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ASSESSMENT PRACTICES AND STUDENT LEARNING IN THE SCHOOL OF MECHANICAL, INDUSTRIAL AND AERONAUTICAL ENGINEERING:
A CASE STUDY AT THE UNIVERSITY OF THE WITWATERSRAND

Teresa Sharon Hattingh

A thesis submitted to the Faculty of Humanities, University of the Witwatersrand, in fulfilment of the requirements for the degree of Doctor of Philosophy.

Johannesburg, 2019

ABSTRACT

Assessment practices have the potential to influence the way students learn. Learning-oriented and student-centred assessment theories provide guidelines for improving assessment practices, but it is not well understood how the principles that underpin these theories are interpreted and used in an engineering context. This study explores students' and lecturers' assessment practices in an engineering school where student success rates are frequently lower than expected. The purpose of the study is to gain insights into the School's assessment practices and how these shape student approaches to learning. Data were collected using a student survey, ten lecturer interviews and four student focus groups. The findings are presented using descriptive statistics and descriptive narratives that provide a rich picture of the current state of assessment and learning in the School. The findings confirm that assessment practices determine the planning and prioritisation of study efforts, the content that is covered when studying and the learning strategies that students use. The intention of students when choosing learning strategies is strongly influenced by their perceptions of the assessment environment, with students often exhibiting surface approaches to learning. The purpose of assessment in the School is predominantly viewed as a means of determining student competence leading to practices that align with an assessment *of* learning paradigm. Due to a poorly developed teaching and learning culture in the School, there is a lack of a holistic approach which leads to misalignment between assessment, learning and degree outcomes. As a result, assessment practices are often teacher-centred, affecting communication of expectations, criteria and feedback, leaving little space for the development of students' self-evaluative expertise. The authenticity and relevance of the curriculum and a detached social environment in the School impacts on student engagement and motivation. Findings reveal interesting phenomena related to the constructive alignment of assessment methods specifically when shifting from more traditional to project-based learning assessment. Although this study has highlighted and confirmed many findings prevalent in the literature, it has also, through the richness of the perspectives and experiences of both lecturers and students, provided a unique perspective on the complexities of context that influence assessment practices. The study revealed that what students and lecturers want to achieve is not necessarily what is being achieved and that a more collaborative teaching and learning environment is required to shift learning in a more positive direction. It also emerged that in a South African context a more collectivist approach is needed when thinking about how students learn and adapt to environments to facilitate deeper approaches to learning. This is a significant finding that can influence teaching and learning practices to improve student access and success. This study provides valuable insights that can be used to transform assessment practices, providing a better structure for student success in the School and more broadly in other engineering higher education contexts.

Keywords

assessment for learning; constructive alignment; approaches to learning; assessment practices; student-centred learning, project-based learning.

DECLARATION

I declare that this thesis is my own unaided work. It is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

Teresa Sharon Hattingh
24 June 2019

PUBLICATIONS EMANATING FROM THIS RESEARCH

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For Joe

Chapter One

Worthless and Irrelevant?

An introduction

1.1 A personal narrative

I recently met Joe, a second-year, mechanical engineering student. However, for this discussion, Joe is rarely referred to by his name and is more commonly known as 23569. 23569, along with 261 other students, has just completed a second-year course in Thermodynamics, one of the first, real engineering subjects that he has ever been exposed to and a course that I was lecturing for the first time. 23569 was quite fortunate that in 2017, this course was overhauled quite significantly in an attempt to engage more students in deeper approaches to learning. The most significant changes in this course aimed to promote assessment for learning approaches and stronger constructive alignment between course outcomes, teaching practices and assessment. The contribution of the exam to the final mark was reduced from 70% to 55%, the test from 30% to 25% and two new assessment methods were introduced. The first was an open-ended poster which required students to present the application of basic thermodynamic principles to an everyday system of their choice. The poster encouraged creativity and required students to work in small groups - encouraging more social approaches to learning. The second was the introduction of weekly, online quizzes which reinforced concepts taught in class and encouraged students to think more broadly about ideas. Quizzes were discussed in class in the following week, flipping a section of the lecture sessions. Both the online quizzes and the poster contributed 10% towards the final course mark. The assumption was that the introduction of these new assessment tasks would deepen students' conceptual understanding in preparation for their test and exam.

23569 appeared to participate actively in the new class activities. He submitted a poster on the application of thermodynamic principles to an internal combustion engine and was awarded a top mark of 75% (relative to the class and typical for an engineering degree). He engaged in weekly online quizzes, attempting 7 of the 11 weekly quizzes,

and although learning is the primary purpose of these quizzes and low scores are not a good reflection of engagement or learning, he did appear to be keeping up with course material with an average performance of 91% on the quizzes which he completed. In the class test, 23569 performed poorly with a result of 21%. However, many students performed poorly in the test, and I encouraged students to learn from the experience as they adapted to the new approach of test questions which encouraged deeper, conceptual learning and focused less on questions requiring the routine application of method steps to solve analytical problems.

23569 obtained a final mark for the exam of 19.2%, the lowest mark in the class.

What happened to 23569?
Why, despite his apparent motivation and engagement in course activities did he fail so badly?
Did he fail us or did we fail him?
Who is 23569?

Despite many attempts to adopt theoretical best practice approaches to teaching and assessment, there appears to be a group of students that is not currently being catered for. I believe that we do not adequately understand all of our students and that adapting and changing assessment practices is unlikely to lead to the success that we are looking for until we do. We need to understand if some of our expectations and practices are more aligned to some students over others. In a South African context, amidst calls for transformation in higher education, understanding these students is even more critical.

This research adopts a lens that is aligned with assessment *for* learning (Sambell, McDowell & Montgomery, 2013) and learning-oriented assessment (Carless, 2007) and considers how assessment practices can be adapted or changed to motivate students, encourage deeper approaches to learning and activate students' full potential, ultimately leading to successful students and graduates. I believe that gaining a deeper understanding of the students in our classes is the first and most critical step in this process. Changes to assessment practices that are not informed by an understanding of students' interaction with assessments and are not analysed using a robust theoretical

framework can lead to scepticism of the value of innovations ultimately undermining opportunities for improvement.

I included this narrative at the beginning of my thesis to remind me why I decided to embark on this journey and to help me to stay focused as I navigated my way through this complicated and exciting project.

1.2 Background

Higher education in South Africa is experiencing high failure and dropout rates of students. While this is not a new phenomenon and high attrition rates of students have existed in South Africa for over 50 years (Malherbe, 1965), the situation is increasingly dire. A sector-wide study conducted by the Council on Higher Education (CHE) for all 2006 first-time, first-year intakes, shows that only 36% of students graduate in regulation time for four-year professional degrees and that there is a 39% attrition rate within these degrees by the end of the regulation time (CHE, 2013). Engineering degrees in the country are under particular pressure with completion rates in minimum time (four years) of only 23% and only 41% of students graduating within five years (CHE, 2013). When this study is compared against the only other sector-wide study, conducted in 2000 (Scott, Yeld & Hendry, 2007), it is found that student performance in some degrees has improved, while engineering is one of a few degrees where results have deteriorated over this period.

Although it is widely believed that the secondary schooling system in South Africa is not preparing students adequately for higher education, this is unlikely to change in the foreseeable future, and academic institutions have been urged to focus on factors that are in their control (CHE, 2013). Low success rates of students are a result of three factors: material factors (especially financial), affective factors (engagement) and academic factors. It is acknowledged that both material and affective factors play a significant role in student success, but that academic factors are currently the biggest obstacle to improving throughout rates (CHE, 2013). The report states that "…if the teaching and learning process is itself not effective or geared to facilitate positive learning, it cannot be compensated for by interventions that focus on addressing affective or material factors" (p 57). This is supported by Tinto (2006) who, through years of international studies on student retention, notes three areas that have the highest impact on student persistence and graduation - individual student characteristics, academic factors (including student contact or involvement) and social systems. The importance of the faculty is singled out as critical to improving student retention considering the use of varying curricular, pedagogy, grading and assessment practices.

In the midst of challenges associated with high failure and dropout rates, universities are experiencing both increasing student numbers and decreasing teaching capacity. University enrolments in South Africa have increased by 80% since 1994 (CHE, 2013), institutions are often under-staffed and are experiencing increasing challenges around how to fund higher education while academics face consistent pressure to improve research outputs (Badat, 2010). Students who fail and need to repeat subjects intensify this pressure by increasing the demands placed on academics as courses are done more than once, increasing class numbers even further. This phenomenon results in significant additional costs for academic institutions (Gouws & Wolmarans, 2002) and although the higher education funding model has changed slightly since this study was done (Ministry of Education, 2004), the overall impact on funding and costs remains significant. The phenomenon of capacity and funding constraints is not specific to South Africa with similar situations reported in both the UK and USA (Gibbs, 2006). In the UK, reduced funding, the pressure to increase research productivity and increasing student numbers have led to lower overall academic time available per student.

As student numbers increase, the total time spent on marking and feedback, in particular, increases proportionally. This phenomenon can result in academics spending much more of their time on assessment processes than on teaching (Gibbs, 2006). This causes assessment costs to rise at a much higher rate than teaching costs, placing increased pressure on the time that can be dedicated to assessment. As a consequence, large student numbers often influence the choice of assessment method that is used and inevitably, less assessment takes place with reduced or lower quality feedback being provided. In extreme cases, courses may be implemented with no assignments, no written feedback or feedback that is only provided after exams are written (Biggs, 1999).

It has been shown that assessment practices are fundamentally linked to how students approach their learning (Prosser & Trigwell, 1999) and qualitative changes in student approaches to learning has been shown to result in qualitative differences in the achievement of outcomes (Marton & Saljö, 1997). Therefore, if students are to succeed, assessment cannot be compromised under pressurised conditions. Carless (2015b) argues that assessment should be "learning-oriented" to support student

learning. Key aspects of learning-oriented assessment include the careful design of assessment tasks, the importance of feedback and facilitating the development of students as independent learners. It is clear that the shifts in teaching and assessment that occur under constrained conditions will have a significant impact on the ability of students to succeed, and are particularly likely to disadvantage weaker or marginalised students who require higher levels of feedback as they develop their learning skills and refine their approaches.

1.3 The context of this study

This study takes place in the School of Mechanical, Industrial and Aeronautical Engineering at the University of the Witwatersrand based in Johannesburg, South Africa (the School). The School has been suffering from very high student failure rates. Less than 8% of students complete the degree in the minimum time while over 60% of students drop out and never graduate (School of Mechanical, Industrial and Aeronautical Engineering, 2017). These failure and dropout rates are not confined to first-year students but occur in all four years of study suggesting that the transition from school to university is not the core reason for the lack of student success and that other academic factors are playing a significant role.

Poor student performance in the School is compounded by a significant increase in student intake over the past ten years with the total number of students having increased by 21% since 2012 (School of Mechanical, Industrial and Aeronautical Engineering, 2017). The School is also resource constrained and subject to both internal and external pressures including requirements to increase research output. All of these characteristics result in a system with increasing demand and decreasing capacity that is likely to affect the quality of assessment practices and experiences in the School.

1.4 Purpose of this study

Constraints in the higher education system can result in compromises in pedagogical alignment that can negatively affect student learning. Increasing student numbers and decreasing teaching capacity can drive assessment practices, in particular, further away from a learning-oriented paradigm. As more students fail, the impact of capacity

constraints on the system becomes more significant, and assessment practices are more likely to move in a direction that does not enhance learning. It is easy to see how this cycle can result in a deterioration of student performance over time. Ultimately, do students, like Joe, *feel worthless in this system, questioning the relevance* of what they are studying? If assessment practices and the quality of students' approaches to learning are to improve sustainably, a thorough understanding of what influences assessment decisions and how students perceive these practices is required (Prosser & Trigwell, 1999).

The purpose of this study, therefore, is to gain insights into how assessments are currently designed, used and experienced in the School considering the views of both lecturers and students. This study positions assessment practices in the School using assessment *for* learning (Sambell et al., 2013) and learning-oriented assessment (Carless, 2015b) thinking and reflects critically on how these practices are shaping student learning. The overall aim is to facilitate a broader conversation on the use of assessment in engineering contexts, providing input that could be used to design practices that enable improved student learning and ultimately higher levels of engagement and success.

1.5 Research Questions and objectives

The central research questions for this study are:

How do students currently interact with assessment practices in the School of Mechanical, Industrial and Aeronautical engineering at the University of the Witwatersrand?
and,
How might current assessment practices be transformed to improve the quality of student learning in the School?

The research question will be addressed through the following **sub-questions**:

1. What are students' current learning practices and how are these shaped by assessment practices in the School?

2. How are assessments currently designed and used in the School and how can these be framed in relation to assessment *for* learning literature?
3. Considering the perspectives of students and the current practices in the School, as revealed by 1 and 2, how do assessment practices in the School shape student learning?
4. How could assessment practices in the School be re-designed to promote improved levels of student learning?

The sub-questions lead to the following objectives:

1. To investigate students' current learning practices and how these are shaped by assessment practices in the School
2. To investigate how assessments are currently designed and used in the School and how these are positioned in relation to assessment theory
3. To integrate the findings from objectives 1 and 2 as a means of understanding and investigating the overall effectiveness of assessment practices on student learning in the School
4. On the basis of the findings from objective 3, make recommendations on how assessment practices in the School can be changed to promote more effective student learning.

1.6 Scope, assumptions and limitations

The scope of this study will be limited to students in the School of Mechanical, Industrial and Aeronautical Engineering at the University of the Witwatersrand, focusing specifically on students in their second, third and fourth (final) years of study.

Although it is acknowledged that assessment cannot exist in isolation from the curriculum and teaching practices, this study has been narrowed in scope to look specifically at how assessment can be adapted to improve student learning. The study will, however, consider how teaching practices influence and inform assessment processes and relevant recommendations will be made where appropriate. The close relationship between the curriculum and assessment practices is also acknowledged

specifically in creating contextual relevance through the use of authentic assessment techniques.

Due to the framing of the research question, a limitation of the research is that assumptions are already made regarding the relationship between assessment and student learning. Although this assumption is well supported by the literature, the study inherently eliminates other external and structural factors from the discussion. This is an inherent limitation of interpretive approaches (Cohen, Manion & Morrison, 2011).

Because a case study approach is used, the extent to which findings can be generalised to a broader population is limited (Thomas & Myers, 2015). However, case studies can describe and interpret instances that can be used in the broader understanding of phenomena to reinforce or challenge existing generalisations (Stake, 2007 as cited in Merriam, 2009). The neutrality of the study or confirmability and opportunities for generalizability or transferability (Merriam, 2009; Lincoln & Guba, 1985) are well-understood constructs that are addressed using a variety of techniques and approaches and are discussed further in Chapter 3. Sensitivity to reliability and validity (Cohen, Manion and Morrison, 2011; Cresswell, 2012) or trustworthiness and credibility (Lincoln and Guba, 1985) are also discussed further in Chapter 3.

1.7 The organisation of the thesis

The remainder of this thesis is structured as follows:

> Chapter 2 includes a literature review that discusses thinking around assessment and student learning, introducing the framework of theoretical concepts that guide this study.
>
> Chapter 3 introduces the overall research approach for the study and presents a detailed account of the methods for data collection, analysis and interpretation.

For the findings of this study, I decided to present the findings in the thesis in the same manner in which I experienced them as a researcher. My exploration of the assessment practices in the School unfolded like an intricately folded origami bird as findings from

each phase of the study influenced subsequent stages. The findings emerged organically as I gained deeper insights into the many features of this very alive and evolving assessment system. The findings are therefore presented as a narrative, taking the reader on the same journey that I encountered. I trust that you will enjoy the experience as much as I did.

Chapter 4 presents a discussion of the findings of a student survey that was conducted to understand students' experiences of assessment practices in the School.

Chapter 5 presents the observations, findings and a discussion of lecturer interviews conducted to understand current assessment practices in the School.

Chapter 6 presents the observations, findings and a discussion of student focus groups conducted to provide a richer understanding of student experiences of assessment practices.

Chapter 7 discusses the insights from all three phases of the data collection process, elaborating on the relationships between themes that emerged throughout the study. Recommendations to improve the current assessment practices in the School are then provided.

Chapter 8 presents conclusions of the study, highlighting key features that provide broader insights into assessment practices in an engineering context and concludes by offering recommendations for future work.

The headings for the chapters of this thesis have been carefully chosen. I have named each chapter after a portion of a quote that captured the essence of this study. The pieces of the quote will unfold as the thesis is presented culminating with the presentation of the full quote in Chapter 7.

Chapter Two

Traditional teacher centred and syllabus centred methods…

A Review of the Literature

Exploring the relationship between student approaches to learning and assessment practices requires reflection on both topics. This literature review includes a discussion of student learning approaches followed by a broad exploration of assessment practices in higher education.

2.1 Role of assessment

There is an international trend towards student-centred learning in higher education which recognises that students need to be more actively engaged in the learning process to construct their understanding (Gibbs, 1995; Fry, Ketteridge & Marshall, 2009). The implementation of student-focused teaching and learning, however, is a global challenge and assessment is considered to be central in facilitating this shift (el-Maaddawy, 2017).

Assessment is one of the most powerful tools that lecturers have to shape the way that students learn and is often seen as more influential than teaching in affecting the actions and approaches of students (Boud, 2007). Assessment sends messages to students about what is being valued in their learning context resulting in "the backwash effect" (Biggs & Tang, 2011). This leads to the notion of the "hidden curriculum" (Sambell & McDowell, 1998) which is one of the best ways to describe the effect that assessment can have on student learning. The hidden curriculum suggests that it is what students *view* as important through their assessment lens that will influence what they do and how they do it. The approaches that assessment drive may not always be useful or effective with some assessment tasks inadvertently inciting less desirable learning strategies (Ramsden, 1979). The challenge for lecturers, therefore, lies in ensuring that what students are seeing and doing, as a result of the influence of assessment practices,

aligns with the intended learning outcomes or what lecturers want the students to be doing and achieving.

2.2 Student approaches to learning

Student learning approaches are typically classified as either deep or surface approaches (Marton & Saljö, 1984). When students use deep approaches, they aim to seek meaning by understanding ideas (Prosser & Trigwell, 1999). Deep approaches are accompanied by a sense of curiosity and actions that require students to critically analyse and evaluate content and concepts, looking for patterns and considering how ideas can be integrated and related to other knowledge and experiences (Prosser & Trigwell, 1999; Entwistle, McCune & Walker, 2001). In contrast, students who exhibit surface approaches see tasks as separate activities that are not necessarily related to gaining an understanding of the underlying content (Prosser & Trigwell. 1999). These students favour strategies that involve the least amount of effort typically characterised by rote learning strategies that do not attempt to relate ideas to other knowledge or contexts (Prosser & Trigwell. 1999). These students also study without reflecting on the purpose and as a result, see little value or meaning in the process (Entwistle, McCune & Walker, 2001).

To appreciate why students exhibit particular approaches in specific learning contexts, it is salient to consider what influences or drives students to exhibit such behaviours. Approaches to learning have two characteristics, the intent or reasoning behind the approach and the strategy that is ultimately used (Entwistle, 1991). If students believe that they need to engage deeply with course material for a particular assessment task they will, but if they believe that they can do well without engaging, some students may choose to adopt surface or rote learning strategies (Bloxham & Boyd, 2007). Students' approaches to learning are therefore influenced by their learning context, but it is their perception of this context that ultimately determines the learning strategies that they adopt (Entwistle, 1987). Students who use an achieving approach (Biggs & Telfer, 1987), driven by a desire to succeed, will adapt or reflectively organise (Entwistle, McCune & Walker, 2001) their choice of approach (deep or surface), depending on what they believe will result in higher overall grades. When understanding student approaches to learning it is therefore vital to understand not only the approach that

students are using but their intent when using a particular approach (Chalmers & Fuller, 1996).

Deep and surface approaches may manifest in slightly different ways depending on the curriculum and context. Case and Marshall (2004) have expanded the traditional deep and surface approaches for an engineering context. They distinguish between deep and surface *procedural* approaches for many engineering problems where the former leads towards conceptual understanding while the latter does not. Considering deep and surface approaches for mathematical or problem-solving contexts is essential for a study in engineering since many of the assessments currently used in the School are mathematical and problem-based. Crawford, Gordon, Nicholas and Prosser (1994) have developed a set of categories of studying for mathematical-type problems. For these categories, the distinction between approaches to learning again lies in the *intention* (Entwistle, 1991) of using a particular strategy. The more surface approaches include rote memorisation and working through lots of examples with the *intention* to reproduce knowledge and procedures. Deeper engagement with material is exhibited by working through lots of examples, sometimes more difficult, with the *intention* of gaining an understanding of how theory and concepts relate to each other or even exploring relationships with the entire body of theory and other existing knowledge. The deepest approaches to learning are exhibited when the *intention* is to understand relationships and consider how theory can apply more broadly (Crawford et al., 1994). These levels of learning have a strong correlation with the five structural levels of learning defined by Biggs who describes the importance of moving from an understanding of independent ideas (multi-structural) to the ability to integrate ideas into a broader structure (relational) and ultimately the ability to generalise expertise to new domains (extended abstract) (Biggs, 1991).

Student approaches to learning can, therefore, be influenced by workload, the flexibility of learning tasks, clarity of learning goals, quality of teaching, the kind of assessments that are used (Ramsden, 1979) and access to appropriate learning resources (Crooks, 1988). Case and Gunstone (2002) conducted a study that specifically adapted the design of a second year, engineering course at a South African university to promote deeper (more conceptual) approaches to learning. They showed that promoting a shift from surface to deep approaches to learning is not easy to achieve and that several

factors affect this transition including teaching practices, the use of aligned assessment tasks, removal of time pressures in assessment and the overall workload of students in the degree programme. This shows the importance of the different elements of an assessment system in influencing the ways that students learn.

Approaches to learning also need to consider the disciplinary context. Different disciplines are often associated with different ways of thinking and practising (Entwistle, 2009), evoking the need for different approaches to address different tasks (Ramsden, 2003). Engineering, in particular, requires crucial transitions in learning strategy throughout the degree as the "engineering identity" is shaped (CHE report, 2013). These transitions include shifts from basic science to engineering science, to complex problems and finally integrated design and research. These transitions naturally require particular dispositions and abilities that need to be developed. Experimentation with learning approaches should, therefore, be informed by critical self-reflection as students navigate from one way of thinking to another (Oehlers, 2005).

While many authors discuss student approaches to learning and how these are shaped by assessments and different academic contexts, there has been some criticism over these sometimes narrow views of student learning. Mann (2001) argues that student approaches to learning can simultaneously be affected by whether students feel alienated in a particular academic context leading to student disengagement from the academic process because of material and social conditions. It is believed that this sense of disengagement can also result in the adoption of surface learning strategies. Mann discusses several reasons that can cause student alienation including whether the nature of assessment as a process results in students feeling alienated and the extent to which the work that is undertaken as part of assessments tasks results in alienation. Many students choose engineering as a profession, with specific ideas and desires around how they believe that the degree will enable them to function as a part of their society (Case, 2013). If there are practices in the curriculum and assessment processes that do not align with these desires, there is a strong possibility that levels of alienation and hence disengagement from learning could occur.

It is therefore critical to understanding student approaches to learning when designing and evaluating the curriculum, teaching methods and assessment practices. It is vital to understand how assessment can motivate students to adopt different learning approaches so that strategies can be put in place to encourage students to gravitate towards desired learning approaches. Due to the critical and complex role that assessment plays in influencing students and the strength that this influence has on student learning, understanding the assessment landscape is key to unlocking the challenges associated with moving to more student-centred learning.

2.3 An overview of assessment

There has been much engagement in literature with the purpose of assessment and how this is viewed within the context of student learning. Summative assessment is traditionally viewed as assessing if students have met the required grade or intended learning outcomes (Chalmers & Fuller, 1996), making formal decisions about progress and level of achievement (Fry et al., 2009). Summative assessment is therefore typically seen as the mechanism of providing access to other areas of the education system or the working world (Sambell et al., 2013). The need for summative assessment is often justified by the requirements of accreditation bodies that insist on seeing evidence of how prescribed exit level outcomes are assessed (Rossiter, 2013). Despite this, summative assessment is often criticised for its limited capacity to assess different learning outcomes such as higher order thinking skills (Green & Rollnick, 2007), reasoning and creativity (Knight, 2006).

In contrast, formative assessment is traditionally viewed as informal and occurring within the teaching process (Fry et al., 2009). The purpose of formative assessment is framed as improving student learning where the tackling of the assessment task *itself* is the learning experience (Scott & Fortune, 2013). As a result, feedback is seen as an inseparable component of formative assessment since it is through feedback that students can understand where they are and what they need to improve (Sambell et al., 2013).

Improved student learning is generally supported by a move away from predominantly summative assessment practices to practices that incorporate more formative

assessment that engages students in assessment and feedback activities (Anderson, 1998 & Sambell et al., 2013). Formative assessment can, however, present its own challenges. Formative assessment can require more lecturer time when compared to summative assessment (Chalmers & Fuller, 1996) and many students do not engage fully with formative assessments (Rossiter, 2013), particularly if tasks are not for marks (Ramsden, 1992).

Traditional thinking claims that formative and summative assessment are quite distinct, implying that formative assessment supports student learning (assessment *for* learning) and summative assessment does not (assessment *of* learning). However, it has been argued that in some cases formative and summative assessment can be indistinguishable (Sambell et al., 2013) and that informal tasks (traditionally seen as formative) can be summated to provide input into final (summative) results and that results from a summative assessment task can be formative by providing feedback on learning (Fry et al., 2009). This perspective shakes up the traditional view implying that both summative and formative assessments can be used *of* and *for learning*.

Due to the obvious difficulties in classifying assessment as either formative or summative, thinking has evolved into perspectives that view assessment more holistically and consider the influence that assessment can have on student learning. Assessment is becoming more *learning-oriented* (Carless, 2007), focusing on assessment that stimulates and facilitates student learning. This *learning-oriented* approach can incorporate both formative and summative assessment if the tasks encourage high levels of cognitive engagement over an extended period of time, stimulating deeper approaches to learning (Carless, 2015a).

In learning-oriented assessment it is also crucial for the agency to shift towards the student, moving from a lecture-driven or teacher-centred learning environment to one where the students themselves play an active role and take responsibility for their own learning. Often, students are more focused on the time that they need to allocate to assessment tasks (Scott & Fortune, 2013) and are preoccupied with marks and passing an assessment over learning (Bloxham & Boyd, 2007). It is these types of challenges that student or learning-oriented assessment needs to address so that assessment

practices not only encourage student engagement and learning but more importantly that they do not drive approaches that do not lead to learning.

It is argued that the shifts towards more student-centred (Gibbs, 1995) and learning-oriented assessment need to be deliberately planned and designed making use of intentional strategies. Ultimately, learning-oriented assessment needs to inspire students to become a part of the curriculum (Ritchie, 2016), motivating students to engage in the processes of assessment and learning (Carless, 2015a). Assessment should also contribute not only to learning that occurs while studying but to learning beyond the timescale of the particular course or degree, referred to as "sustainable assessment" (Boud & Soler, 2016). This compels assessment tasks to consider not only the current needs of students but also their future learning needs. An important element of sustainable assessment is the incorporation of "authentic assessment" tasks (Carless, 2015a) that enable students to experience disciplinary ways of thinking and practising (McCune & Hounsell, 2005) through engagement with problems that represent real-life problems. In conclusion, it is evident that learning-oriented assessment necessitates a purposeful shift away from assessment *of* learning to assessment *for* learning (Sambell et al., 2013).

2.4 Influence of external factors on assessment practices

Several external factors can play a significant role in complicating the learning and assessment environment. An awareness of these factors is vital as they can support learning-oriented approaches or create barriers or conflict that may result in compromises or the need for alternate strategies.

Accrediting bodies influence assessment practices, requiring evidence to show that students have developed the ability to apply engineering skills and knowledge to new and complex problems (Rossiter, 2013). This level of influence from engineering bodies has been increasing internationally (Musekamp & Pearce, 2015), often impacting on assessment practices. Furthermore, there is a perception globally that although engineers are seen as having adequate knowledge, they do not necessarily have the appropriate professional skills and struggle to apply knowledge in the workplace. This is believed to occur because higher education institutions are often too

content-focused (Mills & Treagust, 2003). As a result, accreditation bodies are shifting their focus away from what is being taught, declarative knowledge (Biggs, 1999), to what students are learning (Mills & Treagust, 2003) naturally supporting more learning-oriented approaches.

Current assessment practices in South Africa are strongly influenced by the accreditation requirements of the Engineering Council of South Africa (ECSA), through the Washington accord. These requirements appear to have introduced a level of rigour into assessment practices with the focus on determining individual competence in a variety of technical and professional skills. These requirements are not unlike the ABET (Accreditation Board for Engineering and Technology) standards in the US that require engineers to be deemed competent in "hard" engineering and professional skills. Four of the professional skills are process skills which include communication, teamwork and professional and ethical responsibilities. The effective and efficient assessment of these skills is currently a global challenge. Interestingly, ABET also requires engineering graduates to be competent in an additional two awareness skills, impact on global and societal context and knowledge of contemporary issues (Shuman, Besterfield-Sacre & McGourty, 2005). It is acknowledged that content knowledge does not come close to establishing competence for these skills and there is currently much debate around how to meet these requirements (Shuman et al., 2005). ABET has a significant influence on the requirements of the Washington Accord suggesting that it is likely that these requirements will at some point influence accreditation requirements for South African engineering degrees. This suggests that thinking about assessment practices is likely to become even more challenged once aspects such as these become a requirement for the accreditation of the School's degrees.

Accrediting bodies are not the only external factor that influences assessment decisions. Higher education in South Africa is in a state of transition which also influences the current context. Assessment has been known to result in conflict or power struggles between students and lecturers (Knight, 2002). When lecturers feel pressured to avoid conflict with students, this can lead to assessment and teaching practices that overly prepare students for particular questions and assessment methods. Students often see these practices as "good" assessment as they do not fully understand or appreciate the

importance and value of developing higher-level learning skills (Rossiter, 2013). The current tensions around higher education in South Africa related to the cost of education, throughput rates and the relevance of the curriculum could also sway lecturers to adopt practices that reduce this conflict.

Both of these external factors create an additional layer of requirements and considerations that influence lecturers' choices when they design and implement assessments.

2.5 Integrating assessment into the curriculum

The move away from a content-focused curriculum, encouraged by accreditation bodies, is not unique to engineering (Smith & Lovat, 2003). Bransford, Brown and Cocking (2000) suggest that a superficial coverage of a broad range of topics is an ineffective way to prepare students for the working world and that "content is getting in the way of everything else". There is often insufficient time in curricula to allow for students to cover material in sufficient depth and as a result, students do not have time to organise ideas and concepts so that they can be retrieved and applied when needed (Middendorf & Pace, 2004). Curricula that are content-centred are also likely to neglect other skills, particularly metacognitive skills (Bransford et al., 2000) and the characteristics or dispositions and qualities that need to be acquired to become an engineer (Barnett, 2009). When teaching and assessment practices are focused on content, it is possible to develop the "wrong" types of qualities in students if there is not careful alignment between the desired qualities and those that are encouraged and reinforced through these practices (Barnett, 2009). This need for a balance, therefore, requires careful reflection on the desired aims of any curriculum.

To avoid these pitfalls, it is recommended that curricula focus on the broader purpose of facilitating student learning (Fry et al., 2009). Barnett (2009) describes the curriculum as, "an educational vehicle to promote a student's development" which naturally shifts attention away from content or knowledge alone. Teaching, assessment and most importantly, learning are therefore inseparable components of a learning-centred curriculum (Fry et al., 2009).

2.6 Outcomes

As discussed briefly in the previous section, aligning assessments with the overall purpose or requirements of a course is a critical consideration. This warrants a brief look at the concept of learning outcomes and how they should influence the design of assessment tasks.

Objectives are often used to describe learning outcomes as these need to frame both the content that is to be learned as well as what is to be done with this content (Krathwohl, 2002). Biggs and Tang (2011) prefer the use of the phrase intended learning outcomes because objectives are typically phrased as an action for lecturers whereas intended learning outcomes focus more on the learning that the student is required to demonstrate. In any case, there needs to be strong and clear constructive alignment (Biggs, 2014) between learning outcomes, teaching through learning activities and assessment tasks.

The original conception of a hierarchy of learning outcomes was introduced by Bloom (1971) and is commonly known as Bloom's Taxonomy. The model was revised by Anderson et al. in 2001 (Krathwohl, 2002) to include six categories of cognitive learning processes. Although the model was originally designed as a sequence of hierarchical learning processes, the revised model acknowledges a degree of overlap between the six categories. The categories are ordered from simple to complex and concrete to abstract. The revised taxonomy includes a taxonomy table that includes a further knowledge dimension. Learning outcomes can be placed in the taxonomy table aligning both the required cognitive processing skills and level of required knowledge. The revised Bloom's Taxonomy is a useful and generic tool for designing and aligning courses and assessments.

The knowledge dimension of the revised Bloom's taxonomy considers four different types of knowledge: factual, conceptual, procedural and metacognitive. In an engineering environment assessment typically focuses on the aspect of procedural knowledge through the use of problem-based, mathematical-type questions. This procedural knowledge can exist at many cognitive levels from remembering alone through to evaluation and creation (Case & Marshall, 2004). The extent to which

conceptual knowledge is explored at higher cognitive levels is an important area to explore when designing assessments since a solid understanding of conceptual knowledge is not necessarily a pre-requisite for applying procedural knowledge (Case & Marshall, 2004; Crawford et al., 1994). In addition, higher-order thinking is not only about understanding the knowledge but also about knowing under what conditions that knowledge applies referred to as "conditionalized knowledge" (Bransford et al., 2000).

The fourth knowledge dimension of the revised Bloom's taxonomy, metacognitive knowledge, is critically important (Bransford et al., 2000), and is a skill that is not easily developed or evaluated in summative assessment. Metacognitive knowledge explores how students understand and think about their understanding of knowledge. The extent to which students use this skill to understand and improve their knowledge in the different cognitive domains is an important area to consider. If students are adopting strategic approaches to learning, this metacognitive knowledge, if driven by the wrong intentions, can lead to approaches to learning that are neither deep nor linked to the intended learning and professional outcomes.

In higher education, the intended outcomes of a curriculum should be positioned towards the higher levels of Bloom's learning behaviours namely analysing, synthesising, evaluating and creating (Middendorf & Pace, 2004). However, when lecturers do attempt to shift student behaviours to higher levels, energy should be spent on motivating a change in how *students are learning* and not only on changing teaching methods and the application of different pedagogical techniques (Middendorf & Pace, 2004). The notion of higher-order thinking is also complex and having the ability to do something does not guarantee the disposition to use this ability to ensure consistent performance (Tishman, Jay & Perkins, 1993). Thinking is a skill, and as such, the disposition to think also needs to be valued and developed in students.

The most widely used alternative to Bloom's Taxonomy is the Structure of the Observed Learning Outcome or SOLO taxonomy (Biggs & Collis, 1982). The SOLO taxonomy identifies five different levels of understanding aligned to the development of learning as it increases in complexity from lower levels of understanding a single concept (uni-structural) to higher levels where multiple, independent concepts can be integrated into a structure and generalised to new domains (extended abstract). It is

context dependent and can be adapted to suit unique situations. These features serve a dual purpose as it can be used to formulate assessment tasks and determine the level of student performance when responding to these tasks. The taxonomy can also be used to set up learning outcomes, to guide the detailed analysis and design of assessment practices and is particularly useful for the design of feedback tools such as rubrics (Mentkowski, 2006).

While these different taxonomies of learning can be used to guide and evaluate different assessment tasks and the extent to which they align with learning outcomes, at a macro level, there is some debate on the methods of assessments that can and perhaps should be used to assess different learning outcomes. Green and Rollnick (2007) argue that summative assessment types typically evaluate content knowledge and cannot be used to test higher-order thinking skills. While Carless (2015a) disagrees with this thinking, Knight (2006) presents a convincing case that reasoning and creativity are difficult to measure using *high-stakes* assessment, a term typically used to describe tests and examinations that are time constrained and count *significantly* towards determining whether a student passes or fails.

When considering the learning outcomes for any curriculum, it is important to focus not only on the product or output of the learning process but also on the learning process itself (Gibbs, 1995). When designing assessment tasks, lecturers need to reflect on the processes that the students need to go through to acquire an understanding of the relevant content and to develop the necessary qualities and skills. This requires lectures to broaden the emphasis to the entire process of learning, considering the important differences between thinking and learning in novices (the students) and experts (the lecturers themselves) (Bransford et al., 2000). These thoughts are important as they provide a foundation for understanding how lecturers and learners understand and approach problems, which has implications for teaching as well as assessment. It also provides thoughts on how to unlock learner potential by developing thinking from a novice approach to approaches used by experts. Middendorf and Pace (2004) provide a useful illustration, “decoding the discipline”, that guides lecturers to use expert practices and the identification of bottleneck or threshold concepts to assist students in overcoming obstacles that prevent them from achieving learning outcomes. Their thinking suggests that by identifying and addressing these bottleneck concepts, learning

can be improved. A large part of the process involves making use of experts to identify these bottleneck concepts and articulate how these concepts are overcome. These steps then need to be developed in students through carefully designed teaching and learning activities, assessment tasks and feedback processes. Assessments, therefore, need to be viewed through a lens that considers the different approaches used by novices and experts and the extent to which they enable students to overcome bottleneck concepts.

While the importance of learning outcomes and associated criteria are undeniable, there is some criticism of approaches that obsess over criteria potentially at the expense of learning, leading to what is referred to as convergent assessment types (Torrance, 2007). Convergent assessments focus on monitoring whether students have met the objectives for a particular curriculum without considering what else it is that the student is learning and achieving (Torrance, 2007). It is proposed that assessment should also include divergent elements that are oriented towards creating opportunities for students to be assessed on what they can do in more open-ended or exploratory contexts (Torrance, 2007). Divergent assessments are also more likely to provide opportunities where students can learn both inside and outside the classroom (Ritchie, 2016) leading to assessments that are both more authentic (Wiggins, 2011) and sustainable (Boud & Soler, 2016).

Bringing these ideas together, it is clear that assessments form a critical part of the learning process. The use of assessments is a careful art that needs to consider how best to enable students to learn and to determine if they have met the required outcomes. Outcomes themselves are complex, considering the acquisition and application of knowledge as well as metacognitive skills. It is obvious then that the choice of any assessment needs to be selected in a way that facilitates an appropriate learning journey for every student. Also, student engagement with assessment tasks should not only be about the time spent on the task but should also be about the quality of engagement and the learning that is taking place (Knight, 2002).

2.7 Self-evaluation and student agency

One of the most important learning outcomes for any higher degree is the ability of students to take responsibility for their learning (Rossiter, 2013). As practices move

from assessment *of* learning to assessment *for* learning, students need to become more actively involved in the assessment process and develop metacognitive skills so that they can understand and practice their ability to predict their performance on assessment tasks (Bransford et al., 2000). They also need to be conscious of their dispositions, how these manifest in qualities and what role they play in the process of becoming an engineer (Barnett, 2009). This development leads to students acquiring the ability to self-assess (Andrade & Valtcheva, 2009) enabling them to take ownership of their learning.

A learning-oriented change in assessment practices should, therefore, recognise that students need to be developed into self-regulated and self-evaluative learners (Scott & Fortune, 2013). More than ever, this requires constructive alignment between learning outcomes, teaching and learning activities, assessment tasks and the criteria that are used to evaluate these (Biggs, 2014). Expectations of students should be transparent, clear, consistent and high (Rossiter, 2013) so that students have an outcome that they can aim for and can plan their work accordingly (Gibbs, 1995).

Feedback is often seen as the link between assessment and student learning and the vehicle that facilitates the development of self-evaluative skills (Sadler, 1989; Carless, 2015a). Feedback is a condition for students to succeed as it enables students to assess their skills and monitor their progress (Angelo & Cross, 1993) supporting more self-regulated learning as students move from reactive to proactive learning approaches (Nicol & MacFarlane-Dick, 2006). As part of the self-evaluation process, students need to understand the gap between the standard that is being aimed for and their current performance (Sadler, 1989) and, as a consequence, feedback should always be aligned with the overall purpose (Nicol & MacFarlane-Dick, 2006) of the assessment tasks and the intended learning outcomes. Carless (2015b) highlights the usefulness of exemplars in enabling students to understand the concept of quality through making judgments about the work of others while drawing implications for their work, ultimately developing self-evaluative expertise.

Although feedback is important, it is ultimately the students' engagement with feedback that results in improved learning (Snyder, 1971). Some students are reflective when approaching feedback, but many students are more mechanistic (Scott & Fortune,

2013). Learning takes place when students are actively involved in the learning process and not merely partaking in passive repetition. Students also need to become accustomed to receiving feedback, making judgements and generating constructive feedback for their work or the work of others (Gibbs, 1995). Feedback should, therefore, be frequent enough to provide enough support but not too often to promote surface learning (Chalmers & Fuller, 1996).

Feedback also needs to move beyond telling students *what* needs to be improved, "the diagnostic element" to *how* the learner can develop to improve, "the bridging-the-gap element" (Boud & Molloy, 2013). Boud and Molloy (2013) claim that what students need to improve is often less related to content and more related to skills and behaviours and that feedback needs to provide opportunities for students to expand these. They argue further that feedback needs to be used to grow students so that they seek out feedback and start to trust their self-evaluative expertise ultimately developing the capacity to function in an environment where they will no longer be exposed to structured assessment and feedback processes.

Due to the importance of feedback in developing students' self-evaluative expertise and the close alignment between outcomes and assessment tasks, feedback is not something that can be tacked on at the end of assessment processes. Feedback considerations need to start with the design of a particular course or even the degree programme, considering key learning outcomes, filtering into task design and sequencing and ending with monitoring of how performance improves after feedback in subsequent tasks (Boud & Molloy, 2013).

There is, however, a risk that students can become over-dependent on this structured assessment environment, relying on tutors and feedback and allowing criteria compliance to replace learning (Torrance, 2007). Torrance (2007) refers to this as moving from assessment *of* learning through assessment *for* learning to assessment *as* learning where assessment *as* learning suggests that assessment loses its ability to encourage learning and the learning becomes dependent on the assessments and cannot occur effectively without them. An obsession with the criteria used to evaluate assessments and provide feedback can end up being more about the product or end-point of the learning process and less about the learning process itself. If this happens,

the potential for improving the student can be lost (Knight, 2002). This also has strong consequences for the lifelong learning skills of the student.

A critical aspect of the assessment *for* learning approach is empowering students to be self-evaluative while still promoting learning autonomy (Torrance, 2007). As with any teaching and learning philosophy, there is the possibility that aspects can be implemented without understanding the overall purpose. The potential to move exclusively into an assessment *as* learning (Torrance, 2007) mode is high if student agency in the process is not carefully considered. The balance of agency in a learning environment is delicate which Ritchie (2016) describes as the "push and pull of learning". A teacher-centred environment places most of the learning agency with the lecturer, but this does not imply that a student-centred environment must do the opposite. Underlying much of the frustration and effort in teaching and learning in higher education lies in two extreme views of a solution - either that improving student learning lies with the perfect student who naturally has sufficient motivation and the 'right' learning style to succeed or that the teacher adopts the perfect teaching method that guarantees success in students (Case, 2013). Any solutions that aim to move behaviours and context towards one of these extremes are likely to be fruitless. The reality is that the student body is diverse, lecturers are diverse, and the context of higher education and society are complex and ever-changing. A solution needs to be sought by creating a flexible teaching environment that is sensitive and responds to changing needs and develops students to be equally flexible and adaptive. The solution needs to be one where all role players work together with a common purpose that develops both lecturers and students into engaged and lifelong learners. Deeper learning requires students to develop a true sense of agency through personal learning experiences that enable them to recognise their development (Ritchie, 2016). It is the role of the lecturer to enable these learning processes by pulling and not pushing students. The role of higher education institutions is, therefore, to develop lifelong learners so that when they leave the institution, they can learn on their own, meet the challenges of the workplace and play an active role in society (Boud & Soler, 2016).

2.8 Evaluating the effectiveness of assessments

Due to the importance of assessment and its central role in shaping student learning, attempts are often made to improve assessment practices. It is evident that assessment should take a holistic approach to teaching and learning that cannot be considered in isolation from the curriculum or teaching pedagogy. As a result, improvements to assessment practices should be considered in a structured manner that recognises the impact of changes on other aspects of the assessment system and acknowledges the levers that drive student learning in particular ways. As a result, several guidelines or frameworks have been developed to enable academic practictioners to design good assessments that support learning and to evaluate current assessment practices. This section briefly considers some of these frameworks.

The assessment *for* learning (Sambell et al., 2013) framework is based on six principles that consider a holistic view of how assessment practices should be designed to support student learning. The purpose of the framework is to discourage fragmented approaches to implementing assessment for learning stressing the importance of *all* elements if the quality of student learning is to be improved.
The six principles proposed propose that assessments should:

1. Be Authentic and complex.
2. Have an appropriate balance of formative and summative components.
3. Provide opportunities to build confidence.
4. Develop students' ability to self-evaluate.
5. Make use of rich informal feedback opportunities.
6. Provide rich formal feedback.

An alternative model, by Gibbs and Simpson (2004) considers a set of conditions and an accompanying assessment experience questionnaire (AEQ) that can be used to design assessments that support worthwhile student learning outside of the classroom. These conditions relate to many of the principles of Sambell et al. (2013) but include a focus that considers, more deeply, what the student's response is to the various aspects of the assessment tasks. The conditions that are considered in the AEQ are divided into three key areas:

1. Influence of assessment on volume, focus and quality of studying

This includes conditions for designing assessment tasks that encourage sufficient and productive study time that requires the appropriate kind of learning activity on the most important aspects of a course.

2. *Students' conceptions of learning, knowledge and discourse*

   This includes conditions that require feedback to be engaged with by students and acted upon in such a way that students can use the feedback to learn and direct further studying.

3. *Influence of feedback on learning*

   This includes conditions of frequent feedback that is in sufficient detail and focuses on performance, learning and action within the student's control. It needs to be received in time for appropriate action to be taken by the student and needs to address the purpose and requirements of the assessment as well as students' understanding of what was required.

The *learning-oriented assessment* model provides a further framework for understanding and evaluating assessment practices (Carless, 2007). Three fundamental principles guide this model:

1. *Assessment tasks should be designed to stimulate sound learning practices amongst students*

   This principle encourages deep learning experiences that aim to mirror real-world experiences and spread attention across a period of study.

2. *Assessment should involve students actively engaging in criteria, quality, their own and peers' performance*

   This principle aims to create the correct expectations around required standards and encourage transparency of the process. It is suggested that this can be done through student involvement in drafting criteria, engaging with exemplars, peer feedback and assessment and the development of self-evaluation skills.

3. *Feedback should be timely and forward-looking to support current and future student learning*

   This principle encourages timely feedback and the promotion of student engagement with feedback.

In summary, when determining the overall effectiveness of assessment practices, there are a number of frameworks that can be used, adapted or combined. Although each framework provides a slightly different perspective, key aspects of determining the effectiveness of assessments include: the volume, type and quality of learning that assessments encourage, the balance and appropriateness of different assessment, the quality and nature of feedback, the degree to which students can engage with the assessment process and ultimately the effectiveness of the assessment process in developing self-evaluative expertise. Since this study is considering current assessment practices in the School in an attempt to improve student learning, these frameworks can provide further valuable insight guiding the study and developing the research instruments.

2.9 Conclusion

Both a strategic and a scholarly approach is required when changing assessment practices to meet the changing needs of students, lecturers and the working world. Changes in assessment need to occur across degree programmes and cannot be limited to individual models or assessment tasks. There needs to be a consistent approach (Thomas, 2012) across the institution with a clearly defined philosophy. Feedback cannot benefit students or be used for developing self-reflective skills if it only relates to one course or one assessment task (Lea & Street, 1998) requiring students to shift and adapt in a confusing and turbulent environment. Most of the required learning outcomes for engineering degree programmes are typically fairly generic such as engineering professionalism, team and multidisciplinary working, independent learning ability and engineering problem-solving skills and these outcomes can only be achieved if courses are aligned throughout the degree programme (Rossiter, 2013).

Learning-oriented models can result in the improved quality of student approaches to learning (Carless, 2015a). However, a shift from assessment *of* learning to assessment *for* learning requires a fundamental shift in the paradigms that underpin teaching, assessment and the curriculum as a whole (Sambell et al., 2013). There needs to be a move away from *traditional teacher centred and syllabus centred methods* and a focus on the assessments themselves - a product-centred approach, to a focus on the learning that takes place through assessments – a process-centred approach (Knight, 2001).

2.10 Synthesis of theoretical concepts

This chapter has explored central aspects of this research problem by drawing on relevant assessment literature to illustrate the importance of assessment and to elaborate on the mechanisms that enable assessment practices to influence the quality of student approaches to learning. This section aims to bring these ideas together into a conceptual framework which will guide this study.

A framework is proposed which shows the interrelationship between different theoretical elements and places a boundary around the study in terms of scope. This framework, presented in Figure 1, identifies the critical relationship between assessment practices and student approaches to learning. It acknowledges that assessment practices have a significant ability to shape student learning (Ramsden, 1979; Crooks, 1988; Sambell & McDowell, 1988; Boud, 2007; Biggs & Tang, 2011; Carless, 2015a). By implication, student approaches to learning lead to the achievement of actual learning outcomes. There is, therefore, an important relationship between assessment practices, student approaches to learning and learning outcomes.

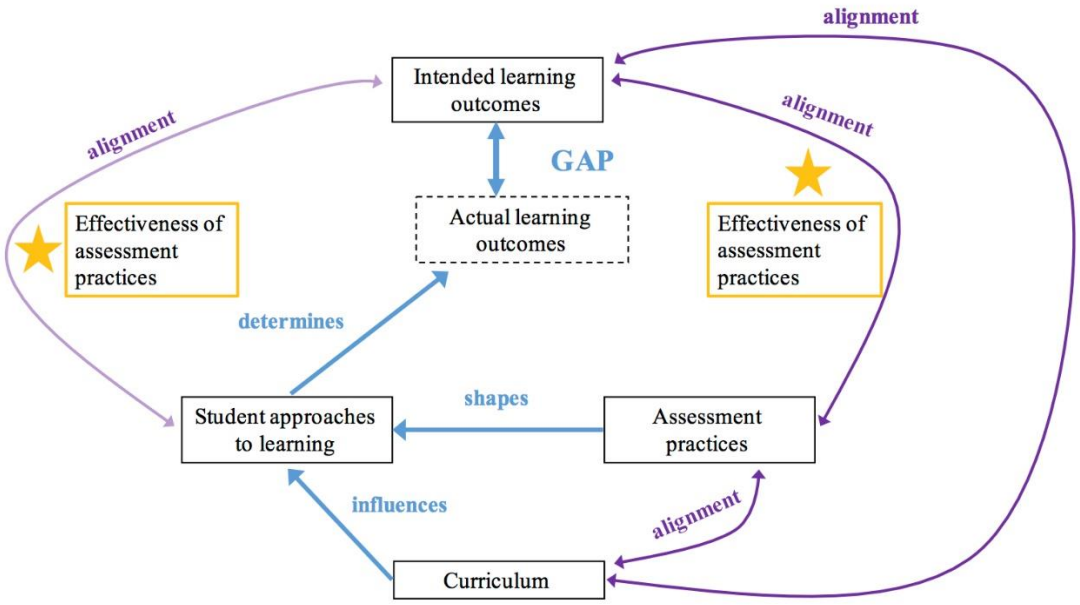


Figure 1: Framework of theoretical concepts

Although other factors influence student approaches to learning, the relationship between learning outcomes, student learning approaches and assessment practices form the focus of this study. A further element which, although not the focus of this study, will play an important role in interpreting and understanding data is the curriculum. The curriculum, including content and context, plays a role in influencing student learning approaches (Entwistle, 1987, Ramsden, 2003) which have an implicit relationship with assessment practices.

This study is concerned primarily with understanding the relationship between these three key elements, student approaches to learning, assessment practices and achievement of learning outcomes, and the extent to which a mismatch occurs between the elements, affecting high levels of student failure and dropout. The starting, and ending, point for the research is, therefore, the *gap* that exists between actual and intended learning outcomes (Biggs & Tang, 2011). The requirement for alignment between intended learning outcomes, assessment practices, student learning approaches and the curriculum is based on the model of constructive alignment (Biggs, 2014). The mismatch can occur from either or both sides individually: through assessment practices that do not align with intended learning outcomes and through student learning approaches that do not align with intended learning outcomes. The purpose of this study is to understand the nature of the reasons for this gap. This will be done by evaluating the effectiveness of assessment practices in shaping student learning approaches to achieve the intended learning outcomes as well as evaluating the effectiveness of assessment practices in assessing what is aligned to intended learning outcomes.

The framework is linked to the overall research questions and objectives for this study. The research objectives are listed again, with a short explanation of how they tie into the conceptual framework.

Objective 1: To investigate students' current learning practices and how these are shaped by assessment practices in the School

The first objective considers the left side of the framework - understanding how assessment practices shape student learning, and how these ultimately lead to a set of learning outcomes.

Objective 2: To investigate how assessments are currently designed and used in the School and how these are positioned in relation to assessment theory

The second objective considers the right side of the framework – considering the alignment of current assessment practices with intended learning outcomes.

Objective 3: To integrate the findings from objectives 1 and 2 as a means of understanding and investigating the overall effectiveness of assessment practices on student learning in the School

The third objective brings together the findings from objectives 1 and 2 to better understand the extent and origins of the gap that exists between intended and actual learning outcomes. This objective acknowledges that this gap could result from assessment practices that are misaligned and from student learning that does not lead to the intended learning outcomes. The evaluation of the current practices considers the current practices and experiences in relation to assessment *for* learning (Sambell et al., 2013) and learning-oriented assessment (Carless, 2015b) literature.

Objective 4: On the basis of the findings from objective 3, make recommendations on how assessment practices in the School can be adapted to promote more effective student learning.

The final objective considers insights from the findings to provide recommendations to align assessment practices and student learning approaches to the intended learning outcomes, using a learning-oriented perspective.

Chapter Three

Methods have…led to
The Research Design

This chapter starts by presenting the study setting and overall research approach including the data collection processes linked to each objective of the study. The chapter then presents the detailed method for each phase of the data collection process including the development of research instruments, sampling, data analysis and validity and reliability considerations. The chapter ends with an overview of how the findings will be presented and a short section on ethical considerations.

3.1 Study setting

This study takes place in the School of Mechanical, Industrial and Aeronautical Engineering at the University of the Witwatersrand in Johannesburg (the School). Students complete two common years before specialising in one of three branches (Mechanical, Industrial or Aeronautical) in their third year. The curriculum for the four years of study is set for each degree programme. This study focuses on students in their second, third and final years of study as discussed in Chapter 1.

In the School, formal in-class lectures are provided for all courses. Some courses also use formal, scheduled tutorial sessions where students work through problems, individually or in smaller groups with assistance provided by tutors. Attendance at lectures and tutorial sessions is not compulsory although students are sometimes 'encouraged' to attend tutorials through the use of spot tests. Practical laboratories take place in dedicated courses. Class sizes vary by year and branch. In the first and second year, class sizes typically exceed 250 students; reducing in higher years. Most lectures follow a traditional, lecture-centred format and in-class activities are limited due to the large class sizes.

Assignments (or projects), tests and exams are the primary means of providing summative assessment of student performance. An overview of typical assessment

methods (Luckett & Sutherland 2000) is included in Table 1. A passing mark for any course is a minimum of 50%. Students are provided with a schedule of all assignment deadlines and test dates at the beginning of each semester.

Table 1: Overview of assessment used in the School

Assessment methods	Format	Contribution to the year mark
Spot tests/quizzes	Often take place during tutorial sessions but can also be online. Occur throughout the semester	< 10 %
Assignments/projects	Often more open-ended or complex than tutorial questions and can include group work. In design and laboratory courses these make up a more significant portion of the final mark. Occur throughout the semester	Typically 0-20 % (can be more than 50% in design/lab courses)
Tests	In a formal setting, scheduled during the semester, typically one test (nett) per week, each test is 1-2 hours in duration	20–30 %
Exams	In a formal setting, at the end of a semester, the entire exam session is around two weeks long, each exam is typically 3 hours in duration	50-70 %

The curriculum consists of a first year that focuses on foundational mathematical and natural sciences including mathematics, chemistry, physics and applied mechanics. Students are also introduced to engineering drawing and design and a course on critical thinking. In the second year, the curriculum includes an introduction to engineering sciences including subjects like thermodynamics, fluid mechanics, computer programming, statics and dynamics. Design and laboratory take on a more prominent role in the second year, and although the primary purpose is to introduce students to design and investigational thinking and approaches, some efforts are made to integrate content from other subjects into these courses. In the third year, the curriculum continues to focus on engineering sciences including more specialised subjects for the

three branches (aircraft structures for aeronautical engineering students, operations management and operations research for industrial engineering students and further thermodynamics and fluid mechanics for mechanical engineering students). Students are also exposed to subjects of a broader relevance including mechatronics and business management. Design and laboratory courses continue to play an important role in the development of key skills and attributes. In the final year, the year is split into two, the first semester focusing on specialised engineering science courses and the second semester consisting of two 8-week capstone projects (one design and one research).

The curriculum is guided by global developments and trends in engineering, the needs and influence of local industry and other interested organisations, areas of research focus in the School and the requirements of the Engineering Council of South Africa (ECSA), (Hattingh, 2018). ECSA, as the accrediting body for engineering degrees in South Africa, plays an influential role in degree outcomes and the development of internal School processes to ensure that students meet these outcomes.

3.2 Research approach

Crotty (1998) identifies four key elements that need to be made when embarking on a research study: epistemology, theoretical perspective, methodology and methods. *Epistemology* concerns the nature of knowledge and how it is acquired. For this study, it is believed that knowledge is personal, subjective and unique. This requires an epistemological approach that rejects an objectivist position and makes use of a *subjectivist position* that requires involvement between the researcher and the subjects being studied. *Theoretical perspective* is the philosophical stance that provides context for the study and defines the logic that governs the choice of methodology and methods. This study believes that human behaviour is not rule governed and that human beings do not respond deterministically to their environment but are free to initiate their own actions in creative ways, thus producing their own environments. This study assumes that human beings act in a state of voluntarism and not determinism. This study therefore uses a *theoretical perspective of interpretevism* which appreciates differences between human beings and acknowledges the importance of making meaning from a broad range of subjective views. The *methodology* therefore required for this study is one that values the importance of the subjective experience of individuals or an idiographic approach. This is in contrast to a nomothetic approach that favours

identifying and defining factors and their relationships in the search for laws which govern these.

In summary, a qualitative research approach based on a subjectivist position is necessary to investigate how both students and teachers relate to, conceive and experience the assessment practices used in the school. A positivist position based on any particular a priori theory or model along with the associated determinants of student performance and assessment practices is not appropriate for addressing the research questions posed. Rather the model or theory and determinants should emerge from an analysis of the experiences of the students and teachers involved. The method for this study will be described later in this Chapter.

The research approach was guided by the overall purpose of the study, the research questions and objectives and the theoretical position and methodology. The purpose of this work is to understand a complex problem within an existing environment that has specific, contextual challenges that make it unique and interesting. The learning strategies and behaviours of students are strongly influenced by their prior learning experiences (Biggs, 1999) and current perceptions of their learning environment (Prosser & Trigwell, 1999). The phenomena under investigation can therefore not be separated from their context making a case study approach most suitable for this study (Yin, 2014). Due to the specific nature of the research question, this is an intrinsic case study (Stake, 1995). An interpretive approach (Cohen et al., 2011) was chosen to gain a rich picture of the phenomena in the School through in-depth data collection and analysis of subjective experiences.

The case study approach that was used for this study draws on the most relevant elements of Yin (2014), Stake (1995) and Merriam (2009) to support the overall epistemology, methodological approach and purpose (Yazan, 2015). The case was defined using an interpretivist paradigm (Stake, 1995) and considered a particular situation (Merriam, 2009). The case study made use of a flexible design that developed as the study unfolded (Stake, 1995; Merriam, 2009) incorporating appropriate qualitative methods based on the literature review and considerations for triangulation of the data.

The study focuses on assessment practices across the degree programme considering a

range of courses. This holistic view is intended to capture how experiences in courses influence concurrent or future courses, as student approaches to learning develop. To gain a rich picture of current practices and their influence on student learning, perceptions and experiences of both students and lecturers are explored. An overview of the approach is outlined in Figure 2. The approach is made up of four phases aligned with the four objectives of the study. The research method for each phase is justified and discussed in subsequent sections.

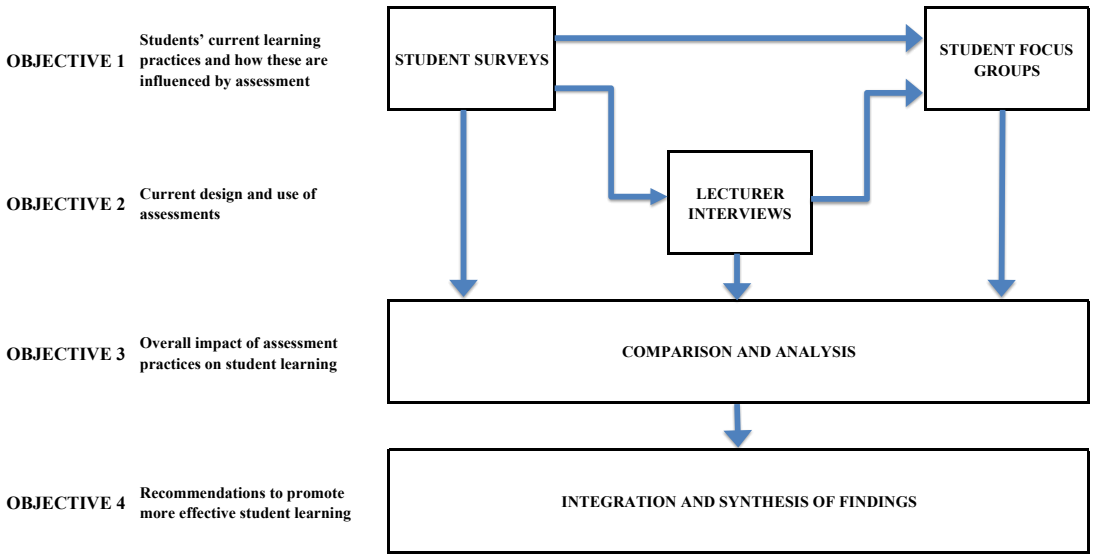


Figure 2: Overview of the research approach

The purpose of the study and the different sources of data resulted in the use of both quantitative and qualitative research methods. The research approach brings the data from the various sources together to answer the research questions, making it a mixed-methods study. The typology of the mixed methods approach is a sequential, qualitatively weighted study with connected mixing as defined by Creswell (2009). The data collected from each phase of the research feeds into subsequent phases, informing and enriching the data collection process. Due to its exploratory nature, the study primarily makes use of qualitative data collection methods. The study, however, begins with a quantitative approach; the justification for this choice is described later in this chapter. The data from the various phases of the research process are brought together to deepen the study and triangulate data, providing findings that consider various perspectives and provide a richer understanding of the problem within its context. The mixed methods procedure is represented in Figure 3.

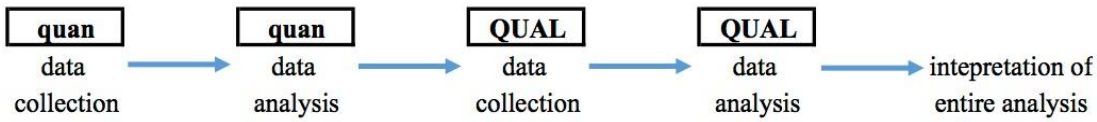


Figure 3: Mixed methods procedure (modelled after Creswell, 2009:209)

3.3 Data collection

This section introduces the high-level data collection processes for each of the four objectives of the study. The detailed method for each data collection phase is described in Section 3.4.

3.3.1 Research sub-question and objective 1

The research sub-question is:

> What are students' current learning practices and how are these shaped by assessment practices in the School?

The objective of this research question is:

> To investigate students' current learning practices and how these are shaped by assessment practices in the School.

The data for this objective are obtained from students in the School using two data collection techniques. The first source of data is a survey using a questionnaire and the second is student focus groups. Questionnaires are not often used in exploratory case research as the questions within surveys are typically highly structured and based on theoretical constructs which the researcher has chosen based on what they anticipate the factors emerging from the research will be (Sapsford, 2007). Although this research is exploratory, the results from the survey were able to provide some direction early on in the research process. A questionnaire also enabled a larger number of students to be surveyed within a short space of time. This provided an initial perspective on the range and extent of approaches and perceptions of students in the School. The findings from the survey were used to inform the questions developed for the student focus groups and the lecturer interviews.

The focus groups were chosen to be more exploratory allowing students to provide reasons for their different responses to assessments. This catered for a wider variety of approaches and limited the extent to which the questions guided the students towards particular responses or answers (Merriam, 2009). The focus groups were also designed to provide a generative environment that promoted social learning through the process.

This phase of the research aims to understand how assessment practices shape student learning and what actual learning outcomes emerge from student approaches to learning as presented in Figure 1 in Chapter 2.

3.3.2 Research sub-question and objective 2

The research sub-question is:

> How are assessments currently designed and used in the School and how can these be framed in relation to assessment for learning literature?

The objective of this research question is:

> To investigate how assessments are currently designed and used in the School and how these are positioned in relation to assessment theory.

To establish how assessments are currently designed and used in the School, data is sourced from lecturers in the School. Lecturers are an integral part of both the teaching and assessment aspects of student learning and therefore provide an important source of data. Semi-structured interviews were chosen as a means of gaining in-depth insight into the range of assessment practices and perceptions of student learning in the School (Wengraf, 2001).

This phase of the research aims to understand how assessment practices align with intended learning outcomes and how assessment practices are perceived to shape student approaches to learning as presented in Figure 1 in Chapter 2.

3.3.3 Research sub-question and objective 3

The research sub-question is:

Considering the perspectives of students and the current practices in the School, as revealed by 1 and 2, how do assessment practices in the School shape student learning?

The objective of this research question is:

To integrate the findings from objectives 1 and 2 as a means of investigating the overall effectiveness of assessment practices on student learning in the School.

This phase of the research triangulates (Creswell, 2012) the findings from the first two phases to gain a rich view of student learning approaches, how these are aligned to the intended learning outcomes and how they are shaped by current assessment practices.

3.3.4 Research sub-question and objective 4

The research sub-question is:

How could assessment practices in the School be re-designed to promote improved levels of student learning?

The objective of this research question is:

On the basis of the findings from objective 3, make recommendations on how assessment practices in the School can be adapted to promote more effective student learning.

The final phase of the research process integrates findings from each phase of the research process with personal reflection and literature (Creswell, 2012) to provide practical recommendations on how assessment strategies could be adapted in future to align with assessment *for* learning theory.

This section has provided an overview of the various sources of data and how they relate to the research questions and objectives. The following section introduces the detailed method for each of the data collection processes.

3.4 Student survey

3.4.1 Research instrument

A cross-sectional survey design was used to examine the current practices, attitude and opinions of students (Creswell, 2012). An online student survey was developed for this study, based on the Assessment Experience Questionnaire (AEQ) by Gibbs and Simpson (2003). The AEQ focuses on understanding how assessments influence what students do rather than focusing on what lecturers do or what lecturers intend for the students to do. It is based on a set of conditions that Gibbs and Simpson (2003) believe need to be present for assessment to support student learning and was developed to assist lecturers in reviewing the effectiveness of their assessment practices. The AEQ is designed to understand students' experiences of feedback considering how assessment influences the volume, quality and focus of their efforts, how feedback influences their learning and their conceptions of learning and how this affects their role in the learning process (Gibbs & Simpson, 2004).

The AEQ incorporates many of the key aspects of assessment practices identified in the literature including: volume, focus and quality of effort (Chalmers & Fuller 1996; Carless 2015a), the importance of feedback in supporting learning (Boud & Molloy 2013; Carless et al. 2011; Hattie & Timperley 2007; Hounsell 2007; Nicol & MacFarlane-Dick 2006; Sadler 1989) and conceptions of learning (Carless 2007). The AEQ was modified for this study to suit the context and to include additional ideas based on the literature review. To address emergent issues, additional questions were added to consider different methods of assessment (Sambell et al. 2013), to explore strategies and intentions when approaching learning (Boud & Soler 2016), to probe students' understanding of the gap between expectations and their performance (Sadler 1989), to review levels of student engagement and self-evaluation (Andrade & Valtcheva 2009; Carless 2015a; Sadler 1989; Snyder 1971) and to examine the extent to which students take on an active and reflective role in the learning process framed by learning-oriented assessment thinking (Carless 2015a). All of the survey questions recognise the important role that student agency plays in ensuring that assessment leads to deeper and more sustainable approaches to student learning.

The AEQ specifically considers student learning about assignments and exams. To adjust for the context of this case, sections pertaining to tutorials and tests were included. Many AEQ questions refer to students' behaviour related to 'doing well'. Based on experience in the School, it was felt that 'doing well' may not be the primary

motivator for some students and that these questions could, therefore, be misinterpreted and answered inappropriately. Some questions from the AEQ were therefore rephrased to differentiate between 'passing' and 'doing well'. A question was also added to the questionnaire, asking if the main aim of the student was to 'pass' or 'do well'.

The original AEQ is made up of 36 questions. In this study, the questionnaire was expanded to 56 questions, excluding demographic questions related to year, branch of study and the length of time that the student had been registered for their degree.
The final questionnaire was divided into seven sections aligned with the AEQ and to make responding to the survey easier (Cohen et al., 2011). The categories were: amount and distribution of effort; tutorials and learning; assignments and learning; tests, exams and learning; perceptions and experiences of feedback; engagement with feedback and general approaches to learning.

The questionnaire used a four-point Likert scale including the categories of strongly disagree, disagree, agree and strongly agree. Unlike the AEQ, it was decided not to include a neutral position on the scale to encourage students to take a position for every answer. Not including a neutral position (or not applicable category) is argued to force an opinion even when a participant does not have one (Cohen et al., 2011), this was mitigated by not requiring respondents to answer every question. The inclusion or exclusion of a neutral category in survey research remains a contested issue, and although it is generally believed that the decision will affect the findings, there is no preferred approach (Garland, 1991). A few of the additional questions in the questionnaire asked students to rate certain options relative to each other. The final free-text section of the questionnaire also gave respondents an opportunity to express any further thoughts on the issues.

A year after the first survey was conducted, an opportunity presented itself to probe themes arising from the first survey through a second survey. The School was considering implementing a test week, and a survey was sent out to elicit student feedback on this idea and test and exam experiences in general. A few questions were included at the end of the survey which covered three areas. Firstly, students' experiences relating to the stressful nature of exams was questioned; secondly, students were asked to reflect on their understanding of the purpose of assessments and thirdly;

students were asked to rank the current assessment methods used in the School based on their ability to support deep learning.
The student questionnaires are presented in Appendix A.

3.4.2 Data collection and sampling

Online questionnaires, using SurveyMonkey, were distributed to all students (n= 1011 students) in the School in September 2016 (the academic year in South Africa runs from February to November). The second questionnaire was shared using SurveyMonkey to all students in the School (n=1036) in November 2017, noting that most students for this survey would have progressed by one year since the previous survey. The findings from the latter survey were intended to supplement the findings from the original survey. The use of data from the second survey is specifically indicated when presenting findings.

Respondent profiles and the findings of both surveys are presented in Chapter 4.

3.4.3 Data analysis

The data from both surveys are analysed using simple descriptive statistics (Cohen et al., 2011) and interpreted by comparing the findings to the literature underpinning the framework of theoretical concepts for this study.

3.4.4 Validity

For survey research, Sapsford (2007) suggests three forms of validity that need to be considered: validity of measurement, population validity and validity of design. The questionnaire was developed using an existing assessment experience questionnaire supplemented by questions designed to test additional emergent themes from the literature that addresses the validity of measurement. Pilot studies were also used to test and modify the questionnaire before it was distributed to the student population (Leedy & Ormrod, 2013). The survey was distributed to a sample of lecturers in the School and two experts who have experience in engineering education in South Africa. The questionnaire was also tested on a small, pilot group of students to gain feedback

on the clarity of questions and the length of the questionnaire. The questionnaire was modified to incorporate the feedback from both of these groups. Population validity is less important for this study, since neither the intention of the survey nor the study, is to find a particular set of answers that represent the population. The expectations of this research are that there will be a range of student approaches to learning, and it is more important that the research captures this variety. The validity of design is concerned with the extent to which the data analysis can support the development of an overall argument for the study. Triangulation of data is used to support the validity of the research design and is discussed, considering the study as a whole, at the end of this chapter.

3.5 Lecturer Interviews

3.5.1 Research instrument and protocol

As discussed previously, understanding how lecturers interact with assessments is core to the development of a holistic picture of assessment practices in the School. This study, therefore, aims to gain an in-depth understanding of lecturer's experiences of assessment. As a result, semi-structured, interviews were used to unpack ideas and thinking that lay beyond what might be obtained from a survey (Wengraf, 2001). Individual interviews were conducted instead of group interviews to reduce the influence of particular individuals so that differences between approaches could be interrogated and understood.

Lecturers were asked a series of open-ended questions informed by the literature review in Chapter 2. They were designed to explore lecturers' perceptions and experiences of:

- The overall purpose of assessment
- Alignment of assessments to intended learning outcomes
- Explicit and implicit criteria used to design and evaluate assessments
- Communication of expectations and criteria to students
- The use of feedback
- Factors and constraints that influence the choice and design of assessments
- Perceptions of student approaches to learning and assessments

The interview protocol provided a set of semi-structured questions to address the particular issues being explored. As the interview unfolded, questions were, however, reordered where necessary and additional questions were asked to probe interesting issues and new topics where appropriate (Merriam, 2009). Questions were designed to avoid leading the interviewee and to encourage the use of practical examples (Cohen et al., 2011). Questions were also included to specifically target experiences and behaviour and draw out feelings where appropriate (Merriam, 2009). Ideal position questions were also used to explore issues from alternative angles (Merriam, 2009).

The lecturer interview protocol is presented in Appendix B.

3.5.2 Data collection and sampling

Semi-structured interviews were conducted with ten (n=30), purposively sampled (Cohen et al., 2011) lecturers in the School. Sampling aimed to obtain perspectives from lecturers with varying teaching and assessment experience on a range of courses across the four years of the degree programme.

Notes were taken during the interview and interviews were digitally recorded and later transcribed. After each interview, the researcher wrote a brief reflective essay (Merriam, 2009) that captured the essence of the interview and the researcher's initial response to the interview.

3.5.3 Data analysis

The data analysis process clustered ideas and evidence, noting emergent codes while constantly comparing these codes across interviews and developing themes to build a logical argument (Cohen et al., 2011). While analysing and interpreting data, constant reference was made to relevant literature.

Each interview was initially analysed individually. This was done by reading through the interview transcript in conjunction with the notes taken during the interview and the reflective essay. Emerging ideas were identified and coded using phrases and colours (Merriam, 2009), key supporting quotes (or evidence) were highlighted, and personal

notes were taken where appropriate. This provided a rich overview of each interview. As interviews were coded, the captured codes were expanded to accommodate new ideas.

The identified codes, notes and evidence were then captured into a case study database (Yin, 2014). Each interview was captured in a separate column to organise the data in a way that facilitated easier analysis, comparison and interpretation. Data were clustered into topical categories (Merriam, 2009), initially an iterative process, but ending up with fifteen categories.

The analysis used a combination of computer-facilitated and manual techniques (Merriam, 2009). Once the database was complete, it was printed out in A0 format and the emergent codes across all ten interviews were summarised using sticky notes. The identified codes under each category were then compared and, where possible, similar codes were grouped resulting in a final set of preliminary themes into which all codes could be grouped. The preliminary themes were then arranged in a mind map to organise the data further. The purpose of the mind map was to sequence the data and create relationships that would facilitate the process of discussing the data logically rather than identifying causal relationships.

3.5.4 Validity

The validity of the interviews was addressed by developing a set of questions supported by ideas from relevant literature. The questions were also revised based on feedback from two experts and a pilot interview with one colleague. The data collection and analysis process was described in adequate detail to address issues of transparency (Cohen et al., 2011). The number of interviewed lecturers was discerned by considering the convergence of ideas obtained (Merriam, 2009). To address the credibility of the findings, rich descriptions and evidence were used to support claims, surprising or outlying evidence was investigated and rival explanations were considered when interpreting data with reference to the literature (Cohen et al., 2011). Peer review was also used to challenge interpretations and raise further alternative views (Merriam, 2009).

3.6 Student focus groups

While use could be made of in-depth interviews with individual students, it was believed that more value would be derived from interviewing students in groups**.** Students are the most important source of data for this study as it is how they behave within the context of practices in the School that reveals the nature of the relationship between assessment and learning. Focus groups enable participants to engage with each other and the interviewer. The resulting data captures these interactions (Cohen et al., 2011) and reveals how individuals understand ideas in a collective way (Bryman, 2008). The focus group design was based on the framework of symbolic interactionism which suggests that individuals make sense of issues by interacting with others (Liamputtong, 2011). This sense-making does not require participants to agree or disagree with each other, but through group interactions, a shared understanding emerges (Creswell, 2012). Research suggests that students do not naturally monitor their learning strategies and that through a programme of assessment for learning, students should be taught how to learn and reflect on their learning (Chalmers & Fuller, 1996). This emphasises the need for semi-structured focus groups to enable students to arrive at ideas organically in a group environment.

3.6.1 Research instrument

For the focus groups, a question guide was prepared to encourage and centre discussion around the issues to be explored. The intention was not for the researcher to moderate these focus group sessions but to allow as much interactive discussion as possible. A research assistant was used to take notes and make observations (Liamputtong 2011).

The question guide consisted of 13 core questions. The questions were designed to be sufficiently open-ended to probe students' experiences and behaviours with minimal influence on their answers. Questions were included to encourage students to reflect on feelings and, where necessary, devil's advocate questions were asked, encouraging students to reflect on what other students might experience or do (Merriam, 2009). Sub-questions were prepared under each of the core questions to probe issues further if required.

All questions covered issues that emerged from literature, the student surveys or the lecturer interviews conducted previously. The questions considered a number of issues including: students' overall approach to their studies in respect to different assessment tasks; how they know what is expected from them in assessments; an example of a situation where they were disappointed by an assessment and how they reflected on this experience; forms of received feedback and their response to feedback. Two questions arose specifically from the lecturer interviews and were included to explore students' feelings towards lecturers' perceptions of their lack of curiosity and lecturers' experiences of their poor lecture attendance. The focus group ended with questions that aimed to elicit a degree of self-reflection in students, questioning whether they believed that assessments supported their learning and requiring them to make recommendations of how they, and the School, could change practices to facilitate and support improved learning.

For selected questions (the first question and the last three), students were given an opportunity to spend five minutes reflecting individually on the question by writing their thoughts down on a piece of paper. This was done to ease students into a reflective mood using the principle of "writing as thinking" (Gibbs, 2007) and to give each student an opportunity to reflect on their own thoughts before they were influenced by others in the group.

The full student focus group protocol is presented in Appendix C.

3.6.2 Data collection and sampling

The focus groups sampled students from the second, third and final years of study where failure rates are still high even though students have already passed their first year of study. Due to the high failure rates in all years of study in the School, it appears that the transition from school to university is not the core reason for the lack of student success and that interventions and support in the first year are not long-term or creating sustainable changes in students which extend into their higher years. These students were therefore chosen in an attempt to understand the factors that influence and affect students' ability to succeed without focusing exclusively on the transition from school to university.

Four separate groups of students were chosen for the focus groups using maximum variation sampling (Cohen et al., 2011) – a high-performing group, a low-performing group, a mid-performing group and a group of students categorised as turnaround students. The turnaround students were students who performed exceptionally poorly in one year followed by a year when they performed particularly well. The reason for choosing the groups in this way was twofold. Firstly, due to the wide performance range in the original data set, it was anticipated that some students might not be comfortable speaking out in a group where their performance was significantly different to others in the group. Secondly, it was hoped that further insight could be gathered on how students experience assessment differently. This could prove useful in understanding the relationship between different approaches and experiences and assessment performance.

To categorise low, mid and high-performing students, academic records of all current students in the School were obtained, and all students were ranked based on the total number of subjects that they had failed in their second year of study (results were extracted as of July 2018). The population of students, therefore, included second, third and fourth-year students although the number of subjects failed corresponded to every student's second year of study. Emails were then sent to a group of students from the low, mid and high-performing categories inviting them to be part of the focus group on a specified day. The number of emails sent out was increased until 5-10 students (Merriam, 2009; Creswell, 2012) consented to be part of each focus group.

Table 2 presents the characteristics of each focus group including the number of students emailed and the number of final participants. The performance characteristics for the group (aggregate and number of subjects failed) corresponds to their second year of study. The current year of study is also shown for each group. The high-performing group does not include any second-year students since no current (2018) second-year student had completed their second year when the data was collected. For this group, high-performing students currently in their second year of study were identified (based on the mid-year results) and invited, but no students agreed to participate.

Table 2*: *Participant details for the Mid, High and Low – Performing groups

	HIGH	MID	LOW
No. of students invited via email:	50	66	34
No. of students who participated:	5	7	9
% of invited students who agreed to participate	10%	11%	26%
No. of subject fails in second year:	0	2-3	8-12
Aggregate percentage in second year - Range:	80 - 90 %	42 - 63 %	37 - 54 %
Aggregate percentage in second year - Average:	82.3%	53.5%	44.5 %
Distribution of students per current year of study:			
2nd year	0	2	4
3rd year	4	4	1
4th year	1	1	2

The turnaround students were chosen by analysing their marks for two subsequent years of study. The characteristics of the emailed students, the number of students emailed and responses received are included in Table 3.

Table 3: Participant details for the Turnaround group

TURNAROUND STUDENTS	
No. of students invited via email:	4
No. of students who participated:	3
Average No. of fails in second year - First attempt	7.7
Average aggregate in second year - First attempt	56%
Average No. of fails in second year - Second attempt	0.7
Average aggregate in second year - Second attempt	66.9%
Average number of distinctions (over 75%) - Second attempt	2
Average rank in class - Second attempt	Top 15 %

Demographic data of participants of all groups including gender, race and branch of study are included in Appendix D.

Each focus group was conducted on a separate day. The focus groups were facilitated by the researcher and observed by a research assistant. Notes were taken by both the researcher and the research assistant during the focus groups. The focus groups were recorded and later transcribed. After each focus group, a reflective essay was written by the researcher, to capture observations, the mood and social interaction in the group

as well as an initial reflection on the responses from the group (Merriam, 2009). This essay was later used for analysis and interpretation of data.

3.6.3 Data analysis

These data form the core of the research and as a result, choosing an appropriate analysis technique is critical. When considering the analysis of the focus groups, it is important to reiterate that both the individual voice – an essentialist approach as well as the collective voice – a social-constructivist approach, is necessary (Wilkinson, 2004). The voice of the individual within this research enables the researcher to explore differences between students as well as determine to what extent individuals can be summarised as a collective voice (Barbour, 2007). Willis, Green, Daly, Williamson and Bandyopadhyay (2009) argue that when analysing focus group transcripts, data regarding the content as well as the process must be considered. The analysis will consider these three core aspects: the individual, the group and group interactions.

The detailed analysis followed a similar approach to that used for the lecturer interviews. Each focus group was initially analysed individually. This was done by reading through the transcript in conjunction with the notes and reflective essay. While reading through transcriptions, emerging codes were identified and coded (using phrases and colours), key supporting quotes (or evidence) were highlighted and personal notes were taken where appropriate. This provided a rich overview of the focus group, considering the process, individual ideas and the group interactions. The process was repeated for each focus group, comparing and adding codes when required. The identified codes and evidence were then captured into a case study database (Yin, 2014). To organise the data for analysis purposes, it was clustered into topical categories (Merriam, 2009), initially an iterative process, but ending up with nine categories.

Once data from all four focus groups had been captured in the spreadsheet, with columns for themes, personal notes and evidence for each focus group, a comparative analysis was carried out across the four focus groups for each category. Similarities and differences were captured in a further column of the spreadsheet. After the data were captured in the spreadsheet, they were organised in a way that allowed for easier analysis, comparison and interpretation. Once again, the spreadsheet was printed in A0

format and the identified codes under each category were summarised, compared and, where possible, reduced until a final set of preliminary themes into which all codes could be grouped was obtained. The preliminary themes were arranged in a mind map to organise the data further. The purpose of the mind map was to sequence the data and create relationships that would facilitate the process of discussing the data logically rather than identifying causal relationships.

3.6.4 Validity

The validity of the focus groups was addressed similarly to that of the lecturer interviews. The developed questions addressed issues raised in the interviews and surveys and concepts supported by the literature. The intention was to steer the research away from reinforcing any researcher bias. Feedback was also obtained from two experts before the questions were finalised. The data collection and analysis process was described in adequate detail to address issues of transparency. To address the credibility of findings, rich descriptions and evidence were used to support claims and efforts were made to avoid being selective or distorting data when presenting findings. Surprising or outlying evidence was investigated, and rival explanations were considered when interpreting data by constantly referring to literature (Cohen et al., 2011). Peer review was used at several key points to challenge interpretations and raise further alternative views (Merriam, 2009).

3.7 Analysis of the case study

Yin (2014) suggests that there are few fixed approaches to analysing case study data and that the approach needs to rely on the presentation of evidence and the development of a strong argument using logical thinking with careful consideration of alternative interpretations or rival explanations. The data analysis process evolved through several levels as recommended by Merriam (2009). Firstly, data were analysed independently for each source of data, were organised topically, coded and presented in a descriptive narrative. For each source of data, theoretical concepts and personal reflections were then used to describe phenomena and develop a set of preliminary themes. The preliminary themes from each data set were subsequently compared and contrasted, making use of mind maps, to develop a final set of themes to describe the phenomena. While determining the final themes, care was taken to ensure that the themes were

exhaustive, mutually exclusive, sensitising and conceptually congruent (Merriam, 2009). After that, the final themes were used to make inferences about the case and to develop recommendations and implications for transferability of the findings.

The data analysis chapters are arranged as follows. The survey findings are presented in Chapter 4, concluding with key emergent themes. The lecturer interviews and student focus groups are presented thereafter using descriptive narrative and development of preliminary themes in Chapters 5 and 6. The preliminary themes from the three sources of data are brought together for interpretation in Chapter 7 to develop the final themes.

3.8 Validity and reliability of the case study

Validity is addressed through the appropriateness of the study design to address the research questions (Creswell,2012). This includes the data collection and analysis but most importantly for qualitative research, how the findings are interpreted and presented (Cohen et al., 2011). To answer the research questions for this study, data was sourced, using a variety of methods from lecturers and students thus enabling triangulation of the data to address validity concerns during interpretation (Creswell, 2012; Cohen et al., 2011).

It was important to acknowledge that the perspectives of respondents and the interpretation of the researcher can introduce bias into the findings, affecting the internal validity of the study (Cohen et al., 2011). This necessitated the use of several techniques to reduce the impact of bias on the findings and conclusions drawn. These techniques included: adequate engagement with the data (Creswell, 2009); explaining phenomena making extensive reference to theory (Cohen et al., 2011); the use of peer examination (Creswell, 2009) and constant interrogation of rival explanations (Cohen et al., 2011). These techniques reduce the likelihood that data was attached to preconceived opinions or conceptions (Cohen et al., 2011).

A detailed audit trail (Creswell, 2012) was provided through a thorough description of the data collection and analysis processes. Descriptions avoided preferential selection and distortion of evidence and unsupported generalisations (Cohen et al., 2011). These

rich descriptions address external validity by providing users of the research with sufficient data and detail to determine when transferability to more general cases is possible (Cohen et al., 2011).

3.9 Ethics

According to Leedy and Ormrod (2013), there are four considerations for ethical research. These include protection from harm, voluntary and informed participation, right to privacy and honesty with professional colleagues. All of these categories were addressed within the research process, and all participants in this study were assured of confidentiality and anonymity. This research conforms to all ethical requirements as defined by the code of ethics as set out by the university's Human Research Ethics Committee (non-medical). Ethics clearance has been obtained from the Human Research Ethics Committee (non-medical) – Protocol Number: H16/06/30.

Chapter Four

Quality in learning but,
Findings from the Student surveys

In order to probe students' experiences of assessment in the School, surveys were chosen to provide their perspectives of and responses to the current assessment environment. These surveys aimed to capture these experiences from students across the degree programme providing greater insights into learning practices and the role that assessment plays in shaping these.

As discussed in Chapter 3, two surveys were distributed to students, and the findings of both surveys are presented in this chapter. This chapter introduces the profile of the student respondents and presents the findings leading to concluding observations that inform subsequent data collection processes. The survey findings are presented separately from the findings of the lecturer interviews and the student focus groups. The findings from all three data sources are analysed and discussed in Chapter 7.

For the first survey, in 2016, responses were received from 263 (n=1011) students, distributed over the four years of study. Of the 263 students who agreed to take the survey, 240 started answering the survey questions. There was further attrition of 20 students over the balance of the survey. Although not all students answered every question, there were a minimum of 209 responses (20% of emailed students) for each question that was asked. Response rates per year of study are shown in Table 4.

Table 4: Response rates by student year of study (Survey 1 - 2016)

Highest year of study	% of respondents
First year	19
Second year	27
Third year	30
Fourth year	24

Students registered for courses from two different academic years were counted as being part of the higher year since they were expected to exhibit learning experiences from this higher year as well as all lower years. The response rate for the second survey, in 2017, was 194 (n=1036) with students distributed as follows: 16% in the first year, 37% in the second year, 36% in the third year and 11% in the final year.

Due to high failure rates in the School, many students take more than the standard four years to complete their degrees. This is shown, in this study, by the number of years at the time of responding to the survey, that the student had already added to their degree length summarised in Figure 4. This is included as it provides context for the interpretation of the main survey results.

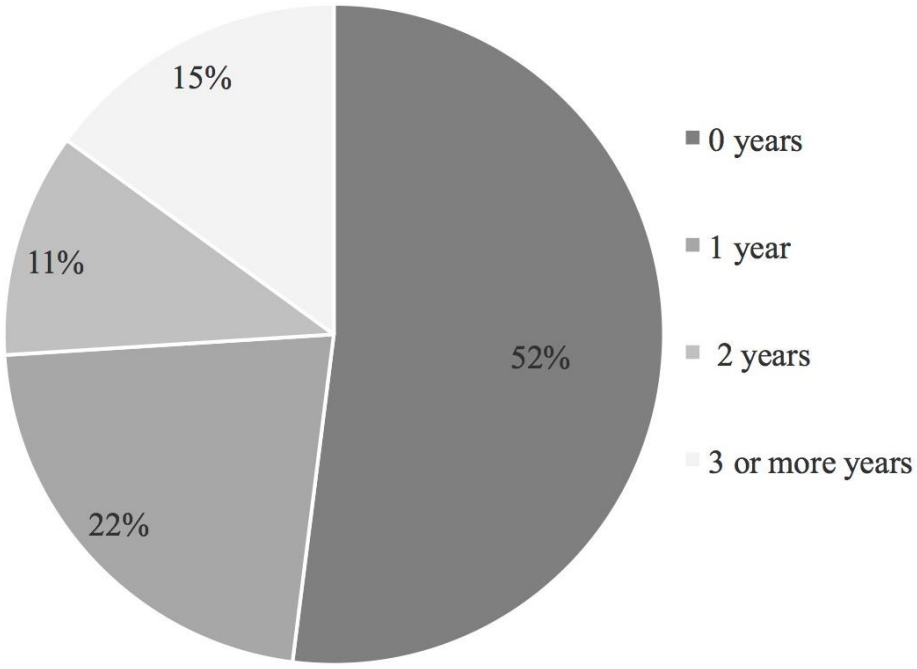


Figure 4: Number of years added to degree length (Survey 1 – 2016)

Selected findings of the main student survey are presented with headings corresponding to the different sections in the questionnaire. These include:

- Focus and distribution of student study efforts
- Tutorials and learning
- Assignments and learning
- Tests, exams and learning

- Perceptions and experiences of feedback
- Engagement with feedback
- General approaches to learning

For each section, the findings are presented by providing a brief introduction that explains the intent of the survey questions, a summary of the findings and a discussion that considers how existing assessment practices influence student approaches to learning. Themes emerging from the comment section of the first survey are then discussed in conjunction with the second survey under the heading: Students' overall experiences of assessment. The chapter ends with general comments on how the findings from both surveys relate to the assessment literature and includes preliminary recommendations on changes needed to shift student learning towards more reflective practices, deeper engagement and higher-order levels of understanding.

When the findings are discussed, negative responses (disagree and strongly disagree) and positive responses (agree and strongly agree) are grouped under the common headings, disagree and agree, unless otherwise specified. In terms of the overall response to the first survey, 51% of the students reported that their primary aim when learning was 'to pass'; 49% reported it to be, 'to do well'. This is an important finding as it sets the scene for interpreting the responses that follow.

4.1 Focus and distribution of student study efforts

This section provides insight into student pressures associated with workload, how students plan and distribute work (balance work across assessments, subjects and the semester) and how they change or adapt their learning behaviours based on their learning context. Workloads are known to significantly affect students' learning approaches (Ramsden, 1979), and it is important to understand both the extent and nature of their impact.

Table 5 shows that the majority (80%) of respondents believe that they need to study regularly to pass but that significantly more work is done in weeks when assignments are due. Workloads require students to prioritise certain work, with 91% of respondents indicating that they do so.

Table 5: Focus and distribution of student study efforts

Questions	Strongly disagree	Disagree	Agree	Strongly agree	Response Count
I have to study regularly, throughout the semester, if I want to pass the course	3% (7)	17% (38)	38% (88)	42% (96)	229
I do the same amount of study each week, regardless of whether an assignment/test is due or not	20% (46)	58% (133)	19% (43)	3% (8)	230
I often find that I cannot do everything and I end up prioritising some work over other work	3% (6)	6% (14)	53% (121)	39% (89)	230
I find that it is possible to do quite well without studying much	53% (122)	30% (68)	12% (28)	5% (11)	229
I only study things that are going to be covered in assignments or tests and exams	3% (7)	21% (49)	49% (113)	26% (60)	229
I can be quite selective about what I study and still do well	8% (19)	44% (101)	43% (99)	4% (10)	229

When prioritising work (asked in a separate question), 68% of students prioritise tests first, 74% prioritise assignments second, and 78% give general weekly studying the lowest priority. Students also selectively study certain content with 76% of respondents revealing that they only study what they know will be covered in an assessment task. This, however, only translates into successful performance for some students (47% stated that they can be selective about what they study and still do well while 52% indicated the opposite).

The findings show that workload does affect student learning behaviours. Tests and assignments are strong drivers of the weekly amount of work that students do. A significant proportion of students are selective about what they study, with the majority of students identifying assessment as a key factor in this selection process. Selective attention does not, however, always lead to success and could indicate students' ability to predict material included in an assessment. The potential, therefore, exists for students to focus their efforts on becoming better at predicting what will be covered in assessments to succeed.

These findings suggest the development of a *hidden curriculum* (Sambell & McDowell, 1998), possibly being driven by workload and forcing students to prioritise work demands. The extent to which this *hidden curriculum* is problematic in driving the right types of student learning behaviours will depend on how well assessments are aligned with the intended learning outcomes of a course (Biggs & Tang, 2011). When students are selective about what they study, the question is raised as to whether they

are missing important concepts, topics or skills and whether the strategies that they are adopting are leading to deep or surface learning.

4.2 Tutorials and learning

The purpose of tutorials in the School is seen as a formal means of consolidating course material and providing support to students while they are engaged in various problem-solving activities. This section intends to understand how students perceive and use tutorials. Their responses indicate the extent to which tutorial sessions facilitate learning by encouraging stronger engagement with course material.

Table 6: Tutorials and learning

Questions	Strongly disagree	Disagree	Agree	Strongly agree	Response Count
I find that attending formal tutorial sessions helps me to understand course material better	5% (11)	18% (41)	45% (100)	32% (72)	224
I find that doing tutorials helps me to understand course material better	1% (2)	5% (11)	50% (113)	44% (98)	224
I make sure that I am always well prepared for tutorial sessions	5% (10)	41% (91)	45% (101)	9% (20)	222

Table 6 shows that the majority of students agreed that attending (77%) and doing (94%) tutorials enables them to understand course material better. Tutorial sessions are rarely compulsory although students can be 'encouraged' to attend through the use of marks being allocated towards work completed in the tutorial such as spot tests. This possibly explains the significant difference between attendance (attending tutorials) and actual participation (doing tutorials). Only 54% of students admitted to preparing for tutorial sessions, suggesting that students work on material while in the session. Recognising that proactive preparation for tutorials would bolster engagement, these results suggest that some students use tutorials as support (i.e. 'guided homework') rather than a platform for engagement with material taught in class.

In relation to the conceptual grasp of course content, respondents agreed (50%) and strongly agreed (44%) that doing tutorials helps them to understand course material better. This is a strong indication that solving example problems in a formal setting is a valuable mechanism for students to learn. Yet, despite this finding, the extent to which students actively prepare for tutorials suggests that these sessions are not being

utilised to their full potential. Students' uneven preparation for tutorials could be a function of workload and the extent to which they prioritise work. Furthermore, as tutorials usually do not contribute significantly to the overall course mark, tutorial preparation would typically fall into the general or ongoing weekly studying category which is attended to last when prioritising work. Students may then attempt tutorials at a later stage, perhaps only when preparing for exams. As students believe that tutorials support their learning process, this is an assessment method that should be leveraged by incentivising students to prioritise tutorial work and aligning workload by ensuring that tutorials are designed to address the intended learning outcomes, reinforce essential concepts and theories and encourage stronger engagement.

4.3 Assignments and learning

Assignments constitute work completed in students' own time that is handed in for summative assessment and that contributes to the final course mark. These typically require students to solve more complex or open-ended problems related to the course material. This section intends to understand how students perceive the role of assignments and what learning behaviour assignments elicit.

Table 7: Assignments and learning

Questions	Strongly disagree	Disagree	Agree	Strongly agree	Response Count
Tackling the assignments really makes me think	2% (5)	10% (23)	56% (123)	32% (70)	221
In completing the assignments, I can get away with not understanding and still pass	12% (27)	39% (87)	42% (93)	6% (14)	221
The assignments give very clear instructions about what I am expected to do	12% (26)	35% (78)	49% (107)	4% (9)	220
When I tackle an assignment it is not clear what would count as a successful answer	2% (5)	21% (46)	58% (127)	19% (41)	219

Table 7 shows that although 88% of students agreed that doing assignments makes them think, 48% also believed that they could pass an assignment without actually understanding the course material. There is often uncertainty about the expectations of assignments with only 53% of students agreeing that clear instructions are provided and 77% agreeing that they often do not know what would count as a successful answer.

As shown previously, assignments receive the second highest priority when studying which indicates that students prioritise work that is 'for marks' over work that supports their conceptual grasp of concepts but is not for marks (tutorials), even when they realise that assignments may not lead to understanding. Assignments may also receive priority due to the many hours that students invest in them.

Findings also suggest that assignments are not always designed or communicated in a way that facilitates independent learning and the development of self-evaluative skills. It is argued that to enhance learning, students should have clear expectations of what is required in assessments (Chalmers & Fuller, 1996; Sadler, 1989). It appears that there is a lack of constructive alignment between course outcomes and the design, expectations and execution of assignments leading to assessment *of* learning rather than assessment *for* learning (Carless, 2015a). This contention will be considered again towards the end of this section when the students' free-text comments are discussed.

4.4 Tests, exams and learning

In the School, tests and exams are the highest stakes assessment methods and the most likely to drive overall student learning due to the high contribution that they make towards the overall course mark. The purpose of this section is to understand how tests and exams affect student learning approaches and behaviours.

Table 8: Tests, exams and learning

Questions	Strongly disagree	Disagree	Agree	Strongly agree	Response Count
When studying for tests or exams, I often memorise methods / steps without understanding what I am doing.	18% (38)	46% (98)	29% (62)	6% (13)	211
I understand things better as a result of the tests and exam	3% (7)	29% (62)	52% (109)	16% (33)	211
I usually forget most of what I have learnt after the test / exam	2% (4)	32% (67)	42% (88)	24% (51)	210
In the test or exam you can get away with not understanding and still pass	27% (57)	31% (65)	34% (71)	8% (17)	210
I usually spot (target) which sections to cover for the exams	11% (23)	28% (58)	46% (96)	15% (31)	208

Table 8 shows that when approaching tests and examinations, 35% of respondents agreed that they memorise steps without understanding. A significant portion of respondents, 42%, believe that they can pass a course without actually understanding

the material. Most respondents (61%), indicated that they target specific material when studying for exams (suggesting the use of achieving approaches to learning). Although 68% of students agreed that they have a better understanding of material after a test or exam, the balance (32%), admitted that they do not believe that tests and exams have any learning benefit. Moreover, most respondents (66%), mentioned that they forget the bulk of the material after writing the test or exam.

The findings suggest that a significant portion of students adopt a procedural, surface approach to learning as defined by Case and Marshall (2004). This is shown by the fact that many students believe that they can pass without understanding, admit to memorising steps without understanding and indicate that they forget material after the assessment has passed. The findings also call into question the extent to which formal assessments are designed for surface learning - or whether students adopt surface, procedural approaches due to their perceptions of the School's assessment practices or their prior experiences with assessment. The findings again suggest the influence of a *hidden curriculum* with a significant portion of students considering only what they believe will be included in an exam when studying - their learning behaviours are therefore clearly driven by these high stakes assessments. Most noticeably, however, not all students see tests and exams as facilitating learning, a key finding considering the importance and value placed on tests and exams in the School.

4.5 Feedback – perceptions and experiences

Feedback (including quality, timing and the use thereof) is critical in the learning process (Hattie & Timperley, 2007). The purpose of this section is to understand how students experience feedback practices. The section that follows discusses the extent to which students engage with this feedback.

Table 9 shows that only 25% of respondents believe they are getting 'plenty' of feedback. When asked, in a separate question, where feedback was currently received, respondents indicated that they receive feedback for tests (79%), assignments (64%), tutorials (41%) and exams (17%). When asked how feedback is typically received, respondents indicated: written comments (55%), class discussions (53%), verbal

feedback (44%) and hand-outs or class notes (26%) – with students being able to receive feedback in more than one mode.

Table 9: Feedback perceptions and experiences

Questions	Strongly disagree	Disagree	Agree	Strongly agree	Response Count
I get plenty of feedback on how I am doing	18% (38)	57% (123)	24% (51)	1% (3)	215
I don't usually bother to look at feedback	32% (68)	59% (127)	7% (16)	1% (3)	214
The feedback helps me to understand things better	3% (6)	21% (45)	60% (128)	16% (34)	213
Once I have read the feedback I understand why I got the mark I did	3% (7)	21% (44)	62% (132)	14% (29)	212
When I get things wrong or misunderstand them I don't receive much guidance in what to do about it	4% (9)	30% (66)	45% (97)	21% (45)	217
I would learn more if I received more feedback	0% (0)	5% (11)	37% (80)	58% (125)	216

Students value feedback with 76% of respondents agreeing that feedback facilitates understanding. Only 8% of respondents indicated that they did not 'bother' to look at feedback, contrary to perceptions exhibited by lecturers who provided input for the development of the survey as described in Chapter 3. When asked if students would learn more if they received more feedback, 95% of students suggested that they would (58% strongly agreeing). As revealed in this survey, feedback is the single, most prominent feature that respondents believe will improve their learning. Feedback is clearly valued and used by students. It also appears that students are using feedback from summative assessment in a formative way by using performance and feedback on tests to reflect and adapt learning strategies as proposed by Hassan (2011).

There are, however, questions around the current quality and adequacy of the feedback that students receive and action. A limitation of this study relates to the somewhat ambiguous use of the word feedback in the survey questions. There are many views on what constitutes feedback, and there is a good chance that students may have had different conceptions of feedback when answering the survey questions. This is a topic that was investigated further in the subsequent phases of this study.

4.6 Feedback – engagement

Feedback is a salient aspect of learning, but ultimately it is students' engagement with feedback (Snyder, 1971) and the processes of judging and self-evaluation (Carless, 2015a; Boud & Molloy, 2013) that determines the extent to which learning occurs. The purpose of this section is to probe how students respond to the feedback that is received.

Table 10: Engagement with feedback

Questions	Strongly disagree	Disagree	Agree	Strongly agree	Response Count
I read the feedback carefully and try to understand what the feedback is saying	1% (3)	11% (22)	65% (135)	23% (49)	209
I use the feedback to go back over what I did	1% (2)	13% (27)	70% (147)	16% (33)	209
The feedback prompts me to go back over material covered earlier in the course	3% (6)	28% (58)	57% (120)	12% (25)	209

Table 10 shows that 88% of respondents articulated that they read through feedback carefully to understand and interpret what the feedback is saying. In addition, 86% of respondents revealed that they use feedback to revise what they did and 69% pointed out that the feedback also prompts them to revise course material dealt with earlier in the course.

It, therefore, appears that most students are using received feedback to facilitate their understanding of the material. Further investigation is needed to understand the nature of feedback that students are currently receiving and using, and how they use this feedback to facilitate learning. It is also pertinent to understand how feedback is used beyond a particular course to the development of self-evaluation and lifelong learning skills. This is a concern raised by the fact that over 30% of students in the survey indicated that feedback does not prompt them to go back over material covered earlier in the course. This suggests that students may not be using feedback to engage with material, develop the necessary skills and construct knowledge in the discipline.

4.7 General approaches to learning

This section explores students' general approaches to learning, including their use of study groups, whom they choose to approach for help, what they do as a result of poor

performance and whether they consider and adapt their learning methods based on past experiences. The questions in this section intend to explore student resourcefulness and the development of self-reflective and self-evaluative expertise.

Table 11: General approaches to learning

Questions	Strongly disagree	Disagree	Agree	Strongly agree	Response Count
I often study with other students in my class	12% (25)	40% (84)	38% (81)	10% (21)	211
I find that studying together with other students helps me to understand concepts better	9% (19)	21% (44)	51% (107)	19% (41)	211
When I am struggling with a course, I seek help from other students in my class	1% (2)	9% (18)	60% (125)	31% (65)	210
When I am struggling with a course, I seek help from the course lecturers	8% (16)	33% (68)	51% (107)	9% (18)	209
When I fail a test or exam, I try to understand why	1% (3)	9% (19)	67% (139)	22% (46)	207
The way in which I study for tests and exams has changed as I have realised what works and what doesn't	3% (7)	10% (21)	57% (119)	30% (63)	210
When I fail or do poorly in a test, I evaluate my study methods and consider what I need to change	2% (5)	24% (50)	57% (119)	17% (35)	209
When I fail or do poorly in a test, I try harder next time using the same methods as before	2% (4)	50% (104)	38% (80)	10% (20)	208
I use my mark for assignments and tests to give me an indication of how well I am doing in the course	2% (5)	7% (14)	55% (116)	36% (75)	210
Answering this survey has made me think about how I study and learn	3% (7)	16% (33)	56% (117)	25% (53)	210
After answering this survey, I may consider how to change the way I approach learning and studying	6% (13)	27% (57)	49% (103)	17% (36)	209

Table 11 shows that most students appear to be actively engaged in understanding why they fail and take steps to adapt and improve. When respondents do poorly, 89% reported that they try to understand the reasons for this. Respondents mentioned that they seek help from classmates (91%) and lecturers (60%). Concerning group work, 70% of respondents agreed that studying in a group helps them to understand concepts better although only 48% of respondents revealed that they do work in groups.

In trying to understand how students think about and adapt their learning practices, 87% of respondents have changed the way that they study over time. The way that studying occurs could refer to the method used, or the effort exerted. It is interesting that 74% consider how to change their study methods while 48% try harder using the same methods. A change in study methods could be a constructive shift, but it could also be one that enables students to do 'better' by aligning methods to what students expect in

assessments, resulting in students becoming more 'strategic' without necessarily encouraging the 'right' approaches.

The last two questions investigate whether students were encouraged to think about their learning as a result of completing the questionnaire. Of all the respondents, 81% revealed that answering the questionnaire made them think critically about the way they learn, with 66% suggesting that they might consider changing the way they approach learning and studying in future. The survey has prompted thinking about the role of assessment in the learning process; however, it also suggests that students may not have been previously engaged in reflecting about assessment. This implies that students need to develop a meta-awareness of the role of assessment in promoting learning in the curriculum (Hassan, 2011).

The findings demonstrate that students are eager to do better although it is unclear whether they have the necessary knowledge and skills to change their learning approaches and develop the capacity to self-evaluate. There may be a need for support structures that encourage the development of the skills that are necessary to judge the quality of their work and reflect on their learning processes.

4.8 Students' experiences of assessment

At the end of the questionnaire, students were asked to voluntarily include any additional comments. Of the 220 students who completed the questionnaire, 46 chose to include comments. Although this represents a small sample of the students in the School, certain minor themes did emerge and are worth discussing as they provide additional insight into students' experiences. The comments gave rise to some of the questions included in the second survey in 2017, assisted in explaining the findings and were used to guide the subsequent phases of this study.

One of the most frequently occurring minor themes emerging from the comments relates to the fairness or appropriateness of exams, with eleven of the comments focusing on this point. Students commented on the high weighting of exams especially in terms of the short amount of time allocated to the exam itself. Many of the comments specifically raise the issue of the fairness of exams with seven comments using the

words fair (not being) or unfair. In some of the comments on assessment methods, exams were contrasted with assignments which are framed as providing a better learning experience that is more relevant to the real world (authentic). Comments also surface the disproportionate weighting of time and marks between exams and assignments. Respondents also mentioned the stressful nature or the high levels of anxiety associated with exams. Extracts from the comments are included to illustrate some of these ideas:

> *"Weighting for tests and exams are extremely unfair - 70% for a final exam is a recipe for disaster."*
>
> *"The amount of time needed to do assignments as well as study is not fairly balanced. Assignments need much more time yet they generally count for much less than the exams."*
>
> *"Personally, I have always despised exams. The idea of a person's competence being based on 3 hours-worth of work in a hall, writing on a piece of paper doesn't sit too well with me…I think that assignments are a great way to truly test students' competencies and evaluate their learning, provided the assignments are structured appropriately and made relevant to real-world problems/situations/scenarios where the subject matter can be applied."*
>
> *"I feel that very often marks for tests and exams do not reflect the student's knowledge accurately as they are stressed under exam conditions and may forget information or do silly mistakes as a result of this stress. I feel that an assignment reflects a person's understanding more accurately as they do not have the stress related to exams. I understand the need for tests and exams as they force people to answer questions on their own and not be allowed to consult with fellow students which is possible for assignments. However, in the real world, people are always able to consult on things they do not understand and ask for help or advice. In the end, they still have to do their own work and understand the work in order to answer it. This is why I feel that assignments should have the highest weighting. Test and exam conditions do not reflect the real world."*

Several comments relate to the process of taking the survey itself rather than concentrating on the outcomes of the survey. Four comments show that students were grateful for the opportunity to provide feedback on School practices. This reinforces

the notion that involving students in the assessment process can have a positive impact on student engagement and investment in assessments (Leslie & Gorman, 2016). Several responses expressed the view that the process of answering the survey has made them think more deeply about their approaches to assessments and that they are encouraged to think differently as a result of the survey. This reinforces findings from the questionnaire shown in Table 11. Some of these comments are included to demonstrate these ideas:

> *"This survey actually got me thinking about how to plan and approach my tasks. Thank You."*
>
> *"The survey made me realise that the methods I have used to study may need to change. Other things I have been doing without noticing is what I do with feedback. I will now look more into the feedback and see if I understand what an assignment required and consult with my lecturer if I don't. Thank you"*
>
> *"It's a really good survey, that makes one think deeply about questions asked."*

Emerging from the findings of the first survey and the minor themes identified in the comments section, further questions were asked in a second survey. The second survey findings are presented after the first survey findings as it is essential to understand the influence of the first survey findings on the second survey and to understand that students did not see or consider the questions from the second survey when answering the first survey.

The first theme is that of stress and anxiety explicitly related to exams. Students were asked three questions that required responses in a four-point Likert style. The findings are shown in Table 12. Students find the exams to be a highly stressful assessment process, in all likelihood linked to the high stakes nature of exams in the School. Students also indicated that stress affects their ability to perform well corresponding with minor themes identified in the first survey.

Table 12: Stress levels during exams (Survey 2)

Questions	Strongly disagree	Disagree	Agree	Strongly agree
I find the exam session more stressful than normal term time	3.2%	11.8%	33.2%	51.9%
I find the exam session extremely stressful	3.2%	18.7%	32.6%	45.5%
I find that stress affects my ability to perform well in exams	3.2%	15.1%	45.7%	36.0%

The subsequent questions probed students' understanding of the purpose of assessment. When interpreting students' responses to this question, their perception of the primary purpose of assessment offers insight into their conceptions of learning, the role that assessment plays in their learning and their expectations around student agency in the process. The first question probed students' perceptions of the purpose of assessment by rating objectives on a scale of importance from 1 to 6. Table 13 presents the average ranking for each purpose of assessment. Although there is a spread of responses, the average ratings provide an interesting perspective on students' expectations. It can be seen that students have a pragmatic view of assessment, expecting assessment to play a vital role in promoting their learning while at university and preparing them for tasks in the real world. This aligns strongly with the conceptualisation of assessment *for* learning (Sambell et al., 2013) and the notion of authentic assessment (Wiggins, 2011).

Students were asked to rank the current assessment methods used in the School based on their ability to support understanding (from most useful to least useful). Table 14 captures students' experiences with different assessment methods used in the School and how these align with their expectations regarding learning. Students appear to value more authentic assessment methods as they rate design projects and assignments more highly than other forms of assessment. These methods of assessment are usually more practical, requiring the application of techniques to the real world and often include elements of group work. Exams and tests are some of the lowest rated assessment methods, possibly affected by the high-stakes and stressful nature of these assessments but perhaps also as students do not believe that they align to their overall learning goals. Laboratory reports are perceived as the least valuable form of assessment. Although the objectives and usefulness of laboratory work in engineering

teaching is a contested area (Feisel & Rosa, 2005; Hofstein & Lunetta, 2004), it is disappointing that laboratories are not seen as useful given their practical nature, ability to reinforce or consolidate theory taught in class and deepen understanding and their potential for making assessment more authentic. The lab course in the School has become more focused on communication skills, data presentation and report writing and it is worth investigating whether the practical aspects of lab work have not been lost or side-lined in this process.

Table 13: Students understanding of the purpose of assessment (Survey 2)

Rank the following in order of importance (where 1 is super important, and 6 is least important)	
In a perfect world, the purpose of assessment should be:	**Average ranking**
To provide feedback to facilitate student learning	2.7
To prepare students for the working world	3.0
To provide feedback to lecturers on how well students understand material	3.1
To ensure that students have met the requirements for the degree	3.2
To maintain high standards at an institution	3.8
To measure and grade students against their peers	4.9

Table 14: Students perceptions of assessment methods (Survey 2)

Rank the following assessment types based on their ability to support you in developing a deep understanding of important engineering concepts (where 1 is most useful and 6 is least useful)	**Average ranking**
Design projects	2.8
Assignments	3.1
Tutorials	3.4
Tests	3.5
Exams	3.6
Lab reports	4.3

4.9 Conclusions from the student surveys

The findings of the survey confirm the impact that assessment practices have on student learning behaviours. Assessments appear to influence student study schedules and how they focus their efforts and prioritise work. The findings also provide some insight into the nature of strategies that students adopt when tackling assessment tasks and the intentions behind the use of these strategies. These data gives prominence to assessment and its influence on student learning and highlights some of the opportunities that this presents.

It emerges that students have expectations of assessment that align with assessment *for* learning literature. Students see the primary purpose of assessment as providing opportunities for feedback that facilitate learning. Furthermore, students believe that assessment plays a crucial role in preparing them for the real world. Students also demonstrate resourcefulness that allows them to adapt and change their approaches in response to their assessment contexts. This suggests *quality in learning, but* as shown by the survey this resourcefulness does not always lead to the achievement of intended learning outcomes. Students exercise their resourcefulness in terms of their perceptions of the *hidden curriculum* in an attempt to approach assessment in as efficient a manner as possible. It is most interesting to note that many students choose not to do what they agree helps them to learn better. Students focus their efforts on assessments that contribute more to overall course marks rather than assessments such as tutorial tasks that are seen to have the potential to more effectively support deeper approaches to learning. They pay more attention to the perceived importance of assessments rather than tasks that support learning (Gibbs, 1995). They prioritise high stakes assessments, leading to a shorter term view that often drives surface approaches to learning as a result of workload pressures.

These findings provide useful insights into how assessment influences student learning behaviours in the School. There are, however, certain limitations of these survey results. Although all students in the School were included in the survey only 20% of students participated. It is not possible to know if students with particular approaches to learning were over or under represented as participants. The nature of survey

questions also limits the ability to understand why students answer survey questions in particular ways or why they respond to assessment tasks in the way that they have indicated. Specific survey questions are also open to interpretation and understanding which may produce skewed or biased results. Despite these limitations, the purpose of the survey was to enable an appreciation of the relationship between assessment and student learning behaviours in the School. The design of this study intended the findings from the survey to develop the protocols and inform the analysis in subsequent phases including the lecturer interviews and the student focus groups. The findings also highlight the importance of the student focus groups that are designed to probe emergent issues and ideas and to gain deeper insight into the factors that influence and drive particular responses and behaviours.

Chapter Five

Passive, bored students

Findings from the Lecturer Interviews

To fully appreciate the influencing role of assessment practices, a balanced view from all stakeholders is required. Learning-oriented assessment is best viewed as a delicate relationship between the assessment tasks and the roles of both students and lecturers. A study of this nature would, therefore, be incomplete without probing how lecturers conceptualise assessment in their contexts and without considering their perceptions and experiences of students' interaction with assessment tasks. The lecturer interviews draw on literature and initial findings from the student survey to build a more vibrant picture of assessment practices in the School. The findings from these interviews afford insights that were used to design and interpret the final phase of data collection, the student focus groups.

5.1 Profile of interviewed lecturers

The interviewed lecturers teach a range of courses across all four years of study. Courses include technical, engineering subjects such as mechanics, engineering drawing and mechatronics, engineering design and laboratory courses and complementary courses such as business management. The teaching experience of lecturers, shown in Figure 5, ranges from less than two years to more than 20 years which is representative of the teaching staff in the School. The wide range of teaching experience is purposively considered due to the broad range of experiences and perceptions that this could elicit. None of the teaching staff has any formal teaching qualification although some lecturers have attended short teaching and learning workshops that are run through the University – this also reflects the teaching profile in the School. The lecturers who were interviewed teach on courses in all four years of the degree, although the majority are second and third-year lecturers. The range of class sizes taught by the lecturers spans from over 200 students for eight of the lecturers to over 20 for two of the lecturers (class sizes vary per year of study and from the third year as students choose a particular engineering discipline).

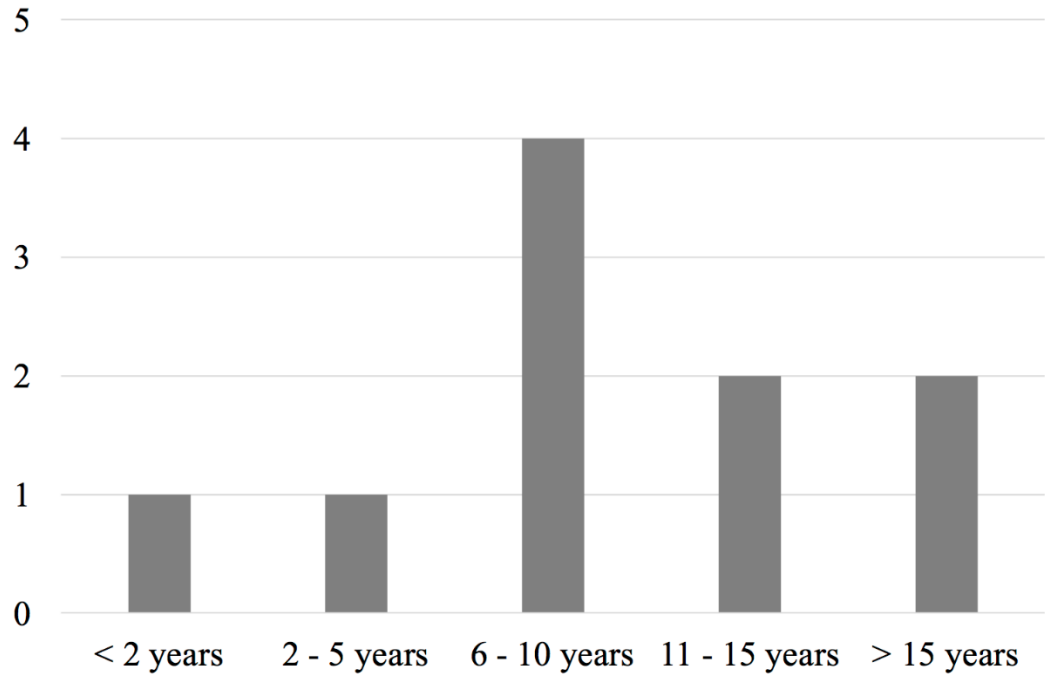


Figure 5: Distribution of lecturer experience

5.2 Observations

Eleven lecturers were approached to participate in the study. All eleven lectures were willing to participate although one interview did not take place due to difficulty in finding a convenient time. A few observations were made before and during the interviews which are worth mentioning. Several of the lecturers pre-empted the interview by indicating that they were not sure that they would be using appropriate "education" terminology when participating in the interview. There seemed to be a general lack of confidence in speaking on the topic of assessment and learning although all participants were enthusiastic about sharing their experiences. This was a concern that needed to be addressed so that the lecturers did not feel threatened by a lack of knowledge (Cohen et al., 2011). Each interview began by putting the interviewee at ease and reaffirming that the purpose of the interview was to share personal experiences and that it was not necessary to use educational theory or terminology.

Most lecturers seemed to enjoy the interview and elaborated on ideas enthusiastically with examples and personal experiences. There also appeared to be a fair degree of self-reflection and synthesis of ideas during the interviews in response to questions.

Lecturers unpacked ideas in detail and started making connections between assessment and learning. In some instances, they acknowledged that this was the first time that they noticed and realised the impact of their assessment practices on student learning. After the interviews, several lecturers approached the researcher to mention that they had been thinking about the ideas discussed in the interview and were either making conscious changes in their practices or that they would like to discuss further ideas around assessment and learning. The implications of these observations are discussed towards the end of this chapter.

5.3 Introduction to the findings

As discussed in Chapter 3, data from the interviews were captured in a spreadsheet. The final spreadsheet is too large to be legibly placed in the report, but a photograph of the overall process can be found in Appendix E. The themes were then grouped until nineteen sub-themes remained. These sub-themes were arranged in a mind map that can be found in Appendix F. The purpose of the mind map is to guide the interpretation of the findings and not to establish definitive cause and effect relationships between themes. The mind map was used to guide the presentation and analysis of the findings which follow in this chapter and to develop the major themes that emerge from the study which will be discussed in Chapter 7.

This section provides an overview and analysis of the design and use of assessment practices in the School based on the interviews conducted with the sampled lecturers. Quotations from interviews are provided throughout the section to support the analysis. The quotations are referenced back to the lecturer from whence they came, i.e. L1 representing lecturer 1.

5.4 Purpose of assessment

The interviews revealed that assessment is primarily used in the School to evaluate the competence of students. This thinking frames most decisions that lecturers make when both designing and using assessments, the aim of the assessments themselves being to determine whether a student is ready to pass a course.

"They definitely have to pass the course otherwise what are we trying to gauge here? So the purpose is to, I suppose that's an obvious, yes, they have to pass the course." (L6)

This evaluation of student competence is seen as a way of establishing whether students are ready for either the working world or the next year of study.

"That they've come to grips with the material and understood sufficiently that they can go onto the next level of taking on the next amount of material or going to the workplace and apply that type of thinking." (L5)

Lecturers elaborated that competence is determined in a variety of ways that can be summarised as identifying if students can demonstrate a deep understanding of course material and the ability to apply concepts to new or unseen problems.

"So I'm looking at, have they understood the fundamental concepts…the fundamental understanding." (L5)

"…if they have understood the concepts. Whether they can apply the concepts in real life." (L6)

A theme that emerges while considering lecturers' conceptions of the purpose of assessment is where the agency or responsibility lies for the competence that is being determined. What is interesting to note from two of the descriptions given by lecturers is the focus on understanding the concepts that have been "taught" or "covered in class" rather than what has been learnt by or developed by the students. Although subtle, this does suggest a particular lecturer mindset that aligns with a teacher-centred approach to teaching and learning. The role of developing understanding is being placed in the sphere of control of the lecturer rather than the student (Gibbs, 1995) and the target is what the lecturer has covered rather than what the student has achieved through the learning process (Biggs, 2014).

"they have understood the concepts ***that have been taught*** *and how to apply it."* (L6)

"To see if the student is competent ***in what they've…what we've covered in class.****"* (L1)

These quotes also frame competence in terms of a rigid course content allowing little scope for developing the students outside of what happens in the classroom. The quotes also suggest that understanding is centred around the content or the product of the

understanding rather than the process of understanding and the development of lifelong learning skills. These ideas are developed further as this chapter unfolds.

Competence is seen to be primarily determined in summative assessments such as tests and exams. Use is also made of more continuous assessments that take place throughout the semester such as tutorials or assignments. The purpose of these continuous assessments is often seen as a way of *"forcing"* (L3) students to keep up to date with course material throughout the semester. Continuous assessments are also used to provide direction to students, giving them (predominantly through performance or marks for the assessment) a sense of whether they are on the right track.

> *"To show students whether they are coping with the material, it's an indicator for the students."* (L3)
>
> "*It's a very quick show of listen you guys don't actually understand the key fundamentals."* (L7)

Assessments carried out during the semester are also designed to prepare students for the final exam.

> *"I suppose the tests are there to give the students an idea of what type of thing is coming in the exam."* (L8)

In extreme cases, some lecturers indicated that tests or assignments are intentionally used as a "*wake-up call"* (L8) or to "*scare*" (L8) students into working consistently towards the final exam. Although assessments are used to provide direction to students, the specific use of feedback (other than marks) is not highlighted by many lecturers as being part of the purpose of assessments.

Assessments are also used by lecturers to monitor if students are coping with material so that concepts that are misunderstood by the majority of students can be recovered in class.

> *"It keeps them up to date with the work and gives them feedback that they understand the work immediately and it highlights to me if there's a problem in the class that they're not understanding the work."* (L5)

In some cases, lecturers described how assessments are used as part of the learning process by scaffolding the ability of students over a semester by *"…building that sort of foundation."* (L7) Continuous assessments are also seen as a means of *"…giving*

(students) *an opportunity to put what they are seeing into practice."* (L3). One lecturer elaborated on the purpose of assessment as providing students with an opportunity to:

> *"Do it and know their safe sort of competency levels, and have worked out what they're good at and what they are not good at*." (L4)

This thinking starts to move into a realm that sees assessment as part of the learning process, developing the requisite skills related to competence and self-reflection in students.

Although there are indications that assessment is sometimes used as a learning opportunity, the predominant thinking in the School is assessment *of* learning whether to determine competence or to provide direction. These findings show similar characteristics to those of Scott and Fortune (2013) who conducted a study of 42 academics in construction management in Ireland. Their findings show that although 86% of their lecturing staff agreed or strongly agreed that assessment should provide feedback to students on their learning (prompted by a survey question), in practice most of the focus is on measuring rather than providing formative learning experiences.

5.5 Choice of assessments

This section captures the current assessment methods that are used by the sampled lecturers and the reasoning behind their choice of assessment methods. The more detailed design of assessments and a reflection on the effectiveness of these assessments are included in the sections to follow.

The frequency of assessment methods used by the lecturers is shown in Figure 6, with most courses using at least three different methods of assessment. Formal low stakes assessments are classified as tests that take place according to a predetermined test schedule during the semester. They occur under exam settings but count less towards the final mark for the course (typically between 25% and 30%). Formal high stakes assessments are traditional exams (typically 3 hours in length) that take place in an exam session at the end of each semester. These exams can count between 50% and 70% of a course mark. Tutorial sessions usually occur weekly to supplement lectures by availing tutors to assist students in working through problems. Tutorials can be voluntary but are often made compulsory by including spot tests or pop quizzes that count for marks to "motivate" students to attend the sessions. Assignments or design

projects are projects that run over weeks (usually 4 to 6 weeks), are typically more open-ended and require students to apply and integrate a variety of thinking and techniques from the course (or in some cases, several courses). These assignments can run individually or in groups. Assignments count between 20% in courses that include tests and exams to over 50% for design based subjects that have reduced or eliminated traditional, formal assessments such as exams.

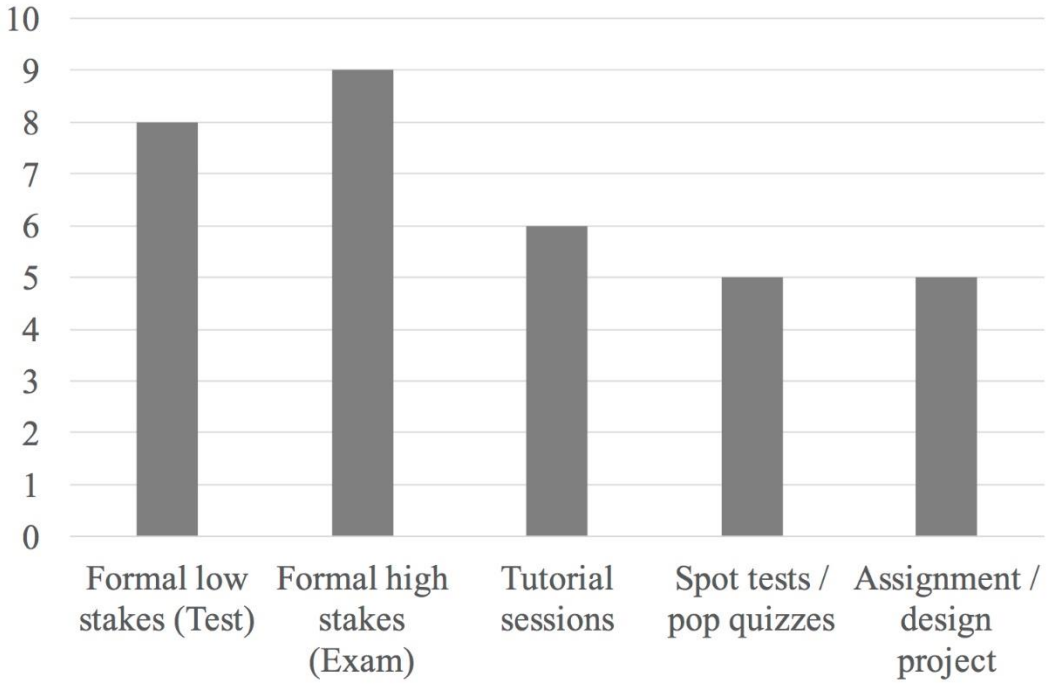


Figure 6: Frequency of assessment methods used by lecturers

When designing assessment tasks, lecturers aim to discourage the use of rote learning strategies. One of the most critical considerations therefore when designing assessments is being able to test if students have a deep understanding of course concepts. When designing problems that are used in tutorials, tests and exams, lecturers are most interested in whether students have gained an understanding of what method to use and why rather than merely arriving at the right answer or rote learning the method.

> *"I'm not so much interested in the: can you do the maths? I'm interested in, do you understand the core part of the question that I'm asking you? …there's theory, but beyond the theory you need to have an understanding. And I'm looking for an understanding."* (L3)

"I want them to understand and an ability for them to show their insight, rather than their ability to remember stuff." (L10)

Lecturers also try to incorporate problems in assessments that require students to apply their knowledge and understanding of concepts to new and unseen problems.

"... we give them scenarios... face(d) with this problem, how would they solve it? So using the information they have and the understanding of the subject area...they then... indicate what they have understood." (L6)

The use of new or unseen problems discourages students from merely learning the method or answer when preparing and focuses their efforts on developing an understanding of the material and the methods and skills required to apply it to solve problems.

"... test something completely that they haven't seen before. Completely different. If you've understood it, you've got it. Well, if you've understood the basics, you've got the problem." (L7)

Lecturers often attempt to design assessments that are authentic, relevant to the real world and encourage students to engage with course material beyond the classroom.

"Try to make assessment more aligned to practising what they do in their everyday job as an engineer." (L4)

"....to try and spark some sort of interest in them, to try and get them to want to keep looking up stuff in engineering ..." (L7).

"It was always just very important to me to set an assessment that was challenging, fun, unconventional and different." (L10)

One lecturer specifically mentioned that when designing assessments, a particular effort is made to: *"give the really good students an opportunity to shine."* (L2) This was the only mention in any of the interviews of assessment design that considers the high-performing students.

In general, the aim is therefore to choose assessments that encourage deep approaches to learning that result in a solid understanding of core concepts and course material and the ability to apply this understanding to problems that relate to the real world of engineering, engaging students in their chosen profession. Most lecturers, however, feel that the current choice of assessment methods (particularly tests and exams) are

not achieving the overall aim and are not shifting students to higher levels of thinking and engagement with course material.

> *"I think the test and the exam were, they were disasters…not disasters in pass rate or anything, just in terms of their usefulness for the course was relatively low, given that the course is trying to achieve something else. So the reason they did badly in the exam is that the course shouldn't have had an exam."* (L10)
>
> *"So I mean, with a course like Design, I almost feel like ideally we shouldn't have exams. Because exams don't necessarily test the ability to design, like I said, last year I picked up that you can easily pass the course just by swotting for an exam as opposed to actually being able to design."* (L1)

Although lecturers identify that current assessments are not optimal, tests and exams remain the predominant forms of assessment in the School. The motivation for choosing exams and tests is often because that is the way that assessment has always been done for a particular course. Many lecturers also admitted that they did not know that it was not a requirement to have an exam:

> *"…That's dictated. I mean, there are very few courses in the School that don't have exams. I think that the technical courses must have exams, although I stand to be corrected."* (L3)
>
> *"I had that in that form simply because that's what we'd done before."* (L7),
>
> *"Probably because that it's always been done."* (L8)

Exams are also sometimes perceived to be the easiest way to consistently and objectively determine student competence:

> *"So, the only reason is it's easy let's put it like that. So, it's the easiest way for me to mark something consistently."* (L1)

Even when lecturers establish that it is not a requirement to use particular assessment methods particularly tests and exams, they often remain resistant to change. Lecturers revealed that they find it difficult to think of alternative ways of assessing whether students understand what they are doing.

> *"I would try and encourage them to rather learn the fundamentals and not learn a recipe so that you get the right answer. Getting the right answer isn't the important bit, it's actually understanding the work which is important. Unfortunately to test that students understand the work is very difficult."* (L5)

Although lecturers aim to design assessments to discourage procedural learning strategies, many lecturers indicated that this is not always possible and that students are often still able to use mechanistic or rote learning approaches.

> *"The intention is to check understanding but that's not always possible. And probably I would say, in both papers, there's probably half of the paper that the students can probably learn in one form or another based on similar questions like that."* (L8)

This is evident particularly in courses where students can practice and learn methods to solve predominantly mathematical problems (surface procedural approaches identified by Case and Marshall, 2004).

> *"....the ones who've managed to memorise enough of the solutions are the ones who end up passing. So I don't think the exams are even serving their purpose…"* (L9)

Lecturers also struggle to design assessments that can distinguish between students who make use of the appropriate methods because they understand the work and those that are merely using methods because they have memorised approaches and do not understand the methods that they are using.

> *"…well it's tricky, if they follow the method and they do everything right…I probably wouldn't be able to know whether they know nothing or whether they know everything…"* (L8).

Misalignment between the choice of assessment methods and the overall objectives and purpose of assessment already starts to emerge at this point. The purpose of an engineering degree is to develop engineers. Being an engineer is not only about knowing but also about becoming someone who can behave in a particular way and fit into a particular context and culture (Barnett, 2009). Exams may be able to test content and possibly even understanding, but they are not necessarily well matched to preparing students to become engineers.

> *"You're basically given a certain period of time to display everything you've learnt over a semester. That's really tough and I don't think it's really fair…..sometimes it becomes about whether you've memorised your tough solutions and practice problems.....the ones who've managed to ...memorise enough of the solutions are the ones who end up passing. So I don't think the*

exams are even serving their purpose and if you want to assess the skills that we want the engineers to have...you can assess some of the theory and knowledge, do they know something you can maybe assess as part of the exam, but being an engineer isn't just about knowing." (L9)

Although there is a tendency in the School to retain the status quo, there are more pertinent questions to be asked about how and why assessments are designed and used in the way that they are. Clearly, there are many constraints that influence the acknowledged misalignment between intended learning outcomes and the choice and design of assessment methods. To explore how this misalignment occurs, the next section takes a step back, considering several elements of the assessment system before revisiting the misalignment towards the end of the chapter.

5.6 Design of assessments

The design and use of assessments are explored by considering three aspects of assessment practices: outcomes, criteria and feedback. This section considers how lecturers view the intended learning outcomes for their courses, what they consider when assessing students, how they communicate what is expected to students (criteria) and how feedback is used. This section considers some of the reasons behind the apparent misalignment of some assessments identified in the previous section.

5.6.1 Intended learning outcomes

The School publishes outcomes for every course in a course outline document. The course outline is used as a quality control document that communicates high-level details of a course. These outcomes are also used to describe the Exit Level Outcomes (ELOs), where applicable, that are prescribed by the Engineering Council of South Africa (ECSA) who accredit the degree programmes.

When lecturers were asked questions relating to the outcomes for their course, it was apparent that most lecturers immediately associate the word "outcomes" with the published outcomes that are included in the course outline. These outcomes seem to be seen as something that is determined in isolation from the decisions that the lecturer

makes in any particular course and it was not clear how these outcomes are actually considered or used when developing and using assessments. The course outline does not appear to be a living document that is used by lecturers to develop their courses, nor is the course outline developed in line with what is done in the course.

When questioned specifically on the word "outcomes" for a course, lecturers found it openly difficult to answer. When asked, more specifically, how they know that assessments evaluate the outcomes for their course, lecturers responded:

> *"…oh, that's a difficult one."* (L1),
>
> "*That's a tricky question….how do you know? How would I know?....I never thought about that too deeply."* (L2),
>
> "*I think so."* (L3)
>
> *"I think I could spend more time on that."* (L5)

This confirms the idea that the outcomes do not appear to inform the development of assessments nor is there conscious consideration of how assessments are aligned to the outcomes.

When the notion of intended learning outcomes was explored and probed further using different words and questions (not outcomes specifically), while lecturers still really struggled to articulate exactly what it is that their course aims to achieve, they did find it somewhat easier to elaborate on ideas. The key outcomes that emerged from lecturers' discussions of their expectations of students all fall into the broad idea of problem-solving.

> *"A methodical approach, a thoughtful, structured, problem-solving method…a creative element….understanding very thoroughly the need that exists, to see the need, solve the problem creatively in a structured way."* (L10)

The lecturers identified five distinct aspects of problem-solving that are important:

- To understand and visualise complex problems
- To source and understand relevant information
- To apply appropriate concepts to analyse/solve complex problems
- To integrate the problem into related systems
- To communicate ideas

Each of these ideas is expanded upon briefly using quotes from the lecturers.

To understand and visualise complex problems

This describes the ability to comprehend and conceptualise a problem that is given and break it down in a way that it can be analysed.

> *"It's getting them to think, understand, visualise, and solve a problem and challenge the brain logically because that's what they're going to be doing in the workplace.."* (L5)
>
> *"So can you can create a very simple logical model of how a complex thing works."* (L4)

To source and understand relevant information

This describes the ability to find and identify relevant information that can be used to analyse the problem.

> *"So you can't teach them everything there is to know, you just have to sort of show them how to dig in the right place."* (L4)
>
> *"Can they integrate the information."* (L6)
>
> *"So they do need to spend a lot of time actually just reading the textbook, reading the notes, and understanding those fundamentals and then going through a problem and pulling the thread across of what I've just understood in terms of the theory or a formulation, how that applies."* (L5)

To apply appropriate concepts to analyse/solve complex problems

This describes a deep understanding of relevant theory and concepts so that they can be correctly and appropriately applied to solve the problem in a structured and comprehensive way.

> *"I need to see that they are forward thinking, and that they don't just think in a box, and try to sort of stick things into little boxes and then apply whatever they've learnt in class to the project."* (L1)
>
> *"So for me it's almost, I want to see a complete solution…that they've gone through the process… identifying what analysis they need to do to get to that final solution…and that they* (don't) *see it in boxes…that they see that the two are linked in between."* (L1)

To integrate the problem into related systems

This describes the ability to see how problems relate to more extensive systems.

> *"Understanding, applying to a certain scenario in the right way and determining how it is related to other things."* (L6)
>
> *"…have they managed to think beyond the project description and actually look at various other …systems that are related to the project."* (L9)

To communicate ideas

This describes the ability to communicate effectively. This communication relates to final design ideas but also to the ability to use a structured and logical approach when explaining problem-solving and analysis that demonstrates an understanding of concepts.

> *"The quality of communication, ability to convey messages, suitable use of graphics or pictures."* (L10)
>
> *"I am looking for a method but such that it shows understanding."* (L3)
>
> *"They also need to justify why they have included particular information."* (L6)

An additional outcome that was mentioned for group projects was the ability to demonstrate all of the outcomes mentioned above while working effectively in a team.

> *"…and also because they're doing it in groups, so we want to see whether they can work together as a group and see that they can discuss these things as well."* (L6)

Although lecturers cannot explain explicitly what the outcomes for their course are and how these align with the published outcomes or their assessment tasks, there is an underlying set of expectations that can be articulated. These expectations align with the process of problem-solving and can be broken down into a critical set of skills that students are expected to exhibit. Whether these expectations align with what is assessed is explored in subsequent sections. The inability of lecturers to link the course outcomes to what is done in the course and what is assessed does suggest misalignment between different aspects of courses and between courses across the degree programme.

5.6.2 Criteria

This section explores the criteria that lecturers use when evaluating student assessments. Lecturers found it difficult to articulate what criteria they use. In many cases, although the question was phrased in several different ways, some lecturers were not able to answer this question. Other lecturers could explain what they were looking for and how they graded students and determined whether students had met the particular assessment requirements even though they did not necessarily associate the ideas with a clear set of criteria. In some instances, it appeared that the criteria themselves are not clear at all.

> *"Design, it's very, very difficult to have set criteria. I try to, where I can I will, so…I mean, if it's stuff like, have they discussed the literature, it's either there or it's not. How well they do it is a different thing, so then I'll try to go on a scale so poor, medium, very good and then excellent. And that's if I see something like really, really amazing compared to what everyone else has done."* (L1)
>
> *"Has he understood, or has he not understood? And so you struggle and say, hm, maybe if I look at this much, much carefully and imagine that I'm thinking of this, ja, maybe we can add one or two marks."* (L6)

Many lecturers described the criteria used to evaluate students in terms of the specific requirements that the *product* that was being designed needed to meet rather than the outcomes that the student needed to demonstrate to be able to design the product so that the product met the requirements.

> *"…has it* (the product) *achieved certain aspects of the task."* (L9)
>
> *"It went down to assessing the quality of the build, the quality of the design that underlines the build, how it performs… just seeing whether as a machine this thing did what it was meant to do."* (L10)

In the case of problem-based assessments, the focus aligned with establishing whether students have an understanding of the concepts that they use to solve a particular problem. The criteria are seen in terms of whether or not the student has included the method steps that demonstrate this understanding.

> *"there are certain steps which to me would indicate that the student has understood this fundamental concept…..they're almost algebra type steps which get marks and which I allocate a certain number of marks to."* (L5)

Although lecturers often evaluate student understanding through the method steps used, there is some hesitancy towards this approach with suggestions that the inclusion of particular steps is not necessarily an indication that the student has understood.

> *"Well its tricky, if they follow the method and they do everything right…I probably wouldn't be able to know whether they know nothing or whether they know everything."* (L8)
>
> *"It's difficult to know whether a student, what they've written down is simply a consequence of them making a stupid mistake and they're carrying on or is it that they're just regurgitating stuff that they learnt from a different problem so it appears like it's a stupid mistake but in actual fact it's a complete and utter lack of understanding."* (L8)

Even though lecturers have identified shortcomings in current practices, criteria continue to be seen more about following methods and procedures and less about the underlying understanding or skills development. For mathematical type problems, the criteria are framed in relation to method steps, and for design projects in relation to sections of a report and the performance of the product that was being designed.

As lecturers move away from exam-based assessments towards project-based assessments, particularly in design courses, a need has arisen to shift how criteria are conceptualised for these assessments. To address the lack of method steps in project type assessments, lectures have started making extensive use of rubrics. These rubrics are used to describe the different elements of the design process that students are required to include. The rubrics are detailed, breaking the process down into the discrete steps (or headings) that would be expected in a design report.

> "*…what I do is break it down systematically where I have a mark rubric and I say, okay, I'm looking for this key information. Have you got this? Fine, you've got the marks then. And I look at everyone like that."* (L7)
>
> *"So break it down as small as possible, removing all the bias as much as possible."* (L7)

Even for project-based assessments, the criteria are focused on inclusion of procedural or method steps rather than the thinking behind correctly selecting and using the methods in an integrated and appropriate way.

In general, lecturers seem to have a product-centred rather than a process-centred view of criteria (Gibbs, 1995). Practically, criteria become about method steps. The breaking down of criteria into discrete elements or steps is also perceived to ensure consistency and objectivity in marking. However, the criteria that assess quality or understanding underlying the steps become much more difficult for lecturers to explain.

5.6.3 Communicating expectations to students

The communication of expectations to students is an integral part of the assessment process. These expectations should link to the intended outcomes of the course and the criteria used to evaluate students' performance in assessments. For students to develop the necessary self-reflective skills, expectations need to be clear and well communicated (Gibbs, 1995; Hattie & Timperley, 2007). This section discusses how the interviewed lecturers communicate their expectations to students.

One of the most frequently used methods of communicating expectations to students is through lectures. Documents are also given to students, often through the online student portal.

> *"I tend to state a lot of things in class."* (L7)
>
> *"I do tend to go through them beforehand, this is how I'm going to mark and stuff like that and their mark breakdowns, to prep them, this is what I'm looking for."* (L7)

The documents are often detailed giving a "breakdown" of what should be included and how many marks are allocated to the different elements.

> *"They get a rubric that explains what needs to be included for example: is it included and how comprehensive have you been."* (L6)
>
> *"I give them a breakdown of what each section should cover."* (L9)

Assessments used during the semester, including tutorials and tests, are also seen as a way of communicating expectations to students by providing them with typical questions that exemplify what will be expected in the course.

Many lecturers see it as the responsibility of students to clarify the expectations for assessments and require students to exercise their agency. Lecturers pointed out that students use many ways to explore these expectations. Some students make use of face-

to-face consultation, arranged privately or in formal tutorial sessions. Other ways include resources - *"Past-papers. There is a textbook and it's pretty standard around the world."* (L5) and finding out from other students - *"Word of mouth".* (L7)

The use of exemplars, seen as a useful means of developing students' self-evaluative expertise (Carless 2015b; Orsmond, Merry & Reiling, 2002), was only mentioned by one lecturer who had tried it once when they had introduced a new assessment technique.

> *"Then I went through a couple of example posters."* (L7)

In general, expectations are communicated to students by "telling" them, typically in class or using an official course document. The communicated expectations appear to focus on the outcome, and little guidance is provided to students on how to develop the skills required. Some lecturers admitted to finding it difficult to explain to students what is required of them to perform well in a course.

> *"Students often ask: Your course is tough; how can I pass this course? And even though I get asked this a lot of times, I always struggle to answer it….have you understood and can you design, do what it needs to do?"* (L9)

This inability of some lecturers to explain to students how to improve could stem from a lack of awareness of the importance of threshold concepts and their role in unlocking understanding and the construction of knowledge and ideas (Middendorf & Pace, 2004).

The product-focused orientation of outcomes for many courses leads to a lack of clear process criteria. Due to the poorly understood relationship between expectations, outcomes, assessment and criteria, lecturers find it challenging to communicate to students what it is that they need to demonstrate to meet the required outcomes. This, in turn, provides an inadequate foundation for the development of self-evaluative skills in students.

5.6.4 Feedback

Due to the importance of feedback in learning-oriented assessment, lecturers use and conceptions of feedback are discussed in this section.

Lecturers generally see the marks received for assessments as the predominant form of feedback. When asked what kind of feedback students get throughout the course, an extreme response was:

"*On Me? Oh, I upload their marks."* (L2)

Students are expected to make use of the marks that they receive to establish whether or not they are coping or doing well in a particular course. For assessments that occur throughout the semester such as tutorials, assignments or tests, it is possible for students to get an early sense that they are not meeting the required expectations for a course, but little useful feedback is provided that can be used to improve understanding or modify study approaches. Marks for final assessments such as exams are naturally too late, leaving limited room for the development of self- reflective skills. Some assessments also need to be kept, for quality control purposes, resulting in students not being able to access the reports or any feedback that may be included.

> *"For the assignment, ah ha! that's a good one. Now for the assignment, because I've marked the assignment…you see, the assignment, what happens, because we need to keep those reports for… So when I give it back it's so hard to get it back from them. So what I tell them is, look, usually what happens, when someone comes and starts complaining that our marks were low, I say, okay, come to my office, the reports are there, you can go through."* (L6)

Marks are sometimes also used to encourage particular behaviours or discourage others – resembling a behaviourist approach to motivating students (Hassan, 2011). Students are rewarded for doing work that lecturers want through the use of marks and are "punished" with the removal of marks if students do something that lecturers do not want them to repeat in future. While possibly effective, marks alone are an inadequate form of feedback to change behaviours (Hattie & Timperley, 2007). In this type of environment, students could also change behaviours to obtain more marks rather than gaining the understanding or skills expected of them.

> *"I'm also giving them bonus marks for stuff during tutorials, if I ask a question and you've done some extra work beforehand then you get an extra percent for the project or something like that, just to emphasise / motivate the extra work."* (L7)
>
> *"…*(students learn), *If I'm going to keep doing this I'm going to get penalised*

and all that." (L7)

Limited individual feedback is therefore provided to students in most of the courses:

"They haven't gotten a lot of individual feedback." (L9)

"No specific feedback was given on the actual scripts." (L10)

Only one lecturer described how detailed and ongoing feedback is provided to students as part of their continuous, formative assessment tasks each week.

"Students can come and get help on it all through the semester." (L4)

Individual consultation sessions are seen as a form of feedback that students can use on their initiative. Lecturers described how students use face-to-face consultations if they require more feedback on any particular assessment. Tutorial sessions are also seen as facilitating these consultation sessions, either with lecturers or tutors.

"Not all tutors give as much feedback as the next but they can speak to the tutors if they have questions." (L9)

Students try to make use of the consultation sessions, but several lecturers disclosed that there are too many students and insufficient time to do this properly.

To address the constraint of insufficient time for individual consultations, most lecturers also make use of a general feedback lecture or a feedback "hand-out" after an assessment like a test or assignment. These feedback sessions highlight common mistakes made by students and perhaps provide some guidance on how students could have approached or should have approached the particular assessment task or problem.

"So, I have this thing where I do a general feedback on design reports at the end of any submission. So once I've marked all of them, they all make the same mistakes, and I take that as a sign that they obviously haven't understood something. So I'll do a general feedback document where I'll say, these were the general mistakes and this is how you should approach it to solve the problem. I do that in the interim and I see that they don't fix it for the final report either. So they actually just don't read their things, or I go through it in class even, so they either don't come to lectures or they don't read it or there's just…there's a broken link somewhere there." (L1)

It is quite clear from this quote that although various means are used to provide general feedback to students, it is not necessarily resulting in an improvement in what students can produce.

When used, rubrics are also seen as a primary source of feedback.

> *"So they'll get each get a rubric, and the rubrics last year were very, very detailed, so they each had…it told you basically, in each section of the design report exactly where you went wrong and what you should have done."* (L1)

However, a thought-provoking realisation that occurred during the interview for this particular lecturer was that rubrics, although designed with good intentions, were possibly reinforcing the types of approaches to assignments that lecturers were trying to move away from.

> *"So I almost think that the very detailed rubric can be a disadvantage. Because they're just trying to tick boxes at the end of the day."* (L1)

This specific course has started to move away from exams and tests since students can merely adopt procedural approaches to solving problems without understanding why they are doing what they are doing. Assignments and projects are seen as a better way of encouraging students to develop the necessary process-type skills, and yet, rubrics are potentially encouraging students to go through the breakdown, ticking off steps in a procedural manner in order to "get marks". It is as if attempts to improve assessment practices are not addressing the root cause issues, and revised practices are falling into the same traps, resulting in a vicious cycle that is not changing the underlying behaviours of students or lecturers.

Rubrics include a list of elements that make up the design process for a particular project with an allocated mark allocation per element. They do not provide any information that relates to the quality of the different elements or address what would make a particular submission better than another one (Carless, 2015b). The rubrics also do not give students any indication of what holistic design skills need to be developed. The breaking down of a process into discrete elements has the potential to encourage "boxing' of the overall approach, without the development of skills that can integrate the elements. The use of rubrics as a tool for developing criteria and providing feedback is not necessarily aligned to intended outcomes (Mentkowski, 2006), leading to misuse by both students and lecturers.

The use of feedback appears to expect students to read feedback notes or listen in lectures, a "telling" style of feedback (Boud & Molloy, 2013). There seems to be a gap in encouraging engagement with feedback which affects the overall active learning process (Carless 2015b). Feedback is typically aligned to "what" needs to be improved, a focus on the diagnostic element (Boud & Molloy, 2013), and not the "how" of getting there, the bridging-the-gap element (Boud & Molloy, 2013). Feedback is also often generic since it is generally provided to the class as a whole and not individually to students. These factors affect the degree to which students can use feedback to reflect and self-evaluate.

5.7 Student learning behaviours

As discussed in Chapter 2, the strategies and intentions exhibited by students are strongly influenced by assessment practices. This section discusses how lecturers perceive student learning behaviours and dispositions and considers how these could be influenced by assessment practices. The section also considers how lecturers' design and choice of assessment tasks is influenced by their perceptions of student responses to assessment.

One of the most frequent observations that lecturers made about students is that they do not manage their time effectively. Lecturers experience that students: *"…don't work consistently"* (L8) and that they start working on assignments, in particular, way too late.

> *"…I'm now seeing more activity towards the deadline of the assignment …you've had perhaps two months… now a week before handing in you're now asking me what you are expected to do! And I'm so surprised. What have you been waiting for all the time?"* (L6)
>
> *"They really just battle with their own time management. And the thing is every single design project that's ever handed in, the students have got regret that they weren't able to do a better job."* (L4)

Time management is perceived slightly differently by some lecturers who imply that there is generally insufficient time for students to do what they need to do. This "lack of time" due to excessive workload or poor planning leads to some serious

consequences for student learning approaches. As students are pressed for time, lecturers believe that students start to sacrifice understanding to get through all the material.

> *"They're just playing catch up, and then the understanding goes with it."* (L2)

When asked why students memorise instead of understanding, this lecturer suggests:

> *"They're trying to do what they can in the time that they've got and maybe the thinking gets lost because they don't have time to think and reflect."* (L9)

Whether driven entirely by issues of time, most lecturers explained how students generally do not focus on trying to understand the material. This was observed in lectures and in the way that students study.

> *"They're in class, and they're writing things down and you ask them a question, what's going on here? Why is this happening? You get no feedback, because they don't understand."* (L2)
>
> *"Learning recipes rather than actually engaging and understanding the fundamentals."* (L5)
>
> *"instead of working their way through … and bashing their heads… they read the solutions and it all seems blindingly obvious"* (L8)
>
> *"they tend to get through on memorising solutions to various types of practice problems that I have given them."* (L9)

As a result of these rote or more procedural approaches to learning, lecturers also believe that students do not actually retain what they are learning in courses.

> *"It has all gone, whoosh! Forgotten."* (L6)

Another observation that leads to similar approaches is student obsession with marks. Students are believed to prioritise and focus their attention based on the marks that are provided for any particular assessment. Students work harder when there is a formal assessment, and they work even harder when the formal assessment has the largest weighting. This focus on marks seems to once again lead to learning approaches that compromise on gaining an understanding of concepts and material.

> *"Sometimes I think like…they're very focused on sort of trying to get as many marks as they can, and they focus on that more than trying to understand what they're actually doing."* (L1)

"So the thing that shocked me… is that they were so focused on getting as much as they could of that 5% that they didn't see it as a feedback opportunity, they saw it as an opportunity to get 5%." (L1)

In extreme cases, the focus on marks not only affects learning but can also result in student copying and plagiarism.

"I let them talk (in tutorials)*, I didn't tell them to do it under test conditions. So they'd literally just copy. And I mean, I didn't want to get to the stage where I'm like policing them and being, no, you can't talk, it's test conditions, because that's not how you learn, and I believe that you can learn from each other. But at the same time you shouldn't just be using that to copy down whatever your friend has done and not asking for an explanation or something like that from the tutor. So that was the problem with the tutorials, which is why I stopped formal tutorials."* (L1)

Another observation made by lecturers is that students lack a structured, methodical approach when tackling problems.

"Students often don't use a methodical approach when trying to solve problems. They just launch in with some equations. And then they get it wrong." (L2)

"…the students have a mechanistic approach … {without} the subtleties as to why you should be doing this or that." (L8)

This tendency to launch into problems without an overall approach suggests that students have a lack of understanding but may also imply that students are struggling beyond the content of courses and lack essential underlying problem-solving skills and strategies.

Students are seen to have a narrow focus that affects the acquisition of conceptual understanding and hinders the development of the skills that will be necessary to solve real problems in the working world once they graduate (Boud, 2007). This narrow focus also reaches beyond skills to attributes including the development of self-confidence and the ability to self- evaluate and work within safe competence levels. This is perceived by several lecturers as a focus on relying on lecturers to tell students if they have what is seen as the "right answer".

"The students continuously ask me; can they have answers for it?". So you have to have confidence in your own competence. And that's something which I try and hammer home with them. That's how you get them from university students to being useful in the real world." (L4)

"This notion of the correct answer was…is something that's always been an annoyance for me. This idea of students that there is such a thing at all. I think that's my biggest frustration is that students seek the right way to solve a problem when…or they seek the right answer when what they should seek is the right approach." (L10)

Students expect and rely on lecturers to determine if their work is of high quality. There is a sense that the agency for learning and assessing lies with lecturers, impeding the ability of students to develop self-evaluative expertise.

"That is the number one question students always ask is what are you expecting? Where's the rubric? Is this right?...Their biggest question is, how will I be assessed? Is this work good enough? Have I done enough?" (L4)

The idea of agency is not limited to self-evaluation of work quality as lecturers pointed out that students are reliant on the use of mandatory assessments such as tutorials to keep them up to date throughout the semester.

"In the last year and the year before, the students said, could they go back to weekly tutorials to force them to do it?" (L4)

With the adoption of mechanistic approaches to learning and assessment tasks, many students "box" aspects of tasks and fail to see the links between aspects of an assignment, sections of reports, problems and surrounding systems and how courses and the degree links together as a whole. This manifests in student approaches to particular assignments:

"Students end up splitting parts of a report (between group members). *And this is a problem, not only because you're not actually practising but also because then you're not realising what the link is between everything. And if you're having to do the entire project that becomes an entirely different story."* (L7)

It is also sometimes apparent in student attitudes towards particular courses. In a first-year, critical thinking component of the design course:

"…students immediately see it as English and shut off." (L7)

The following finding really stood out in many of the interviews as something that lecturers were particularly passionate about and frustrated by. There is generally a perceived lack of resourcefulness or a proactive sense of enquiry amongst students. Some lecturers refer to this sense of disconnectedness as a lack of engagement or limited curiosity in the engineering world. Students are also often seen as doing only what is required and no more, either within courses or their approach to their career development holistically.

> *"The majority of students give me exactly what they've been given…about ten percent would give me something beyond that."* (L9)
>
> *"What students could do differently to improve their performance: A lot of it, I'd say, is work outside, but it's not work on the course. But it's extra, wanting to get involved in engineering."* (L7)
>
> *"But I think the biggest thing which I think our students should do, which they don't, is get involved with the big courses that are coming during the sort of November/December/January break. Almost read ahead. And they don't."* (L4)
>
> *"So the students read, believe, everything in the textbook. They're not keen to go and get several books from several authors to see, is that particular thing explained the same way? So they generally chase one form of what they define as understanding. And by doing so they're just demonstrating that they don't actually understand."* (L4)

Emerging from these ideas, other related issues raised included struggling to know which information to locate and where to get it, struggling with communication and language particularly engineering related jargon and nomenclature and comprehension of a problem.

A recurrent issue around student behaviours in many interviews was poor lecture attendance, particularly towards the end of semesters. Poor lecture attendance is seen as a major issue by lecturers due to the fact that lecturers currently make extensive use of lectures to communicate expectations and provide feedback. In most instances, lectures are the primary means of communicating these important aspects of the assessment process. In extreme cases, lectures are the only means of communicating assessment issues and from the students' perspective, if a large portion of students are

not attending lectures, then these students will not receive feedback and may not understand the expectations of the course. Lecturers suggest that workload and time management could be factors that influence lecture attendance but given its importance in the current assessment process, this is an issue that warrants further exploration in the discussion of student focus groups.

Although most of the comments in this section discuss shortcomings in student learning behaviours, several interesting comments describe scenarios where students exhibited desirable characteristics that suggest deeper engagement and learning. Both examples relate to assessments that involve group work and that are of practical relevance.

> *"Their assignments, their group assignments, and their more or less practical field related, these are the best marks they get, generally. ...they do so well when it's got that practical aspect to it and when they're sort of working in groups."* (L6)

This lecturer gives an example of how students from poorly resourced communities took a real interest in a particular assessment because:

> "*..they saw it's usefulness and applicability."*(L10)

Other examples of exemplary work mentioned related to similar assessment tasks:

> *"...they enjoyed* doing *it, so they spent an unbelievable amount of time on the project. So the enjoyment was important."* (L10)
>
> *"... they really saw purpose in what they did. They really discovered that what they do is meaningful. So again they were able to throw time at the project, which ordinarily they probably would not have done.* (L10)
>
> *"...they displayed…their underlying curiosity, their willingness to explore, their…their creative open-ended, open-minded approach to solving problems. And their…their kind of innovative nature in solving a problem in a different way."* (L10)

These students clearly saw the assessments as relevant and meaningful. A number of students study engineering to make a difference in their communities (Case, 2013) and these methods of assessment align with these aspirations evoking interest, creativity and motivation (Bransford et al., 2000).

There is a range of perceived student learning behaviours that lecturers used to explain student performance in assessments. It is also apparent that student learning is closely linked and potentially strongly influenced by the assessment practices in the School.

5.8 Constraints

Lecturers were explicitly asked to comment on any constraints that they believed affected their choice and use of assessments.

Class size was identified as one of the most significant constraints that influence assessment choices as it affects group sizes for assignments and activities, teaching methods, availability of equipment for laboratories or practical work and marking loads. This constraint influences the methods of assessments that are chosen and how they are designed and used in the School. The increasing use of multiple choice questions in tests and exams was mentioned by several lecturers as a means of coping with large classes.

The other major constraint that was identified was time. Lecturers revealed that they felt that there were often too many conflicting priorities and that more time could be spent on improving assessment practices if this was available. Several lecturers also mentioned that they wanted to spend more individual time with students and believed that this would improve the quality of assessment practices and student learning. Due to lecturer time constraints and the large class sizes, lecturers, however, felt that there was insufficient time for them to spend time one-on-one with students.

> *"...more time individually with students."* (L10)
>
> *"I wish that I could spend more time with individual students."* (L9)

The lack of time for lecturers to reflect is a common theme globally due to workload and conflicting academic pressures (Biggs, 2014).

A common theme that emerged from interviews relating to why students do not perform as expected in assessments was the time that students have available to assimilate and synthesise course material. It was felt that this occurs due to a curriculum that is too full, containing excessive content which does not provide sufficient time for students to understand essential concepts, well captured in the following comment:

> *"The students don't have time to assimilate properly, they're expected to do so much, and, you know, every lecture period is just push, push, push. Every tutorial is, you know, catch up, catch up. We don't really have time to stop and say, okay, here's an example that we can go and do in the lab, or bringing me to the class and spend a whole lecture on breaking it down and looking at the mechanics of it. There are small things that you can do. You can show videos, you can bring small (examples) into the class, which I do, do from time to time. And I do see that the students appreciate seeing something physical. But time is against us all the way, and to make time to bring things like that in is a problem. And maybe it is that our curriculum is too full. I have this view that I don't have to teach the students everything."* (L3)

Lecturers also identified student plagiarism as a constraint that changes the structure and design of assessments. Many lecturers spoke of attempts to introduce more assignments instead of, or in addition to formal tests, but that this was often stopped due to the high levels of plagiarism and copying in writing but also in the solutions provided and the approaches used. Several lecturers mentioned in their interviews that assessments were chosen to assess objectively and consistently and to assess individual competence. These perceived requirements often influenced the choice of assessments, influencing criteria and the way that assignments are designed and marked. Lecturers sometimes shy away from group assignments that complicate the evaluation of individual competence. The use of assignments that encourage collaboration between students often makes it difficult to establish the contribution of individuals and copying and plagiarism are often an issue (Gibbs, 1995) particularly if assessment tasks require students to work towards convergent rather than divergent goals (Carless, 2015b).

Although some lecturers mentioned that tutors are sometimes used to assist with tutoring, marking, consultation and feedback loads, those who do use tutors often complained about the lack of competence of the tutors. None of the lecturers have ever trained or worked with tutors to develop them or standardise marking and feedback.

The structure and non-collaborative culture of the School was also mentioned as a factor that influenced the motivation and enthusiasm for making changes to assessment practices:

> *"Many... the enthusiasm in the School for changing things. I think generally though given…there's a tremendous amount of freedom to do whatever you want actually, that's the truth. The reality is, if I wanted to change my assessment techniques I would have to spend a tremendous amount of time designing that…If I'd had a team around me that would have helped, but I was me."* (L10)

It is evident that there is a range of constraints that influence the design of assessments. These factors also have a significant impact on creating the right environment for change and reflection and freeing and motivating lectures to spend time on creating assessments that align with the expectations that they have of students.

5.9 Self-reflection and change

It is apparent that the design of assessment practices is not necessarily transparent and clear with distinct misalignment between expectations, criteria, the assessments used and the techniques to evaluate students and provide feedback. Emerging from this assessment context are a range of inappropriate student learning behaviours that are reinforced by the overall assessment practices. Although there are many constraints that influence assessment decisions in the School, several positive changes were identified. There is also an acknowledgement in the School that assessment needs to be improved and lecturers appear to be open to a process of self-reflection. Creating a culture that supports positive change is critical to fostering a willingness to experiment and reflect. This section considers some of the shifts in assessment practices that are moving towards assessment for learning and considers why these changes occur and what barriers exist to further change.

Many of the interviewed lecturers described changes in their assessment practices that have taken place in their courses over the past two or so years. Previous sections have shown that assessments are often inappropriate and poorly aligned to what courses are trying to achieve. Changes to assessments have generally been designed to address these shortcomings including ways of engaging students better, making assessments more relevant to the real world and making the assessment process more fair to

students. The most significant changes have been the removal of exams which was described by lecturers as having occurred in three courses over the past two years.

The inspiration for change comes from a variety of sources. Some lecturers make use of feedback from students through course evaluations or surveys to make changes to courses. One lecturer described how their course is very flexible, relying on student involvement in the development of the curriculum and how continuous assessments unfold over the semester. This aligns strongly with a student-centred approach where students are involved in decisions about assessment and the curriculum (Gibbs, 1995; Boud & Falchikov, 2006; Carless, 2015b).

> *"I make up the course for that student cohort as we go along…so the students actually have a say in what comes next in the course."* (L4)

Feedback on courses and assessments is also gathered from external examiners and other lecturers in the department. When questioned around benchmarking and researching new ideas, most lecturers make use of online resources to look at the latest developments in software, determine what is happening in industry and identify curricula at other universities. Only one lecturer had attended a teaching and learning workshop arranged by another school that had inspired many changes in their teaching and assessment practices.

Minimal benchmarking or sharing of ideas occurs outside of the School. Most lecturers indicated that they had never thought about this opportunity and although they could see the value, they would not know where to begin.

> *"So not outside the university, I haven't considered…more I wouldn't know how to actually approach that."* (L7)

It does seem interesting and perhaps ironic that lecturers remarked that students are not willing to go beyond or find out about the world around them, yet they seem to have similar approaches to their teaching practices.

Factors that reinforce lecturer resistance to change include fear, a lack of confidence and competing academic pressures. Although these factors are common (Ritchie, 2016), they do raise questions around the agency of lectures in making shifts in teaching, learning and assessment practices. Younger lectures specifically do not feel

that they have sufficient authority to make changes. Although this may be a perception, it does seem that there is a culture in the School that is not necessarily supportive of all change, indicated in the following statement:

> *"I'm not sure how much leeway I have in changing things. I know there was quite a bit of…I know one of the other lecturers was quite upset that I had already changed the tutorial…I'd broken it down even further from just spot tests to spot tests and pop quizzes. Ja, there was a big like upset about that. So to be quite honest, I don't know if I have a right to change things in the course; it has nothing to do with what I think is best for the students, it's just like I'm following the recipe."* (L2)

There is an element of poor self-confidence and motivation to use resources to make changes in their courses. It appears that lecturers do not know how to improve their courses, but these same lecturers also admit to doing little to find out or do research on the topic. It appears that higher education is not seen as a field with networks, organisations, research and resources. Lecturers seem to confine their scholarly thinking to their engineering discipline but do not see opportunities for extending this thinking to their teaching and assessment practices. This again raises questions around agency but could also highlight a general lack of awareness of research and enquiry in the teaching and learning space.

> *"And perhaps I have a lack of imagination for another way of assessing/run out of originality."* (L8)
>
> *"I think that I need to have some fresh ideas. And I must say I'm not a person for whom that comes naturally. I'm not a creative person, I'm a conservative person who just, okay, this is what I need to teach, and like this is now what I need to do…."* (L3)
>
> *"I haven't made a huge effort."* (L5)

When lecturers do put effort into their courses, it is often aimed at the development of course notes or ways of explaining concepts better to students. This again aligns with a teacher-centred approach with lecturers taking on the responsibility of improving student learning rather than finding ways of getting students to change their learning behaviours (Gibbs, 1995; Biggs, 2014).

> *"…and put effort into the notes and the explanations* (L3)

"I mean, I guess, if it was really simple and easy like click to my finger, I would be doing it. And…ja, I suppose I could spend more time preparing lectures…"

Although every lecturer acknowledged the importance of improving assessment in the School, constraints were often used to justify not doing anything.

"…it's just balancing lecturing with research requirements, with admin, with supervising students. But it's only that…it is super important". (L5)

"…is there a better way than exams to actually assess the students correctly, or effectively? And so I think those are the kinds of questions. and given that we have limited resources in terms of time and personnel, and also the fact that classes are becoming bigger and bigger and bigger, how does one deal with that effectively"? (L6)

One lecturer also raised the current environment and culture in the School and the university more broadly, suggesting that a general feeling of antagonism can close down the appetite for innovation in assessment.

"It's become so difficult, and I found with this job that I'm honestly scared to death of students at this point. Like, it's silly things like, you'll worry if you…so in my first ever class lesson I said, for this course, I had a four-mark question for MCQ (multiple choice questions), *and they complained so much, it became such a big thing, that this question was four marks, but after that I'm just like if you do anything that has major consequences for them, you're almost at their mercy. And it really, really feels like that. In the institution of the university, coordinating that work plus this course has honestly led me to believe that like as a lecturer you have no say-so. Whatever the students want, they will eventually get, and if they want to complain we'll have to change something about it. So with things like that, I mean, if I'm going to assess their understanding, they'll literally just riot and then I'll have to change it."* (L1)

There are several structural and cultural constraints that influence the perceived and inherent agency of lecturers. It does appear, however, that there is a need for a more supportive environment and culture in the School and the institution more broadly that facilitates and encourages more profound levels of reflection around teaching practice.

5.10 Alignment between expectations, assessment practices and outcomes

There is an apparent misalignment between many of the assessments used in the School and the student learning behaviours that are being supported and in some cases potentially encouraged. This section summarises some of the more obvious forms of misalignment that were identified.

The use of exams is the aspect of assessment that lecturers believe is most misaligned to establishing if students are competent as well as eliciting desired approaches to learning. Issues with exams include their time-constrained nature as well as their ability to actually test whether students have gained a deep and conceptual understanding of the course material, as described:

> *"Exams are time constrained which does not allow the right type of assessing. They need to play around for a day and you can't do that in three hours."* (L4)
>
> *"It's getting them to think, understand, visualise, and solve a problem and challenge the brain logically because that's what they're going to be doing in the workplace. It's going to be a new problem and something quite differently but they'll certainly have to use that ability to spatially understand how a machine works if they're designing machines or using CAD or just even understanding the specifications for a machine. And yet, the assessments test something else entirely."* (L5)

The problems with exams extend beyond the evaluation of content and understanding to their ability to identify a greater range of skills and attributes, better linked to lifelong learning (Gibbs & Simpson, 2004). The following lecturer describes how a 'good' student needs to demonstrate particular attributes including an engaged attitude, an enquiring mind and an ability to critically discuss and contribute to a particular topic. The students who do well in exams do not exhibit these attributes and worse still, those that do demonstrate those attributes can end up failing an exam. This raises serious concerns around the appropriateness of assessment methods and the processes that surround their development and use.

> *"I think a good student for me… would be a student who…first of all attends lectures, and is active in class. You ask questions, they're able to answer…raise their hands, are participative, they give suggestions, they're into*

discussions…and they're asking questions… does it translate in what they are able to express if it's written, …because now all the assessments are written, there's nothing oral. What I wonder is, does that bring out actually what the student has been doing in class? So you start wondering because it's true that a lot of students don't attend lectures; there's some who hardly come, but then they do well in the exams. So you wonder, have they sort of got the skill of doing exams. Even when you are in the junior school and so on, there are some skills you learn, how to pass exams, you know…so to me, I'm not sure there's a proper match between those two. Because yes, there are students who are quite active in class and so on, but may not actually in the end (achieve) *the outcome of their exams and so on, may not reflect. Maybe they are just like middle…they might just pass or just be there…or even fail sometimes surprisingly."* (L6)

Again, this misalignment could naturally lead students to shift their behaviours to pass exams instead of developing more authentic and lifelong approaches and skills.

There are some tangible issues between learning expectations and teaching and assessment in the School. The two most evident include communication and approaches to design, problem-solving and group work. Many lecturers indicated that students struggle with communication and yet the development of communication skills is something that is dealt with in isolation from technical content. In the first year, communication is taught by another department in a separate course. Lecturers acknowledged that students do not take this course seriously as they see it as something separate from their degree. In the second year, the teaching of communication and the design process have been moved from one lecture to three lectures (L1), in a full year course. This highlights the lack of emphasis on the development of communication skills despite their stated importance. Lecturers also admitted that the development of group skills is critical to the development of engineers and yet, although many lecturers place students in groups for projects, group skills are never taught, developed or evaluated.

The development of group skills is further inhibited by the perceived need to assess individual competence. When designing assessments, although some lecturers argued that group skills are critical, there is an underlying perception that students need to be assessed individually which results in contrived and counterproductive assessment

practices. For example, most lecturers complained that students do not see the bigger picture yet they require students to submit and complete parts or sub-sections of a full design report individually to prove that each student is competent. Responses similar to the following interview extracts were expressed by several of the lecturers who make use of group projects:

> … *"So even the group project, even though it is a group report, I try to just…to put in a little bit of individual assessment… they submit their code and I assess the code mainly on just how they structure the code rather than the functionality of the code. So have they used functions correctly, and are they commenting and that sort of thing. And does the code make sense? Is it structured? Does it flow well?... I'll say, okay, at least each person must have a portion of the code that they have written themselves. So it shouldn't be a group collaborative effort for the whole code. So then I've said…each person must develop ten percent of the code and then I will assess them individually on that… Then with the report, I've said at least ten percent of the report…must be written by a specific individual, And then I'll just give you an individual mark on your communication….and then the rest of the report is group mark….because each person has to be competent…each person has to be competent."* (L9)

It is therefore not surprising that students often produce fragmented reports and appear to be populating sections without a holistic understanding of how ideas should be integrated into the whole.

Skills such as communication and group work should form an integrated part of all courses. These skills should also ideally be developed across courses and throughout the degree programme. The current issues around integration and development of these skills suggest that misalignment occurs on a broader degree programme level. Although lecturers understand that there is a misalignment in courses, how courses fit into the bigger picture of the degree is possibly something that needs to be explored further. Only one lecturer considered how a course was holistically shaping the person, the engineer for the working world.

> *"So…we're sort of…or me in particular…training up sort of master-chefs that can run their own restaurant kitchen, and actually we should probably be focusing up on more sort of how you fit into a massive integrated team. I don't*

know if that just applies to a design course or whether our whole mode of education should fit into it." (L4)

The misalignment extends beyond assessment at a macro course level. There appear to be issues around misalignment that stretch across the curriculum of a course including content, teaching and assessment and the degree programme as a whole.

5.11 Conclusion

Lecturers, in the interviews, were open and enthusiastic about sharing their experiences and use of assessment. Although the purpose of assessment is driven by the need to establish competence, there is an underlying consensus amongst lecturers about the levels of engagement, dispositions, behaviours and abilities that students need to acquire through their degree. These outcomes operate at higher levels of thinking requiring students to exhibit relational thinking (Biggs & Collis, 1982) and strong elements of metacognitive thinking (Bransford et al., 2000). Many of the issues identified by lecturers suggest that students are operating at uni-structural or perhaps multi-structural levels of learning (Biggs & Collis, 1982). Students may show an understanding of the content, but they are often unable to 'conditionalize' the knowledge by showing why or under what conditions the knowledge applies (Bransford et al., 2000). Students are also perceived to lack time management skills and adopt mechanistic approaches that are focused on getting marks rather than understanding. Students generally struggle to operate at the relational and extended abstract levels (Biggs, 1991; Crawford et al., 1994).

Lecturers' ability to articulate the intended learning outcomes and criteria for their courses is limited and as a result, communicating expectations to students and providing feedback is difficult. The criteria that are used often centre on the product of the assessment tasks rather than the learning processes involved. As a result, feedback accompanying the criteria is typically more diagnostic than showing students how to bridge the gap (Boud & Molloy, 2013). Feedback is generalised, and students need to seek out individual feedback through consultation with lecturers. The use of rubrics has been implemented to provide more explicit expectations and feedback to students,

but the rubrics appear to be poorly designed and lead to procedural and tick-boxing approaches.

High stakes summative assessments, tests and exams, remain the predominant assessment method used in the School despite obvious and acknowledged shortcomings in achieving the desired outcomes. The reasons that these assessment methods persist is partly because of the historical way that they have been conceptualised and implemented but also because there is a lack of experience in the School with other assessment methods. Shifts to assignments and even tutorials in the School may present a number of challenges that are yet to be resolved. Almost all lecturers concur that current assessment practices do not align with the overall objectives for courses. This occurs against a backdrop where students are frequently *passive and bored*, do not engage with course material and exhibit mechanistic approaches to their studies. The relationship between assessment practices and current student learning behaviours is not necessarily well understood, but it is acknowledged that the two are interrelated. As a result, despite several constraints, including large class sizes and a range of academic pressures, lecturers are making changes to improve the alignment of assessment with learning and to engage students better.

Overall, however, there appears to be a lack of a systemic, holistic approach to teaching, assessment and the curriculum in the School. There are no formal teaching and learning structures in place, there is ad-hoc use of pedagogical tools and techniques, and most changes are implemented independently from other courses or the degree programme. Lecturer agency is therefore affected by a lack of awareness and confidence in teaching and learning as a discipline. There is also no evidence of the use of broader networks to gain exposure to teaching and learning experiences beyond the School itself. Many of the changes to assessment continue to place the onus on lecturers with limited transfer of the responsibilities of learning onto the students. The School appears to be becoming increasingly more efficient at assessment *of* learning instead of moving towards assessment *for* learning.

Chapter Six

Grade-grabbing

Findings from the student focus groups

The student surveys provided an overview of students' interaction with assessments in the School (Chapter 4) while the lecturer interviews provided insights into how assessments are designed and intended for use (Chapter 5). Both of these data sources have been invaluable in revealing how assessment influences how students adapt and respond to their learning contexts. Up to this point, however, the data has not always been able to provide rich explanations for student learning behaviours. The focus groups afford an opportunity to interact with students in a way that will enhance and elaborate on the findings thus far.

This chapter presents the findings from the student focus groups. It briefly discusses the profile of the focus group participants, presents process observations from the focus groups and an introduction to the findings followed by the findings themselves. The section ends with observations made from the student focus groups. This section discusses the focus group findings separately from the findings of the student surveys and the lecturer interviews (unless data from the previous data collection methods informed the data collection process for the focus groups). The findings from all three data sources are brought together in an analysis and discussion in Chapter 7.

6.1 Profile of focus group participants

The profile of the focus group participants was introduced in Chapter 3. There were four focus groups in total chosen based on student performance in their second year of study. The four groups were classified as high-performing, mid-performing, low-performing and the turnaround groups. In this chapter, the groups are referred to as low, mid, high and turnaround. It is interesting to note that the participation rate of the students in the low and turnaround categories was significantly greater than that of the high and mid groups. When conducting the focus groups, there were also distinct

differences between the groups suggesting that obtaining data from these four distinct categories was relevant and worthwhile for comparison purposes.

6.2 Process observations

In all of the focus groups, all participants contributed to the discussions. While participants often agreed or reinforced the ideas of others, there were situations where participants openly disagreed with each other suggesting that participants felt free to participate and did not feel pressured to have a particular opinion by either the facilitators or fellow participants. It was easy to tell when there was consensus around any participant's response, with laughter being the most common way for students to indicate that they could relate to and agree with what someone was saying. Other ways of telling how the group was responding to any participant were through the nodding of or shaking of heads. In all of these cases, notes were made by the facilitator and research assistant.

Many students were particularly honest during the focus groups often sharing very personal and emotional experiences. There appeared to be good relationships between the students in all groups – a sense of community - perhaps based on the premise that this was a common experience for them and something that they all felt a part of. In some focus groups, participants knew each other, but this was not the case for all participants nor for all groups. This familiarity did not seem to result in a situation where some students were less eager to speak than others. In fact, in most groups, particularly at the beginning of the focus group, it was as if every participant felt that they needed to contribute to each question individually even if merely to state that their experiences were similar to those of a previous participant. In only one focus group did a particular participant start to dominate the conversation towards the end. Participants were most hesitant to answer when they were asked the question that required them to consider what they would change in future. Although this question was asked at the end of the focus group, it was followed by a question that required them to reflect on what the School could do differently, and this typically resulted in many thoughts and suggestions. The reason for the lack of self-reflection is discussed further later in this chapter.

6.3 Introduction to the findings

As discussed in Chapter 3, data from the focus groups were captured in a spreadsheet. The final spreadsheet is too large to be legibly placed in the chapter, but a photograph of the overall process can be found in Appendix G. The themes were then grouped until thirty-four sub-themes remained. These sub-themes were arranged in a mind map that can be found in Appendix H. The purpose of the mind map was to guide the presentation and analysis of the findings and not to establish definitive cause and effect relationships between themes.

Quotations from the focus groups are provided throughout the section to support the analysis. The quotations are referenced back to the focus group from whence they came i.e.

- FG1: focus group 1, the mid-performing students
- FG2: focus group 2, the high- performing students
- FG3: focus group 3, the low-performing students
- FG4: focus group 4, the turnaround students.

6.4 Planning

Students were not explicitly asked about planning or prioritising of their work in the focus groups. They were asked to describe how they approach their studies on a week-by-week basis throughout the term. The dominant discussions for all focus groups, in response to this question, were, however, around the notions of planning and prioritising of work. When considering planning, there are distinct differences between the responses from the four focus groups.

In the high-performing group, all students spoke about planning and schedules. The high-performing students tend to have long-term plans that consider an entire semester of work at a time. Participants also spoke about the fact that although planned, their work schedules are flexible, based on current work demands. The plans of the high-performing students also appear to be more proactive, anticipating potential stress due to deadlines and accommodating this in their schedules. Although carefully planned, some participants did mention procrastinating at times.

In the mid-performing group, some students admitted to planning while others indicated that they did not plan, preferring to approach each day as it came. The planning in this group appeared to be less formalised and proactive. The variety of responses from this group included:

> *"...I draw up a schedule and try and link it to the class timetable."* (FG1)
>
> *"I do not have a plan, I do not have a schedule."* (FG1)
>
> *"I learn more when I'm under pressure, so I set a reminder for every test coming up in the week…for assignments, I just wing it."* (FG1)

The last quote could refer to either a flexible or an ad-hoc approach. The suitability of such an approach would depend on the student's ability to meet deadlines while still addressing the required learning outcomes associated with particular assessment tasks. This would depend on the approaches that are used and the extent to which the lack of planning influences these.

The low-performing students also indicated that they plan but the time horizon seems much shorter, considering only a week or month in advance. The low-performing students seem to be more reactive, often planning based on the current stress that they are already experiencing. This participant describes how planning is influenced by workload pressure:

> *"With me it's more of a pressured thing, like on a weekly basis as to what's…like what's…is there any pressure for like a test that coming week, or an assignment, then that's what I work and I think that's normally that guilt or that fear that (motivates) you, but really I don't have a plan either as to, you know, like, okay, this is what I'm going to do this week, but depending on what's needed from me that particular week then that's what I'll do. Like I just take things as they come."* (FG3)

The degree to which planning takes place and the time horizon seems to be a significant difference between the groups, which could be related to performance. This is reinforced by the turnaround students who indicated that one of the critical shifts in their weekly studying routines was towards a more planned approach:

> *"What I used to do is I never used to have like a work schedule, but then the following year I used to actually plan out my day.... I always used to write in*

my diary, like probably three top priority things that I need to do in the day." (FG4)

"So I have a list of things that I need to do depending on like assignments or tests that are coming up and ja…that's what I do. But before I never used to do that, I used to just…the weekend before a test I'd start studying." (FG4)

Participants in all groups also spoke about the practice of prioritising work. Typically, work is prioritised based on the allocated marks or course weighting for the assessments. Due to the generally large weighting of tests and exams in the School, these methods of assessments are prioritised over others when compromises need to be made:

"If you're writing a test that's 40% versus an assignment that's 10%, you're going to spend more time on the test." (FG2)

A significant difference was also noted in how students approach assignments. The low-performing students typically leave assignments until just before they are due, suggesting poor strategic planning:

"…I look at the due date and then I see where I am and then I can start to work on it if it's close enough. But if it is far, ja, I kind of relax." (FG3)

High-performing students seem to anticipate that assignments can take more time than expected and always start these as soon as they get them:

"I always try and make sure that I'm not working on it the day before because then that just places a lot more stress on me personally." (FG2)

"Projects (assignments), *I normally do way in advance, try and get out of the way."* (FG2).

The daily revision of work was seen as a priority for many students although it did seem that often this revision was sacrificed to do more pressing assessment tasks. Participants in the mid-group also indicated that if a course is perceived to be difficult, far more time would be spent on this course, frequently at the expense of other courses. This behaviour was not mentioned in any of the other groups, but it is plausible that this is typical behaviour for most students. Interestingly, the only participants who mentioned that they did preparation work for lectures were the low-performing group who revealed that they aspire to prepare for lectures before they take place. These

practices seemed to be idealistic for many students as the workload was increased and the time available to do this was reduced.

It seems as if the pace of course delivery is too fast for low-performing participants affecting their ability to be proactive. Although they try to understand the material and keep up with the pace, they indicated that they frequently cannot do everything that is required to fully understand the concepts that are being taught in class. This participant described how understanding sometimes needs to be compromised to keep up:

> *I had an initial plan, because I had a timetable that I wanted to follow, so my plan was to first prepare for every lecture and study after every lecture. But then it became hard to stick to that plan because some courses maybe it will take me like a lot of time to understand certain concepts and I end up maybe spending more time on one course instead of giving others attention. So from there I now stick to the pressure thing. I will just look at the test timetable, which tests are closer, then I'll study based on that."* (FG3)

A theme that starts to emerge at this point is the notion that students are *studying for passing* rather than *studying for learning*. This is a theme that is developed throughout this chapter. It is prevalent in all groups, with this *studying for passing* approach emerging as a conscious tactic for the high and mid-performing students and as more of a survival tactic for the low-performing students.

Another factor that plays a role in the prioritisation of work is the perceived "value" that assignments have for students. Students struggle to connect the purpose of assignments with the purpose of the tests and exams, and due to the focus on *studying for passing,* students are hesitant to spend time on work for an assignment if they do not feel that they will "need" it in the exam. The following quotation reveals several interesting ideas:

> *"Some courses are structured such that the assignments that they give you are stuff that they can't test in a written test, and usually in those particular situations the stuff that you do for the assignments you won't need for the exam. …those types of assignments usually get sent to the back of my list because they're not part of the core material of the course and they won't help me with the test and the exam. Whereas with some assignments, …the assignment is linked to what you're given in the test and linked to what you'll get in the exams,*

so doing the assignment is actually helping you prepare for the test and the exam as well. So I tend to like to focus on those." (FG3)

On assignments: *"It depends. They can be, it's just like…but sometimes it feels like it's a…like a deviation or…not a…like it's…like I didn't have to go that far. I don't know…when I could have just focused on, like she said, the test is probably going to weigh more. But I guess it is the bigger picture but not in the little picture."* (FG4)

Students are however willing to dedicate more time and effort to assignments that are seen to support the learning process of preparing for exams. This suggests that assignments that are better aligned and are perceived as supporting learning are more valued by the students.

The following sections take a more in-depth look at how students tackle the different assessment tasks and consider what conclusions can be drawn regarding the alignment of assessment tasks to learning outcomes. At this point, it is not clear whether the assignments, in particular, provide value and support appropriate learning approaches or whether students merely see assignments as valuable because they enable students to obtain the desired marks. As a result of students' *studying for passing* paradigm, assessment tasks that are valued may not always be the tasks that enable students to achieve the intended learning outcomes. This emphasises the need for distinct alignment between the overall purpose of assessment tasks and the approaches to learning that are encouraged (Biggs & Tang, 2011) particularly in an assessment *for* learning environment.

6.5 The influence of assessment methods on approaches to learning

This section discusses how participants approach assessments. This includes preparing for tests and exams, use of resources, and experiences of tutorial sessions, assignments and lectures.

6.5.1 Preparing for tests and exams

Tests and exams are generally seen by participants as the primary assessment methods due to the weighting associated with them. As a result, most of the study practices that

participants described are working towards these assessment methods. This section describes these study practices. Practices linked to tutorials and assignments are covered in sections to follow.

The typical approach, described by most participants is best summarised by the following quotation:

> *"I usually start by going through all the notes that we've been given and I try and redo the examples, and then understand the examples, then I start doing questions…any additional questions, and then I do past-papers."* (FG4)

Participants explained how in general, they prefer to go over material taught in class, making use of notes, the textbook or lecture slides, followed by worked examples and finally trying practice problems. Many participants mentioned that they supplement these resources with online videos.

The higher-performing students seem to be able to maintain this approach to studying, having time to ensure that they have a thorough understanding of the material before moving on to solving problems.

> *"…so as I said, I love my theory so if I don't understand it then I'm not going to go for questions or anything, I'm not going to practise, I'm going to go back and look for as many references as I can until I understand everything that is going on and then I'll go for questions."* (FG2)

While most participants revealed the desire to spend time understanding the material before tackling problems, many participants mentioned that due to time constraints and workload pressure this time needs to be compromised and problems need to be tackled before a proper understanding of the material has been gained.

> *"I do the lecture slides, like something that's a summary of the work, so I know the bigger picture kind of. And then I kind of break it down into like the textbook. But it depends, if I feel like…it depends how much time I have, so if I have given myself enough time then I can go through the textbook and also doing problems, because I think sometimes it can be time-consuming to do all the reading and not get to the problems that you're going to eventually have to answer. So I try to read the theory but do problems and make sure I get to like the hardest problems, then ja, I can feel like comfortable for that."* (FG4)

This need to compromise on understanding is less prevalent in the high-performing students who seem to be less pressurised to prioritise due to time constraints.

The targeting of particular tutorial questions or past exam paper questions is then pursued as participants start to use a more strategic approach to learning (Prosser & Trigwell, 1999). It seems that very quickly, the learning process becomes focused on mastering the art of practising the problems that are most likely to come up in the exam:

> *"…and tutorials because a lot of the time we find that the tutorial questions are what come up in the test exactly…..past paper questions they always come up in tests and exams."* (FG3)
>
> *"…I think you come to understand…with some lecturers, you just practise what they do, then you'll do well. …people will practise a lot more because they know they can do well if they just practise.* (FG2)
>
> *"people ended up going so far as finding the book that he got his questions from and using that book because they found out that he liked it…."* (FG3)
>
> *"you never quite know whether or not you're doing the right thing…….I'd actually look through the solution manual and go through all the problems, so I have an understanding of how to answer all of the questions that can come up. So that took up a lot of time but it helped. Because with the questions that I actually found in my exam, I had actually gone over them and I knew how to approach it."* (FG4)

Participants, therefore, tend to compromise understanding, resulting in a series of behaviours that revolve around trying to replicate answers to problems without an in-depth understanding. These "practising" behaviours were prevalent in the participants relating to what Case and Marshall (2004) refer to as procedural approaches to learning. All participants appear to be more focused on being able to recall a particular method or approach rather than understanding core material and the ability to apply it. Again, the theme of *studying for passing* rather than *studying for learning* starts to emerge.

> *"…and if you get hold of the answers, you just look at the common thread throughout the answers, and then you try and formulate your answers based on that."* (FG1)

"If I don't understand something… I normally divert to just doing problems then at least even if I don't understand it but if I'm given an equation then I might be able to solve it." (FG3)

These procedural approaches across focus groups spill over to other facets of the teaching and learning process with participants changing their view on lectures and the purpose of worked examples. Attention becomes more about the method that needs to be replicated than the concept that is illustrated in a particular application. This participant describes the value of worked examples used in class:

"…because that's where they actually show us like what method we're supposed to use." (FG2)

Participants start to shift their entire perspective of what studying and learning are about. The focus becomes what needs to be known to pass a particular assessment rather than a holistic view that incorporates the skills and knowledge that are needed in the profession. Participants struggle with this shift as they compromise on understanding in order to get through all the material that they need to.

"In second year, I wanted to know, but I ended up knowing more than I had to know. But I ended up being like confused as to what I had to know." (FG1)

"I remember talking to people who had been here, I remember this guy. So he once told me that, whatever you need to know, just know. But some of the things that you know you don't have to understand. Just do it because you have to…. Okay, you don't know how this thing, why you solved it this way, don't go into knowing why, just do it that way and get the answers." (FG1)

Despite this shift in perspective towards a *studying for passing* mindset, many participants acknowledged discomfort with this approach suggesting that they would prefer to understand but feel that they are constrained by the environment in which they find themselves.

"I wouldn't spend time on a subject that doesn't have an exam or an assignment over one where I need to pass. Ja, it's not who I am but because of time and pressure, I sort of gravitate towards and end up doing that just because I have to pass." (FG1)

The general performance of students in assessments in the School suggests that these approaches to studying are not enabling students to do well in tests and exams. A participant described this process as follows:

> preparing for a test, "*…we did all the question papers they gave us, we did all the question papers and then we were so confident only to go to the test and it was so hectic. So it was really a dramatic end…"* (FG1)

Students generally adopt *procedural approaches* to learning with a focus on *studying for passing*. Students dedicate many hours to practising problems, rote learning approaches to solve standard problem types that are likely to come up in tests or exams rather than trying to gain a deeper understanding of core material.

6.5.2 Approaching tutorials

Participants' experiences of tutorials are complex with some groups indicating that tutorials are one of their most valued assessment methods while other groups revealed that these are their least favourite. Tutorials in the School are also complicated by the fact that they run in different ways for the various courses. For this reason, this section discusses the different formats of tutorials in the School followed by the experiences of participants and a discussion that aims to understand the range of responses to tutorials.

Tutorials in the School are timetabled sessions, usually lasting 45 minutes, where students typically solve problems related to the course. Tutorial sessions are generally run in test-type venues with students seated individually. Their use is more prevalent in the first and the second year levels of study. The reason that some courses have tutorials and others do not seems to be based on historical practices rather than strategic reasoning. Over the years, different lecturers have developed different schemes for tutorials. Some lecturers run tutorial sessions "for marks" in test-type settings while others use informal and more formative based sessions. The justification behind "for marks" tutorials is to "encourage" student attendance. Tutorials are mostly facilitated by the course lecturer and tutors who are typically final-year students. As mentioned, the range of responses from participants is broad. This is mainly influenced by the different study approaches used as well as the degree to which students require help from lecturers and tutors in the learning process.

Although there are students who would not attend tutorials if they are not for marks, introducing marks adds stress to the learning environment of a tutorial and hinders the learning process of those who need to and want to attend, as expressed by this student:

> *"If the tutorial is not for marks then I don't give it attention…I'm probably going to the tutorial class just to tick that off but I think if the option was given, I wouldn't go. And for those that are for marks, then I am forced to work days beforehand such as I am able to ace the actual tutorial. If tutorials are for marks, it adds stress."* (FG1)

Most participants suggested that tutorials are the most useful form of assessment as tutorial sessions facilitate a conversation between students and lecturers or tutors.

> *"Some tutorials are more useful, when they are not for marks and actually reinforce the material…and you can get help, it's like a consultation because there is an opportunity if there is something that you don't understand."* (FG1)

Assigning marks for tutorials breaks down this process as students are not able to ask for assistance nor are they allowed to discuss problems in groups.

> *"Tutorials are (useful) because if you don't understand, you are able to ask the lecturer during the tutorial and they will explain to you. But if it's for marks, there's no way that they can give the solution or help you to such an extent that you get the solution. So the ones that are for marks, we have to understand the work on your own and then come back hoping to get the (marks). But this one, even if you don't understand you know that (attending) the tutorial and* (you) *will come up with the knowledge.* (FG1)

For participants who find it challenging to approach lecturers, the tutorial environment seems to break down some of these barriers making it easier for students to approach lecturers with questions.

> *"I haven't always been one to consult one-on-one with the lecturer but I've found that in a tutorial environment it's very relaxed. It's easier for me to ask questions from the tutors…even from the lecturers, I don't know why but it's just…I just feel like it's a lot less intense.* (FG3)

There are a number of participants, mainly from focus group three, the low-performing group, however, who seem to lack the self-regulation to keep up with work and the

tutorial sessions become a form of "guided homework" that structures their studying and "forces" them to keep up with the material.

> *"I also think an aspect of tutorials that's important is for tutorials to have a mark allocation because I think what the School has done is they expect you by the time you get to fourth year you've developed a certain set of skills that allow you to focus on your tutorials even though they don't have a mark distribution to them. But I think what that then does is it kind of makes you ignore the tutorials and focus on other streams of learning, and you take stuff from other stuff rather than focusing on the tutorials themselves....and if they'd at least put a mark on it, it would force you to do them."* (FG3)
>
> *"If tutorials are weighted then like you are forced to work, like to always prepare for it. So staying up to date with the course content it's easier that way."* (FG3)

Although it is important to ensure that students keep up to date, it appears as if some participants become reliant on the "forced" tutorial environments, struggling in higher years where students are expected to exercise more independent learning skills. There appears to be a lack of agency and the development of lifelong learning skills in some participants. As a result, the tutorials "for marks" in lower years are supporting this tendency especially since there is no scaffolding that gradually diminishes support and structure to enable independence.

Overall, there seems to be real confusion amongst participants as to the purpose of tutorials due to the mixed messages they receive from tutorial structures and design. They struggle to understand what the tutorials are trying to achieve and as a result what is expected from them when they interact in this learning environment. The marks that are sometimes allocated to tutorials seem to exacerbate this confusion. Most participants prefer a learning process that starts with reading through the textbook or notes to gain a deep understanding of the material before they practise problems. The forced tutorial sessions may not come at the right time in an individual student's learning trajectory which forces them to jump over trying to understand straight into practising the problems without conceptual understanding. The tutorials for marks can, therefore, drive learning behaviours that are misaligned to individual learning due to the mismatch in timing or pace. As a result, tutorials can become "product" oriented –

all about the answers and whether they are right and not about learning or understanding.

The following participant captures the essence of the tutorial environment very effectively:

> *"I do attend because it's compulsory, but I don't like the whole setup of the tutorial.....I don't understand what that approach is supposed to do because I think tuts* (tutorials) *are supposed to be there for us to help ourselves. So I need to go to a tut if I feel like it will help me. But it's not going to help me if I'm told, okay, you need to complete these questions because chances are you're probably not going to put in all the effort to actually understand it, you're going to do it to complete it, as opposed to actually understanding it. So I think it's…tuts are good for like structure, to help you like keep up with your work, yes, but also in that regard you need to be able to work at your pace and understanding."* (FG4)

Tutorials are one of the few formative assessment practices that the School has established. Tutorials can create collaborative spaces that facilitate interaction between students and lecturers (Benwell, 1999; Fry et al., 2009). However, the introduction of marks to encourage everyone to attend the sessions appears to confuse the purpose of these sessions and tends to drive the wrong types of learning practices in students. Most importantly, it removes one of the few learning spaces that assist many of the students in the School, particularly those that struggle with the pace and workload.

6.5.3 Approaching assignments

Participants generally indicated a preference for assignments. One of the main reasons for this is that they are perceived as less stressful as the time available to work on them is longer. Participants explained that as a result, they can gain a better understanding of concepts.

> *"And I think most people would say they prefer projects over exams, because you have more free time to do it, you can do it more to yourself, it's not as much stress, I think that's a big factor."* (FG2)

"I think assignments are valuable because there's usually like a lot of time, or enough time allocated so…you have…well, I've found that I have…it's easier for me to learn concepts and put them into practice in an assignment as opposed to…in another setting…because, I don't know, I feel like I learn better when I'm not under pressure. So with assignments I feel like they just work better for me because I have had enough time to read up on stuff and, you know, and discuss things with my classmates." (FG3)

Participants also really value the practical nature of assignments that give them a better sense of relevance to the real world and the engineering profession.

"I think they expose you and then like encourage you to also be able to try to find out some things even those you are not studying what they are... so I think it's exposure." (FG3)

"I think assignments are better because they help you apply and you get to see, okay, how does what we're learning apply to the everyday world." (FG2)

"You're getting more like practical approaches to whatever you're being taught." (FG4)

An aspect of assignments that students struggle with is group work. Many assignments throughout the degree are group projects, and this has an impact on how students view and are able to learn from these assignments. Group assignments involve a number of individuals, and as a result, this affects the control that students have over time management and scheduling. This was raised by participants as one of the features of group assignments that they found most difficult to manage.

"We had a lot of group assignments this year and time management has been an issue always." (FG3)

"I think assignments are a bit tough because if it's a group project then you can try and schedule it, but sometimes you don't stick to it because there's other people's schedules." (FG4)

More importantly, however, many participants expressed the view that they struggle to work productively in groups. This was more prevalent in the lower-performing groups who articulated that although they see the development of these skills as essential, that

they battle with the learning process. There appears to be a insufficient scaffolding to provide students with the necessary skills and facilitate the process of working in teams.

> *"I think a valuable skill is learning how to work with people, learning how to get information from people and I think that in the university setting, you know, the best way to learn that is through group work. And I think that is, in that sense, assignments are really good in forcing…in giving the students that skill...for a lot of students it's overwhelming....you don't know how to deal with all these different kinds of personalities, and everything is just happening all at once. So I think that it's something that should be like introduced gradually from first year."* (FG3)
>
> *"With assignments I think the issues with the School is that…they don't introduce you to a lot of group work before you get to the fourth year level……. a lot of the stuff you do on your own, and you don't pick up the skills you need to be able to deal with people when you get to fourth year.....there's a lot of clashes.....that sort of aspect of learning to deal with people you only start at a very late stage and it can be critical to your ability to finish the assignments.* (FG3)

Some participants described negative experiences with group work that also appears to affect their overall self-confidence and motivation.

> *"I do value assignments a lot, but I have a problem with a group… whoever is managing the group now, tends to be the boss. He wants to send you there, he wants to send you there, he wants to drag everyone around, he wants to rush everyone, …he wants everything to be according to their own things…Whatever input that you may put in the group, when they type the report… he'll find ways to change your work and put it in his own understanding, or change everything completely. You won't even find your work in there."* (FG3)

Participants emphasised how they see real value in assignments and prefer them to other assessment methods due to their ability to facilitate learning (Gibbs and Simpson, 2004). However, the issues around group work hinder their ability to develop effective teamwork skills and affect the potential for assignments to reinforce learning. This has implications for the design of assignments, especially if the development of group skills is a valuable competence that is facilitated through these methods of assessment.

6.5.4 Lecture attendance and participation

Several lecturers raised concerns around poor lecture attendance in their interviews. Lectures are used extensively in the School as a means of sharing not only content knowledge and modelling problem-solving approaches but also to articulate expectations and criteria associated with assessments. The importance of face-to-face contact between lecturers and students, typically through lectures, is emphasised by Allais (2014) who stresses the value of students identifying with the lecturer's thinking process. She also describes how this is particularly important for underprepared or disadvantaged students.

Students were asked in the focus group to comment on their experiences of lectures and thoughts on poor lecture attendance. In general, participants seemed to be motivated to attend lectures although they admitted to not attending if they see no value in them. In several groups, participants explained how they would spend the first few weeks of term assessing which lectures were worth attending. Participants indicated that they then use the time allocated for lectures to work through material on their own. They articulated the benefit or value in the following ways:

> *"If I don't attend a lecture it's because I feel like there's nothing for me there."* (FG4)
>
> *"I think my lecture attendance is dependent on whether I benefit from that lecture or not." (FG3)*
>
> *"...the way the lecturer approaches the lectures determines whether or not you're actually interested in going. So if a lecturer is enthusiastic and they show that they're passionate about it, sometimes it helps in getting us engaged and actually getting us interested as well. or like if a lecturer wants to show us a different aspect of the course it's always interesting because you know, okay, I'm definitely going to learn something from this lecture."* (FG4)

Participants expect lectures to provide something in addition to what is already available in the textbook or what could be studied independently. One participant explained the phenomenon of students who do not attend lectures because they find them too difficult and incomprehensible:

> *"I also know people who don't attend because they know that the lecture is*

going to be hard or they don't understand, so they'd rather go and do it themselves, study on their own." (FG1)

This ties into the benefit or value sought by this student but flags the issue around the pace of courses. This indicates that there are students who are left behind resulting in them being unable to adequately understand material.

Some participants, more prevalent in the mid and low-performing groups, explained that when the workload builds up over the semester, they sometimes need to prioritise other work over lecture attendance:

on lecture attendance, *"...so sometimes it's a matter of what's urgent at that time."* (FG3)

They appear to avoid this situation if possible indicating that they would prefer to circumvent this.

"I realised that you cannot sacrifice going to lectures to study for tests." (FG1)

Other participants, particularly in the high-performing group appear to attend all lectures. In some cases, this seems to be driven predominantly by *cue-seeking* behaviours:

"I just attend like in case I miss something that the lecturer said would be important or something." (FG2)

Again, the high-performing students display a less pressured, proactive approach to their study practices, with the flexibility to attend lectures while still keeping up with other course material. The *cue-seeking* reasoning (Miller & Parlett, 1974 as cited in Gibbs & Simpson, 2004) for attending lectures also supports *studying for passing* practices.

Overall, it appears that participants will try to attend lectures because of their perceived value. They do not, however, necessarily always experience lectures as optimal learning opportunities. They find it difficult to engage with material in lectures that are more *teaching for passing* oriented. Under these circumstances, many participants prefer to tackle the material on their own. Although not the focus of this study, this does warrant an investigation into how lecturers can become more learning oriented, particularly amidst demands for increasing the use of blended modes of learning.

6.6 Curiosity and relevance

As discussed in Chapter 5, many lecturers raised the issue of students' perceived lack of curiosity, awareness of the world or willingness to "go beyond what was required". This issue was presented to the focus groups as a comment from the interviewed lecturers. In most focus groups, the immediate response was laughter. This reaction, together with the participant responses is used to explore the issue of student curiosity in the current assessment context.

In every focus group, participants pointed out that they believed that they were curious but that the current context does not support this characteristic or disposition. Time constraints were suggested as a significant factor that contributes to this phenomenon with participants suggesting that there is insufficient time, for the students and the lecturers, in the current curriculum for the pursuit of topics that satisfy students' curiosity.

> *"Students are actually curious. I know for sure that people are curious. The problem is this, both students and lecturers work around our time…. the problem that you'll find that once you start to (engage with the lecturer on a particular topic), you'll find that you're actually delaying other students. And then since they planned… what I'm going to be lecturing on this day… they want to cover what they had planned."* (FG1)
>
> *I feel like there are curious people, it's just that what you test and what I am curious about are two different things. You're testing core kind of things, when I'm more interested in applied things.* (FG1)

Participants also felt strongly that being curious does not "count" in the current assessment environment and as a result, participants had either moved away from being curious or had placed this tendency "on hold" until their studies were completed.

> *"Wits has created an environment where all you want to do is survive. So, I mean yes, before you come here you're excited about engineering and what is going on. But once you're here it is about, okay, I need to finish, I need to pass this year." (*FG2)
>
> *"I've been curious about the industry before but you realise that, no, it doesn't pay or if you don't get…okay, when you have a test or an exam, it's stuff not*

worth knowing about, so you end up focusing on the stuff that will be in the exam…for passing...maybe you'll be curious once you graduate." (FG3)

The pattern of *studying for passing* came through strongly when students discussed how the assessment context actually discourages them from doing anything extra due to the focus on passing and marks. The following participant's remark implies that some students are keen to find time for these kinds of activities but are unable to because of time pressure:

"I think maybe like if you're a student you can also start to worry about, I just want the marks, I just want like what's actually tested and what's going to be…what's going to make me pass. So it might kind of feel like…even though something might be interesting, is it going to waste my time if I start doing all these extra things. And these people that do things on the side, and it's like that's nice, I wish I was also doing that." (FG4)

Students who keep up with the pace of courses are more likely to be curious and interested in what is going on around them including doing extra work on assignments. Naturally, the pace affects weaker students more than those who are coping, making studies less relevant and contextualised for these students.

Even though most participants argued that they lack the time and "motivation" to pursue topics related to what they learn about in class, all participants discussed the value and importance of being able to relate concepts to the world around them and the engineering profession.

"…real world examples, so how will this help me when I'm an actual engineer? What is this going to apply to? Because there's no point in learning something that you'll never use again. Everything we learn should be relevant to us." (FG2)

One participant even shared how they believed that being able to relate concepts to the real world had an overall impact on their understanding of material and performance in formal assessments.

*"We had this lecturer who used to work outside (*in industry*?) something like that. (*He raised*) our curiosity to such an extent that when we came to the exam, because he was relating what he was lecturing with what he was working. When*

*it came to the test, most students passed compared to other sections and other lecturers. And that was because of he was (*increasing*) our curiosity, we wanted to know more. And when you want to know, you would actually do well.* (FG1)

Although all participants saw value in relating course material to the real world, several students raised the issue of the relevance or appropriateness of examples and contexts.

> *"And we all come from different spheres so we don't all have…and some of us do have a lot of interest in this stuff but it's just not related to their interest. And I think also the language barrier I've seen as a problem for some people, is that lecturers just don't understand what students are saying to them sometimes."* (FG3)

These factors also influence the perceived approachability of lecturers with participants indicating that they either do not know how to relate to lecturers or that they are scared to approach them.

> *"So you don't even know the lecturer, you don't know what they're doing, like, what are they researching at the School, for example. What their interests are…so you don't know what questions are out of scope from what is actually being taught."* (FG1)
>
> *"Personally I don't ask the lecturers because I am scared of approaching them, so if I'm curious about something I'll go and research it on my own…"* (FG1)

Overall, it emerged that participants are curious about the real world and would value a curriculum that incorporated more space for exploring the application of concepts to their contexts. There appears to be misalignment between lecturers' desire to have curious students and what is perceived by students as valued in assessment contexts. There is also an emerging theme of the contextual relevance of examples that are used to illustrate the application of concepts as well as issues around the perceived approachability of lecturers. This could be an opportunity to engage with students on the nature of the curriculum and pedagogies in a transformative higher education environment.

6.7 Expectations, criteria and feedback

This section explores how students understand the expectations and criteria for any assessment tasks and how they experience and use feedback.

6.7.1 Expectations and criteria

When participants were asked to describe how they knew what was expected of them in assessments, most participants shook their heads. This response was consistent across groups suggesting that in general participants do not find it easy to know what is expected from them in assessments. It appears that in general, expectations for assignments are vague. For tests and exams, participants point out that they refer to past-papers to give them an indication of what to expect. For assignments, some participants mentioned that consulting with lecturers is the best way to gain a better understanding of what is expected.

> *"... you can consult…I think when people consult they usually have more insight into what's going to be there."* (FG4)

It is striking that this behaviour is much more apparent in the higher-performing groups as compared to the lower-performing groups who find it challenging to approach lecturers. In these cases, it appears that most participants make use of other students who have been through the particular course before them to provide insight into what is expected.

> *"Each time that I have had an idea of what to expect it's always been from people that have done the course before. And then sometimes the lecturer will like give you a vague overview of what it's like or, you know, what…but it's very vague. It's a lot more…I felt it's been a lot more insightful coming from someone who's actually done the course."* (FG3)

This is typically seen as the most reliable resource for most participants. Interestingly, participants suggested that they need a high-level picture of what is expected from them in a course as well as a view of how the course will unfold over the semester.

> *"If there was a way to prepare people for the course then I don't know how but let them know how it's going to happen or how it's likely to happen."* (FG4)

Again, past students are seen as the most useful source of this information.

Since most participants find it difficult to understand what the expectations are for any particular assessment, examples were described where participants felt that they had performed well in an assessment only to find out that they had done poorly. Participants find this experience very disappointing and struggle then to know what they need to do to improve.

> for a particular assignment*: "We put in the extra effort… when the marks came back they were so, so low. They were so embarrassing, I can't even say the marks, they were so low. So I was really disappointed because I thought…I considered the effort, the amount of work we put in, the time, I thought that we'd actually get a good mark. So that was really disappointing."* (FG1)

This suggests a gap in criteria and the poor alignment makes it challenging for students to meet the intended learning outcomes (Biggs & Tang, 2011).

Rubrics were singled out as a particularly useful resource for understanding the expectations around assignments. However, it appears that the use of these rubrics is aligned more to a *studying for passing* rather than a *studying for learning* paradigm. Participants are using the rubrics to "tick-off" sections where they will be allocated marks rather than using it to guide their overall learning process associated with the assignment.

> *"Most of the time, a rubric, I find that helpful….a break down of what they expect. So they'll tell you that the quality of the report it's going to out of five and the introduction is going to be out of ten so you sort of have an idea of what is expected of you according to the mark allocation."* (FG1)
>
> *"Like also in the rubric, it's not always helpful, because some of the lecturers only give it to you when (you've already done the work) and that doesn't help you because then you're kind of just doing whatever and when you get the rubric you might have to add something in or take out or stuff. So if they give it to you beforehand you then know like how to use your time."* (FG1)
>
> *"I think getting a rubric also helps. Especially if there'll be a follow or similar type thing, then you can see exactly where the marks are, where you need to improve."* (FG2)

Participants find it difficult to know what to expect from assignments with lecturers and past students seen as the primary means of clarifying what is expected. This suggests a major re-conceptualisation of the implementation of assessment criteria and rubrics to accommodate student diversity if learning-oriented assessment (Carless, 2015b) is to be valued and underpin the assessment process.

6.7.2 Feedback

Depending on the group, responses around feedback were particularly interesting. Participants were either confused by the question, not understanding what was being asked or they immediately responded by discussing marks. These responses highlight the perceived lack of useful feedback that students receive and use. It also raises questions about the extent to which students engage with feedback processes (Boud & Molloy, 2013).

> *"feedback from…? You get feedback on your marks so that's where you see if you're doing good or bad, but if there's an assignment there is usually a rubric and a comment, can you please repeat the question?"* (FG1)
>
> *"I'd say, personally this School doesn't really give feedback, like from their side, all they do is just give marks. So…and then depending on the type of person that you are, then you'll actually follow up why I got a specific mark. …the only time when we actually get feedback* (is) *with assignments because it's very detailed. There's a rubric and everything, sometimes the lecturers do sort of make side comments on the reports. So…ja, tests, it's really bad. It's just the mark, so then if the lecturer is actually a nice lecturer and you go and you consult then you're able to understand where you went wrong. But sometimes that's not always the case."* (FG1)

Emerging from this quotation are two themes associated with feedback – the focus on marks and the role of consulting with a lecturer as a feedback mechanism.

Most participants commented that if they want feedback, they would need to consult with a lecturer.

> *"I think most people see feedback as important when they don't do well. When they don't do well they will try to understand it but when you do well, I don't*

really see people going to see people speak to a lecturer if I don't do well or I fail, I go and see the lecturer." (FG2)

This particularly affects students who struggle to approach lecturers, marginalising them further. It also appears that both the students and the lecturers see these consultations as "mark seeking" opportunities which restrict learning possibilities. Engagement with feedback is driven by the need to pass assessments, further rendering this process unnecessary if students are doing well. This limits the scope for further self-evaluation, reflection and learning in all students regardless of their current performance.

Ultimately, feedback and the associated consulting process is generally focused on marks, aligning with the theme of *studying for passing.* Participants are not trying to improve their understanding or learning processes but are trying to improve their mark – either for the current assessment task or future tasks. Students in all focus groups made this point:

> *"that's why the interactions that you end up kind of having with the lecturers are okay, why are my marks so low…it's not okay, help me understand this concept, it's my mark needs to advance…so at the end of the day, it's all about marks."* (FG2)
>
> *"I think feedback is very one dimensional in this School. There's…from the very first year you get discouraged from sort of checking your marks if they're correct….so by the time you get to the later years you don't even care about checking your marks; if it's like that, it's like that, you move on."* (FG3)

Despite the learning affordances of rubrics, participants also use rubrics to increase their marks and not as an opportunity to reflect on their strengths and weaknesses. They, therefore, do not see value in any feedback for an assignment if they are not going to get something similar again since the rubric is only used to "tick boxes" against mark allocations rather than change learning behaviours and approaches to solving problems that are universally useful in future assignments.

> *"feedback on assignments is only useful if you get the same one again, but if it is a course on a random assignment then it is not exactly helpful in any way."* (FG1)

Even improvement is described by this participant as merely finding out where students can get more marks:

> *"I think getting a rubric also helps. Especially if there'll be a follow or similar type thing, then you can see exactly where the marks are, where you need to improve."* (FG2)

The mindset around feedback and "mark-seeking" seems to extend beyond students to the lecturers as well. The following participants described how they try to make use of consultation opportunities for feedback on how to gain a deeper understanding of concepts. They expressed their frustrations around the limited success of this as an option.

> *"Because sometimes you go there and they are thinking that you are here to fight for more marks. And then like maybe you're trying to understand more. When you get there sometimes some lecturers when you ask them, okay, I didn't get this correctly so how was that…like they want you to answer it again and like you will put the idea on the paper and it didn't work, so sometimes you think that, no, going there is just a waste of time. (*FG3)
>
> *"I also think just the devil is in the detail with some things, you know. I think lecturers sometimes take for granted the value of answering a small question, or a question that they deem is not worthy, type thing. And for some people that question was the cornerstone to opening the entire course for you, or the entire section that you were doing. So that answering, I think if lecturers could focus on being cognisant of the fact that we're not all in the same headspace and our understanding procedures are all different, I think that would make things easier because then they'd answer all questions no matter how dumb, or how dumb you sound. And I think you do get lecturers that if you ask a dumb question they ridicule you, and then you can't approach them any more." (*FG3)

These experiences surface the issue of lecturer approachability. There is an additional idea that emerges around the notion of *threshold or bottleneck concepts* (Middendorf & Pace, 2004) as it seems that lecturers are not aware of the key concepts that students need to understand to unlock further knowledge in the discipline. This inhibits lecturers' ability to explain concepts, drawing on their expert knowledge in a way that enables students to gain a deeper understanding of course material.

Students' ability to self-evaluate and improve is limited by the lack of clear expectations and feedback around assessments. Without these key elements, students are unable to see where they are going wrong or develop ways of reflecting, changing and improving. The following participant sums up this frustration:

> *"You work really hard on your assignment and you get it back and you realise you've gone wrong, and it gets you really down because you spent so much time doing it and it doesn't show you what's wrong."* (FG1)

6.8 Social and cultural factors

A number of themes emerged from the focus groups related to social and cultural factors. Participants tend to value networks and a sense of community, and the value of these in the learning process seems to grow as they progress through their studies. Participants also made many comments on the School's culture, which they do not believe facilitates a supportive learning environment.

Social learning is an idea that was supported by many of the comments made by participants. Participants value networks that support the learning process, hold them accountable and open their minds to other possibilities and ways of seeing the world.

> *"I think what I would really like to emphasise is for the School to have a sense of community like a village where especially in first year, we get to know a lot of people, like connections."* (FG1)
>
> *"So it's also knowing people not just in your year but in other years. So I try to help people in lower years."* (FG4)
>
> *"…it also makes you accountable…because some people have like groups of people that they are always with and it kind of forces you to go to class so to…you know if you don't go then you get questions about, why weren't you there."* (FG4)
>
> *"People are very helpful because I know…there was a time where I decided I actually don't want to go to like a lecture or a tutorial, and then I spoke to someone and they said to me, look, you should just go because it's going to help you. Like try and write notes, write whatever you can and use that when you actually study for your test. And it helped."* (FG4)

"I realised that when I studied on my own it's very easy for me to fool myself into thinking that I'm ready for something, or I know or understand something, when actually I don't. Whereas I've found that in a group now there's someone there to challenge your thinking, and then because someone is challenging your thinking now, you're being open to other possibilities, other ways of doing things...so it's made me more open to other people's...it's made me more curious to know how other people see things and how they understand them and how they come to certain conclusions and things." (FG3)

Social networks should be seen as a valuable means of supporting student learning and ways of developing these types of networks could be a useful way of changing student approaches to learning.

The overall culture of the School is, however, seen as a significant barrier to creating a conducive learning environment. Participants acknowledged that they are in an environment that values marks above learning and suggested that they would prefer an environment that was more learning-centred and conducive to social learning practices.

"I feel like the environment we work at, at Wits, is very much …all about the marks and doing well and the classwork. I think we could create environments where people feel inspired, people feel happy, people want to be at Wits, I think that's like the best thing you can do." (FG2)

"So I think we need to be able to create a sort of like a culture or something in the class that we need to build up the class beyond the scope of what they're supposed to do." (FG1)

Participants also expressed that they feel as if they do not have a voice in the School and are often driven by fear. Some participants suggested that this is more prevalent in earlier years, but others countered this by saying that these feelings are present in all years of study.

"I feel like in our School we are driven by fear." (FG1)

"But you feel like you're in a cold ice room from first year and you're alone, and when you emerge into second year it's…then you start getting taken sort of seriously, and you only get really taken seriously at third year-ish, and still then there's sort of like a ladder to climb." (FG3)

> *"Another thing is, I feel like in this School people feel like only certain people will be heard if they speak. So people are reluctant to say, okay, let's do this and raise this issue. It's like…you feel like these people if they speak, they never will be heard. And last year it was helpful because if you were on conditions then you can speak* (in at-risk student meetings). *But now, we're not repeating…... the problem is, do we have to fail so that we can voice our opinion?"* (FG4)

Participants see more inclusive networks amongst students in the School as a way of creating a more conducive learning environment.

The last comment raises an interesting opportunity for the School. Clark and Redmond (1982) have developed a method known as small group instructional diagnosis (SGID), a technique for engaging students in small groups to understand what they like and dislike about a course and what improvements they would suggest. They have shown that using this technique in a school has a significant impact on student motivation. It appears that the use of small groups for students at risk in this School has an impact on the motivation and success of students. It would be worth considering the possibility of expanding this initiative to more students in the School.

6.9 Agency and self-reflection

The development of self-evaluative skills is a key aspect of developing a learning-oriented assessment environment (Carless, 2015a). This presupposes that lecturers will provide structure and support for students to exercise agency in their learning contexts to create opportunities for developing these skills (Ritchie, 2016). This section explores the self-reflective skills exhibited by participants and the extent to which students are willing and able to influence learning practices by using their agency.

At the end of the focus group, participants were asked to reflect on what they could do differently and what the School could do differently to improve the learning and assessment environment. In every focus group, the focus on individual changes was limited, but the recommendations for the School were extensive.

When asked what they could change themselves, most participants articulated that the process of talking about learning and assessment had been useful. Many participants revealed that it had made them feel less alone to know that other students had similar experiences to themselves.

> *"…it's just reaffirmed the fact that we're not alone. I think a lot of the times you approach your progression from a very lonely perspective and everything is on you and everything is up to you to solve it."* (FG3)

When reflecting on what they could change, ideas included managing time better, procrastinating less, improving prioritisation of work, creating better networks with other students and approaching lecturers with issues. Some participants indicated that the process had given them insight into what works for others which they would try to emulate in future. While open to change, the level of self-reflection is not well developed with participants suggesting that they will keep trying other ideas until they work instead of reflecting on their practices and trying to understand why it is not working and analysing what needs to change.

> *"…and if I go like, in the long run, my system is not working any more, I'll always refer to her system and I'll try to implement it through trial and error and see if it can help me. And if it's not working out I'll move on to his system."* (FG3)

Some participants showed a lack of agency by suggesting that lecturers should be responsible for analysing how students should improve.

> *"…lecturers should sit and see where most students are going wrong and try to come to class and work out some of those mistakes that students make."* (FG1)

It was interesting to observe that the low-performing groups were more reflective. It is possible that the low-performing students have a greater need to reflect and change to improve while the higher performing groups are already doing "well" within the current context and therefore have less need to change. The high-performing group was challenged to think of ways that the assessment environment could be changed to enhance deeper engagement and learning. It was surprising how resistant they were to any ideas that would result in them needing to adapt their current strategies, emphasising their achieving approach (Biggs & Telfer, 1987) to learning.

Of all the self-reflective activities that took place during the focus groups, the most worrying phenomenon was that most participants described how they continually adapt their strategies to align better with *studying for passing* paradigms.

> *"I had felt like maybe I hadn't done enough but I felt like I put in a lot of effort. So that's when I realised that I can put in effort but the wrong kind of effort and fail, you know. So I had to kind of readjust how I looked at the work and focus on…focus on the mark, like, I don't know, I don't want it to sound like shallow but focus on getting the marks, because not just that I know the work, so I deserve to pass, but like actually pass the course and stuff. I think it's still a difficult thing like, but it's fine, it's a process."* (FG4)

The topic of lecturer or course evaluations was raised by both the mid-performing and turnaround groups. Students seem to be frustrated by the apparent lack of action on the feedback that is provided through these evaluations. There is a sense that students focus more on what lecturers should change rather than what they should change, but they express that when they do make suggestions that they are not being heard. Evaluations have the potential to make a valuable contribution to course alignment and improvement (Edström, 2008) and to make students feel that they are partners in the assessment process (Gibbs, 1995).

6.10 Conclusion

The focus groups with students revealed several interesting themes. In general, participants are driven by assessment *of* learning practices that result in *grade-grabbing* and *studying for passing* behaviours. It is typical for students to pay more attention to assessments that they perceive as more important rather than focusing on tasks that support their learning (Gibbs, 1995), confirming the findings from the surveys and lecturer interviews. Participants plan, prioritise and study to maximise the marks that they will get rather than maximising learning, undermining the development of lifelong learning skills.

There is evidence to suggest that many students are approaching learning by doing many examples with the intent of reproducing the methods learnt in assessments (Crawford et al., 1994). Some students indicated that they do examples to gain an

understanding of theory and concepts, but this is often compromised due to workload pressures and the need to prioritise. There is little evidence that students are using deeper approaches to learning, trying to see the relationship between theory and concepts more broadly and opportunities for application in other scenarios (Crawford et al., 1994).

Assessment practices in the School have limited means of communicating expectations and feedback to students making it difficult for students to develop self-evaluative skills. One of the primary strategies participants use to fill these gaps is through consultations with lecturers and the development of student networks, particularly for participants who find it difficult to approach lecturers. Tutorial sessions are also used by students to approach lecturers and obtain feedback due to the reduced barriers that exist in these more informal settings. Forcing attendance at tutorials by creating a test environment destroys this possibility and closes down on options, particularly for the students who are not coping. It appears that students have different needs for tutorial sessions and that perhaps these environments are currently not catering for diverse student needs. Using mechanisms to force every student to attend is creating confusion and discomfort with this as a learning environment. Although often seen as a very useful formative assessment process, the current purpose and structure of tutorials are not consistently supporting learning.

Participants from all groups generally prefer assignments to tests and exams due to flexibility and the contrast to the high stress, time-constrained environment of tests and exams. Participants also felt that assignments were more authentic and gave them better access to developing skills needed for the real world. These findings again confirm the findings of the student surveys. The use of group assignments is met with mixed feelings. There is currently insufficient scaffolding for the development of group skills needed for assignments, leading to dysfunctional behaviour that affects the self-confidence and motivation of many students, again particularly those that are otherwise struggling.

It seems that the pace of course delivery is too fast or the workload is too much for many participants, allowing inadequate time for reflection on and synthesis of core concepts (Bransford et al., 2000). This affects lecture attendance and the time that

students have available to extend their learning opportunities beyond the classroom into other experiences around them. The use of personal experiences to enhance the learning process has a significant impact on driving deeper approaches to learning (Ritchie, 2016).

Although participants find themselves adopting *studying for passing* behaviours in this restrictive assessment *of* learning environment, there is evidence that they have a strong desire to move towards practices that develop deeper levels of understanding.

Chapter Seven

Giving back to teachers what they have been given

A Discussion of the findings

This study set out to determine how assessment practices in the School play a role in influencing student approaches to learning. The study has achieved this by bringing together the perceptions and experiences of both students and lecturers and framing these in relation to assessment for learning and learning-oriented assessment. The findings have revealed that assessment is an unmistakable driver that influences and constrains student approaches to learning. The originality of this thesis lies in the unique perspectives that were afforded by this case study approach which provides a rich description of the intricate and complex relationship between assessment decisions and the quality of student learning. The findings and recommendations of the study are suitably broad to facilitate further conversations aimed at improving the objectives of the higher education environment in other contexts.

The previous chapters have detailed the findings from the three data sets: student surveys, the lecturer interviews and the student focus groups. These findings were organised in mind maps to create links between the emerging themes and to provide a framework for comparison and interpretation. The preliminary themes were then mapped using the framework of theoretical concepts that was presented in Chapter 2 and are shown in Figure 7 at the end of this discussion. These preliminary themes were then grouped to arrive at a final set of themes that best represent the findings of this study.

Four final themes have emerged from the findings, and although the themes are distinct, they all relate to each other and support the overall conclusions for this study. The first theme relates to an environment that is structured around assessment *of* learning thinking which underpins the structural constraints to learning in the School. The second theme evolves from a School culture that does not support a conducive teaching

and learning environment. The third theme emerges from a learning context that has elicited pronounced student learning behaviours and dispositions that focus on studying for passing rather than studying for learning. The fourth and final theme relates to weak, formal social structures that hinder learning and create a sense of alienation for many students. In this chapter, I will discuss the four, final themes and subsequently propose recommendations for the School based on the findings.

7.1 Assessment *of*, and not *for* learning

It has emerged from the three data sources that the current assessment practices in the School are strongly aligned with an assessment *of* learning perspective. Lecturers see the main purpose of assessment as establishing competence, a mode of thinking that permeates into the methods of assessments used, the design of tasks and the execution of assessment processes. Lecturers obsess over criteria that ensure that assessments can be evaluated in a way that is consistent and accurately represents competence at an individual level. It is rare that the design and use of assessment tasks considers the learning processes that students need to navigate in order to address particular outcomes or to achieve the product requirements of the assessment task. The current practices also incorporate teacher-centred strategies as lecturers aim to control how students approach their learning through assessment tasks (Gibbs, 1995; Biggs, 2014). These teacher-centred strategies focus on the use of assessment as a tool to manage the learning process for students which supports the conclusion that assessment practices are aligned with an assessment *of* learning paradigm rather than a learning-oriented one.

The assessment *of* learning thinking in the School manifests in several ways. The first of these is exhibited through the use of criteria. Assessment criteria are currently product-oriented, under-stating what it is that *students* need to achieve and providing minimal scaffolding for students to appreciate the concept of quality in their work (Sadler, 2010). This simplistic view of criteria disregards the *process* of learning and engagement and has spin-offs for issues related to feedback, the development of self-evaluative expertise and the use of rubrics. Marks are the predominant mode of feedback supplemented with generic comments that are disseminated either via lectures or typed notes. The feedback typically focuses on the product of the assessment task, indicating how the answer or design has not met the engineering specifications or

requirements without suggesting what the student could have done differently to improve the quality of their engagement with the task in order to deliver a quality final product. Feedback remains teacher-centred with lecturers "telling" students what was wrong rather than developing the ability of students to understand the concept of quality and exercise judgement about their work and the work of others. Consequently, these practices minimise the extent to which feedback can be tailored or used individually to inform student learning and hinders the development of self-evaluative capacity (Carless 2015b).

The current feedback practices and use of criteria are not only poorly aligned to an assessment for learning culture, but they are also particularly inappropriate for the specific context of this case. Although developing a student–centred culture is sometimes seen as a solution to the challenges of large classes with the imperative to develop independent learning skills (Gibbs, 1995), some students have not developed these skills organically and need support and scaffolding so that these capabilities can mature. It needs to be acknowledged that contemporary South African higher-education classrooms include many students who have disadvantaged educational backgrounds. Those students who have little experience of critically engaging with ideas are likely to struggle with feedback presented in large classes (Allais, 2014). Good feedback in contexts such as these generally requires low lecturer to student ratios and face-to-face interaction, the absence of which is likely to have the biggest impact on underprepared and disadvantaged students (Allais, 2014). Although more intimate feedback is not necessarily always practical, the current, "one-size-fits-all" approach is leaving many students stranded which not only impacts on their ability to learn but also affects their confidence and sense of alienation.

A further factor that contributes to the emergence of an assessment *of* learning environment is the thinking that contributes to the choice and design of different assessment tasks. The School relies heavily on individual assessment driven, in part, by a need to evaluate individual competence. Some group assessment tasks are however used in the School, opening up opportunities for alternative assessment practices and the development of critical capabilities and skills. These assessment tasks are also typically project-based, providing a platform for authentic learning and increased levels of engagement and motivation. The choice of group tasks appears to

be driven by efficiency gains, through the reduction of marking loads, but also by a strong desire to promote social learning opportunities. The detailed design of these group assessment tasks, however, is not pedagogically motivated and circumvents elements that develop teamwork skills and encourage students to be aware of the learning processes associated with working in teams. Although many students recognise group projects as an essential part of their development as engineers, due to the lack of structure and scaffolding that is provided for the skills associated with group work, they find these experiences stressful and demotivating. The low-performing students appear to be more emotionally affected than the higher-performing students yet all appear to be aware of the sensitive dynamics surrounding group work. Despite the undeniable benefits of social learning and group work, few students seem to be adequately deriving the requisite group work skills and advantages from these learning environments. The learning benefits of working in groups are yet to be harnessed by the School. Even in group assignments, the focus remains on the product of the assessment task, assessment *of* learning, with little regard for the learning opportunities that social and group learning presents.

Assessment theory suggests that there are several motivators for using group work but that understanding the purpose is key. Group tasks should not merely be chosen to reduce workloads but should align with the overall intended learning outcomes *and* should stimulate the desired learning behaviours (Gibbs, 1995; Biggs & Tang, 2011). Furthermore, adequate support needs to be provided with the scaffolding of tasks, if necessary, to prepare students to engage with group work in a way that supplements the learning process. Ultimately, students need to learn how to do group work (Gibbs, 1995), a desire that was expressed by many students in the focus groups.

Many of the group work tasks that are used in the School are project based. These project-based assessment methods generate remarkable opportunities for incorporating relevant contextual elements, inter-disciplinary thinking and authentic features into the assessment process. Project-based assessment tasks can also exploit alternative means of assessing that address some of the constraints in the current assessment environment. However, even for project-based assessment, it remains essential for evaluation criteria to consider both the product of the task and the process of arriving at the product. For project-based assessments, this may require the inclusion of additional tasks through

the use of draft submissions, presentations or logbooks (Gibbs, 1995) to facilitate an awareness of the *process* of learning while developing the requisite self-reflective capabilities. Including different types of milestone tasks in group assignments can also provide opportunities for assessing individual competence and contribution in group projects and is frequently used to incorporate elements of peer and self-assessment, scaffolding students' ability to gain a sense for quality in their own work and the work of others.

With the introduction of more project-based learning in recent years, the School has started to make use of rubrics. These are a relatively new addition to the assessment techniques used in the School, replacing the typical assessments marked with merely a mark allocation per section. The reasoning behind the shift to rubric use has largely been to improve the efficiency and consistency of marking and to provide improved guidelines to students regarding what is expected. The rubrics facilitate this by increasing the mark resolution for particular sections and providing students with some indication of the content that is expected in each section. Although the rubrics are more detailed than the methods used previously, they are still frequently designed in a way that provides criteria simply as mark allocations for each section of a report or task. Gibbs (1995) warns against using rubrics in a way that does not provide any indication of the *quality* of work that is required to achieve the marks that are allocated for a particular section. As underlined by Carless (2015b), ultimately, rubrics need to be aligned to support the development of judging capabilities and self-evaluative expertise and not merely to provide evidence for the evaluation of competence. The introduction and use of rubrics in the School should provide students with a learning opportunity that focuses on the *process* of learning in addition to the product or outcome alone. The current use of rubrics is however, unfortunately, promoting a "tick-box" approach to completing and evaluating assessment tasks, emphasising, once again, the strong assessment *of* learning paradigm in the School.

Interestingly, students also expressed the need for visibility of what to expect in a particular year of study. They have a requirement to see beyond tasks and even modules and desire a view of what will be expected of them more holistically. It seems as if this information is currently used for planning of studying strategies, but it also appears that this foresight gives students a sense of comfort. In order to cope with the current

uncertainty around what they will face in any particular year, students currently seek this information from other students who have completed the year previously. Although students may not presently use this information to improve the quality of their learning approaches, it does seem that this presents an opportunity to tap into more holistic and sustainable approaches. It makes sense that students are likely to adopt short-term strategies that see tasks in isolation from each other if they do not have the means to see how knowledge and the development of skills fit into a bigger picture of learning over their degree and even their career as an engineer. A learning-oriented assessment environment should be cognisant of this need and ensure that expectations and the purpose of assessment and learning are more explicitly communicated.

The findings of this study show that the School does not promote learning-oriented assessment practices and is driven primarily by a need to establish and measure competence. In general, assessment tasks are not seen as learning opportunities and the design of assessment tasks does not consider student learning processes or student self-regulation. The predominance of assessment *of* learning practices provides a restricted and quite severe environment that clearly sends very strong messages to students about what is being valued in their learning context (Biggs & Tang, 2011).

7.2 An unsupportive culture of teaching and learning

Although assessment is driven by a need to determine competence, the level of certainty around the outcomes that should define this competence is unclear. The uncertainty around outcomes permeates through assessment practices to the expectations that are communicated to students, the criteria that are used to mark assessments and the feedback that is provided. This results not only in students who are unsure of what is expected of them but also in lecturers who are unsure how to guide students to improve.

The absence of clear outcomes ties distinctly to a lack of a structured, systemic approach to teaching and learning in the School. Lecturers are unsure of the institutional and professional requirements around assessment and feel trapped by constraints that may not always be real. Lecturers admit that many of the assessment methods that are used are not aligned to the desired student learning behaviours and yet, there is resistance to change. The reasoning behind this resistance stems from a

lack of awareness of the possibility to innovate but more importantly from a lack of lecturer confidence and exposure to alternatives and know-how.

When initiatives and changes are made, these appear to be done in an ad hoc manner often without thoughtful consideration of why the changes are being made and limited subsequent evaluation of whether the changes result in improved student learning. In best case scenarios, where lecturers are implementing solutions that engage and motivate students, these examples are not formally shared amongst staff in the School. These initiatives are therefore not used to promote collaboration or to enable lecturer learning and development. Furthermore, lecturers largely view courses in isolation from the degree programme, and as a result, there is a lack of a macro-level, holistic approach to the development of skills and application of knowledge throughout the student learning journey.

It is interesting and somewhat ironic that lecturers expressed their desire for students to be more curious, aware of the world and well read on topics in the engineering discipline yet many lecturers' do not recognise a similar need to be curious and aware of their teaching and learning practices. There is limited evidence of benchmarking, and although some lecturers make use of online resources to enhance their courses and teaching practices, none make use of a teaching and learning community of practice outside of the bounds of the School. Several lecturers indicated that they have no idea where to start to improve or change their current practices.

It is obvious that the current culture of teaching and learning in the School is not supporting the development of lecturers as teachers nor engaging lecturers in constructive conversations around challenging and improving their current practices. There are signals that suggest that teaching and learning are not necessarily valued in this context and, as a result, innovations and reflective practice in the teaching and learning space appear to be initiated by motivated individuals rather than due to a School driven strategy to support and enhance the quality of student learning.

The teaching-centred and assessment *of* learning themes appear to originate from the culture of teaching and learning in the School. This emphasises the importance of starting the process of change by reflecting on current practices and reconceptualising

the value of assessment in the context of student learning. These findings highlight the need for a community of practice and a more scholarly approach to teaching and learning in the School (Middendorf & Pace 2004; Streveler et al., 2012; Biggs, 2014).

7.3 Student focus of *studying for passing*

The findings from this study have shown that assessment in the School influences student approaches to learning in a variety of ways. These include how students prioritise their work, what content they focus on, what methods of assessments they prefer and what strategies they adopt when studying. Underlying all of these decisions is a clear intention, that students focus on and adapt their learning strategies to pass or do as well as possible. Students are therefore constantly aware of and searching for cues (Miller & Parlett, 1974) that give them an indication of what strategy or effort is required in assessment tasks. This includes acquiring information from students who have done the course before and gaining insights by consulting with lecturers. They also use feedback or marks from previous assessment tasks to adapt their strategies to align effort to maximising marks. Students tend to opt for strategies that enable them to practice methods and procedures for replication in an assessment. They will typically only spend time trying to understand the material and how it applies to different scenarios when this is a requirement for passing the course. Deep approaches are more likely to be exhibited when students have an intention to understand relationships and consider how the particular theory can be applied more broadly (Crawford et al., 1994). If assessments expect students to understand and apply material, they are inclined to adopt strategies that are more likely to lead to deeper understanding because of their focus on passing. This shows the power of assessment in shaping student learning and the pedagogical importance of alignment between assessment tasks, the intended learning outcomes and the quality of the desired approaches to learning.

It, therefore, appears that students are flexible and adaptive and use strategies that are most likely to lead to them maximising the number of marks that they obtain. These practices were prevalent in the low-performing as well as the high-performing student groups. The strategies suggest that students are adopting "achieving" approaches to their studies although, for many students, the word "surviving" more accurately represents the overall intention. If assessments require them to adopt strategies that

lead to deeper learning, they are likely to attempt to do this. The research shows that for many of the current assessment practices in the School, students are however adopting procedural or mechanistic strategies to their studies. They are resistant to exploring content beyond what is required which results in the perceived lack of curiosity and interest in the engineering world. Unfortunately, these findings suggest that students view the responsibility for learning as something that lecturers or the School controls. Students do not, therefore, exhibit initiative or take ownership and accountability for their studies and learning. As a result, the skills that students are developing are ultimately less likely to be useful in the real world.

To facilitate a shift to a learning-oriented assessment environment, attempts need to be made to develop students' capacity to self-evaluate, leading to them become more accountable and autonomous in their approaches to learning. This can be done in several ways but improving the communication of expectations to students and alignment of assessment tasks to these expectations is a key priority. As students are already operating in a *studying for passing* paradigm, there is a risk that increasing the transparency of outcomes and criteria could lead to an over-reliance on these with *criteria compliance* (Torrance, 2007) replacing learning. There is already evidence of this type of behaviour around rubrics for projects. Rubrics have been included to improve transparency and consistency and to provide students with better guidelines of what is expected. The content of the rubrics, however, remains product rather than process centred leading students to use the rubrics as a means of cue-seeking and mark-hunting, resulting in mechanistic and "tick-boxing" strategies. This highlights the relationship between outcomes, teaching, assessment tasks, marking and feedback techniques and the indisputable role that they play in influencing students intentions and strategies.

It was interesting to note that lecturers have a perception that students have poor time management skills (including planning, prioritising and monitoring of work) and that this is one of the primary reasons for the lack of student success. Findings from this study show distinct differences in the planning approaches used by high-performing and low-performing students, yet there is evidence that all students make use of planning, scheduling and prioritising techniques. Although global and local studies have shown inconclusive links between time management skills and student success

(Swart, Lombard & de Jager, 2010), it is apparent that some students struggle substantially more than others to keep up with the workload. The workload of the curriculum, therefore, appears to be a dominant factor that influences how students approach learning, driving the adoption of strategies that lead to surface approaches, for the purpose of maximising marks to pass. This supports the findings from Case & Gunstone (2002) who found similar issues around workload in a comparable context. The School needs to be aware of the influence of workload and course content, particularly on less-prepared students as some compromises on content and lifelong learning skills are inevitable. Presently, it appears as if the School values content over the development of application and transferable skills that will prepare students for the real world. This needs further exploration and consideration, perhaps leading to a change in curriculum strategy for the School.

7.4 Under-developed social structures

The original framework of theoretical concepts, that was developed from the literature review in Chapter 2, did not include the influence of social factors on student learning nor the supportive function that social networks would play in the assessment environment. It became evident, however, from the focus groups with students in particular, that group learning, support networks and a sense of community in the School are all significant factors that influence how students learn. A strong theme that emerged from the study was the extent to which students feel that they have "no voice". This implies that students lack ownership and involvement in their learning context (Carless, 2015b). Students expressed dissatisfaction with the fact that their ideas for curriculum and assessment development were not heard or recognised which made them feel less inclined to engage on that level. Students long for a sense of self-realisation from being aware that they are contributing to their learning environment.

A possible means of creating social learning spaces in which students can participate optimally includes the use of group work. Group work can enable students to develop a range of group and interpersonal skills while facilitating deeper understanding of the material due to increased levels of engagement (Carless, 2015b). However, the current execution of group work assessment tasks in the School does not appear to be serving this purpose.

Because performance and participation in group assessment tasks are often product-oriented, high-performing students are frequently rewarded with high marks without having necessarily developed the teamwork and interpersonal skills that would be expected of a graduate engineer. Stronger students are often insensitive to the needs of the group members, questioning whether they are developing appropriate skills for the real world. The task and performance driven behaviours of stronger students also affect team dynamics, demotivating students, particularly students who feel unprepared for the high intellectual and practical burden placed on them through group work. These students often feel that they have not had adequate time to synthesise material before committing openly to their mastery of it in a vulnerable and open setting. They believe that ideas and approaches that do not align with the performance-driven approach of other students are not valued, creating conflict both within the group and within the individuals themselves. There are also students who feel ill-prepared for working in groups and express a desire for the School to play a more active role in supporting the development of these skills in an unpressurised and protected setting. The social dynamics of group work in assessment tasks, therefore, has the potential to allow the strongest students to thrive and the students that are already struggling to wither. This highlights the need to carefully design and scaffold group assessment tasks that create a learning environment that benefits all students.

Student-centred learning often focuses on the role of individual students, sometimes without adequate consideration for how these individuals interact with their social environment or their community of learning (Mckenna, 2013). Improvements to teaching pedagogy and assessment also frequently centre around students as individuals fostering an individualistic approach to studying and learning. It appears that in this context, a more collectivist approach is needed when thinking about how students learn and adapting environments to facilitate deeper approaches to learning. Students are intuitively aware of the social nature of learning and desire a stronger, comprehensive learning community that includes staff, tutors and other members of the university community. This raises issues and opportunities related to the creation of supportive learning environments both online and in person. The School should consider how to adapt classroom settings, particularly tutorials, and group projects to harness the potential opportunities for enabling students to use social networks to develop their

confidence and create a sense of belonging in the School and their learning communities more broadly.

7.5 An evaluation of the assessment and learning environment

The chapters of this thesis have used portions of a quotation that I believe really captures the essence of the current assessment and learning environment in the School. I re-read this quotation towards the end of my journey of gathering the perspectives of the students and the lecturers. I then realised that this quotation described the experiences in the School, suggesting that this situation is not unique and that ideas and experiences that have been presented by many authors can be used to change and improve this context so that both lecturers and students can learn. The quotation is:

> *"…traditional teacher-centred methods and syllabus centred methods have not always led to quality in learning but to passive, bored students giving back to teachers what they have been given in a worthless, grade-grabbing way irrelevant to their lives."*
>
> (Gibbs, 1995 p2).

The power of assessment in the School is unquestionable and has been clearly demonstrated by this study. Assessment influences what students do, when they do it, how they do it and why they do it and presently, students are *giving back to teachers what they have been given*. In the current environment, assessment is not always influencing student learning in a way that evokes deep approaches to learning, but the potential to change and shape student learning in different ways is apparent.

Referring to the findings in relation to the framework of theoretical concepts, shown in Figure 7, there is indeed a gap between the intended and actual learning outcomes of students although the extent and nature of this gap are difficult to establish due to the poorly defined intended learning outcomes. However, the evidence from all data sources corroborates that what students want to achieve *and* what lecturers want to achieve is not necessarily what is being achieved. There appears to be misalignment at various points in the assessment system: between outcomes and assessment practices, between assessment practices and student approaches to learning and between student

approaches to learning and learning outcomes. There also appears to be misalignment between the assessment system and the curriculum in which it operates and between the curriculum and the social context of both students and lecturers. Yet, despite the obvious challenges, there is a strong desire amongst lecturers *and* students to shift the current assessment environment to support deeper engagement and better quality learning.

The findings from this study, therefore, suggest that there is a willingness from both lecturers and students to change and learn by creating opportunities to adapt assessment strategies to harness students' instincts, dispositions and resourcefulness in a way that drives deeper approaches to learning and the development of a holistic and relevant skill set. Potential opportunities include finding ways of adapting high stakes assessment for formative purposes, exploiting the power that these have to shape student learning or reducing the prevalence of high stakes assessments, giving preference to other methods. These considerations should factor in the inherently stressful nature of high stakes assessments and the impact that a more balanced and considered assessment strategy could have on student understanding, preparedness, anxiety and lack of confidence.

Ultimately, assessment needs to be recognised as a powerful yet complex aspect of student learning that is made up of many parts that work together in an interrelated and congruent way to influence and shape student learning. Initiatives to improve assessment in an engineering context need to be wary of improving the effectiveness and efficiency of assessing competence at the expense of understanding that the primary purpose of assessment should be to support and promote deeper and higher levels of student learning. Consequently, understanding and harnessing the possibilities that exist in any assessment environment can play a significant role in enhancing student learning, their understanding of fundamental concepts, their development of relevant skills and their readiness for the engineering workplace.

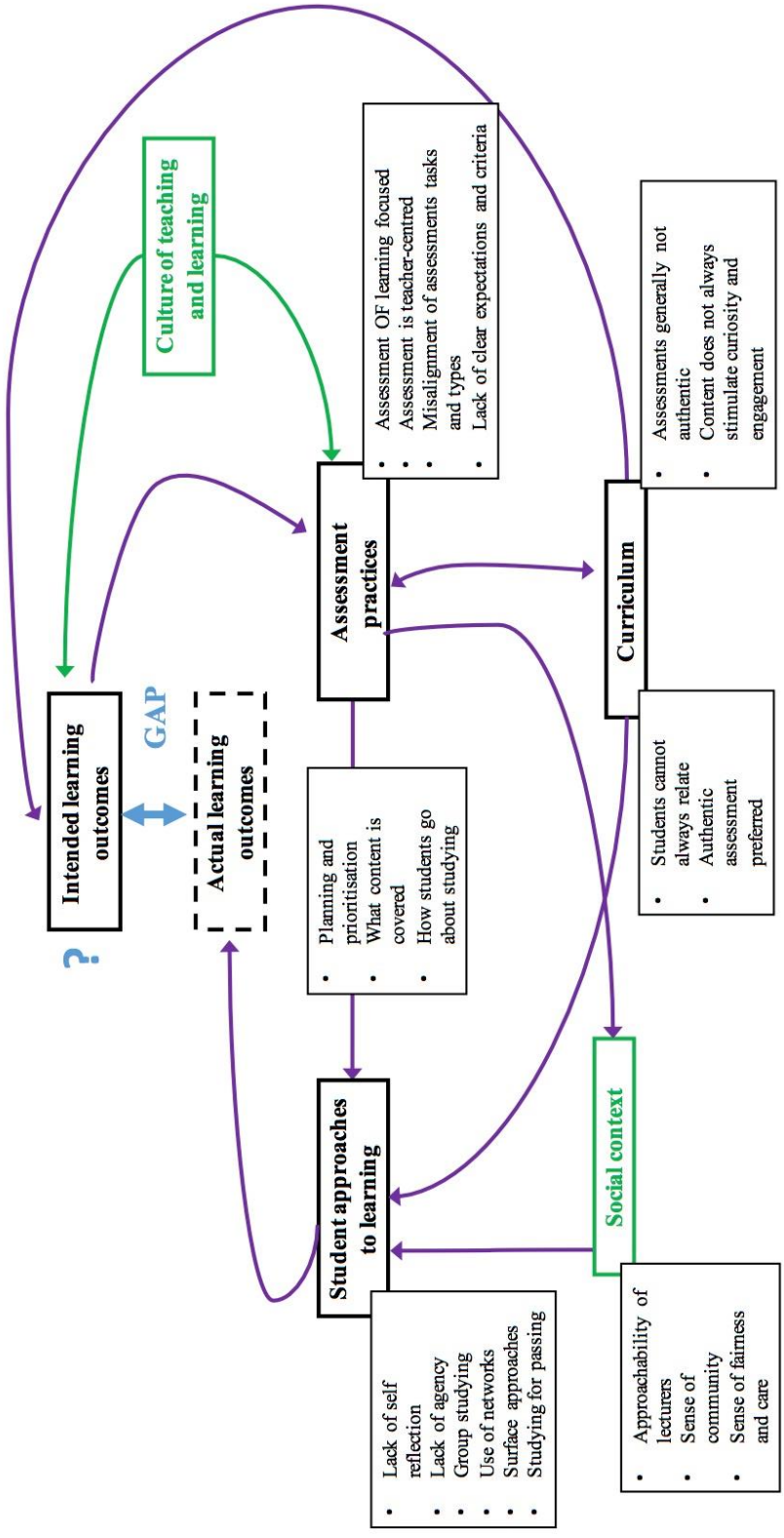


Figure 7: Key findings in relation to the conceptual framework for the study

7.6 Recommendations for the School

The findings show that assessment in the School is not aligned to a conducive learning environment. Consequently, there needs to be a dramatic move away from an assessment *of* learning to an assessment *for* learning approach that underpins assessment practices (Sambell et al., 2013). An essential part of this transition will be creating a balance between the responsibilities of students and lecturers. The new assessment environment needs to develop lecturers so that they can design and create learning spaces and assessment tasks that stimulate and inspire learners, encouraging deeper approaches to learning. Creating this type of environment could be seen as providing too much support to students or over 'coaching' (Torrance, 2007) but the reality is that higher education spaces are rarely anything like the real world and some scaffolding is required to bridge the gap and support students as they grow and begin to navigate the discipline at increasing levels of complexity. Essential to the transition, however, is the development of students as self-evaluative and autonomous learners so that they develop lifelong learning skills in an enabling teaching environment and do not become reliant on assessment tasks to facilitate their learning. A learning-oriented assessment environment perhaps requires protected learning spaces that aim to be authentic while still allowing students the space to explore and play.

Although the study focused on the relationship between assessment practices and learning and did not specifically probe the role of teaching, it would not be complete without briefly considering this. The uncertainty around intended learning outcomes and the misalignment between expectations and assessments stem from systemic and structural issues. Many of the findings suggest that teaching practices have similar concerns which is not surprising considering that the underlying issues will equally affect teaching pedagogy. It was evident from the findings that teaching practices generally make use of lectures followed by tutorials using a very teacher-centred, telling approach with one-way flow of information (Biggs & Tang, 2011). The shifts in the philosophy and approaches in the School should therefore not only consider assessment practices but also teaching and learning "situations" (Biggs & Tang, 2011) that can be used to support the shifts in learning and engagement in a congruent manner.

It is proposed that the transition begins by developing an environment in the School that supports the development of both the researcher and teacher identity of lecturers and encourages a culture that moves towards a community of practice both within and outside of the School (Middendorf & Pace, 2004; Streveler et al., 2012; Biggs, 2014). It is believed that this could lead to the following benefits:

- The sharing of teaching and assessment ideas and initiatives in the School
- An evolving, scholarly approach for evaluating teaching and learning and assessment initiatives through more informed and reflective decision making
- A more integrated and holistic approach to teaching, assessment and learning in the School
- Structures to develop lecturers so that they have stronger teacher identities, are more familiar with teaching and learning theory and feel more confident to innovate and experiment with new ideas
- Increased lecturer involvement in understanding the differences between how novices and experts learn (Middendorf & Pace, 2004)
- Broader conversations with other engineering education researchers both locally and abroad

In conjunction with developing lecturers and starting significant conversations on teaching and learning, it is critical that the School initiates a review of the current curriculum. This needs to include the development of a set of outcomes for the degree programme at the macro level, followed by the different courses in the degree. These should then be aligned to assessment practices and should consider more authentic assessment approaches. The School also needs to reflect critically on the obsession with assessing students individually and explore alternative approaches without jeopardising the alignment of assessment and learning. This could include drawing on case studies such as those presented by Carless (2015b). Part of this process needs to consider the content of the curriculum and establish if there is too much content that results in excessive workloads, compromising the quality of student learning (Bransford et al., 2000). The processes of curriculum review and the development of a teaching and learning culture in the School should unfold concurrently. It is through the process of staff development that more active engagement will take place and

through the process of curriculum development that staff themselves will reflect, learn and grow (Scholtz & Bester, 2012).

As part of this curriculum review initiative, the following specific issues should be considered:

- Once outcomes are more explicitly defined and assessment becomes more aligned to these outcomes, better criteria can be developed. These should inform feedback processes and the development of rubrics that support more holistic and self-evaluative skills in students (Carless, 2015b). The School should also consider a broader range of feedback techniques that are both time efficient and valuable to students.
- More formative assessment structures that cater to a broad diversity of students need to be considered and introduced. This process needs to acknowledge that not every support structure will be relevant for all students and that some initiatives, designed to encourage participation, can shut off the learning process for other students. The structures, therefore, need to be flexible, enabling students to make their own decisions around participation and engagement, assuming more accountability for their learning.
- The issues of self-regulation and accountability need to become more explicit outcomes of the degree. These also need to be actively developed and assessed throughout the programme, from first year to final year. The development of these competencies is necessary if more flexible assessment structures are considered.
- The use of group work and the development of team skills should take cognisance of the fact that different students have different needs and that appropriate scaffolding needs to be in place to support students as they develop the necessary skills for teamwork, peer-assessment and self-reflection (Scott & Fortune, 2013; Boud & Molloy, 2013).
- The introduction of more authentic and project-based learning that aligns with the outcomes discussed previously and stimulates student curiosity while remaining relevant to the interests and motivators of a diverse student body (Case, 2013; Wiggins, 2011).

It is also recommended that the awareness and improvement of teaching and learning in the School incorporates the students. The School needs to open up conversations with students about teaching and learning, engaging them as agents in the learning process (Gibbs, 1995). This could include the use of small group instructional diagnosis (Clark & Redmond, 1982) or lecturer evaluations. Edström (2008) argues that course evaluations should be part of the constructive alignment of courses and programmes and that the responsibility for these should be shifted from individuals to the institution and that course evaluations should be done, "as if learning matters". Involvement in the processes around teaching and learning should also start to give students a better sense of their learning trajectories, the importance of their active participation in assessment activities and the need for them to take the initiative when approaching their studies. In addition, this will address students desire to have a longer-term view of how their studies will unfold, aligning modules and seemingly disjointed requirements with a greater purpose that is aligned to their vision of their degree. Furthermore, engaging students in these processes creates a strong message for lecturers and students that teaching and learning is a partnership and that all parties need to be aligned in order for it to work. This approach would however require a level of trust and mutual respect, which, from some of the comments from both students and staff, appears to be lacking. This is therefore potentially a long process that needs to develop and grow over time in order to foster a more collaborative learning environment. Again, the process itself has the potential to support the development of trust and respect rather than something that is externally enforced.

Due to the systemic issues that have led to the unsupportive practices in the School, it is not easy to provide short term solutions. The recommendations require a thoughtful and committed approach to changing the underlying philosophy of learning and assessment in the School. I am hesitant to suggest any quick-wins since any changes that do not consider the holistic environment are unlikely to improve the quality of student learning and consequently student pass rates. If changes are introduced using a piecemeal approach, there is the possibility that immediate results will not be seen, confirming the bias of any sceptics, and closing down on future innovations. I would also caution against being too quick to measure changes against student pass rates. Presently, passing is not necessarily a good indicator of the quality of student learning that is taking place. The strategies that students are adopting have also been entrenched

over the years due to their contexts, and it will take time to shift the intention of students and develop the skills and dispositions to engage in deeper approaches to learning.

To generate some momentum and enthusiasm around teaching and learning in the School, it is possibly wise to consider what changes can be made in the shorter term so that lecturers do not become overwhelmed or despondent about the challenges ahead. There are also likely to be institutional barriers to some of the structural initiatives which may take time to navigate, potentially frustrating the process. There are, however, many well-researched practices that could start to inform assessment decisions in the medium term. These include increased opportunities for individual and process-level feedback, interventions to create awareness around teamwork skills and reducing the use of formal tutorial settings that force students to attend by associating marks with tutorial participation.

Ultimately, the findings of this study have highlighted several critical and noteworthy observations. Firstly, the students and lecturers in the School are aware of and are willing to acknowledge that the current practices do not support the quality of learning that is desired. Secondly, students use flexible strategies and have adaptive intentions regarding their learning which can both be redirected through carefully and intentionally designed assessment practices. And finally, the vision that students and lecturers have of the ultimate purpose of the degree have many similarities. Although this vision is frequently clouded by the immediacy and practical challenges that are experienced, it is possible to see how common ground can be reached in the future. All of these observations are crucial as they suggest that once all parties understand the ultimate goal, that the resistance to change and improvement should be manageable.

7.7 Significance of the study

This study makes a significant contribution to the assessment practices in the School. It has provided holistic insights into the key factors that influence how assessment shapes student learning and how assessment can be used to improve student learning. It has also shown how underlying structures and cultures can constrain innovation but more importantly how these can be used to open up opportunities for transforming the teaching and learning landscape and the engagement and success of lecturers and students alike.

More broadly, this study has made use of a unique combination of surveys, interviews and focus groups to obtain perspectives from both students and lecturers in an engineering education context. This combination illuminated the relationship between these perspectives and exposed the potential for a biased and one-sided perspective if certain voices in a particular context are not heard. This study therefore provides a valuable methodology that can be used in other contexts to understand the complexity of the relationship between assessment and learning from multiple perspectives.

Although this study has highlighted and corroborated many findings in assessment literature, it has also shown how the complexities of context can influence assessment practices significantly. The context of this study was particularly interesting because of the diversity of the student body and the wide range of educational backgrounds inherent in a South African higher education context. This landscape is further complicated by the very high student failure rates in engineering education with most students operating in survival mode much of the time. All of these factors play a role in how students approach learning, how they respond to pedagogical strategies in a higher education teaching and learning environment and what approach is required to ensure access and success for all students. The findings of the study can be used to guide assessment practices not only in engineering contexts but across all higher education disciplines in South Africa.

Of particular relevance to the South African context are the issues around the under - developed societal structures in the School that are alienating many students and placing constraints on learning processes. Strategies need to be developed for supporting learning in a context that suggests more collectivist approaches to learning and the establishment of an inclusive and learning-oriented community of practice.

Chapter Eight

Their lives

The Conclusions and suggestions for further research

In the final chapter, I refer back to the original purpose of this study and consider the findings in relation to the research questions and objectives. I then conclude by reflecting on opportunities for further research that were inspired by this study.

8.1 Conclusions of the study

The conclusions refer back to the proposed research questions in Chapter 1. They are presented for each sub-question followed by the central research questions for the study. The conclusions related to the four sub-questions for the study are as follows:

Sub-question 1

What are students' current learning practices and how are these shaped by assessment practices in the School?

The predominant approach evident from the student surveys and student focus groups is that of *studying for passing*. Students believe that the School values passing more than understanding and curiosity and as a result, it is students' intention to pass in as efficient a manner as possible. The design of assessment tasks and the perceived philosophy of assessment in the School influences student learning strategies and the focus and prioritisation of study efforts. Students consequently make use of strategies that aim to recall methods and procedures rather than intending to understand, relate and apply content and knowledge. For many students, the workload or pace of course delivery seems too fast which, further affects prioritisation and the prevalence of surface learning approaches.

Sub-question 2

How are assessments currently designed and used in the School and how can these be framed in relation to assessment for learning literature?

Although there are pockets of excellence in the School, assessments are generally designed and used with the overall intention of establishing the competence of students. The intended learning outcomes associated with competency are, however, poorly defined leading to uncertainty and misalignment throughout the assessment process. The process of student learning is rarely considered when choosing assessment methods and when designing assessment tasks. Although lecturers aim to design assessment tasks in a way that establishes deep levels of understanding, this admittedly fails in many instances. The manner in which students tackle assessment tasks is generally observed as being mechanistic or procedural, associated with surface approaches to learning. Lecturers often try to control student learning through the use of assessments, resulting in a teacher-centred approach rather than encouraging a learning-oriented environment. This limits student agency, which further results in high frustration levels amongst staff regarding student initiative and engagement. Assessment practices in the School are, on the whole, aligned with assessment *of* learning and not assessment *for* learning theory. The exceptional cases of assessment that are oriented towards learning are typically not shared in the School thus limiting opportunities for holistic improvement and change.

Sub-question 3

Considering the perspectives of students and the current practices in the School, as revealed by 1 and 2, how do assessment practices in the School shape student learning?

Assessment practices in the School do two important things. Firstly, they indicate to students what is valued in their learning context, and secondly, they place constraints on students, which impacts the flexibility of student study and learning practices. In the current context, the purpose of assessment practices is primarily aligned to measuring competence, which leads to students focusing their attention on demonstrating this competence, often at the expense of learning. The outcomes that are used to evaluate competence are typically content and product-centred and do not measure the lifelong skills and dispositions that would be better aligned to supporting deeper approaches to learning. The high failure rates and high workload result in compromises throughout the learning process affecting understanding, engagement and higher-order thinking skills.

Sub-question 4

How could assessment practices in the School be re-designed to promote improved levels of student learning?

Several recommendations have been provided to shift assessment practices from an assessment *of* learning to an assessment *for* learning paradigm. These include the need for a conscious and extensive focus on teaching and learning in the School and a review of the current curriculum for the degree programmes. Specific consideration also needs to be given to more authentic learning tasks that develop skills and attributes beyond content knowledge and understanding alone. It is also recommended that students should be actively involved in both of these initiatives.

Central research questions

How do students currently interact with assessment practices in the School of Mechanical, Industrial and Aeronautical engineering at the University of the Witwatersrand?

and,

How might current assessment practices be transformed to improve the quality of student learning in the School?

Overall, this study was able to answer the two central research questions for the study. How students currently interact with assessment practices in the School of Mechanical, Industrial and Aeronautical engineering at the University of the Witwatersrand was established, and a set of recommendations are provided to align current assessment practices with assessment for learning literature to improve the quality of student learning. The recommendations suggest that assessment practices need to be relevant and that students need to become better agents in their own learning. Ultimately, assessment needs to be about *their lives.*

8.2 Suggestions for further research

The findings from this study have shown that there appears to be a legitimate need to assess students in a way that establishes individual competence (Rossiter, 2013)

primarily driven by accrediting bodies that require institutions to show that students have demonstrated the necessary competencies. Conventional thinking suggests that this is easiest to do through traditional, summative assessments such as tests and examinations. It has, however, been shown that these high-stakes, formal assessments have several constraints and often do not align with the skills, attributes and competencies that are required (Green & Rollnick, 2007; Knight, 2006). Students also find these methods of assessment stressful, disconnected from the real-world and a poor reflection of their abilities. More open-ended and authentic assignments can address some of these shortcomings but assessments that allow room for collaboration and access to resources introduce new challenges around plagiarism and copying (Gibbs, 1995). There is, therefore, an inherent compromise in this scenario that needs to be investigated. Alternative forms of assessment need to be explored considering techniques that can be used to address these somewhat conflicting requirements without jeopardising the overall learning objectives.

Perhaps as a counter or complementary alternative to exploring different assessment methods, I believe that there remains merit in exploring how traditional assessments such as tests and exams could be used more creatively to incorporate authenticity, tap into curiosity and engage higher-order thinking skills ultimately encouraging deeper approaches to learning. Although it could be argued that some skills and attributes can never adequately be developed or addressed using an exam, a better mix of assessment methods may be required to address learning needs while retaining some pragmatism around quality control and operational efficiencies.

The strong theme around the social context of students also warrants further exploration. McKenna (2013) cautions against student-centred learning that does not consider the student's social context. Further research needs to consider how to create a sense of community in a school that addresses student diversity and gives students a sense of belonging. This community needs to encourage and support the development of networks that include students, lecturers and the broader societal contexts, creating an environment for learning to thrive. This is of particular relevance to South African not only because each context has unique challenges but also because this need for an awareness of the collectivist nature of student learning appears to be a somewhat unique characteristic of the South African context.

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APPENDIX A – STUDENT QUESTIONNAIRES

FIRST STUDENT SURVEY

1. Informed consent

I acknowledge that by submitting my responses to this online questionnaire that I have consented to participating in the research.
I understand that my participation is entirely voluntary.
I understand that the information that I provide will be stored electronically and will be used for research purposes now or at a later stage.
I understand that this is a research project whose purpose is not necessarily to benefit me personally in the immediate or short term.
I understand that my responses to this questionnaire will remain confidential.
At the end of the questionnaire you will be asked if you are interested in participating in an additional phase of the research which will make use of focus groups. If you are willing to be considered for these focus groups, you will be asked to provide your email address and student number. Your questionnaire responses will then no longer be anonymous to the researcher. However, no names or identifying information will be included in any publications or presentations based on these data, and your responses to this questionnaire will remain confidential.

Clicking on the "Agree" button indicates that

- You have read the above information
- You voluntarily agree to participate
- You are 18 years of age or older

◯ I agree

2. Introduction

When completing this questionnaire, please select the answer that best describes your feeling - don't mull over it too long, the first answer that jumps into your head is usually the one that we want.
Nevertheless, make sure that you understand the question before answering.
Try to answer the questions based on your overall experience of courses which you have done as part of your degree - do not focus too much attention on a specific course. There is place at the end to include some of your own comments on whether a particular course stands out for you as being very different to the majority of courses.

In what year did you first register for engineering at Wits?

In what years of study are you currently doing courses?

(Cross-registered students can check multiple boxes)

- [ ] First year
- [ ] Second year
- [ ] Third year
- [ ] Fourth year

What branch of engineering are you currently registered for?

- ( ) Mechanical
- ( ) Industrial
- ( ) Aeronautical
- ( ) Nuclear

3. Amount and distribution of study effort

When it comes to my studies, it is my primary aim to:

- ◯ Pass
- ◯ Do Well

When answering this section, consider all the courses that you are doing

	Strongly disagree	Disagree	Agree	Strongly agree
I do the same amount of study each week, regardless of whether an assignment/test is due or not	◯	◯	◯	◯
I can be quite selective about what I study and still do well	◯	◯	◯	◯
I have to study regularly, throughout the semester, if I want to pass the course	◯	◯	◯	◯
I only study things that are going to be covered in assignments or tests and exams	◯	◯	◯	◯
I find that it is possible to do quite well without studying much	◯	◯	◯	◯
I often find that I cannot do everything and I end up prioritising some work over other work	◯	◯	◯	◯

If I need to prioritise, I usually prioritise in the following order:

- ☐ Weekly general studying
- ☐ Tests
- ☐ Assignments

4. Tutorials and learning

When answering this section, consider all courses that have tutorials that need to be completed

	Strongly disagree	Disagree	Agree	Strongly agree
I find that attending formal tutorial sessions helps me to understand course material better	○	○	○	○
I find that doing tutorials helps me to understand course material better	○	○	○	○
I make sure that I am always well prepared for tutorial sessions	○	○	○	○
I always complete tutorials that need to be handed in, on my own	○	○	○	○

5. Assignments and learning

When answering this section, consider all courses that have assignments that need to be completed

	Strongly disagree	Disagree	Agree	Strongly Agree
Tackling the assignments really makes me think	○	○	○	○
I learn more from doing the assignments than from studying the course material	○	○	○	○
In completing the assignments, I can get away with not understanding and still pass	○	○	○	○
In completing the assignments, I can get away with not understanding and still get high marks	○	○	○	○
The assignments give very clear instructions about what I am expected to do	○	○	○	○
When I tackle an assignment it is not clear what would count as a successful answer	○	○	○	○

6. Feedback and learning

I typically receive feedback for tests and assignments in the following forms:

(You can select more than one option for this question)

- [ ] Handout which discusses key areas of learning from an assignment/test
- [ ] Written comments on work handed back
- [ ] Class discussion after assignment/test
- [ ] Verbal feedback from lecturer/tutor

I typically receive feedback for:

(You can select more than one option for this question)

- [ ] Tests
- [ ] Tutorials
- [ ] Assignments
- [ ] Exams

When answering this section, consider all courses that have feedback

	Strongly disagree	Disagree	Agree	Strongly Agree
When I get things wrong or misunderstand them I don't receive much guidance in what to do about it	○	○	○	○
I would learn more if I received more feedback	○	○	○	○
Whatever feedback I get comes too late to be useful	○	○	○	○
When solutions are provided, I do not find them useful at all	○	○	○	○

7. Feedback quality

When answering this section, consider feedback broadly i.e. feedback on all work done - assignments, tutorials and tests

	Strongly disagree	Disagree	Agree	Strongly Agree
I get plenty of feedback on how I am doing	○	○	○	○
I don't usually bother to look at feedback	○	○	○	○
The feedback mainly tells me how well I am doing in relation to others	○	○	○	○
The feedback helps me to understand things better	○	○	○	○
Once I have read the feedback I understand why I got the mark I did	○	○	○	○
I don't believe that I get any feedback	○	○	○	○

8. What you do with feedback?

When answering this section, consider feedback broadly i.e. feedback to all work done - assignments, tutorials and tests

	Strongly disagree	Disagree	Agree	Strongly agree
I read the feedback carefully and try to understand what the feedback is saying	○	○	○	○
I use the feedback to go back over what I did	○	○	○	○
The feedback does not help me with any subsequent work	○	○	○	○
The feedback prompts me to go back over material covered earlier in the course	○	○	○	○
I tend to only read the marks	○	○	○	○

9. Tests, examinations and learning

When answering this section, consider all course tests and examinations

	Strongly disagree	Disagree	Agree	Strongly agree
When studying for tests or exams, I often memorise methods / steps without understanding what I am doing.	○	○	○	○
I understand things better as a result of the tests and exam	○	○	○	○
If I did poorly in a course test, I will focus more on this course when studying for exams	○	○	○	○
I usually forget most of what I have learnt after the test / exam	○	○	○	○
In the test or exam you can get away with not understanding and still pass	○	○	○	○
I prepare for exams and tests in the same way	○	○	○	○
I put much more effort into studying for exams (rather than tests)	○	○	○	○
If I did poorly in a course test, I often feel like giving up	○	○	○	○
I usually spot (target) which sections to cover for the exams	○	○	○	○

10. General questions on learning

When answering this section, consider all the courses that you are doing

	Strongly disagree	Disagree	Agree	Strongly agree
I often study with other students in my class	○	○	○	○
I find that studying together with other students helps me to understand concepts better	○	○	○	○
When I am struggling with a course, I seek help from other students in my class	○	○	○	○
When I am struggling with a course, I seek help from the course lecturers	○	○	○	○
I usually have a sense of achievement after writing exams	○	○	○	○
I believe that the course weighting for assignments / tests / exams is fair	○	○	○	○
When I fail a test or exam, I try to understand why	○	○	○	○
The way in which I study for tests and exams has changed as I have realised what works and what doesn't	○	○	○	○
When I fail or do poorly in a test, I evaluate my study methods and consider what I need to change	○	○	○	○
When I fail or do poorly in a test, I try harder next time using the same methods as before	○	○	○	○
I use my mark for assignments and tests to give me an indication of how well I am doing in the course	○	○	○	○

	Strongly disagree	Disagree	Agree	Strongly agree
Answering this survey has made me think about how I study and learn	○	○	○	○
After answering this survey, I may consider how to change the way I approach learning and studying	○	○	○	○

11. Comments and follow up

Are there any comments that you would like to make?

As part of this research, I may wish to contact you for further information at a later stage, please include your **student number** if you do not mind being contacted at a later point. Your data will still remain confidential.

This survey may be followed up using interviews or focus groups, if you would be willing to participate in this, please indicate yes. If you indicate, yes, you will also need to include your student number and email address so that I can contact you at a later stage to ask if you are still interested and make the necessary arrangements.

- ◯ Yes
- ◯ No

Please include your email address if you indicated yes above

Thank you for participating in this survey!

SECOND STUDENT (FOLLOW UP) SURVEY

Introduction

The School of MIA is currently considering replacing the weekly structure of tests (every Monday morning) with a test week that will run once per semester. All course tests would then be written in this week.
Before making this decision, the School wishes to obtain as much input as possible on this matter. We would value your thoughts on this decision and invite you to partake in this survey which should take about 20 minutes of your time.

Your response to this survey will remain anonymous and no personal details will be included when presenting results to the School.

The results from this survey may however also be included in a research publication, where your details will once again remain anonymous, but we will require your consent in order for us to include your response in any research publications.

By completing this survey, your thoughts will be considered by the School when making the decision regarding the test week.

If you agree to have your response included in possible research publications, please click agree in the check box below.

1. I agree to allow my responses to be included in a research publication

- ◯ Yes
- ◯ No

2. What would excite you about the idea of placing all course tests in a single week?

3. What would concern you about the idea of placing all course tests in a single week?

4. If the School was to implement a test week, would you prefer it to be:

- ◯ Directly before the mid-semester break
- ◯ Directly after the mid-semester break
- ◯ In the middle of the first block
- ◯ In the middle of the second block

Other (please specify)

5. If you had a choice, how many tests would you prefer per course (in a semester)?

6. If tests were scheduled weekly instead of a test week, when during the week would you prefer these tests to be written (you may select more than one option):

- [ ] Monday mornings
- [ ] Friday mornings
- [ ] Saturday mornings
- [ ] Other (please specify)
- [ ] Afternoons in the week
- [ ] Evenings during the week
- [ ] During weekly lecture sessions

7. In the current set up of weekly tests: Do you find that:

	Strongly agree	Agree	Disagree	Strongly disagree
I understand course material better after studying for a test	○	○	○	○
I forget course material after I have studied for a test	○	○	○	○
I don't know what to expect when preparing for a test	○	○	○	○
I miss lectures in order to study for tests	○	○	○	○
I get behind in subjects because I prioritise studying for tests	○	○	○	○
I end up cramming for tests at the last minute	○	○	○	○
I forget the material that I have learnt for a test after it is written	○	○	○	○
Writing tests prepares me for exams	○	○	○	○
Tests encourage me to keep up with course material throughout the semester	○	○	○	○
Balancing assignments, tests and weekly studying requires me to develop time management and planning skills	○	○	○	○
Feedback from tests that I have written helps me to learn how to approach studying for future tests	○	○	○	○
If I have a bad week, I am able to work harder in future weeks to make up for it	○	○	○	○
I feel that my final marks for a test are a good reflection of my understanding of a course	○	○	○	○

8. Although you have no experience with a test week, consider your current experience with exam sessions when answering the following questions:

	Strongly agree	Agree	Disagree	Strongly disagree
I find myself getting into a study rhythm which makes preparing easier	○	○	○	○
I struggle to decide which subjects to focus on	○	○	○	○
If I feel that an exam has not gone well, I am motivated to work harder for future exams	○	○	○	○
I find that I get tired over the exam period and do worse for later exams	○	○	○	○
I find the exam session more stressful than normal term time	○	○	○	○
I find the exam session extremely stressful	○	○	○	○
I find it difficult to stay focused on studying over such a long period of time	○	○	○	○
I feel that I am less prepared for exams written towards the end of the exam period	○	○	○	○
If I feel that an exam has not gone well, this negatively affects future exams and studying.	○	○	○	○
I find that stress affects my ability to perform well in exams	○	○	○	○
I change my study approaches during exams based on what is working and what is not working	○	○	○	○
I feel that my final marks for an exam are a good reflection of my understanding of a course	○	○	○	○
I feel that the exam period is too long	○	○	○	○
I feel that the exam period is too short	○	○	○	○

9. If a test week was implemented, knowing that tests would cover a module of a course, I would be comfortable writing more than one test in a day:

- ◯ Yes
- ◯ No

10. Rank the following in order of importance (where 1 is super important, and 6 is least important):
In a perfect world, the purpose of assessment should be:

- ☐ To maintain high standards at an institution
- ☐ To provide feedback to facilitate student learning
- ☐ To provide feedback to lecturers on how well students understand material
- ☐ To ensure that students have met the requirements for the degree
- ☐ To measure and grade students against their peers
- ☐ To prepare students for the working world

11. Rank the following in order of importance (where 1 is super important, and 6 is least important):
In a perfect world, the purpose of assessment should be:

- ☐ To maintain high standards at an institution
- ☐ To provide feedback to facilitate student learning
- ☐ To provide feedback to lecturers on how well students understand material
- ☐ To ensure that students have met the requirements for the degree
- ☐ To measure and grade students against their peers
- ☐ To prepare students for the working world

12. Rank the following assessment types based on their ability to support you in developing a deep understanding of important engineering concepts (where 1 is most useful and 6 is least useful)

- [ ] Tests
- [ ] Exams
- [ ] Assignments
- [ ] Tutorials
- [ ] Lab reports
- [ ] Design projects

13. If you were Head of School and needed to make a decision regarding this, which option would you choose:

- ( ) Continue with weekly tests
- ( ) Implement a test week

14. Do you have any further comments or thoughts that you would like us to consider when making this decision:

15. If we choose to interview students before making this decision, would you be willing to be interviewed, if so please include your email address so that we can contact you to arrange a suitable time and place.

APPENDIX B – LECTURER INTERVIEW PROTOCOL

Notes:

The following questions will be used to guide the lecturer interviews. They may be reordered based on the interviewee responses. The protocol also allows for the inclusion of additional questions to probe issues that arise through the process.

Questions posed to lecturers

1. What types of assessment do you use and why do you choose these?

2. When preparing an assessment, what types of things are you thinking about / considering / weighing up?

3. For your course / s what is your main purpose for assessment and how does this compare to what you do / experience?

4. What are you trying to establish / determine in a test regarding student learning?

5. Do you think that there are any constraints which limit the extent to which you can do the things that you would want to do in assessments?

6. What student performance do you expect from students in an assessment? Do you have clear criteria for knowing what "good" would look like?

7. What do you experience regarding student performance in the different types of assessment that you use? Is there anything that surprises you, that you expect or don't expect?

8. What do you think some of the reasons could be that students don't always perform as expected?

9. What do you think that students could do differently to improve their performance?

10. What do you think that you could do differently to improve student performance?

11. When marking assessments, how do you know what to look for and do you think that it is an accurate way of determining this?

12. How do students know what to expect from your assessments?

13. What types of feedback do students receive throughout the course?

14. Do you have a means of getting new ideas, input from others, benchmarking your approaches?

15. How do you know that your assessments evaluate the outcomes that you set for your course?

APPENDIX C – STUDENT FOCUS GROUP PROTOCOL

Notes:

Key questions are numbered in sequence. The indented black questions underneath are intended only for further probing if required.

The questions have been designed to probe students' perceptions and experiences without influencing them. For this reason, the questions go into further detail towards the end of the focus group (if students have not already brought these issues up). I really want to see if the students bring issues up before I do. As a result, the survey starts with a very open-ended question to see what students naturally bring up before focusing their attention.

The issues that require further probing have emerged from literature, the student surveys or the lecturer interviews.

Four focus groups are planned, with groups selected based on performance in assessments. The groups will be as follows:

- *Mid-performing group*
- *High-performing group*
- *Low-performing group*
- *Low to high performing group (a selected group of students who performed exceptionally poorly one year and then very well the following year when repeating)*

Focus groups will be aimed at 6-8 participants.

At the beginning of the focus group, each participant will be given the first question on a piece of paper. They will be asked to spend 5 minutes reflecting on the question and writing down their own personal response. This is done to get students into a reflective mood and to try and get each student to reflect on their own thoughts before they are influenced by others in the group. It is expected that some social construction of ideas will be occurring and it is hoped that these initial answers may be useful in the analysis phase. Students will not be given all the questions as they will then be able to see where the focus group will lead which could influence their responses to earlier questions. Towards the end of the focus group, students will be given the last question and will

again be given 5 minutes to reflect and write on their own before contributing to the group. Both pages will be collected in.

It is planned that the focus groups will be run for 1 hour (allowing half an hour for extra time if required).

PROCESS OF LEARNING / LEARNING PRACTICES

To probe themes emerging from both the surveys and the interviews

1. **How do you approach your studies on a week by week basis throughout the term?**
    a. How do you approach assignments? In what ways do you find that these are valuable?
    b. How do you approach tutorials? In what ways do you find that these are valuable?
    c. What has assisted you in your studies or how have you made use of resources to help you? (Probing use of resources such as tutors, libraries, lecturers, past-papers, ADU, online resources, past students, fellow students, other?)
    d. In what ways do you change your approach if you know that it will count for marks / more marks / a lot of marks?

AND (IF REQUIRED)

2. **How do you go about preparing specifically for a test or an exam?**

EXPECTATIONS

To probe themes emerging from both the surveys and the interviews

3. **How do you know what is expected of you in your assessments?**
    a. Assignments, tutorials, tests, exams – as appropriate

SELF-REFLECTION AND AGENCY

To probe theme emerging from literature and lecturer interviews

4. **Can you share an example of a time when you have been disappointed by your result for a test/exam/assignment?**

AND (IF REQUIRED)

5. **What do you think that the reasons for this were and what did you do about it?**
    a. Have you ever changed or considered changing your approach to studying?
    b. Do you believe that the study / learning techniques that you are using work well?

FEEDBACK

To specifically probe theme emerging from student survey

If this does not emerge in other questions above….

6. **How do you experience feedback?**
    a. What forms of feedback do you receive?
    b. How do you respond to the feedback that you receive?

CURIOSITY

To probe themes emerging from the lecturer interviews

7. **In the lecturer interviews that were conducted, lecturers indicated that they were hoping that students would be more curious about and engaged in what is going on in the engineering world? Do you have any thoughts on this issue?**

AND (IF REQUIRED)

8. **Can you think of ways in which you could explore engineering beyond what happens in the classroom?**
    a. For example (if required), reading, watching videos/TV, work experience, tinkering around with models/building things etc.

LECTURE ATTENDANCE

To probe themes emerging from the lecturer interviews

9. **In the lecturer interviews that were conducted, lecturers indicated that attendance at lectures is often very, very poor? Can you comment on why you (or other students that you know) don't attend lectures?**

SELF-REFLECTION

To probe whether students are aware of the potential behaviours that assessments can be driving

10. **Do you think that the way that assessment is set up in the School enables you to gain a good understanding of concepts?**

SELF-REFLECTION AGAIN

1. **Has this process of chatting about learning and studying provided you with any insights or ideas that may affect the way in which you approach your studies in the future? (For the paper version)**

AND

2. **Can you think of at least two ways in which you may change the way that you approach your studies in future? (For the paper version and group discussion)**

3. **Can you think of at least two recommendations that you would give a lecturer on how they could support your learning better? (For the paper version and group discussion)**

PAPER VERSION TO BE HANDED OUT AT THE BEGINNING

1. **How do you approach your studies on a week by week basis throughout the term?**

PAPER VERSION TO BE HANDED OUT AFTER QUESTION 8

1. **Has this process of chatting about learning and studying provided you with any insights or ideas that may affect the way in which you approach your studies in the future? (For the paper version)**

2. **Can you think of at least two ways in which you may change the way that you approach your studies in future?**

3. **Can you think of at least two recommendations that you would give a lecturer on how they could support your learning better?**

TIME PLANNING

To be used as a guide for keeping the focus group on track

1.	Introduction and explanation of how the process will work	5 mins
2.	First handout and individual reflection	5 mins
3.	Questions 1 and 2 (Learning Practices)	10 mins
4.	Question 3 (Expectations)	5 mins
5.	Questions 4 and 5 (Self-reflection 1)	10 mins
6.	Questions 6 (Feedback)	5 mins
7.	Questions 7 and 8 (Curiosity)	5 mins
8.	Second hand out and individual reflection	5 mins
9.	Questions 9, 10 and 11 (Self-reflection 2)	10 mins

With an additional 30 minutes if discussion is going well and students wish to carry on.

APPENDIX D – STUDENT FOCUS GROUP DEMOGRAPHIC PROFILES

MID-PERFORMING GROUP

No. of students invited via email:	66			
No. of students who participated:	7	11%		
No. of subject fails in second year:	2-3			
Aggregate percentage in second year:	42 - 63%	(average = 53.5%)		
Demographic profile of participants:				

	Mechanical	Industrial	Aeronautical
2nd year			2
3rd year	1	3	
4th year		1	

	Black	White	Indian	Asian
Female	3		1	
Male	3			

HIGH-PERFORMING GROUP

No. of students invited via email:	50			
No. of students who agreed to participated:	5	10%		
No. of subject fails in second year:	0			
Aggregate percentage in second year:	80-90%	(average = 82.3%)		
Demographic profile of participants:				

	Mechanical	Industrial	Aeronautical
2nd year			
3rd year	1	1	2
4th year		1	

	Black	White	Indian	Asian
Female			1	
Male	1	2		1

LOW-PERFORMING GROUP

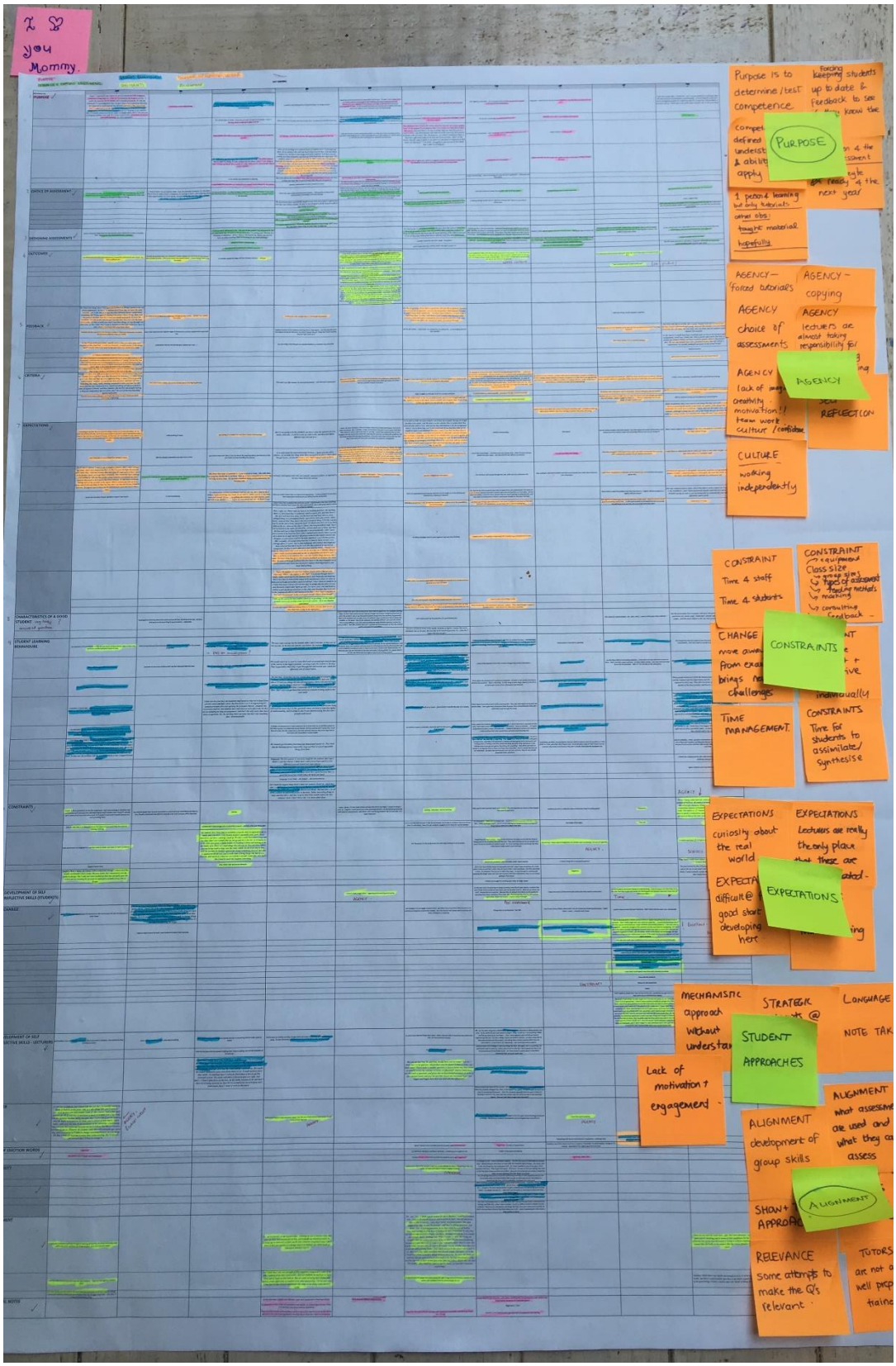
No. of students invited via email:	34			
No. of students who agreed to participate:	7	21%		
No. of subject fails in second year:	8-12			
Aggregate percentage in second year:	37-54%	(average = 44.5%)		
Demographic profile of participants:				

	Mechanical	Industrial	Aeronautical
2nd year	3		1
3rd year	1		
4th year		1	1

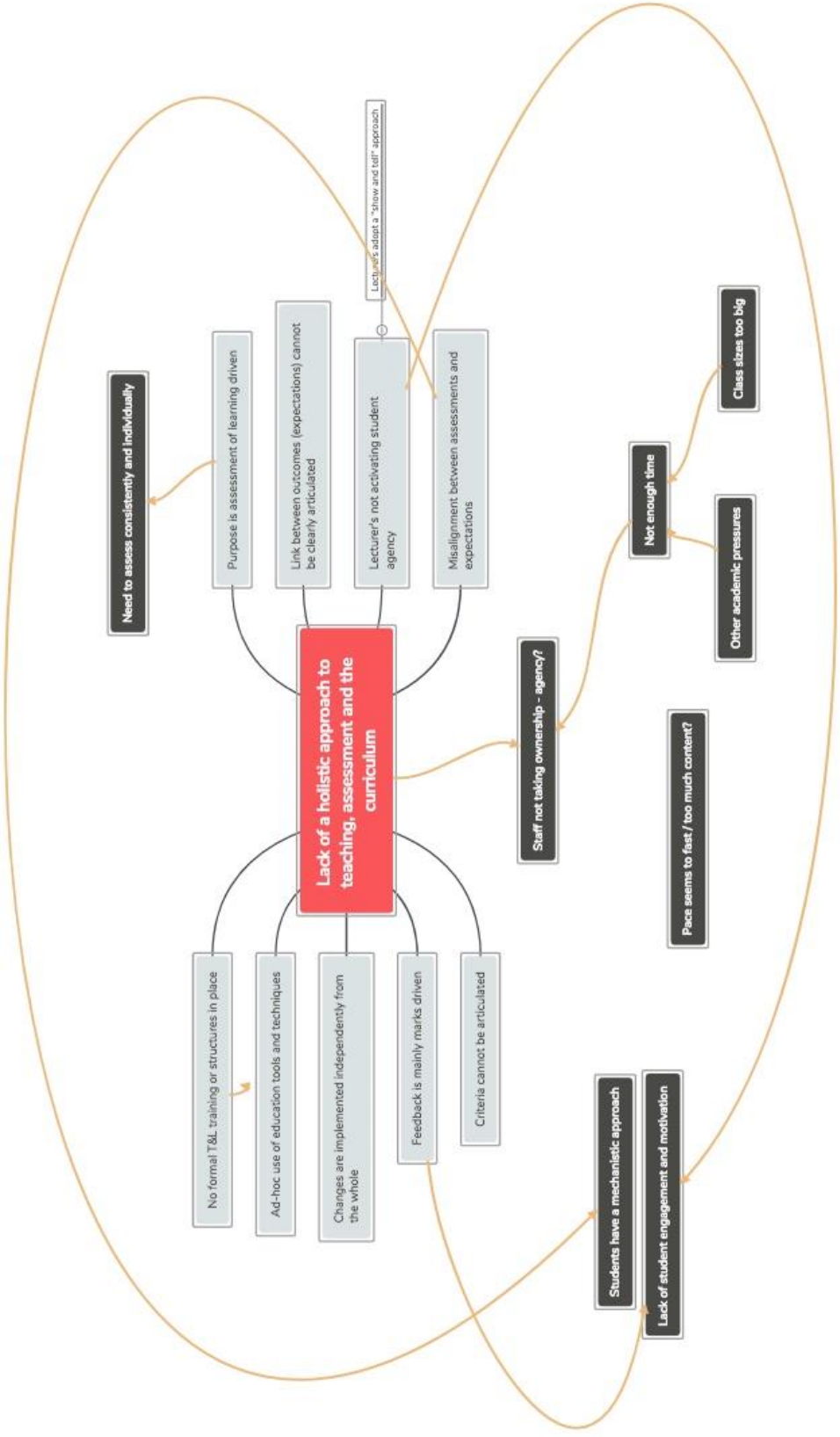
	Black	White	Indian	Asian
Female	1			
Male	6			

TURNAROUND STUDENTS	
Average No. of fails in second year - First attempt	7.7
Average aggregate in second year - First attempt	56%
Average No. of fails in second year - Second attempt	0.7
Average aggregate in second year - Second attempt	66.9%
Average number of disctinctions (over 75%) - Second attempt	2
Average rank in class - Second attempt	Top 15 %
Demographic profile of participants:	
Mechanical	2
Industrial	1
3rd year	3
Female	2
Male	1
Black	3

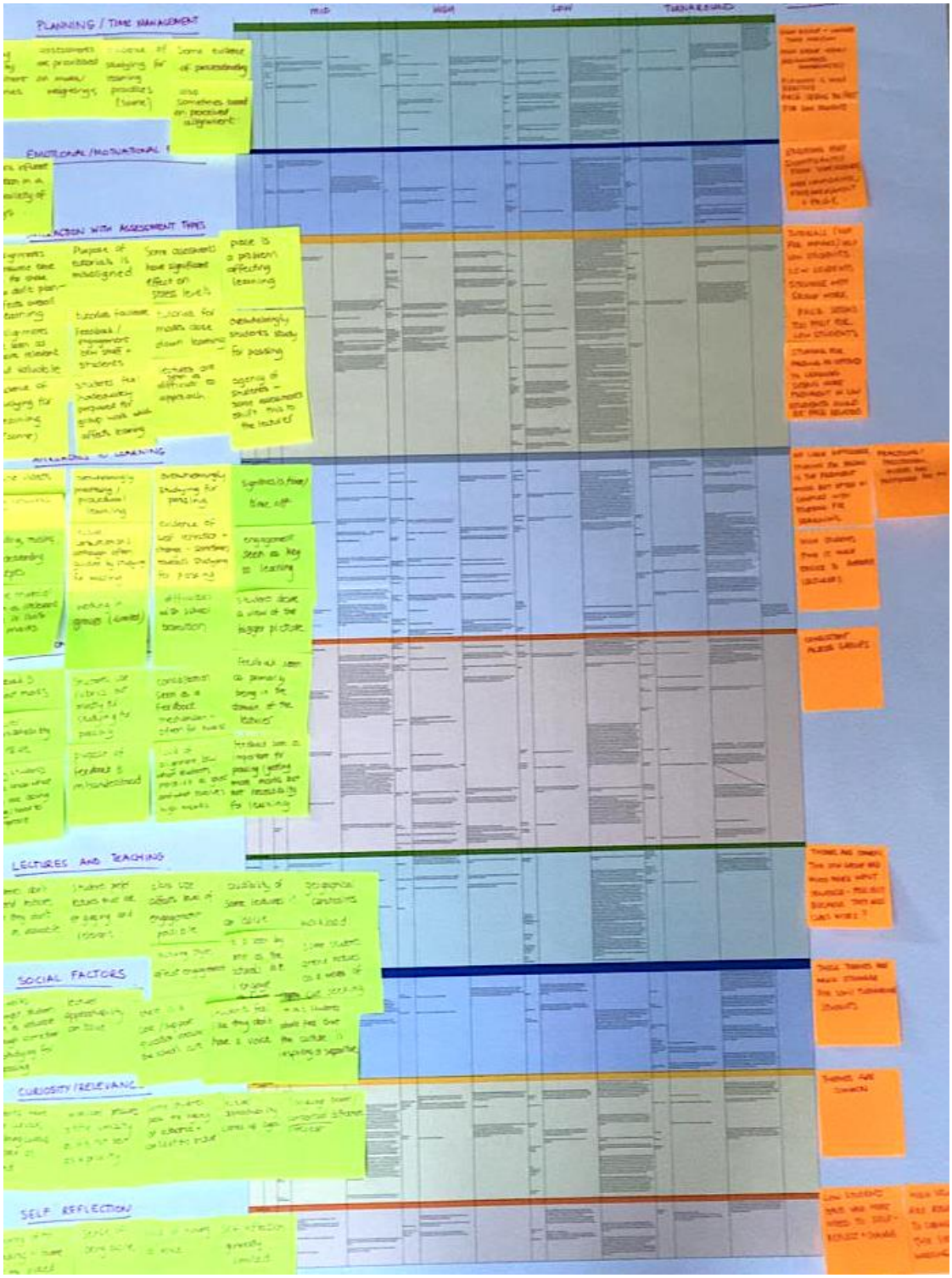
APPENDIX E – LECTURER INTERVIEW DATA CAPTURING AND ORGANISATION



APPENDIX F – LECTURER INTERVIEW MIND MAP



APPENDIX G – STUDENT FOCUS GROUP DATA CAPTURING AND ORGANISATION



APPENDIX H – STUDENT FOCUS GROUP MIND MAP

