Chemical and Metallurgical Engineering

Faculty of Engineering and the Built Environment.

LETTER OF PERMISSION

Dear Sir/Madam

This letter serves to confirm that the department of Chemical and Metallurgical Engineering grants permission to Mr. Marius Pienaar to come do his empirical study with our department; the title of for his research is: Planning, designing and implementing e-assessment as component of WIL case study.

Kind Regards,

Mr. M.S Ranyaoa

11/10/2012
Date

HoD Chemical and Metallurgical Engineering

APPENDIX C

Tshwane University of Technology

Higher Education Development and Support
Directorate of Cooperative Education

30 November 2012

To: **North West University**
From: **Directorate of Cooperative Education**

LETTER OF PERMISSION

Dear Sir/Madam,

This letter serves to confirm that the Directorate Cooperative Education grants Mr. Marius Pienaar permission to come do his empirical study with our directorate; the title of his research is: **Planning, designing and implementing e-assessment as component of WIL: a case study**.

Kind regards

Dr. Marius Wessels
Director: Cooperative Education
Tshwane University of Technology

APPENDIX D

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
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PO Box 1174, Vanderbijlpark
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Tel: (016) 910-3111
Fax: (016) 910-3116
Web: http://www.nwu.ac.z

INFORMED CONSENT (LECTURERS)

Dear Lecturer,

I am currently busy with research for my PhD-degree and I need your assistance to provide me with information to complete the study. This document will provide you with information regarding the project and what your involvement will entail. If you feel comfortable with the contents of the explanation I will appreciate it if you could sign the section indicating your consent to take part in the study.

Kindly note the following before you give consent to participate in the project.

The aim of the research is to conduct a case study on the development and implementation of e-assessment as component of Work Integrated Learning (WIL). It is envisaged that the research results will inform the advancement of e-assessment as alternative assessment approach which could impact on how WIL is structured and valued. Moreover, it could also enhance students' learning.

Since the research requires shared expertise in the fields of assessment and WIL, you were identified to participate in the research. However, your permission is needed to be involved.

Your participation is requested to obtain data about the following question: *What should be considered and included in the planning and design (development) of e-assessment as component of WIL*? The data will be collected by means of individual interviews. You will be contacted to schedule a suitable time to be interviewed. The individual interview will take between 40 and 60 minutes of your time. Please note that the intention of the research is NOT to evaluate **your** knowledge and comprehension of e-assessment or WIL, but to gather information-rich data which will help the researcher to understand what should be considered for inclusion in the development of e-assessment as component of WIL.

Participation in the research is not compulsory and you may withdraw at any time should you feel uncomfortable. Please be assured that your inputs will be used for research purposes only and that your participation will be treated confidentially.

There are no direct benefits for taking part in the study. However, the findings of the research may in future assist as indicated above.

The research will personally be conducted by myself, M Pienaar (Student number: 21978204), who works under the supervision of Prof BJJ Lombard from the School of Educational Sciences, North-West University (Vaal Triangle Campus). If you have any questions or queries you can contact Prof Lombard at Kobus.Lombard@nwu.ac.za or at 016 910 3067. Alternatively, feel free to contact me at 072 210 9749.

CONSENT TO PARTICIPATE IN THE STUDY ENTITLED:

The development and implementation of e-assessment as component of WIL: a case study

I……..... (Full name) have read and understand the nature of my participation in the PhD project of M Pienaar and hereby agree to participate.

Signature:…….. Date:……

Contact details: .....

.....

.....

APPENDIX E

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
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Tel: (016) 910-3111
Fax: (016) 910-3116
Web: http://www.nwu.ac.z

INFORMED CONSENT (External Stakeholders)

Dear Stakeholder

I am currently busy with research for my PhD-degree and I need your assistance to provide me with information to complete the study. This document will provide you with information regarding the project and what your involvement will entail. If you feel comfortable with the contents of the explanation I will appreciate it if you could sign the section indicating your consent to take part in the study.

Kindly note the following before you give consent to participate in the project.

The aim of the research is to conduct a case study on the development and implementation of e-assessment as component of Work Integrated Learning (WIL). It is envisaged that the research results will inform the advancement of e-assessment as alternative assessment approach which could impact on how WIL is structured and valued. Moreover, it could also enhance students' learning.

Since the research requires the first-hand experiences of external stakeholders about the implementation of e-assessment as component of WIL, you were identified to participate in the research. However, your permission is needed to be involved.

Your participation is requested to obtain data about the following question: *What are the experiences of external stakeholders on the implementation of e-assessment as component of WIL*? The data will be collected by means of an online questionnaire. The questionnaire will take between 15 and 20 minutes of your time to complete.

Please note that the intention of the research is NOT to evaluate **your** knowledge and comprehension of e-assessment or WIL, but to gather information-rich data which will help the researcher to understand your experiences regarding the implementation of e-assessment as component of WIL.

Participation in the research is not compulsory and you may withdraw at any time should you feel uncomfortable. Please be assured that your inputs will be used for research purposes only and that your participation will be treated confidentially.

There are no direct benefits for taking part in the study. However, the findings of the research may in future assist as indicated above.

The research will personally be conducted by myself, M Pienaar (Student number: 21978204), who works under the supervision of Prof BJJ Lombard from the School of Educational Sciences, North-West University (Vaal Triangle Campus). If you have any questions or queries you can contact Prof Lombard at Kobus.Lombard@nwu.ac.za or at 016 910 3067. Alternatively, feel free to contact me at 072 210 9749.

CONSENT TO PARTICIPATE IN THE STUDY ENTITLED:

The development and implementation of e-assessment as component of WIL: a case study

I……..... (Full name) have read and understand the nature of my participation in the PhD project of M Pienaar and hereby agree to participate.

Signature:…….. Date:……

Contact details: .....

.....

.....

APPENDIX F

NORTH-WEST UNIVERSITY
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INFORMED CONSENT (Students)

Dear Student

I am currently busy with research for my PhD-degree and I need your assistance to provide me with information to complete the study. This document will provide you with information regarding the project and what your involvement will entail. If you feel comfortable with the contents of the explanation I will appreciate it if you could sign the section indicating your consent to take part in the study.

Kindly note the following before you give consent to participate in the project.

The aim of the research is to conduct a case study on the development and implementation of e-assessment as component of Work Integrated Learning (WIL). It is envisaged that the research results will inform the advancement of e-assessment as alternative assessment approach which could impact on how WIL is structured and valued. Moreover, it could also enhance students' learning.

Since the research requires the first-hand experiences of students about the implementation of e-assessment as component of WIL, you were identified to participate in the research. However, your permission is needed to be involved.

Your participation is requested to obtain data about the following question: *What are the experiences of students on the implementation of e-assessment as component of WIL*? The data will be collected by means of a focus group interview. Approximately five students will participate collectively in the interview which will take no longer than 30 minutes of your time. Please note that the intention of the research is NOT to evaluate **your** knowledge

and comprehension of e-assessment or WIL, but to gather information-rich data which will help the researcher to understand your experiences regarding the implementation of e-assessment as component of WIL.

Participation in the research is not compulsory and you may withdraw at any time should you feel uncomfortable. Please be assured that your inputs will be used for research purposes only and that your participation will be treated confidentially.

There are no direct benefits for taking part in the study. However, the findings of the research may in future assist as indicated above.

The research will personally be conducted by myself, M Pienaar (Student number: 21978204), who works under the supervision of Prof BJJ Lombard from the School of Educational Sciences, North-West University (Vaal Triangle Campus). If you have any questions or queries you can contact Prof Lombard at Kobus.Lombard@nwu.ac.za or at 016 910 3067. Alternatively, feel free to contact me at 072 210 9749.

CONSENT TO PARTICIPATE IN THE STUDY ENTITLED:

The development and implementation of e-assessment as component of WIL: a case study

I……..... (Full name) have read and understand the nature of my participation in the PhD project of M Pienaar and hereby agree to participate.

Signature:……... Date:……

Contact details: .....

.....

.....

APPENDIX G

Dear Research Participant,

The intention of this individual interview is to gather information which will inform the planning and design of e-assessment as component of Work Integrated Learning (WIL). The study is specifically aimed at the WIL programme of the Department of Chemical and Metallurgical Engineering. The data will be operationalized for the development of e-assessment as part of the WIL programme in the said department.

You are kindly requested to answer all questions in a frank and open-minded manner. Your responses should be related to your involvement with the WIL programme, including the assessment thereof.

Although the interview will be recorded and transcribed verbatim to assist in the analysis of the data, your responses will be treated anonymously and confidentially and will be used for research purposes only in order to address the above-mentioned intention. Please be assured that the information obtained from this interview will be held in safekeeping for access and use by the undersigned only. The research results obtained through this interview will be reported on in the PhD study of the undersigned which is entitled: The development and implementation of e-assessment as component of WIL: a case study. In addition, results will be made available to the TUT and the NWU. Participating in the interview implies that you give consent that your responses may be used anonymously for the purposes as stated.

Should you have any queries regarding this interview or the purpose of the study, please contact me at 012 382 0735 or e-mail: PienaarM1@tut.ac.za, or my supervisor, Prof BJJ Lombard at 016 910 3067 or email Kobus.Lombard@nwu.ac.za.

Thank you for your willingness to participate.

Mr M Pienaar

Instructional Designer

Interview questions

1. Please provide the following biographical information:
   a) For how long have you been involved in the WIL programme?
   b) Explain the nature of your involvement in the WIL programme.
2. Describe the assessment procedures currently used in the WIL programme.
   (Your response may include an elaboration on the processes, the methods and the people involved)
3. Evaluate the assessment procedures currently used in the WIL programme in terms of the following:
   a) reliability
   b) validity
   c) fairness
   d) authenticity
   e) adequacy
   f) feedback
4. If you are required to improve on the assessment procedures currently used in the WIL programme, what will your recommendations be?
5. What are your opinions on e-assessment?
6. To add value to current WIL assessment procedures, what recommendations would you make in as far as e-assessment of WIL is concerned?
7. If e-assessment is to be included as component of WIL, how would you like the following to be addressed?
   a) Orientation of stakeholders in terms of e-assessment
      (Stakeholders include students, lecturers, and external stakeholders)
   b) People to be involved in e-assessment in a WIL programme
   c) Processes to be followed in the planning and developing of e-assessment tasks in a WIL programme
   d) Possible kinds of e-assessment tasks to be included in a WIL programme
   e) Variety of e-assessment tasks to be included in a WIL programme
   f) Ideal number of e-assessment tasks to be included in a WIL programme
   g) Feedback on e-assessment tasks in a WIL programme
   h) Evaluation of e-assessment tasks in a WIL programme.
8. Additional comments on e-assessment

APPENDIX H

Questions that guided the document study	
Question 1	Where was the document produced?
Question 2	When was the document produced?
Question 3	What was the purpose of the document?
Question 4	What were the underlying assumptions of the document?
Question 5	What did the document say?
Question 6	What did the document not say?
Question 7	How did the document relate to other documents?

APPENDIX I

Dear Research Participant,

This questionnaire is aimed to gather data on your experiences of the implementation of e-assessment as component of Work Integrated Learning (WIL) in the Department of Chemical and Metallurgical Engineering of the TUT.

You are kindly requested to complete the questionnaire in a frank and open-minded manner by indicating your experiences of the implementation of e-assessment as component of Work Integrated Learning (WIL).

Your responses will be treated confidentially and will be used for research purposes only in terms of the aim outline above. Please be assured that the information obtained from the questionnaire will be held in safekeeping for access and use by the undersigned only, and that the results of this questionnaire will be reported on in my thesis entitled: **The development and implementation of e-assessment as component of WIL: a case study**.

Completing the questionnaire implies that you give consent that your responses may be used anonymously for the purpose as stated.

Should you have any queries regarding the questionnaire or the purpose of the research, please contact me at 012 382 0735 or e-mail: PienaarM1@tut.ac.za, or my supervisor, Prof BJJ Lombard at 016 910 3067 or email Kobus.Lombard@nwu.ac.za.

Thank you for your willingness to participate.

Mr Marius Pienaar

SECTION A: BIOGRAPHICAL INFORMATION

- **Indicate the response MOST relevant to you by marking the appropriate box.**

1. Gender

Male	1
Female	2

2. Age

20-25 years	1
26-30 years	2
31-40 years	3
41-50 years	4
51-60 years	5
Older	6

3. Highest higher education qualification

Certificate	1
Diploma	2
3 year degree	3
4 year degree	4
Honours degree	5
Master's degree	6
PhD	7
Other (please specify)	8

4. Sector of position held at your company

Education and training sector (e.g. lecturer, training officer)	1
Administrative sector (e.g. clerk, secretary)	2
Management sector (e.g. HoD, section manager)	3
Core business sector (e.g. occupying a specific position in the institution/company in terms of its core business; an metallurgic engineer in an engineer company)	4
Other (Please specify)	5

5. Work-related experience in the position mentioned in four (4) above

Less than 5 years	1
5-10 years	2
11-20 years	3
21-30 years	4
31 years or more	5

6. Number of years involved in WIL programmes offered at the TUT

Less than 5 years	1
5-10 years	2
11-20 years	3
21-31 years	4
31 years or more	5

7. Please indicate the nature of assessment training applicable to WIL offered by the TUT, you have undergone during the last TWO years

The training was offered in the form of a hard copy of a procedural manual	1
The training was offered in the form of an electronic copy of a procedural manual	2
The training was offered as an one-time, face-to-face event for which no follow-up sessions were provided after the initial training	3
The training was offered as a long-term, face-to-face event for which a sequence of follow-up sessions were provided after the initial training	4
Although face-to-face training was offered, I did not attend any training sessions	5
No training, that I am aware of, was offered	6

8. Are you a certified assessor?

Yes	1
No	2

9. Are you a certified moderator?

Yes	1
No	2

SECTION B: THE IMPLEMENTATION OF e-ASSESSMENT AS COMPONENT OF WIL

- **Indicate the response MOST relevant to you by marking the appropriate box.**

Please rate the implementation of e-assessment as component of WIL in terms of the following statements:		Strongly disagree	Disagree	Agree	Strongly agree
B1. Instructions and guidelines					
B1.1	The overall e-assessment guidelines were clear and easy to follow	1	2	3	4
B1.2	The guidelines in terms of the respective e-assessment tasks were clear and easy to follow	1	2	3	4
B1.3	Sufficient instructions in terms of e-assessment procedures were provided	1	2	3	4
B1.4	Sufficient instructions in terms of the respective e-assessment tasks were provided	1	2	3	4
		Strongly disagree	Disagree	Agree	Strongly agree
B2. Processes					
B2.1	The e-assessment process acknowledged flexibility	1	2	3	4
B2.2	The e-assessment process was logically structured	1	2	3	4
B2.3	The e-assessment process was time consuming	1	2	3	4
B2.4	The e-assessment process was doubtful	1	2	3	4
B2.5	The e-assessment process made allowance for students to plan, perform and revise tasks where necessary	1	2	3	4
B2.6	Network availability and Internet connection interfered with the e-assessment process on a frequent basis	1	2	3	4
		Strongly disagree	Disagree	Agree	Strongly agree
B3. Tasks					
B3.1	The e-assessment tasks allowed for the accommodation of student diversity	1	2	3	4
B3.2	The e-assessment tasks contributed towards students' better understanding of matters related to the knowledge domain of engineering	1	2	3	4
B3.3	The e-assessment tasks contributed towards students' better understanding of matters related to the skills domain of engineering	1	2	3	4
B3.4	The e-assessment tasks contributed towards students' association with engineering as profession	1	2	3	4
B3.5	The e-assessment tasks were all relevant to the engineering profession	1	2	3	4
B3.6	The difficulty level of the e-assessment tasks were set too high	1	2	3	4
B3.7	The number and variety of e-assessment tasks were adequate	1	2	3	4
B3.8	The e-assessment tasks enhanced student performance	1	2	3	4
B3.9	The e-assessment tasks made provision for constructive feedback to enable student development	1	2	3	4
B3.10	The e-assessment tasks promote copying and plagiarism	1	2	3	4

		Strongly disagree	Disagree	Agree	Strongly agree
B4. Time					
B4.1	The time allocation set for students to complete the individual e-assessment tasks was realistic	1	2	3	4
B4.2	E-assessment required less of my time to be involved in students' WIL assessment	1	2	3	4
		Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
B5. Students' thinking					
B5.1	The e-assessment tasks encouraged students to apply higher order thinking such as problem-solving, critical thinking, creativity	1	2	3	4
B5.2	The e-assessment tasks stimulated students to relate theory to practice	1	2	3	4
B5.3	The e-assessment tasks challenged students' decision making capabilities	1	2	3	4
B5.4	The e-assessment tasks encouraged students to reflect	1	2	3	4
B5.5	The e-assessment tasks forced the students to think independently	1	2	3	4
		Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
B6. The institution					
B6.1	E-assessment was well facilitated by the institution	1	2	3	4
B6.2	The processes and procedures of e-assessment were well supported by the institution	1	2	3	4
		Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
B7. Compliance					
B7.1	The e-assessment tasks were ***aligned*** with the academic expectations (outcomes) as set by the institution and the professional expectations as set by the profession	1	2	3	4
B7.2	The e-assessment tasks satisfied the criterion of ***reliability*** (the assessment tasks have the potential to arrive at the same judgements should the tasks be done in the same or similar contexts)	1	2	3	4
B7.3	The e-assessment tasks satisfied the criterion of ***validity*** (the assessment tasks measure what it is supposed to measure in terms of the appropriateness, usefulness and meaningfulness of the tasks)	1	2	3	4
B7.4	The e-assessment tasks satisfied the criterion of ***authenticity*** (the assessment tasks require students to execute real-life tasks that are relevant and worthwhile)	1	2	3	4
B7.5	The e-assessment tasks satisfied the criterion of ***discrimination*** (the assessment tasks distinguished between students who grasped the essence of the tasks and those who did not)	1	2	3	4
B7.6	The e-assessment tasks satisfied the criterion of ***accountability*** (the assessment tasks were credible and above suspicion)	1	2	3	4
B7.7	The e-assessment tasks satisfied the criterion of ***feasibility*** (the assessment tasks were easy-to-work-with and considered factors such as time and finances)	1	2	3	4
B7.8	The e-assessment tasks satisfied the criterion of ***fairness*** *(*the assessment tasks were reasonable in terms of time allocation and difficulty levels, and treated all students equally)	1	2	3	4

B7.9	The e-assessment tasks satisfied the criteria of ***generalizability*** and ***transferability*** (the assessment tasks allowed students to make clear connections with the workplace)	1	2	3	4
B7.10	The e-assessment tasks satisfied the criterion of ***balance*** (balance was obtained between lower and higher cognitive tasks and time allocation and task complexity)	1	2	3	4

SECTION C: ADDITIONAL INFORMATION

1. You are invited to include any additional information on your experiences of the implementation of e-assessment as component of WIL

Thank you very much for your time to complete this questionnaire. It is much appreciated.

APPENDIX J

Dear Research Participant,

The qualitative online questionnaire survey and face-to-face focus group interviews are aimed to gather data on your experiences of the implementation of e-assessment as component of Work Integrated Learning (WIL) in the Department of Chemical and Metallurgical Engineering of the TUT.

You are kindly requested to participate in this interview in a frank and open-minded manner by indicating your experiences of the implementation of e-assessment as component of Work Integrated Learning (WIL).

Although the interview will be recorded and transcribed verbatim to assist in the analysis of the data, your responses will be treated anonymously and confidentially and will be used for research purposes only in order to address the above-mentioned intention. Please be assured that the information obtained from the interview will be held in safekeeping for access and use by the undersigned only. The research results obtained through the interview will be reported on in the PhD study of the undersigned which is entitled: **The development and implementation of e-assessment as component of WIL: a case study**. Participating in the interview implies that you give consent that your responses may be used anonymously for the purposes as stated.

Should you have any queries regarding the questionnaire or the purpose of the research, please contact me at 012 382 0735 or e-mail: PienaarM1@tut.ac.za, or my supervisor, Prof BJJ Lombard at 016 910 3067 or email Kobus.Lombard@nwu.ac.za.

Thank you for your willingness to participate.

Mr Marius Pienaar

Interview questions

1. Please provide the following biographical information:
    a) In which academic year are you with your studies?
    b) What prompted you to enrol for a qualification in engineering?
2. Comment on the sufficiency of the overall e-assessment guidelines
3. Comment on the clarity of the instructions of the respective e-assessment tasks
4. Comment on the quality of the e-assessment process
5. Comment on the e-assessment tasks in terms of the following:
    a) Strengths
    b) Weaknesses
6. Comment on the time allocation for the respective e-assessment tasks
7. Complete the following sentences:
    a) “The e-assessment tasks helped me to …”
    b) “What I liked the most about the e-assessment tasks was…”
    c) “What I disliked the most about the e-assessment tasks was…”

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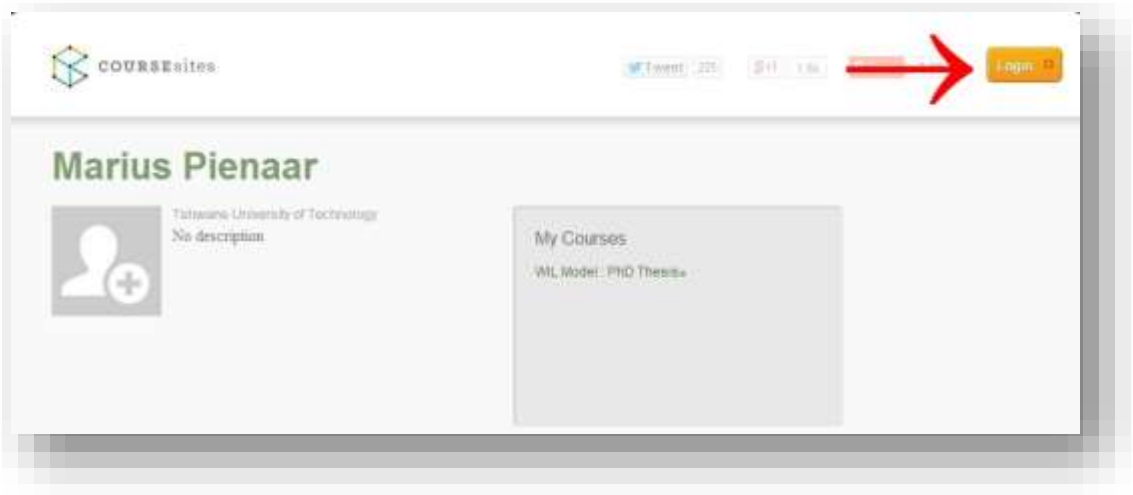
- 

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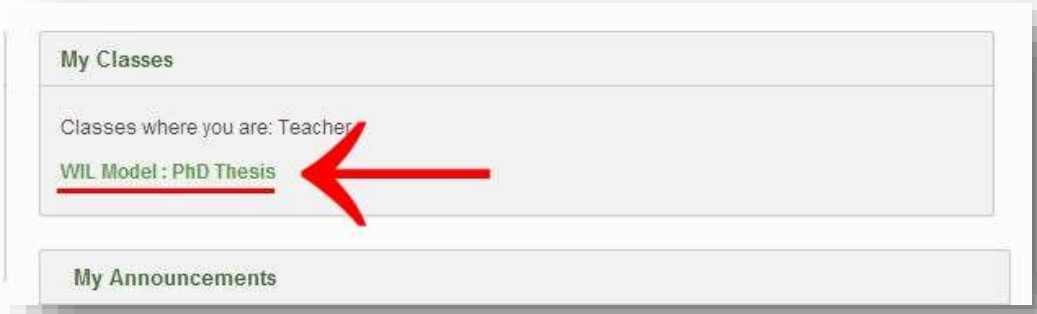
- 
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Classes where you are: Teacher
WIL Model : PhD Thesis
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WIL Model : PhD Thesis
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Course Organisation
WIL Coordinator
Course Communication (Home Page)
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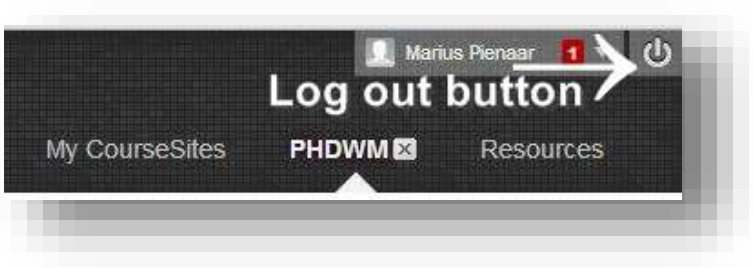
- 
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