

Assessment Practices in Biosciences: University Students' and Teachers' Views

Mapula Nkgau Matimolane



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ABSTRACT

This doctoral thesis investigates highly emotive and topical aspects of student learning in higher education namely, assessment and feedback. The study deals with the complexities and barriers to using learning-oriented assessment approaches to equip students with skills needed to thrive within the uncertainty, demands and challenges of rapidly changing societies. In the current research literature, views about assessment, and in particular formative assessment, are diverse and in some instances contradictory. The argument I make in this thesis is that assessment is situated within a local context, comprised of students and their teachers, which is regulated by disciplinary, professional and institutional traditions, expectations and needs. This research study was impelled by the realisation that most research into pedagogical views held by teachers and their students in higher education has examined them in isolation of each other. In recognition of this disparity in the literature, a more comprehensive study on teachers' and students' views, expectations, and experiences of assessment was undertaken in the South African context.

The study was conducted at a research-intensive university and investigated the aforementioned assessment aspects in students and teachers involved in second year compulsory bioscience courses. Using an exploratory, interpretative, mixed method research approach, data were collected through a combination of interviews, questionnaires and document analysis. An in-depth examination of documents from the selected courses, including students' marked work, provided evidence of assessment and feedback practices experienced by the students registered in the courses. Teachers were interviewed about their assessment practices and their rationale for using these practices. Students' views and their reactions to assessment and feedback were ascertained through questionnaires and interviews.

Interpretations that emerged from using a socio-cultural-historical theoretical lens were helpful in understanding the factors that present challenges to the implementation of learning-oriented assessment approaches. From the characterisation of assessment environments based on learning-oriented assessment principles it was apparent that there was limited active involvement of students in the process. The data highlighted a complex array of factors influencing teachers' conceptions of assessment and subsequently their practices. Significant about the study was the identification of the effects of existing course level assessment cultures and histories on teachers' assessment practices. Program and course factors had more

influence on teachers' practice than their subject expertise, pedagogical beliefs and values. The main highlights emerging from the study were the multiplicity of students' and teachers' views of assessment and feedback with a number of convergent and divergent perspectives. Notably, the cause of dissonance between academics and students stems from the tension between the competing needs of facilitating students' independence and the desire to give them detailed corrective feedback. This dissonance translated into varied emotional responses to feedback from students. Although the focus of the study was on the comparison between students' and teachers' understanding of assessment, the preponderance of students' emotional reactions to assessment feedback that emerged offered an important insight into an unpredicted social-relational dimension of assessment. My original contribution to research knowledge is the generation of the Assessment-Systems-for-Practice (ASP) framework, a reflection and methodological tool for investigating and analysing assessment practices. This framework provides a holistic way of dealing with the complex nature of assessment in higher education. The framework thus has implications for assessment design that would take into consideration cognitive, structural and social-relational dimensions, and its use could have a positive impact on teachers' individual assessment practices.

Nothing we do to, or for our students is more important than our assessment of their work and the feedback we give them on it. The results of our assessment influence our students for the rest of their lives and careers – fine if we get it right, but unthinkable if we get it wrong.
(Race, Brown and Smith, 2005: xi).

DECLARATION

I declare that this thesis is my own unaided work and that all sources are acknowledged in the text. It is being submitted for the Degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at any other University.

_____ day of _____ 2015

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TABLE OF CONTENTS

Title page	i
Abstract	ii
Declaration	iv
Acknowledgements	.v
Contents	vi
List of Tables	x
List of Figures	xi
List of Appendices	xii

CHAPTER 1: GENERAL INTRODUCTION TO THE STUDY

1.1	An overview of the study.....	1
1.2	Why assessment - my assumptions and preconceptions.....	2
1.3	Background.....	6
1.3.1	South African Higher Education	6
1.3.2	Assessment and its link to teaching and learning in higher education	8
1.3.3	Assessment and the multiple goals of science learning.....	11
1.4	Significance of students' and teachers' views of assessment	12
1.5	Purpose of this study and its research questions	14
1.6	Methodology – An overview	15
1.6.1	Context of the study.....	16
1.6.2	Participants	16
1.6.3	My involvement in the context.....	17
1.6.4	Data collection.....	17
1.7	Ensuring rigour in this research study	20
1.8	Ethical considerations	21
1.9	Significance of this study.....	21
1.10	Structural organisation of the thesis.....	22
	A note about the papers.....	25
	References.....	26

CHAPTER 2: University Students' Views on Their Experiences on Assessment and Feedback

Abstract	31
2.1 Introduction.....	31
2.2 Literature review and Theoretical framework	32
2.3 Research design	35
2.3.1 Marked coursework	36
2.3.2 Questionnaire.....	36
2.4 Findings and discussion	37
2.4.1 Assessment tasks as learning tasks	37
2.4.2 Students' involvement in assessment	40
2.4.3 Feedback as feed-forward.....	41
2.5 Conclusion	42
References.....	44

CHAPTER 3: University Students' Experiences of Feedback: Implications for Adoption of Sustainable Assessment Practices

Abstract.....	47
3.1 Introduction.....	47
3.2 Feedback in Higher Education.....	48
3.3 Conceptual Framework.....	49
3.4 Context of the Study	51
3.5 Data sources and analysis	52
3.6 Findings and Discussion	54
3.6.1 Practices of Assessment Feedback	54
3.6.2 Feedback as Disclosure of Achievement.....	56
3.6.3 Feedback as Instructions of How to Improve or Achieve Higher Marks	61
3.6.4 Feedback as Guidance and Support.....	63
3.7 Conclusion	67
References.....	68

CHAPTER 4: The Power of Emotions in the context of Students’ Experiences of Assessment Feedback

Abstract.....	71
4.1 Introduction.....	71
4.2 Emotions as a <i>critical</i> factor in feedback situations	73
4.2.1 The influences of student emotions on learning and academic achievement.....	75
4.3 Purpose of this study.....	75
4.4 Methodology and context	76
4.4.1 Data gathering strategies	76
4.4.2 Data analysis.....	76
4.5 Findings.....	79
4.5.1 The feedback-related emotions experienced by students	79
4.5.2 Emotional responses to positive and negative feedback outcomes	80
4.5.3 Effects of feedback strategy on students’ emotions	84
4.5.4 Effects of feedback content and function on students’ emotional experiences	86
4.5.5 Relations and trust in feedback as antecedents of negative emotions	90
4.6 Conclusion	91
References.....	93

CHAPTER 5: Insights into University Teachers’ Conceptions and Practices of Assessment in Bioscience courses

Abstract.....	96
5.1 Introduction.....	96
5.2 Trends in science learning and assessment.....	98
5.3 Assessment of science learning as an activity system	100
5.4 Methodology.....	104
5.4.1 Study context and participants.....	104
5.4.2 Data sources and analysis	105
5.5 Findings and discussion	106

5.5.1	Assertion 1: Lecturers' improvement (formative) and measurement (summative) conceptions of assessment are interwoven and co-exist in a complex and multifaceted way.....	107
5.5.2	Assertion 2: A number of factors at macro, meso and micro levels influence lecturers' assessment decision-making.....	112
5.6	Conclusion	117
	References.....	120

CHAPTER 6: GENERAL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

	Introduction.....	123
6.1	Assessment and feedback interactions in classrooms	126
6.2	A sociocultural-historical explanation of assessment and feedback discourse in a bioscience courses.....	129
	Students' Reflections on their Assessment and Feedback experiences	136
	Lecturers and Students' understanding of assessment	139
6.3	Towards a framework for a coherent approach to assessment and feedback in classroom discourse in diverse social contexts.....	142
6.4	Significance of the findings for assessment practice at micro (personal), meso (school) and macro (university) levels.....	145
6.5	Limitations of this research.....	148
6.4	Recommendations for future research	150
6.7	Final word	150

LIST OF TABLES

Chapter 2

Table 2.1 Features of the assessment environments in the two courses	35
Table 2.2 Distribution of written comments into several categories	36
Table 2.3 Comparison of the two courses in terms of students' perceptions of transparency of assessment	38
Table 2.4 Students' perceptions about marking and transparency of assessment	38
Table 2.5 Perceptions about assessors	40
Table 2.6 Comparison of students' perceptions about the quantity and quality of feedback...	41
Table 2.7 Perceptions of the value of the feedback	42

Chapter 3

Table 3.1 Distribution of written comments into several categories	52
Table 3.2 Depth of symbolic, content and skills feedback.....	53
Table 3.3 Feedback presentation formats preferred by students.....	57

Chapter 4

Table 4.1 Coding of emotions	77
Table 4.2 A 3D taxonomy of feedback emotions	78
Table 4.3 Emotions and their feedback antecedents	79

Chapter 6

Table 6.1 The Assessment Systems-for-Practice (ASP) framework	143
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LIST OF FIGURES

Chapter 3

Figure 3.1 Students' perceptions of assessment feedback	56
Figure 3.2 Students' rating of feedback comments	58

Chapter 5

Figure 5.1 Assessment as an activity system (adapted from Engeström, 2001)	101
Figure 5.2 Factors influencing academics' conceptions and practices of assessment	103

Chapter 6

Figure 6.1 Consolidated synthesis of the research study.....	124
Figure 6.2 Two interacting activity systems of teachers and students during assessment and feedback encounters	127

LIST OF APPENDICES

Appendix A	Assessment Perceptions and Experiences Questionnaire
Appendix B	Students' interview schedule
Appendix C	Teachers' interview schedule
Appendix D	Participants' information sheet and consent form - Teachers
Appendix E	Participants' information sheet and consent form – Students
Appendix F	Sample of staff interview coding
Appendix G	Sample of student interview transcript and coding
Appendix H	Sample of marked student work

CHAPTER 1

GENERAL INTRODUCTION TO THE STUDY

1.1 An overview of the study

Due to their central role in student learning in higher education, assessment and feedback have received much attention over the years. For students, assessment is usually seen less as a learning process but more as a gatekeeper enabling or denying them access to employment, financial and social security. Feedback from assessment plays a central role in learning and teaching. However, a number of research studies report that students are often dissatisfied with feedback because it does not meet their expectations and needs. Although assessment and feedback are currently regarded as sociocultural processes (Gipps, 2002; Shepard, 2000), assessment practices in most universities seem to lag behind in addressing the vast changes in the sociocultural context and aims of higher education. Moreover, what appears to be largely overlooked in the literature is the relationship between students' views of assessment and their teachers' assessment practices. In this doctoral study on students' and teachers' perspectives of assessment and feedback, I illuminate nuances of how assessment understandings and their enactment occur in a specific higher education context in South Africa. I have chosen to view assessment through a learning-orientated lens in order to reflect on how this integral part of teaching and learning plays out in the context of this study.

Research findings presented in this thesis emerged from 2nd year university students and their teachers' experiences and views about assessment. Learning-focused assessment has been shown to have great potential in promoting students' conceptual development in science classrooms (Bell & Cowie, 2001). The focus of this study was on assessment practices in three compulsory second year biosciences courses at a South African university. The primary aim of this research study was to highlight both the challenges and opportunities of using learning-oriented assessment practices as a basis for aligning teaching and enhancing learning in science courses. Thus, the results of this study can potentially enlighten assessment practitioners on ways to support teachers and to develop teachers' and students' knowledge about using assessment to enhance sustainable learning in undergraduate science courses.

The six chapters making up this doctoral thesis highlight various aspects about assessment as a learning tool. In this introductory chapter, I provide an overview of the research study and start the chapter with the assumptions and preconceptions I had at the onset of this research study. Next, I describe and discuss the contextual and theoretical issues around assessment and learning in science. Finally, I conclude the chapter with an outline of the subsequent chapters.

1.2 Why assessment - my assumptions and preconceptions

I am a Black South African woman who holds a position of senior tutor within the school¹ under investigation. My main responsibility within the school is to provide academic support to first year students in tutorial settings. Apart from running tutorials for first year students, I also present lectures and run laboratory sessions for a group first year Health Sciences students (total of n=580 students). My interest in assessment and feedback stems from my own experiences over ten years of higher education teaching and of providing academic support to university students in my capacity of academic support tutor. Over my teaching years the most common conversations I have had with colleagues around assessment were often oversimplified focusing largely on marking issues. My own experiences in assessing big classes reflect, in many ways, the struggles many lecturers might face in similar contexts. These struggles include giving effective timely feedback or actively involving students in the assessment process.

My experiences as an undergraduate student, the memories and dread of receiving what I considered negative feedback, sometimes the sense of inadequacy and the glow of happiness after receiving outstanding achievement profoundly triggered my curiosity about assessment. In order to improve my own assessment practices and to make them effective in terms of promoting learning, I engaged extensively in assessment related literature and attended professional development courses on assessment. For me assessment offers a fruitful point from which to ascertain constructive alignment between curriculum goals, teaching, learning and assessment and to explore the impact and changes it may have as advocated in the research literature especially on learning-oriented approaches in higher education. I discovered that some of the assessment related challenges I personally experience have been

¹ In some higher education contexts what I refer to as a school is referred to as a department.

widely reported in the literature. These cemented my interest and heightened my awareness of the effects of assessment on students.

As I reflected on my own assessment challenges, I was curious about challenges my colleagues faced in using assessment to address the stated objectives of preparing scientifically literate, ‘research ready’ students and lifelong learners. These objectives are among some of the outcomes stated by the university for its graduates. My interest in exploring assessment practices was also sparked by informal talks I had with students and academics². I encountered different expressions of discontent over assessment and feedback in particular, from both students and their lecturers. For example, students on the one hand complained about exam stress or anxiety about anticipated feedback, while lecturers on the other hand complained about heavy marking loads and students’ lack of interest in feedback. The different discontentment about assessment led me to question the relationship between student assessments, the values academics and higher education envisage and what students experience in their classroom interactions.

My preconceptions (mostly informed by my experiences as a student and those of my own students) were that students were mainly interested in and motivated by marks. That is, I assumed that students did not read or engage much with the written feedback teachers provided on their papers. Interesting comments from my colleagues over the years were about students not collecting their marked tests and assignments. These comments supported my view and some of my colleagues’ views that some students do not care about or engage with feedback teachers provide. Through this study, some of my preconceptions were confirmed. However, I have also discovered that students’ reactions to assessment and feedback varied greatly and that marks definitely play a critical role in how student engage with assessment and feedback.

As lecturers, we are often puzzled by how poorly students are performing despite the effort we put into teaching and the explicit and transparent ways we feel we communicate assessment criteria to students. A comment often heard from students was, “I don’t know what lecturers wanted in this test or assignment”. This was despite students having received feedback in the form of marks and written comments. Students' uncertainty about assessment

² In this thesis, I use the terms academics, lecturers and teachers interchangeably.

expectations and our sentiments as lecturers about transparency confirmed to me Sadler's (2010) contention that "the mere provision of feedback [or assessment criteria] does not necessarily lead to improvement" (p536) or shared understandings. Therefore, it was important to ascertain the enacted assessment practices and students' experiences of such practices. This study confirms and supports the notion that assessment and feedback are complex and that they provoke different emotional responses in the students. The value of this research study is to increase our awareness as lecturers of the factors hindering shared understandings of assessment between ourselves and students.

My preconceptions about lecturers arose mainly because of the main requirements for their appointments. The majority of lecturers are often appointed mainly on their research expertise, and less on their pedagogical proficiency. In light of this, I assumed that their lack of pedagogical training would profoundly influence their assessment practices so as to render them ineffective with respect to learning and teaching issues. However, I was intrigued by how, notwithstanding their lack of formal teaching training, it was obvious that some of these lecturers had adopted innovative and pedagogically sound practices. This led me to wonder about their motivation for this and sparked my interest in finding out what teachers think about assessment and why they assess the way they do.

A number of researchers in the field of assessment stress the value of collaborative and dialogic assessment approaches in promoting shared understanding of tacit assessment standards and feedback between teachers and students (Carless, 2006; McDonnell & Curtis, 2014; Rust, Price, & O'Donovan, 2003). Within the dialogic approaches to assessment the importance of motivation, self-esteem, self-regulation and the significance of emotions are highlighted (Nicol & Macfarlane-Dick, 2006; Värlander, 2008). Collaborative and dialogic approaches to assessment, teaching and learning as such have implications for equitable power dynamics, respect and trust issues amongst teachers and students. Most importantly, these approaches challenge the traditional views of teachers as the only legitimate assessors and that of assessment as something done to students. The complexity of the assessment and its related feedback encouraged me to explore the contextualised set-up regarding the division of labour and relations in assessment systems.

My argument in this research study is that given that assessment or its feedback is a social practice that is context-dependent, the notion of a clear-cut conception of assessment and

feedback is elusive. This may be because from a socio-cultural point of view, assessment is viewed as part of a system of learning and teaching which is influenced by individual, social, cultural, historical and contextual factors (Gipps, 2002). My argument is that the use of learning-oriented approaches to assessment as a theoretical lens in this study would help us understand and enhance our approaches both in teaching and learning in different and diverse learning environments. The foregrounding of the learning and formative purposes of assessment reasserts the value of assessment as a crucial part of teaching and learning (Shay, 2008). “Formative assessment aids learning by generating information that is of benefit to students and teachers” (Juwah *et al.* 2004, p.3). Acknowledging assessment as a social practice requires account to be taken in understanding it as both a process and structure located in broader systems of social contexts of policy systems and course instructional systems.

As assessment is an important aspect in the ecology of teaching and learning, we cannot review systems of assessment without acknowledging their relationship to the view of learning and teaching underpinning them. For example, student diversity in terms of their levels of preparedness, confidence, motivation and academic literacy influence what they value in terms of feedback. Under these conditions, feedback cannot be a ‘one size fits all’. This array of factors, which this study hopes to highlight in order to create awareness in lecturers, poses a challenge to lecturers’ pedagogical approaches. We as lecturers are challenged to adapt our assessment practices for this diversity in our conceptualisation and design of assessment and feedback systems. Hence, the key aim of this research study is to reflect on the roles of assessment in the broader context of teaching and learning. In addition, I hope to map out the challenges of adopting the learning oriented assessment.

The next section provides an overview of the general trends in the South African higher education development realm. I will use the relevant literature to explore the assessment challenges and opportunities for using assessment to enhance effective science teaching and learning.

1.3 Background

1.3.1 South African Higher Education

Higher Education in South Africa is not immune to the challenges faced globally. Global trends such as ‘massification’, knowledge production, and interest in lifelong learning (Altbach, Reisberg, & Rumbley, 2009) affect South Africa (SA) in many and different ways. The South African National Development Plan (NPC, 2011), which is the blueprint for future developments in the country alluded to the fact that higher education as the major driver to development must also be cognisant of the information/knowledge system challenges. That is, teaching in HE needs to develop graduates who will be able to contribute to the country’s economic challenges.

In its plans, the NPC focuses on three functions of universities. The first function listed by the NPC (2011) is that of “educating people with high-level skills for the employment needs of the public and private sectors”. Secondly, the NPC envisages that the skilled people produced by universities will be the “dominant producers of new knowledge”. Lastly, universities need to provide “opportunities for social mobility and simultaneously strengthens equity, social justice and democracy” (p.262). In addition, the Plan acknowledges that a "greater understanding within government is required to acknowledge the importance of science and technology and higher education in leading and shaping the future of modern nations" (ibid). In the context of the current teaching that emphasize predominately-traditional assessment approaches emphasising summative purposes of assessments, the plan seems ambitious. However, changes especially towards learning-focused assessment approaches may enhance our chances of achieving the NPC goals. All of these societal and economic needs should change our conceptions about the kinds of knowledge and skills educations systems need to address in their learning, teaching and assessment practices. Therefore, assessment and feedback practices in higher education teaching provide a fertile ground in which to explore the potential for addressing these societal and economic needs.

In the South African higher education context, the need to address diversity in students’ educational, linguistic and socio-economic backgrounds is proving to be a challenging task. Since the advent of a democratic government in 1994, the South African higher education sector has expanded significantly with a substantial growth in enrolments of black students. Of concern are the outcomes of the analysis of access and throughput in higher education

(Scott, Yeld and Hendry, 2007) showing racial disparities in terms of students' completion rates. Additionally, the Council on Higher Education report (CHE) contends that even in 2013 “addressing equity of access ... [and]...outcomes remains elusive” (CHE, 2013 p.27). Of note, is that, despite the increase in student numbers in the scarce skill areas of science, technology, engineering and mathematics (STEM), South Africa is still not producing enough STEM graduates to meet its economic development objectives (Department of Higher Education & Training (DHET), 2013). This raises serious concerns about addressing socio-economic and equity issues in the country.

How then do we envisage increasing students at HE if the fields they follow or are able to enrol in, are not relevant to addressing the ills of the past education systems? The envisaged expansion of the university sector from just over 937 000 students in 2011 to about 1.6 million enrolments in 2030 as per the White Paper (DHET, 2013 p. xiv) will mean more challenges for academic staff in terms of teaching loads and high student-to-staff ratios. This occurs amidst other factors affecting academics such as publication pressure, greater administrative responsibilities, resource constraints, and the pressures of teaching to a diversified student body. Other significant factors in higher education include drives to professionalise teaching and trends towards modularisation. Under these circumstances, improving student success and throughput rates becomes a very serious challenge for the university sector. All of the aforementioned factors will impact on the time and resources needed to adopt more learning-focused assessment approaches.

Both the South African National Development plan (NPC, 2011) and the White paper on post-school education and training (DHET, 2013) call for curriculum development initiatives that will contribute to improved success and graduation rates to meet the needs of citizens in the 21st century. However, Scott, Yeld and Hendry (2007, p. 40) note that diversification of student intake in some cases “has not been matched by institution-wide modification of educational approaches”. Additionally, Case, Marshall and Grayson (2013) contend that mainstream programmes in STEM have remained relatively unchanged over this period of expansion. Overall, we know little about current pedagogical practices in the context of these trends.

However, there is at least recognition that science education can contribute to addressing some of the current societal needs of a developing country. Case et al (2013) identify

pedagogy, curriculum and institutional culture responses as key to dealing with the massification of STEM in HE education. The three targeted areas identified are connected and interdependent. For example, curriculum structure and institutional cultures affect the effectiveness of pedagogy (Fisher & Scott, 2011). Pedagogical responsiveness is linked to improving the effectiveness of learning, teaching and assessment to meet the disciplinary-specific needs, economic needs and address the diverse socio-cultural-historical realities of students (Slonimsky & Shalem, 2006).

In their contribution to the South African higher education debate, Luckett and Sutherland (2000) stress the importance of formative assessment practice as a means of improving learning and teaching in this complex higher education environment. Taras (2002) points out that “examining assessment practice is also a useful means of gauging change and development in higher education since it impacts directly or indirectly on other processes” such as teaching and learning (p.503). Indeed, a substantial number of researchers provide insightful ideas about assessment practices in this shifting HE context (e.g. Beaumont, O’Doherty, & Shannon, 2008; Boud & Molloy, 2013). Notably, in science education, assessment continues to be an area of considerable research interest (Bell, 2007; Friedrichsen, Driel, & Abell, 2011; Goubeaud, 2009; Hanauer & Bauerle, 2012). In the biosciences discipline in South Africa there is little research on assessment aims to enhance both teaching and learning. The next section focuses on assessment as a crucial part of science teaching and learning.

1.3.2 Assessment and its link to teaching and learning in higher education

The international growth of, and interest in, assessment for learning and feedback in different educational sectors may be an acknowledgement by researchers, teachers and students that assessment practices are an expression of the value of meaningful learning in HE (Ramsden, 2003). Assessment as an integral part of teaching and learning has a wide range of purposes in education and in the context of tertiary education in particular. It can be used to support teaching and learning, to diagnose students’ needs, for selection or certification purposes and to serve as an accountability procedure (Gipps, 2002). Furthermore, there is a recognition of the evolution of assessment from educational measurements emphasizing objective testing, grading and summative testing, to more formative practices (assessment *for* learning and learning-oriented assessment) to align with sociocultural/constructivist forms of teaching and

learning (Bell, 2007; Pryor & Crossouard, 2008; Shepard, 2000). However, despite this idealistic conceptualisation of assessment, its enactment at classroom level might be a different story. Shepard (2000) argues: this different story must be told differently looking at assessment, “its form and content...to better represent important thinking and problem solving skills in each of the disciplines ..., and the way it [assessment] is used in classrooms and how it is regarded by teachers and students must change” (p.7).

We cannot review systems of assessment and feedback without acknowledging their contribution to learning and teaching activities underpinning them. Assessment practice is part of the overall teaching context where the teacher’s view of his or her role (Black & Wiliam, 1998) is crucial. Teachers draw on their discipline knowledge, what they consider important and their view of how this should be assessed in a particular context to construct their assessment tasks. In fact, the assessment decisions are influenced by the local teaching and learning regime (Trowler & Cooper, 2002). Research on assessment shows that the design of assessment systems has an impact on students’ approach to learning. Assessments which focus on recall of factual knowledge tend to steer students towards surface approaches to learning, whereas assessments which emphasize application and comprehension tend to encourage deep approaches to learning. Deep approaches to learning and teachers’ assessment orientation as facilitating and supporting learning are consistent with the concept of formative assessment.

Referring back to the changes proposed by Shepard (2000), there is also the need to differentiate between the terms summative (assessment *of* learning) and formative assessment (assessment *for* learning) especially in the ‘infancy stages’ of formative assessment (Bennett, 2011). The challenge faced by assessors here is in the differing interpretations and implementations of formative assessment. Despite these challenges Sadler's (1989) definition of assessment addresses most areas needed to understand the purposes of assessment for learning. Formative assessment is primarily concerned with monitoring student learning and for providing on-going feedback that can be used by teachers to improve teaching and by students to improve their current and future learning. In an attempt to reconcile the blurring of lines between formative and summative assessment which do not reflect the complexities of assessment in teaching and learning contexts Carless (2007) proposed a construct termed ‘learning-oriented assessment’. This construct has resulted from an attempt to create a

synergy between summative and formative assessment with the primary purpose of promoting learning.

A number of models and principles of good assessment and feedback practices have emerged from research undertaken within the learning-oriented assessment perspective (Boud & Molloy, 2013; Nicol & Macfarlane-Dick, 2006; Yang & Carless, 2013). The literature on assessment provides compelling evidence that the effective use of formative assessment can have a significant influence on student achievement (Black & Wiliam, 1998). Two central issues with regard to the effectiveness of formative assessment are the nature and quality of assessment tasks and the feedback students experience in diverse learning contexts. Despite the wide acknowledgement of theoretically and empirically grounded principles of good feedback practice, assessment practices experienced by students in higher education have hardly evolved. Some researchers contend that little attention is given to assessment and feedback as social practices (Adcroft, 2011; Nicol, 2010).

My view of assessment *for* learning stems from a sociocultural theoretical orientation. The value of a sociocultural view to understanding learning and assessment is that it problematizes the dominant cultural and historical ways of the use of assessment. The sociocultural view directs us to recognise the interdependency between the individual and social environment in which teaching, learning and assessment occurs. That is, the teachers and students' experiences and histories cannot be ignored; they are part of the assessment processes and products. The argument here is that the potential that assessment has for improving learning and teaching needs to account for the role of interactions, participation, collaborations and identity construction for both the teacher and student.

Key to assessment *for* improving learning is sharing among participants of explicit intended and emergent learning outcomes and assessment criteria. That is, constructive alignment between teaching, learning and assessment and scaffolding through forward looking and dialogic feedback are imperative. According to Biggs and Tang (2007), "in a constructively aligned system ... the learner is enveloped within a supportive learning system... where all the components in the broader system support each other in addressing the same learning agenda" (p.109). Within the broad teaching and learning system, assessment dialogues and collaborations are also possible through the involvement of students in self-monitoring and self-regulation. All of these are central to the notion of sustainable learning through

assessment practices. These practices position students as active role players and have the potential to promote their awareness of assessment as a form of a two-way communication between teachers and themselves (Boud & Molloy, 2013; Carless, Salter, Yang, & Lam, 2011).

The overarching conceptualisation of assessment in this thesis leans towards learning-oriented assessment as a tool for learning, contributing to the teaching processes and learning outcomes. My view of learning oriented assessment encompasses both assessment *as* learning and assessment *for* learning. Learning-oriented assessment approaches contribute to student learning at university but also develops learning and evaluative skills essential for employment and lifelong learning (Boud & Molloy, 2013; Carless et al., 2011). While both summative and formative are essential in order to gather information on student learning, Black and McCormick (2010) advise that harmonising and balancing the two forms of assessments deserves further interrogation and innovation in higher education. They contend that this should be done in the light of the aim of tertiary education to help students to become independent learners. It is for this reason that this study focuses on assessment and feedback from a sociocultural perspective of learning. This social-cultural dimension includes wider networks in which assessment offers affordances and barriers to learning for both teachers and their students.

1.3.3 Assessment and the multiple goals of science learning

The South African National Qualifications Framework encourages science undergraduate curricula to emphasise enquiry and higher order skills learning (SAQA, no date). This aligns with global goals of reforms in science to increase scientific literacy amongst society. A growing undergraduate science education literature supports the view of using assessment of student learning as a key lever for innovation in science learning and student success (Hanauer & Bauerle, 2012). There is a need to reconceptualise assessment for conceptual understanding and long-term learning. Globally, assessment is still topical in the context of a rapidly changing higher education context. This might be due to the drive to improve the quality of teaching, learning and assessment to meet the need to prepare students for the 21st century economy irrespective of the context in which learning takes place.

Despite the teaching, learning and assessment reforms over the years, there is a general perception that science instruction in higher education still privileges content retention over conceptual understanding and the skills development needed for the today's science practice (Hanauer & Bauerle, 2012; Momsen et al., 2013). In an analysis of assessment items (1100 exam items) in two introductory biology courses in a US university, Momsen et al (2013) found that 93 % of the items were assessing at knowledge and comprehension levels. In a South African context, Green and Rollnick (2007) found that undergraduate chemistry assessments were predominately at the comprehension level and that lecturers relied heavily on summative, time constrained closed book tests and examination. Green and Rollnick's main argument is that these assessment methods are heavy on testing of content knowledge and cannot be used to test higher order skills.

On a related point about timed tests, Knight (2006) argues that graduate outcomes such as reasoning and creativity cannot be measured with 'high-stakes' assessment. Effective assessment in science education should therefore assess students' reasoning in ways that are consistent with ways of thinking and practising in the discipline especially in diverse contexts. Assessments must tap into a broader range of competencies, capture skills that are more complex and higher order content knowledge reflected in new expectations for science learning. In that case, assessing higher order cognitive skills and attributes will require assessment practices fit for addressing these science reform goals.

1.4 Significance of students' and teachers' views of assessment

The centrality of assessment in students' approaches to learning in higher education is widely acknowledged. Students' experiences and perceptions of assessment have also been shown to affect their learning approaches and thus ultimately their academic performance and acquisition of lifelong learning skills (Struyven, Dochy, & Janssens, 2005). Although students often receive the assessment information from their teachers, their individual "motivations and orientations to study influence the ways in which they perceive and act upon messages about assessment" (Sambell & McDowell, 1998, p. 400). Hence, students' conceptions of the task (requirements of the task and what counts as a good response) will influence the interpretation of the feedback in the light of their conceptions of the task requirements (Gibbs & Simpson, 2004). These interpretations of feedback in some cases

arouse different emotions. More importantly, emotions aroused due to feedback outcomes or activities shape students' learning experiences, motivation and self-regulated learning, which makes it valuable to explore. That is, it leads us as researchers to explore students' views, experiences and reactions to assessment and feedback as a socio-cultural practice particularly as there may be perception gaps between students and teachers.

Several scholars posit that teachers' pedagogical conceptions have a profound influence on students' learning in science (Friedrichsen et al., 2011; Prosser & Trigwell, 1999; Tsai, 2002). Also, pedagogical conceptions will significantly influence the assessment practices that academics adopt (Maclellan, 2001). Teachers' conceptions of assessment constitute a part of the core of the assessment environment that is integral to the whole teaching and learning system. Thus, an examination of the complex relationship between teacher conceptions and practices is important for understanding and promoting changes in teachers' decisions about assessment and teaching practices. In this study, I have attempted to understand the relations between teachers' conceptions and practices of assessment in three core biosciences courses. Additionally, as I explore teachers' conceptions, I attempt to establish any existence of the use of sustainable learning-oriented assessment principles in these teachers' practices.

Research literature generally shows that views of assessment held by higher education teachers and their students are often examined in isolation from each other. This, I argue, does not recognise teaching, learning and assessment as one coherent social act. For example, only one third of the articles recently reviewed by Evans (2013) on assessment feedback in higher education considered both students and teachers' perspectives together. Furthermore, the literature indicates that, to date, there has been limited exploration of the intersection between teachers and students' views of assessment and feedback, especially in university science contexts (e.g. Bevan, Badge, Cann, Willmott, & Scott, 2008; Orsmond & Merry, 2011). In recognition of this disparity in the literature, a more comprehensive approach to investigating teachers' and students' assessment views was required.

This study therefore, was designed purposely to address the gap in the literature by investigating the assessment views held by teachers and students in a science faculty at a South African university. Students and their lecturers although being part of the same classroom system use different lenses to observe and make conclusions about the happenings

in the teaching, learning and assessment ecosystem. In light of the different positions of teachers and students in a learning environment an argument for a comprehensive understanding of teachers' and students' views of assessment is made to identify impediments and enhancers of learning in science.

1.5 Purpose of this study and its research questions

A primary focus of this study was to understand challenges that may arise if sustainable learning-oriented assessment practices in undergraduate science courses were to be adopted. I need to highlight that learning oriented assessment principles are used in this study as a benchmark that may or may not be achievable. It is used as a goal to strive for if ills of the previously disadvantaged schooling are to be mediated through HE teaching and learning approaches. Hence, the purpose was two-fold. Firstly, to review and characterise assessment practices in the compulsory second year biological sciences course at a South African university. In characterising assessment practices, I intend to identify key features of the assessment environment, best assessment practices within the courses offered, gaps in addressing the programmes' outcomes, as well as opportunities to improve efficiency in existing assessment. The second purpose of the study was to explore and understand the relationship between assessment practices evident in the assessment environment and students' and academics' assessment conceptions and experiences. Understanding these relationships would help in ensuring and encouraging alignment between assessment expectations, requirements and experiences. This doctoral study thus addressed the following research questions:

- 1) What are the current assessment practices in selected bioscience courses?
 - a) How do bioscience teachers conceptualise assessment?
 - b) What influences teachers' decision-making about assessment practices?
- 2) What are students' views, experiences and emotional reactions to assessment and feedback in biosciences courses?
- 3) What are the relations (if any) between students' views and experiences of assessment and teachers' conceptions of assessment?

1.6 Methodology – An overview

Given my sociocultural view of learning and assessment, I found the interpretive methodological approach appropriate for answering my abovementioned research questions. The study adheres to the socio-cultural interpretive paradigm because it focuses on understanding the subjective world of human experience in specific contexts (Cohen, Manion & Morrison, 2011). That is, interpretive approach was deemed relevant in exploring and understanding the current assessment practices and participants' views about assessment in specific Biosciences course contexts. In addition, the study takes into account the wider socio-cultural-historical context within which the participants (lecturers and students) operate.

This study took an exploratory approach with the aim of understanding the current assessment practices as experienced by students and conceptualised by their lecturers. It is a mixed methods study with a primarily qualitative approach. The qualitative approach allowed me to explore participants' views and practices of assessment in the natural context in which they occur. While this study is essentially qualitative in nature, some quantitative data were gathered to complement and support the findings of the qualitative components. Adopting a qualitative research design was deemed appropriate in fulfilling my need as a researcher to illuminate multiple perspectives held by different students and lecturers of various second year Bioscience courses (Creswell, 2009). I did not want only to present descriptions of what the practices were in terms of assessment. Rather I was also interested in exploring and characterizing the various reasons that generated those practices.

My intention of understanding the nature of the relationship between lecturers' conceptions of assessment and their actual practices, suggested that I should adopt a case study approach. I have used an in-depth multiple case design with cross case analysis of four lecturers to gain a deeper understanding of the relationship between the lecturers' conceptions and practice of assessment. In this instance, a case study research design provided the means for understanding each individual lecturer within a "real" course environment. The multiple case study research design (Stake, 2006) facilitated the construction of contextualized experiences and systemic analysis procedures. I adopted a multiple case study approach because it allowed me to

- explore and understand context specific conceptions of assessment held by individual lecturers and to make associations between their assessment conceptions and practices
- compare some aspects between cases thus providing a richer understanding of the nature and sources of these lecturers' conceptions and practices of assessment.

1.6.1 Context of the study

The study was conducted in three compulsory second year courses for Biology majors in the School of Biological Sciences at a research-intensive South African university. Selection of the three courses was due to their strategic position in the degree programme. All the students doing these courses would have completed a first year introductory life sciences pre-requisite course. These courses are, in turn, prerequisites for attaining a degree in the majors selected. The three seven-week courses (coded courses A, B and C) serve as foundations in essential biological concepts, skills and processes. The courses are meant to promote scientific literacy, understanding and integration of fundamental overarching concepts of organismal diversity, evolutionary paradigms and ecological systems.

These courses are team taught through direct contact by between two and five lecturers per course. The courses have one broad course outline and lecturers take turns in teaching specific topics over a period of between one and three weeks. For every topic/section taught individual lecturers had specific outcomes addressing the overall course outcomes. The value of choosing the three courses with different teachers, teaching styles, and teaching philosophies is that it offers us a global picture of the students' experiences. In these three courses, teaching assistants (postgraduate students) facilitate small group instruction during practical/laboratory sessions. Student enrolment in these compulsory courses is capped at around seventy and eighty students. Student assessments consist of weekly practical/laboratory work, course assignments, class tests, research/project reports and end-of-course examinations. The assessment practices are guided by the institution's student assessment policy.

1.6.2 Participants

In this research all second year undergraduate students enrolled for the three compulsory courses (n=70) were approached to participate in the study. Thirty-four of the 70 students

volunteered for and participated in the study. Forty-five per cent of the students enrolled in these courses at the start of this research study in 2011 were English Second Language speakers.

Four science lecturers (given the pseudonyms Freda, Johnny, Kelvin and Chris) were purposively selected based on their involvement in teaching one of the three core second year BSc (biology major) courses. At the time of the interview, Freda was in her second year of teaching; Johnny was in his fourth teaching year; Chris had more than five years' tertiary teaching experience as well as a higher education teaching diploma in addition to qualifications in the discipline. Kelvin had fifteen years teaching experience, four of which were at university level. All the participants had attended teacher professional development courses offered by the university. It should be noted that all the teachers that participated in this study were relatively inexperienced at teaching at tertiary level.

1.6.3 My involvement in the context

This research involves the study of a real world context, higher education, with its individuals, structures and power relations. I am researching a field which I am a member of. In order to make sense of the design of the research it is necessary for me to give a brief account of the personal and professional roles I have as an 'insider' in this study's context. My identity during the course of this research study was as a part-time PhD candidate, a tutor to Bachelor of Science students and lecturer to first year Health Sciences students. Some of students who participated in this research study will have been part of my tutorial groups in their first year of study. I also serve on the School's teaching and learning committee. My identity during the study meant that I had no power relationship with the participants. My interactions with the lecturers interviewed for this study was an informal advisory role on issues of assessment, teaching and learning. In fact, my identity as a PhD student made participants more at ease in sharing their views and practices and thus helping me to obtain richer data.

1.6.4 Data collection

Given the broad nature of the research questions addressed in this study, I used multiple sources of data and methods of collection.

Survey – Students’ questionnaire

To investigate students’ experiences and views about assessment and feedback I used a Likert-scale questionnaire adapted from Maclellan’s (2001) Assessment audit tool and from Gibbs and Simpson’s (2003) Assessment Experience Questionnaire (AEQ). The questionnaire (Appendix A) using both closed and open-ended questions was used at the beginning of this study to provide a baseline and to complement for more in-depth interviews conducted with all the participants. The questionnaire results provided a snapshot of students’ views about their assessment and feedback experiences in two of the three compulsory courses. Thirty-four students (i.e. 37% of the total enrolment in the three courses) completed paper-and-pencil questionnaires anonymously. I personally administered the questionnaires to the students during one lecture period in one of the core courses. My presence when the students completed the questionnaire gave me an opportunity to give explanations and clarifications to students on some survey items when needed. Descriptive statistics in the form of frequency distributions are tabulated and presented in graphs to present the questionnaire responses provided by students. In chapters 2 and 3, I report on students’ views and experiences of assessment using data sourced through questionnaires.

Semi-structured interviews

Semi-structured interviews were conducted with both students and lecturers. Of the students who participated in the study, nine volunteered to be interviewed (six individual interviews and one focus group of three students). Both the individual interviews and focus group interview with students were used to elicit students’ perceptions of their assessment and feedback experiences in all the three compulsory courses. The interviewed sample, for whom pseudonyms are used was made up of one male, Scott (English First Language and a high achiever³) and eight females (three ESL: Hlompho (low achiever), Zinhle (average achiever) & Pumla (average achiever) and five EFL average and high achievers: Marcia, Kelly, Felicia, Dorothy & Sophia). Interviews with Marcia, Kelly and Felicia took place as a group. Semi-structured interviews (Appendix B – students’ interview schedule) that included questions of their experiences of feedback lasted between 30 and 60 minutes. Data sourced through students’ interviews is reported in chapters 3 and 4.

³ Achiever status (low, average and high) based on academic performance

Individual interviews with the four lecturers who participated in this study provided data on their conceptions of assessment and current assessment practices. Two semi-structured interviews, audio taped and later transcribed verbatim, were conducted with each lecturer. The second interview was a form of member checking, to establish the credibility of the findings based on the interview transcriptions, data interpretations and findings. Participants were given an opportunity to comment on the research findings, interpretations, and conclusions. All interview data were coded using Atlas ti programme for preliminary analysis and then analysed manually for development of themes. Constant comparisons and contrasts were made throughout the whole process of data analysis between data from different participants and between different sources of data. In chapter 5, I report on lecturers' practices and views on assessment using data sourced through semi-structured interviews.

Artefacts - Document analysis

Course documentation such as course outlines and assessment-related handouts were examined for evidence of assessment practices and the formative assessments and feedback given to students were evaluated. Course documents for the three courses were evaluated and categorised based on a modified template originally devised by Gibbs and Dunbar-Goddet (2009). The aim of document analysis was to explore the features characterising the assessment environment and current practices with regard to types of assessment used, timing of assessments, and the weighting of the different assessments. Assessment criteria and the type and nature of feedback given were also probed.

Content analysis of feedback that students received as part of their course work (class tests for Courses A and B and research reports for Course C⁴) was conducted. One hundred and eighteen marked class tests for Courses A and B and 210 practical reports for Course C were analysed. The comments and various forms of feedback were categorised and collated. The purpose of the content analysis was to explore teachers' feedback practices and the type of feedback students experienced. Data from these all these artefacts was also triangulated with data collected from the questionnaires and interviews. Data sourced from document analysis is reported in chapters 2, 3 and 5.

⁴ Course C test feedback was in the form of marks, ticks and crosses. There were no written comments on the test scripts.

1.7 Ensuring rigour in this research study

If educational research is to be of use, we as researchers should ensure that our research is rigorously designed to provide trustworthy results (Lincoln & Guba, 1985). In this mixed methods study I have adopted the principles of credibility, triangulation and generalizability to ensure trustworthiness of my research. A primary justification for using mixed method design is pragmatism. I have selected what seemed best and practical from various methods in addressing the research questions. Related to the pragmatic justification is the triangulation justification, especially more contemporary notions of triangulation that focus on the complementarity, validation and corroboration added by multiple data sources and their analyses (Creswell, 2009). For triangulation purposes, I collected data about assessment practices and perceptions from both students and lecturers. Content analysis of a variety of course and assessment related documents, teachers' interviews, students' interviews and students' questionnaire were the multiple sources of information in this study. Therefore, the conclusions I present in this study are based on and supported by data collected from multiple research instruments and subjects.

To ensure credibility of the research I conducted a pilot study to identify possible limitations and deficiencies with the questionnaire and interview schedules prior to conducting the main study. The pilot study afforded me the opportunity of practising interviewing skills. My colleagues and supervisors helped in checking, reviewing and in validating the data collection instruments, data analysis and interpretations. With the teachers' interviews, I did member checking, checking with the participants to determine the accuracy of the transcription and data reporting.

In this introductory chapter, I have articulated the possible biases I bring into the study. I have provided the background information about the context of the research and me as the researcher to locate the readers into the research setting and to facilitate readers' judgements about interpretations and conclusions of my findings. The rich and thick description provided in the subsequent chapters is done to facilitate the readers' interpretation of my analyses and claims.

1.8 Ethical considerations

Issues of ethics in research are very important and researchers should find a balance between the “demands placed on them as professionals in their pursuit of the truth and their participants’ rights and values”, which might be threatened by the research (Cohen, Manion, & Morrison, 2011, p. 75). This study was conducted in accordance with the ethical standards set out by the University Human Research Ethics committee. The committee reviewed and granted approval for the research in March 2011 (Ethic approval number: H1 10211). The following ethical principles were addressed in this study:

- *Full disclosure.* Participants were fully informed both verbally and in writing of the purpose and nature of the research beforehand. The intended use of the research data collected was explained to the participants.
- *Informed consent.* Participants signed an “informed consent” form (see Appendices D and E) before participating in the research.
- *Voluntary participation.* Participation in the study was voluntary and participants were assured that they were free to withdraw at any time of the research.
- *Confidentiality.* Participants’ right to privacy was honoured. Pseudonyms are used when referring to the participants as a way of protecting their identities.

1.9 Significance of this study

This research study is novel because it has focused on students’ experiences of teachers’ assessment practices in the South African education context. The study is also unique in the sense that I have not found any research project in the South African context that investigated both students' and teachers’ views of assessment and feedback together from the cognitive, structural and social relational perspectives. Student views are particularly valuable because students’ direct experiences, which include their emotional reactions to assessment and feedback, may allow for appropriate pedagogical responses. Thus this study will contribute to an enhanced understanding of how students’ diverse experiences and perceptions of the assessment environment relate to teachers’ conceptions and practices of assessment. It is also intended to deepen our understanding of how to support students’ learning and practices through assessment.

This study will to some extent highlight why teachers assess the way they do. It will also provide insights into challenges that teachers may experience if they intend adopting learning-oriented aspects of assessment in their courses. This research will therefore contribute to both South African and international assessment literature regarding students' and academics' perspectives of assessment in the current context of higher education massification, diversification and modularisation. Significantly, this study will broaden our understanding beyond the structural and cognitive dimensions of assessment by exploring the social relational dimension, which includes the nature and antecedents of emotions in assessment feedback situations. In sum, the study will provide an evidence-based rationale for reviewing and transforming current assessment practices in higher education. I therefore anticipate that this thesis will become part of the conversation in promoting scholarship of assessment in higher education.

1.10 Structural organisation of the thesis

Chapter 1 has provided a general overview of the research, the rationale for the study and introduced the purpose of the study. The results of the thesis are organized into four stand-alone empirical papers, which I refer to as chapters (chapter 2, 3, 4 and 5). I have written the four papers in such a way that they can be read independently. Consequently, some overlap in the introductory sections of the chapters and the data used was inevitable. Chapter 6 is the concluding chapter in which I discuss the significance of the findings as a whole, draw conclusions and make recommendations for practice and further research.

I deem it appropriate to briefly outline the rationale behind my adopted format of presenting my thesis as a series of papers. Primarily, the nature of my research study lends itself well to addressing the various interacting aspects of assessment through a series of papers. Assessment is a multi-layered, dynamic and contextualised process, which make this thesis format appropriate for dealing with the complexity of assessment. This format afforded me an opportunity to address different dimensions of assessment in more detail and in unique ways. Secondly, as an emergent scholar who works in a research-intensive university, my view is that because of its strong focus on developing skills of writing for publication (compared to traditional thesis), PhD by publication is a worthwhile tool for building scholarly capacity.

In Chapter 2 I present a paper titled “University students’ views on their experiences of assessment and feedback⁵” by Matimolane, Keane, & Brenner (2013). In this paper, I present how I used the learning-oriented assessment (LOA) conceptual framework as a tool to characterise assessment practices in two compulsory second-year biosciences courses and relate them to students’ perceptions and experiences of assessment *for* learning. Copies of course outlines that included in courses’ learning outcomes, some assessment tasks and students’ marked work were collected to inform the ways in which academics described their assessment intentions and to provide concrete examples of assessment practices experienced by students. A questionnaire was administered to students to elicit their assessment experiences. Findings suggest that there were specific practices in the courses under study, which incorporated assessment *for* learning principles. These practices were positively perceived by students. While students experienced a wide range of assessment types and show awareness of the learning potential of assessments, they generally do not feel that they understand lecturers’ expectations. Some of the assessment methods were questioned by students in terms of their relevance in preparing them for their prospective science careers. The LOA framework proved valuable in identifying learning-oriented practices. The limitation at this phase of the study was relying on quantitative data when exploring students’ assessment views and experiences.

Chapter 3 presents an unpublished paper titled: “Students’ views of their experiences of assessment feedback”. This paper provides an analysis of the nature of feedback practices students’ experienced in three 2nd year undergraduate bioscience courses. Additionally, in this paper I explored students’ views and experiences of their feedback environments in the context of these courses. The chief findings indicate that students perceived the purpose of feedback to be multidimensional. Students desired a range of feedback ranging from being simply fed with corrections (prescriptive feedback) to more self-evaluating facilitating types of feedback. They predominantly expressed their preference for a combination of marks and comments on different aspects of tasks. Students highlighted that they valued forward-looking feedback and the importance of receiving feedback on their ability to address the question at hand. The findings are discussed in relation to sustainable assessment feedback models and principles of good feedback practices advocated in the literature. I conclude that

⁵ This paper is published in the International Journal of Assessment and Evaluation (see reference list)

it is imperative that feedback practices create opportunities for peer and lecturer discussions and for student reflection to improve teaching and learning in tertiary institutions.

Chapter 4 presents an unpublished paper titled: “The power of emotions in students’ experiences of assessment feedback”. This paper expands on what I presented in Paper 2 but focuses on students’ emotional reactions to feedback. The emotional aspects of students’ assessment experiences emerged as an important theme in the study on assessment feedback. The most enthralling aspect of this paper is the infusion of emotions in assessment and feedback environments. In this paper, I examine the occurrence, nature, sources and roles of students’ emotions in feedback situations. The aim of the paper is to highlight emotions as a critical factor in students’ learning and achievement. The paper draws on qualitative analyses of interview data conducted with nine second-year bioscience students. Students experienced a range of emotions in different feedback situations. Negative emotions, such as uncertainty, disappointment, annoyance and anger appeared to be dominant. Elements or ‘objects’ of feedback that gave rise to these emotions included feedback content and the manner in which feedback was given. Comments about feedback from students illustrated how the social dynamics of the assessment foregrounds issues of relations and mistrust/trust. The paper highlights the important effects of emotions on feedback and concludes with practical recommendations on how to enhance positive emotional experiences of feedback among students.

Chapter 5 presents an unpublished paper titled: “Insights into university teachers’ conceptions and practices of assessment in bioscience courses”. The paper focuses on four teachers of second year bioscience courses at a South African university. In an attempt to understand the nature and origins of these lecturers’ assessment conceptions and practices, I decided to conduct a multiple case study. The data used in the study came from interviews and course documents used by these lecturers. Emergent themes from cross-case analysis of the four cases are presented. Data analysis shows a multifaceted, complex and nested teacher conceptualisation of assessment of science learning. It is apparent that a combination of meso and micro level factors has a pervasive and potent influence on lecturers’ assessment practices. The paper concludes with implications and recommendations that take into account factors most influential to lecturers in their different contexts of assessment for educational development interventions.

Chapter 6 presents the conclusions derived from all the papers presented in the thesis. In this section of the thesis, I provide a summary of the findings I consider to answer the research questions and represent the papers in the study. In this section of the thesis, I revisit the research questions and draw on the findings of the four papers to synthesise new insights in answering the research questions. In this final section of the thesis, I also discuss possible theoretical and practical implications based on the findings and suggest future research possibilities.

A note about the papers

All the empirical chapters, regardless of their publication status are my own work. I conceptualised the research, performed the data collection and analyses, interpreted the data and wrote the papers. My supervisors who appear as co-authors in the papers provided guidance and support in the development of the research, helped in the interpretation of the data and evaluated the manuscripts. Three unpublished papers provide detailed accounts of the research findings and interpretations, which I deem necessary for the purpose of this thesis. However, it is my intention to rework the unpublished manuscripts for peer review in accordance to the requirement (word counts, presentation & referencing styles) of the targeted journals outlined below.

The target journal for the paper presented in chapter 3 is ‘Studies in Higher Education’. This established international peer-reviewed journal deals with international and global trending issues around teaching, learning and assessment in higher education. This paper that deals with the trending theme of students’ experiences of feedback is well suited for this journal.

Chapter 4 is currently being prepared for submission to an international peer-reviewed journal ‘Assessment & Evaluation in Higher Education’. This journal reports on all aspects of assessment including the role of emotions in assessment and feedback context, which this paper focuses on. This targeted journal is appropriate for this research study theme because it seeks to advance understanding of assessment practices and processes in enhancing student learning.

The ‘South African Journal of Higher education’ journal is my target for Chapter 5 reporting on lecturers’ assessment understandings and practices. This paper will appeal to practitioners in the South African higher education context because it critically examines the values and presuppositions underpinning practices of assessment. The paper is well suited for this journal’s audience because it also looks at the role of assessment in student learning in order to explore the challenges it presents in the socio-cultural-historical context of South African education system.

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CHAPTER 2

University Students' Views on Their Experiences on Assessment and Feedback

Abstract

This paper explores and analyses assessment environments with regards to their contribution in supporting student learning. The student perspective on assessment is related to the learning-oriented assessment (LOA) conceptual framework. The context is course-level assessment practices employed in selected undergraduate Biosciences courses at a South African university. Lecturers' assessment practices were related to students' perceptions and experiences of assessment and feedback. The data were collected from course and assessment documents and drew on students' experiences of assessment and feedback. The analysis from documents showed that courses relied mostly on summative assessment tasks (little use of explicit formative assessment tasks) and that students predominantly experienced frequent practical tasks (laboratory reports), tests and examinations. It was evident from students' responses that they viewed assessment as measuring learning, and that feedback was focused on awarding marks. Furthermore, students were generally dissatisfied with the clarity or transparency of assessment and on the feedback they received. LOA proved to be a useful tool in analysing the assessment environment and as a sounding board for possible future developments in assessment in these complex socio-cultural contexts. In addition, LOA appeared to be a valuable tool that could be widely used for Quality Assurance.

Key words: Assessment Higher education, Feedback in Bioscience education

2.1 Introduction

In South Africa, the need to widen access at higher education institutions (Luckett & Sutherland, 2000) means that universities need to grapple with under-prepared students, imperatives to increase throughput rates and student retention (Council on Higher Education, 2010). Most of these students come from historically disadvantaged teaching and learning backgrounds. According to the Council on Higher Education (2004, p.4), assessment is seen as having the potential to address equitable student achievement through "robust and transparent" assessment procedures and methods. However, Scott, Yeld and Hendry (2007) note that diversification of student intake in some cases "has not been matched by institution-wide modification of educational approaches" (p40). They highlighted the lack of

“conceptualisation of the educational process in terms of appropriateness of content and assessment methods which promote more developmental learning” as one possible reason for unsatisfactory student learning.

There is a substantial body of international literature supporting assessment for learning (AfL), as well as policy reflecting such support in the South African higher education context. Shay (2008) noted that even though AfL principles, such as making assessment criteria and learning outcomes explicit, are reflected at institutional policy level in the South African context, there are doubts and concerns about their actual implementation at course levels. My argument is that little is known about the actual implementation of such policy at departmental/school and course levels. In researching the practice in a well-functioning biosciences school at a South African university, I hope to gain in-depth insight into the actual conceptualisation and implementation of AfL. I begin here with an overview of the literature on assessment.

2.2 Literature review and Theoretical framework

Conceptualisation of assessment practices in higher education internationally is changing. There is an apparent movement from a behaviourist and measurement perspective of measuring students’ acquisition of knowledge to a social constructivist/cultural perspective providing information to improve learning and teaching (Shepard, 2000). This move has influenced recently adopted higher education assessment policies which recognise the role of assessment *for* learning (AfL, aka formative assessment) to promote equity and fair chances of success to all students in the face of a diversified student body (Council on Higher Education, 2004; Yorke, 2003). Students’ experiences and perceptions of assessment have been shown to affect their learning approaches and thus ultimately their academic performance and acquisition of lifelong learning skills (Struyven, Dochy, & Janssens, 2005). In addition, students’ conceptions of the requirements of a task (and what counts as a good response) will influence their interpretation of feedback they receive (Gibbs & Simpson, 2004). It is also acknowledged that using AfL can be effective only if students’ perceptions of learning and assessment closely reflect the teachers’ intentions.

This research focuses on this latter aspect: how well aligned are AfL principles to lecturers' intentions and to students' perceptions and experiences. There are a significant number of studies highlighting the lack of shared understandings of assessment by students and lecturers (Bailey & Garner, 2010; Maclellan, 2001; Orsmond & Merry, 2011). Possible reasons identified for conception mismatches include the tacit nature of assessment standards and criteria (Rust, Price, & O'Donovan, 2003), the nature of the requirements of the assessment system (Bailey & Garner, 2010) and the need to meet the obligations of the multi-roles of lecturers in the current view of teaching, learning and assessment (Yorke, 2003).

In the context of a paradigm shift towards more learning-oriented assessment approaches and against the backdrop of the challenges faced in the higher education sector, this study seeks to understand how adopted assessment strategies are geared to address these challenges in the wake of, among other factors, increasing class sizes, changing student profiles and modularisation. Thus, this paper reports on the lecturers' intended assessment practices and undergraduate students' perceptions and experiences of assessment and feedback they receive.

Formative assessment and its associated immediacy of feedback are crucial in providing students with relevant information about their progress at relevant developmental stages. In its learning-oriented nature, formative assessment is meant to help students to gradually master discipline content and skills without the risk of affecting their course marks. In addition, formative assessment is being advocated as a mechanism that can enhance the quality of students' learning experiences and increase the understanding of assessment between lecturers and students (Bailey & Garner, 2010). However, more recently, authors such as Bennett (2011) and Torrance (2012) have interrogated the different theoretical and pedagogic interpretations underpinning these approaches and the complexities of implementing formative assessment.

Acknowledging that formative assessment may be "at a crossroads" (Torrance, 2012, p. 323), this paper views formative assessment from a sociocultural theoretical orientation. The social and cultural context of learning-oriented assessment is premised on socially constructed learning, and involves participation within a community of assessment practice where students are inducted into ways of knowing, thinking and practising within the discipline. Key to assessment *for* learning are issues of sharing explicit intended and emergent learning

outcomes and assessment criteria, ensuring constructive alignment between teaching, learning and assessment and scaffolding by providing forward looking and dialogic feedback and, most importantly, students' involvement in self-monitoring and self-regulation.

The conceptual framework used in this study for characterising assessment environments in order to explore the extent to which they support student learning is based on the learning-oriented assessment (LOA) framework by Carless (2007). The theoretical focus for analysis further encompasses the “conditions under which assessment supports student learning” (Gibbs & Simpson, 2004) and the “principles of good feedback practice” (Nicol & Macfarlane-Dick, 2006), both of which are based on theoretical and empirical evidence-based formative assessment literature. The learning-oriented assessment (LOA) framework is based on three principles (Carless, 2007, pp. 59–60):

- *Assessment tasks should be designed to stimulate sound learning practices amongst students.* This principle encompasses the notion of constructive alignment and four conditions under which assessment supports learning (Gibbs and Simpson 2004).
- *Assessment should involve students actively in engaging with criteria, and quality of their own and/or peers' performance.* Active participation, collaborations and induction into discipline practice are essential within the sociocultural perspective.
- *Feedback should be timely and forward-looking so as to support current and future student learning.* This principle encompasses Gibbs and Simpson's seven conditions under which feedback is believed to influence students' learning and Nicol and Macfarlane-Dick's seven principles of good feedback facilitating self-regulation.

These principles assisted in the analysis of what teachers did in relation to achieving their courses' teaching and learning objectives. The viability and sustainability of implementing these learning oriented assessment approaches might seem problematic in the current South African HE context. However, I regard these principles as primary springboards to optimising educational practice as a whole.

In order to better understand students' perceptions of assessment and feedback and how it related to lecturers' intended assessment practices this study:

- reviewed and characterised assessment practices in two Bioscience second year compulsory courses, and

- explored the relationship between assessment and feedback practices in the assessment environment and students' perceptions and experiences of assessment and feedback in the two courses.

2.3 Research design

All the second year undergraduate Biosciences students enrolled for the compulsory courses (n=70) were approached to participate in the study. The compulsory courses were chosen because of their strategic position in the degree programme. All the students doing these courses would have completed their first year introductory life sciences compulsory course.

Course documentation such as course outlines and assessment-related hand-outs were examined for evidence of assessment practices and the formative assessments and feedback given to students were evaluated. Course documents for the two courses were evaluated and categorised based on a modified template originally devised by Gibbs and Dunbar-Goddet (2009). The aim of document analysis was to explore the features characterising the assessment environment with regard to types of assessment used, timing of assessments, and the weighting of the different assessments. Assessment criteria and the type and nature of feedback given were also probed. Table 2.1 shows characterising features of the two courses' assessment environments.

Table 2.1 Features of the assessment environments in the two courses

Characteristics of the assessment practices	Course A	Course B
Range of assessment types used	Timed closed book test, practical tasks and assignments, timed closed book examination	Laboratory tasks, practical test, timed closed book test, timed open book exam, field collections (insect and plant collections)
Formative assessment only	Not indicated	Selection of practical tasks
Summative assessment	100%	100%
% of marks from coursework	40% (class test and practical assignments)	40% (class test, field project and practical work)
% of marks from examinations	60% from written exam	40% from written exam and 20% from plant collection
Feedback given	Verbal and written comments	Written comments
Explicitness of learning outcomes	Specified in course outline	Specified in course outline
Explicitness of criteria	Mark breakdown for tests/exams Assignment marking rubric	Mark breakdown for tests/exams. Rubric for field collection marking

Source(s): template adapted from Gibbs and Dunbar-Goddet 2009.

The assessment environments in the two courses are characterised by frequent summative assessment in the form of weekly laboratory reports and dominance of timed tests and examinations. It appears that the assessments in these courses are similar to Brown, Bull and Pendlebury's (1997) report that 80% of university assessment is made up of essays and time-constrained tests or examinations. Course A is characterised by a relatively high percentage of marks from examination (60%), written and oral feedback, closed book examination and a relatively low variety of practical tasks. In contrast, course B had more variety in terms of the practical tasks and a lower percentage of marks from examination (40%), very low levels of written formative-only assessment and an open book examination.

2.3.1 Marked coursework

To analyse the type and nature of feedback given to students, copies of the available marked class tests, (n=69 for Course A and n=49 for course B) were examined and written feedback comments were categorised and collated (quantified). The coding of the feedback with respect to written comments was adapted from Brown and Glover's (2006) coding tool, which was designed for the Sciences and for evaluating the formative potential of feedback. Table 2.2 shows how the written feedback comments made on the two courses' class tests were distributed across the categories used in the coding scheme.

Table 2.2 Distribution of written comments into several categories

Category of comments on quality of work	Examples and explanations	(%)
Generic comment	Ticks, crosses, underline, question marks, no, yes	48
Course specific content	Quality and accuracy of answers, appropriateness of what is included, omissions, errors identified and corrected and clarification	20
Skills	Structure of the answer, whether the question has been properly addressed, use of language and communication skills	8
Motivational comment	Praise, encouragement	6
De-motivating comment	Use of negative words e.g. confused, rubbish	2
Feed forward:	Reference to resources, dialogue, questioning, signposting, further learning	16

2.3.2 Questionnaire

To investigate students' experiences and perceptions, a Likert-scale questionnaire was developed drawing from the adopted theoretical framework, the Assessment Experience Questionnaire (AEQ) of Gibbs and Simpson (2003) and the Assessment Audit tool of Maclellan (2001), both of which allow one to analyse how assessment supports learning. The

instrument was piloted and subsequently amended based on the responses and outcomes. Thirty-four student participants representing 49% of the total enrolment of second-year undergraduate compulsory Bioscience courses completed the final questionnaire anonymously. Analysis and discussion of the questionnaire responses were guided by the three LOA theoretical framework principles.

2.4 Findings and discussion

2.4.1 Assessment tasks as learning tasks

For assessment task to support learning, they should be varied to cater for the diversified student body; capture students' study time and effort (Gibbs & Simpson, 2004); be constructively aligned to teaching and learning activities and communicate clear and high expectations. From the documents analysed, it is clear that students were exposed to various tasks. This aligned to students' responses on their views on the assessment practices in the two courses where 47% and 61% of the respondents for courses A and B respectively agreed that the two courses used a variety of assessment methods. Multiple assessment methods in the view of socio-constructivist models offers wide opportunities for the diverse student body to perform. In addition, multiple methods would cater for students' individual preferred learning styles, address different assessment purposes and cater for various intended learning outcomes. The ranges of assessment tasks, including the weekly practical tasks used in both courses are "sufficient to capture study time and effort and to distribute students' effort across weeks". In addition, diverse assessment will be appropriate for different assessment purposes and for addressing various intended learning outcomes.

In their questionnaire responses, over half of the students in both courses perceived that the aims and objectives of assessment tasks were clear and that they communicated the high standards expected. In both courses, 85% of the students indicated that the assessment tasks were based on what was taught in the lectures. This indicates the acknowledgement of some form of constructive alignment between teaching and assessment in the two courses. Item by item analysis of the responses revealed less favourable scores on the questions probing clarity of marking and marking criteria as indicated in Table 2.3. Thirty-nine per cent of the respondents for course B compared to 59% of the respondents for course A seemed unclear

about what would count as a valid answer in the assessment tasks. Less than 40% of the respondents in both courses indicated that the marking process was clear.

Table 2.3 Comparison of the two courses in terms of students' perceptions of transparency of assessment

	Course A		Course B	
	% Agree	Likert 1-5 Mean score	% Agree	Likert 1-5 Mean score
The aims and objectives of this course's assessment tasks were made very clear.	58	3.76	70	3.82
When I tackled an assessment task, it was not clear at all what would count as a valid answer.	59	2.44	39	2.88
The assessment tasks had very clear instructions about what one is expected to do.	50	3.41	67	3.72
How the assessment tasks were marked was made very clear.	33	3.12	36	3.24

Half of the students claimed, as shown in Table 2.4, that they did not know whether marking was against implicit or explicit criteria. Almost three quarters of the students, (73%) indicated that they sometimes knew what marks were being awarded for, indicating that the marking criteria were perceived to be explicit – at least part of the time. In addition to that, 85% of the students said they sometimes, or frequently, were unaware of the marks breakdown. Eighty-eight percent of the students had some idea of what marks were for but 85% did not know the mark breakdown. My interpretation from this is that students knew the broad mark allocation but not the specifics. This implies that there might have been inconsistent practices in terms of communicating criteria to the students. Making criteria explicit does not guarantee that students will perceive assessment in the same way as the lecturer. Some of the problems with effective use of assessment criteria signal their tacit nature (Rust, Price & O'Donovan, 2003). The challenge is to make staff perceptions and expectations of assessments (requirements, standards, criteria) known, understood and aligned to students' perceptions and experiences.

Table 2.4 Students' perceptions about marking and transparency of assessment

	Frequently	Sometimes	Never	Don't know
We knew what we will get marks for	15%	73%	12%	
We were not aware of the mark breakdown (implicit criteria)	23%	62%	12%	3%
Marked tasks counted towards final class mark	74%	23%		3%
Marked tasks did not count for final marks		59%	35%	6%

Students perceived that the content of assessment tasks focused on various cognitive levels. Over half of the students in both courses who indicated that assessment tasks were not about memorising corroborated students' perception that assessment frequently focused on understanding. Generally, assessment forms are linked to the purpose of each assessment type. For example, as evident in this study laboratory or practical assessments were used to evaluate the students' application skills whereas tests or examinations are used to measure the extent of the students' knowledge.

With heavy reliance on timed closed-book tests/examinations, it is evident that these assessment practices were not clearly aligned to students' perceptions that assessment focused on understanding. Additionally, this raises a question of whether timed tests adequately assess more complex and higher order cognitive outcomes such as critical thinking, verbal communication and creativity. Green and Rollnick's (2007) study supports this argument. They found that testing in second year Chemistry was predominantly at the comprehension/application level, given the nature of timed tests, as affirmed by students in this study. The heavy weighting of tests and exams raise concerns about the risks of over-emphasising factual recall and lower order understanding to the detriment of higher order learning outcomes. The laboratory reports for the two courses were lecturer-designed procedures. The practical assignment and field collections presented the students with opportunities to design their own work, and thus the notion of student involvement in assessment design. That said, overall, the field and laboratory reports can be viewed as teaching and learning activities designed to induct students into disciplinary ways of thinking and practising (McCune & Hounsell, 2005).

With regard to the purpose of assessment, there was a general perception by the students that it is for measuring learning. This view is aligned more with the summative purpose of assessment than the formative purpose. Sixty-two per cent of students thought assessment is for scoring or ranking achievement. As shown in Table 2.4, 74% of the students perceived marking to be frequently given summative marks and 35% who perceived marking never used for formative purposes (not counting for marks). These perceptions support the argument in the literature that student assessment is most often used as a measuring device (Brown, Bull & Pendlebury, 1997). In describing the purposes of assessment, a significant number of students perceived it as promoting learning (formative role). Forty-four per cent of the students that it was sometimes used to diagnose weaknesses and strengths, and 35% of the

students indicated that it was sometimes used to motivate learning. It is clear from the course documents that the majority of the assessment tasks were for summative purposes and that concurs with the students' perceptions. It is important to note here that it is students' perceptions of these teaching, learning and assessment environments that are central.

2.4.2 Students' involvement in assessment

The second component of the learning-oriented assessment (LOA) framework is that students should at times be involved in the assessment process through self- or peer-assessment where they will be exposed to developing and using criteria to judge the quality of their work. As indicated in Table 2.5, 85% of the students perceived assessment as frequently being lecturer/tutor-driven, meaning that students rely on lecturers to assess their work and provide feedback. 56% and 50% of the students perceived assessments as never carried out by self or peers respectively. The discrepancy in the responses given by students might be due to students' perceptions of variable explicitness of the requirements of self and peer assessments in the different courses.

Table 2.5 Perceptions about assessors

Assessment is carried out by	Frequently	Sometimes	Never	Don't know
Self	14%	24%	56%	6%
Peers	6%	41%	50%	3%
Lecturer/Tutor	85%	9%	6%	

Self-assessment facilitates a deep approach to learning as well as self-regulation and the development of metacognitive skills and life-long learning (Black & Wiliam, 1998; Boud & Falchikov, 2006). Boud (2000, p. 151) states that, "in order for students to become effective lifelong learners, they need also to be prepared to undertake assessment of the learning tasks they face throughout their lives". The reason why self-assessment is particularly useful for Bioscience courses and for higher education in general, is that students need the experience and encouragement to think of how assessment criteria are applicable in different contextual and content scenarios, thus reducing the dependence on lecturers for feedback on their work. For the 56% of the students who indicated that they were never involved in self-assessment, despite being given assessment rubrics for some tasks, opportunities can be created within the discipline for students to engage in assessing themselves. Students need, through training, to be supported in understanding the purpose of assessment if they are to engage with it.

2.4.3 Feedback as feed-forward

The third component of the LOA framework concerns feedback, which should be timely and forward-looking so as to support current and future learning (Carless, 2007). According to Gibbs and Simpson (2004), feedback must be “sufficient, frequent, understandable and adequately detailed” if it is to support student learning. They further indicate that feedback should not focus solely on marks but should be used to promote future learning. Although the potential motivational value of marks on student learning is widely acknowledged, feed-forward is essential in facilitating student’s ability to close the gap between the current and desired or future levels (Sadler, 1989).

In terms of the quantity of feedback, course document analysis reveals that feedback was provided in the form of marks and individual written comments on students’ work in both courses. However, in addition to that, course A also had an oral feedback session. From the questionnaire responses, 39% and 60% of the students claimed that feedback was provided only in the form of marks in courses A and B respectively (see Table 2.6).

Table 2.6 Comparison of students’ perceptions about the quantity and quality of feedback

	Course A		Course B	
	% Agree	Likert 1-5 Mean score	% Agree	Likert 1-5 Mean score
Feedback on my work was usually provided only in the form of marks.	39	2.88	60	2.48
On this course, I got plenty of feedback on how I am doing.	53	3.38	52	3.30
The feedback came back very quickly.	56	3.59	49	3.36
The feedback helped me know how to do better next time.	73	3.9	70	4

The outcome of analysing written feedback in the two courses indicated that the most commonly provided comments were generic comments (48%), followed by course specific content comments (20%) and feed-forward comments (16%) (Table 2.2). There was a balance in provision of motivational and negative comments, which is crucial in promoting engagement with feedback. The course-specific content, skills and feed-forward comments accompanied with explanations indicate that students were provided with valuable feedback, which can be used not only for the tasks at hand but also for future tasks. Students had positive perceptions with regard to the quantity and timing of the feedback. As indicated in Table 2.7, over half of the students perceived their feedback to be sometimes helpful in its detail, enabling understanding of assessment and for prompting discussions with tutors/peers.

This positive perception by students was further illustrated when over 70% of the students indicated that the feedback helped them know how to do better next time for the two courses (Table 2.6).

Table 2.7 Perceptions of the value of the feedback

Feedback	Frequently	Sometimes	Never	Don't know
Is helpful in its detail	41%	53%	6%	
Enables understanding of assessment	41%	56%	3%	
Improves learning	44%	47%	6%	3%
Prompts discussion with tutor or peers	29%	59%	9%	3%

Forward looking feedback enables students to become reflective, self-directed and self-regulated learners. Feedback (especially in the form of marks or brief comments) will not lead to an increase in motivation and improvement unless it is perceived as informational, thus leading to subsequent improvement. Despite the positive perception students had with regard to the quality of feedback, one gets the sense that students might interpret generic comments evident from the document analysis as being too cryptic and telegraphic to be understood and used. Lecturers emphasised identification and correction of errors. The majority of the feedback comments provided were task specific. The potential transferability of these types of comments beyond the end of the modules was less evident due to a lack of clear strategies, which encouraged self-evaluative and reflective skills. However, one needs to be cognisant of limiting factors in giving such feedback given the size of the classes and the modularised course system the lecturers might be working under.

In sum, the regular practical tasks which mainly served formative purposes provided students with quick and useful feedback. In addition, students were generally more positive about the value of feedback in these assessment tasks.

2.5 Conclusion

The course documents provided an overview of the features of the assessment environment but, if these were to be the sole source of information about assessment in the course, it would be very limiting in terms of the details of the assessment environment. Furthermore, one cannot be certain that what appears on course documents is translated into assessment practices. The overall analysis from documents shows that the assessment environments in

the two courses are dominated by summative assessment tasks and that students predominantly experienced frequent practical tasks (laboratory reports), timed tests and examinations. It should be noted therefore that the course outlines might not explicitly outline some of the specific details on assessment in general and/or formative assessment in particular. However, one of the limitations of this study is exclusion of informal assessment which might be occurring during teaching interactions.

In brief, the weekly practical tasks, explicitness of learning outcomes, variety of assessment methods and perceived alignment of assessment to the teaching, all of which are aligned to the principle of “assessment tasks being learning tasks”, indicate how specific practices in the two courses support student learning. All of these characteristics are often emphasised in quality assurance and thus balancing various roles of assessment is illustrated in these courses’ assessment environments. The regular practical tasks provided quick and useful feedback. Feedback structured criteria (mark breakdown and marking rubrics) ensured that feedback is linked to the purpose of the assignment and to criteria.

It was evident from the questionnaire data that the two courses reviewed were generally favourably perceived by students as subscribing to some aspects of the learning-oriented assessment environments. Nevertheless, students were less positive about the clarity or transparency of assessment and the feedback they received. Furthermore, students viewed assessment as primarily used for measuring learning, and feedback as primarily an awarding marks. There was clear alignment between students’ views and experiences and what was evident from the documents analysed. This means that lecturers’ intentions outlined in their course documents translated into practice experienced by students.

It was, however, not explicit from the course documentation how students were actively involved in the assessment process. Students’ perceptions also attested that assessment was frequently lecturer-driven, which is incongruent with the sociocultural view of assessment for learning. Clarity and articulation of marking criteria may be enhanced if students are involved in the marking process either through self- or peer-assessment but, as discussed, these forms of assessment did not occur in the two courses. Little explicit formative assessment practices and clear strategies of student involvement in the assessment process are understandable in these contexts where teacher expertise in the learner- focused pedagogy are required. Both the lack and existence of some learning oriented assessment elements were to be expected given

the expertise and contextual conditions required for their implementation. It remains questionable whether the learning-oriented principles advocated in the current research literature are entirely desirable and viable in these current sociocultural contexts. Nevertheless, we should be pragmatic about the need to address equity issues using development-oriented assessment in order to optimise fair chances of success for all students.

In conclusion, the learning-oriented assessment framework proved valuable in identifying assessment practices that support learning. In addition, an analysis of assessment practices thorough the learning-oriented lens may make lecturers more aware of the trends and effects of practices and this may create a useful basis for generating new ways to redesign learning, teaching and assessment environments. It is evident, however, that there is need for more in-depth qualitative data to develop a detailed understanding of the perceptions of assessment from both students' and lecturers' perspectives.

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CHAPTER 3

University Students' Experiences of Feedback: Implications for Adoption of Sustainable Assessment Practices

Abstract

In line with the goal of developing independent, lifelong learners, there is a substantial body of research, which increasingly advocates sustainable feedback practices. However, a number of studies continue to report on the lack of the impact of feedback on students' learning within the broader shift towards student-centred pedagogy. I conducted a questionnaire survey and interviews with bioscience students to elicit their experiences and perceptions of formal assessment feedback⁶. Additionally, I examined and categorized the assessment feedback students received within their coursework in three, second-year undergraduate courses. The analysis of feedback on 328 students' tests scripts and research reports showed that feedback comments were dominated by disclosures in the form of symbolic annotations (e.g. marks, ticks). The majority of students viewed feedback dominantly as being simply "fed" with corrections (given prescriptive feedback), rather than be provided with feedback that enhances future, self-regulated learning strategies. The feedback experienced by students is problematized in terms of dialogic and sustainable forms of feedback, which are linked to development of students' capacity to self-regulate and self-assess.

Keywords: feedback; learning; dialogue; self-regulation; sustainable assessment; students' views

3.1 Introduction

Research into student assessment practices has consistently demonstrated the importance and benefits of feedback in directing effective student learning and experiences (Black & Wiliam, 1998; Price, Handley, Millar, & O'Donovan, 2010). However, other available evidence gleaned from reviews of empirical studies indicates inadequacies in assessment feedback (Evans, 2013; Hattie & Timperley, 2007; Li & De Luca, 2014). Some of the concerns arising are the differences in conceptions and interpretations students and lecturers have regarding the purpose of assessment feedback. This apparent lack of convergence in the understanding of feedback may be the source of the many documented problems associated with this

⁶ Even though feedback can be generated in various teaching-learning interaction and through various sources, in this study the focus is on feedback in the context of formal assessment activities

construct. In fact, the purpose of feedback may not be shared when students are unable to interpret lecturers' written comments (Adcroft, 2011; Orsmond & Merry, 2011). It is for this reason that researchers suggest assessment dialogues as a way to reduce the gap between lecturers' feedback and students' understanding of its use (Carless, Salter, Yang & Lam, 2011; Nicol, 2010). For this reason, in this paper I explore students' views of feedback within the context of sustainable dialogic assessment practices as part of understanding and addressing the feedback gap.

3.2 Feedback in Higher Education

Reviewing higher education research into assessment feedback (e.g. Evans, 2013; Li and De Luca, 2014) highlighted two significant areas, which are of relevance to this study with regard to sustainability of feedback. Firstly, there are calls for the rethinking of assessment feedback in the changing context of higher education. Secondly, there is a fundamental requirement to address the gap between theory and practice in feedback.

The current realities of higher education (HE) include increased class sizes with students of differing motivations, abilities and academic background, the modularization of courses and anonymous marking as well as multiple demands on lecturers. According to Nicol (2010), massification is “squeezing out dialogue with the result that written feedback is essentially a monologue” (p.503). The shift to course modularization has been criticised for tendencies of end loading of assessment (Hounsell, 2007) and “lack of meaningful continuity” (Duncan, 2007, p. 276) in using feedback to influence subsequent learning. With moves to professionalization of teaching in most HE institutions, lecturers are expected to adopt a professional/scholarly approach to their pedagogical activities. It is within this complex HE context that Evans (2013) and Sadler (2010) contend that we need to know more about designing effective learning-orientated feedback systems.

A number of researchers consider that the shift towards socio-cultural/constructivist approaches to learning and teaching has not resulted in an equal, parallel shift in approaches to assessment feedback (Nicol & Macfarlane-Dick 2006; Shepard 2000). Similarly, Adcroft (2011) and Nicol (2010) have noted that current research literature has paid little attention to feedback as a social practice to align with this shift. They argue that more emphasis is still being placed on the technical nature of providing feedback, or what Nicol (2010, p.502)

refers to as a “transmission view of feedback”, or a "monologue practice", or what Sadler (2010) refers to as “feedback as telling”. Sadler (2010) argues that the “fundamental problem lies less with the quality of feed forward and feedback [but] ... with the assumption that telling, even detailed telling, is the most appropriate route to improvement in complex learning” (p.548) . The transmission view of feedback practice operates on the premise that students are completely able to comprehend the comments and devise strategies to enable them to act on the feedback (Dowden, Pittaway, Yost, & McCarthy, 2013).

Various researchers have called for “sustainable use of dialogic feedback” systems and adoption of iterative feedback cycles through peer- and self-assessment to ameliorate the feedback problems mentioned above (Boud & Molloy, 2013; Carless et al., 2011; Hounsell, 2007). It is overwhelmingly argued that dialogic feedback systems are necessary to develop student self-evaluative and self-regulating capabilities (Boud & Molloy, 2013; Yang & Carless, 2013). Such feedback systems occur in co-produced, dynamic social settings, which involve lecturers and their students. In feedback systems, individual, contextual, socio-cultural and relational factors influence the interactions, generation and utility of feedback (Yang & Carless, 2013). For example, contextual constraints might affect the quantity and quality of written feedback to students. However, these advocated feedback dialogues depend heavily on power and trust issues embedded in cultural and social relationships between lecturers and students. In addition, success of these practices relies on lecturers who understand their course contexts in terms of students’ academic and socio-cultural situations.

The challenges presented above call for further attention to feedback processes. In order to enhance learning through assessment feedback, we first have to understand feedback and gain a shared understanding of particular individuals and their contextual situations. Secondly, we need to arrive at a shared understanding of the role and purpose of feedback amongst all the role players. This study therefore focuses on the students’ perceptions of the assessment feedback provided to them.

3.3 Conceptual Framework

Feedback is defined by Ramaprasad (1983, p.4) as “information about the gap between the actual level and the reference level of a system parameter which is used to alter the gap in

some way”. Sadler took Ramaprasad's definition further, saying, “information about the gap is considered as feedback only when it is used to alter the gap” (1989, p.121). Carless et al. (2011, p.397) provided another perspective on feedback, describing it as “dialogic processes and activities which can support and inform the student on the current task, whilst also developing the ability to self-regulate performance on future tasks”. This feedback perspective highlights three elements:

- Feedback strategy
- Informational content
- Feedback function

Taking these definitions together foregrounds a feedback system framework entailing three integrated components: feed up, feedback/feed-out and feed-forward (Hattie & Timperley, 2007). The three feedback types satisfy Sadler’s (1989) three conditions that enable students to judge and regulate their learning. Students are therefore, under these feedback conditions expected to:

- Possess a concept of the *standard* (or goal, or reference level) for which they are aiming (Sadler, 1989, p. 121), i.e. feedback provided in relation to this condition will confirm possession and attainment of goal and identify errors and misunderstandings. Feedback linked to this condition informs the students where they are going.
- Compare the *actual* (or current) *level of performance* with the standard (Sadler, 1989, p.121) i.e. feedback provided in relation to this condition will inform the student about their current status or progress towards the goal.
- Engage in appropriate *action* which leads to some closure of the gap (Sadler, 1989, p.121) i.e. feedback provided in relation to this condition will indicate strategies or specific action to close the gap between the current and the desired goal. This condition answers the feedback question: “Where to next” (Hattie and Timperley, 2007, p. 86).

Sadler’s three conditions clearly indicate that feedback can take various forms, which in turn, have varying roles in the development of student learning. Various forms of feedback, such as identification (symbolic comments) and correction of student’s errors play a critical role in helping students close the gap between the current and desired understanding. Certainly, the manner in which students define feedback will, in part determine how they engage with it. However, in this study feedback will be regarded as (and limited to) information and dialogic

processes used by students to close performance gaps on current and subsequent tasks. What is of importance in this study is primarily how students behave or what they perceive rather than what actually exists within the feedback system, which forms an integral part of their learning environment.

3.4 Context of the Study

In this study, I explored students' perceptions and experiences of their assessment feedback within the context of an undergraduate biological science programme at a South African university. Three compulsory second-year seven-week courses (coded Courses A, B and C) offered as part of a Science degree qualification were selected for this research. The compulsory courses serve as foundations in essential Biology concepts, skills and processes. All the courses are meant to promote scientific literacy, understanding and integration of fundamental overarching concepts of diversity of organisms, evolutionary paradigms and ecological systems. In addition, the courses are meant to address higher order skills related to scientific research approaches and to prepare research ready students.

Selection of the abovementioned courses was due to their strategic position in the degree programme. All the students doing these courses would have completed a first year introductory life sciences pre-requisite course. These courses are, in turn, prerequisites for attaining a degree in the majors selected. Approaches to teaching include team-taught lectures (i.e. where individual lecturers present a set number of lectures in the same course), weekly practical sessions and fieldwork projects. Assessment includes practical work reports, class tests and end-of-course examinations. The value of choosing the three courses with different lecturers, teaching styles, and teaching philosophies is that it offers us a global picture of the students' experiences.

All the second year undergraduate Biosciences students (n=70) enrolled for the compulsory courses in 2011 were approached to participate in the study. Thirty-four of the 70 students volunteered for and participated in the study. The research was undertaken with the consent of the participating students and lecturers and was in line with the ethics approval granted by the University's ethics committee.

3.5 Data sources and analysis

Data were sourced from a content analysis of feedback that students received as part of their course work (class tests for Courses A and B and research reports for Course C). One hundred and eighteen marked class tests for Courses A and B and 210 practical reports for Course C were analysed. Five lecturers, each marking those sections of the topics that they taught, marked the class tests. Teaching assistants (postgraduate students) marked the research reports, guided by a marking scheme devised by the course lecturer. Lecturers were also responsible for moderating the work marked by the teaching assistants.

Feedback comments in this study were analysed based on their types, depth, tone and focus as captured in Tables 3.1 and 3.2. In categorising the feedback comments I adapted a coding tool by Brown and Glover (2006), which was designed for the Sciences and for evaluating the formative potential of feedback. Brown and Glover's coding tool contained five categories of feedback types to which I added a sixth category. The sixth feedback type category, symbolic comments relates to both contents and skills comments in the form of symbols or abbreviation (e.g. ticks, crosses etc.). Table 3.1 depicts the distribution of the written feedback comments across the categories used in the coding scheme. I counted comments in all the scripts, noted the presence of ticks, crosses and question marks.

Table 3.1 Distribution of written comments into several categories

Feedback type	Examples & explanations	%
Symbolic comments	Abbreviated e.g. Ticks, crosses, underline, question marks & no/ yes	51
Course-content specific comments	Quality and accuracy of answers, appropriateness of what is included, omissions, errors identified and corrected and clarification	20
Skills comments	Structure of the answer, whether the question has been properly addressed, use of language and communication skills , referencing	8
Motivational comments	Praises, encouragement e.g. Good, excellent	8
De-motivating comments	Use of negative words e.g. confused, rubbish	2
Developmental feedback	Reference to resources, dialogue, questioning, signposting, further learning	11

Course A - n= 69 class test; Course B – n = 49; Course C n= 210 practical reports

Focus categorisation of feedback is linked to Hattie and Timperley's (2007) four levels of feedback focus namely task, process, self and self-regulation. Feedback type and focus of feedback categorisations overlaps. For example, from Table 3.1, the task-focused feedback corresponds to content comments, process-focused to skills comments, self-focused to motivational/demotivating comments and self-regulation focused to developmental focused comments.

Brown and Glover (2006) further categorized feedback comments in three levels to reflect their depth in enhancing learning (refer to Table 3.2). The levels correspond to Sadler's feedback conditions, discussed under the section on the conceptual framework. Comments for Level one are retrospectively framed and focus on identification of errors, omissions and acknowledgement of achievement or failure (i.e. identification of performance gap in the form of ticks, crosses or marks). Level two comments focused on correction of errors and clarifications or reinforcement of concepts (i.e. student is provided with information to close the gap). Level three comments concentrate on providing elaborated explanations of errors, achievements and/or praise given.

Table 3.2 Feedback depth - distribution of symbolic, content and skills comments across four levels

Course	Symbolic comments (%)			Course content comments (%)			Skills comments (%)		
	A	B	C	A	B	C	A	B	C
Level 1 –Identification level	87	92	95	31	49	15	37	79	20
Level 2 - Correction/editing	-	-		15	24	35	15	3	10
Level 3 - Corrections with explanations or elaborations	13	8	5	42	26	50	48	18	56
Level 4 – Cues, hints, suggestions in a dialogical tone	-	-	-	12	1	-	-	-	14

For this study, I have added comments at a fourth level, which are framed in a dialogical tone with invitations for further discussions of feedback. Comments at Level four may also be in the form of questions, prompting further reflection or in the form of suggestions or references to resources for further or future learning. Level four comments address some of the sustainable feedback principles (i.e. enhance self-reflection, assessment and regulation). The tone of the feedback refers to whether the feedback is of a 'telling' or 'conversational' nature (Mutch, 2003)

Elicitation of the students' perceptions of their feedback experiences was by means of a quantitative questionnaire survey and qualitative interviews. Both the questionnaire and interview questions sought students' views on their experiences and perceptions of feedback. Thirty-four students (i.e. 37% of the total enrolment in the three courses) completed paper-and-pencil questionnaires anonymously. Of the students who participated in the study, nine volunteered to be interviewed (six individual interviews and one focus group of three students). Forty-five per cent of the students enrolled in the three courses are English second

language speakers (ESL). The interviewed sample, for whom pseudonyms are used was made up of one male, Scott (English First Language and a high achiever⁷) and eight females (three ESL: Hlompho (low achiever), Zinhle (average achiever) & Pumla (average achiever) and five EFL average and high achievers: Marcia, Kelly, Felicia, Dorothy & Sophia). Interviews with Marcia, Kelly and Felicia took place as a group. Semi-structured interviews that included questions of their experiences of feedback lasted between 30 and 60 minutes.

The next section presents the outcomes of my analysis of the written feedback students experienced in all the core courses. The emphasis is not on comparing courses but is on highlighting the range of feedback content and/or practices experienced by the students.

3.6 Findings and Discussion

3.6.1 Practices of Assessment Feedback

Analyses of the marked test scripts and research assignments revealed that feedback was provided in the form of marks and individual written comments on students' work in all the courses. In addition, Courses A and B contained in-class oral test feedback sessions. Analyses of written feedback (Table 3.1) indicate that symbolic comments (ticks, crosses, etc.) were the most common for all the courses (51%) with very few demotivating comments. More than half of the 51% symbolic comments were related to course content. Table 3.2 demonstrates that the majority of the symbolic comments were at identification or acknowledgement level. The most frequently noted symbolic comments were in the form of ticks and crosses, followed by underlining and question marks and then yes/ok or no. Explanations accompanied less than 15% of symbolic comments for all the courses (e.g., "no, you have described ...and not ... as per question"). The second dominant category of feedback was that of content related comments.

A more detailed analysis of content comments indicated a prevalence of provision of omitted information and clarification of concepts. In such cases, the results indicate that feedback at Level 2 served primarily for instructional purposes. Course-specific content comments are what Hattie and Timperley (2007, p. 91) refer to as "feedback about the task" or "corrective feedback". These types of comments provide information on students' current achievement in

⁷ Achiever status (low, average and high) based on academic performance

relation to the goal. Hattie and Timperley (2007, p. 92) warn that, “too much feedback at task level may encourage students to focus on the immediate goal and not the strategies to attain the goal”. Course-specific content comments are usually relevant to particular tasks and therefore rarely transferable to other assessment tasks (Carless, 2006). However, this might not be the case for the core courses intended to address students’ understanding of core concepts and which provide a solid foundation for further learning. Such comments may be effective if used in other tasks, leading to improvement of strategies for processing tasks or creating an awareness of self-regulation in learning. It is therefore my argument that Level 3 content specific comments are extremely important in this context.

As indicated in Table 3.1, the comments of a feed-forward nature accounted for 11% of the analysed comments. Comments of a questioning nature like “What do you really mean by this....; How about...; How can this lead to.....?” might engage students in thinking and possibly lead to active self-engagement with feedback. There was only one comment on one paper analysed where an invitation to discuss feedback was extended. This finding indicates that the lecturer giving feedback is opening possibilities for dialogue with the student. Adopting a dialogic style of feedback is in line with moves towards independent and lifelong learning. A proportion of Course A’s feed-forward comments referred students to resource materials (29%). This type of feedback might help students alter the gap between their current state and the desired level. This is a better option than providing corrective feedback and perpetuating students’ dependency on their lecturers for feedback.

The majority of the comments praising achievement were more personal and included the use of students’ names. The personalised feedback could be reflecting that the lecturer is keeping track of students’ learning development or just acknowledging their progress. Only one-third (8%) of motivating comments were accompanied by an explanation. Hattie and Timperley (2007) argue that “praise related to task performance about the self as a person” which accounted for the majority of comments in this category is largely ineffective due to its lack of learning-related information. There were more negative comments noted in Course A than in the other two courses. Some of the negative comments used included examples such as “jumbled and confused; a very emotional answer containing very little logic; rubbish”. Ferguson (2011) reported that students in his study claimed that they are likely to give up or that they ignore negative comments. Negative comments fail to address Hattie and

Timperley's (2007, p. 86) three feedback questions "Where am I going... How am I going... and Where to next?" in relation to the learning goal.

What did become evident from the analysis is the connection between the informational content of the feedback at Levels 1 to 3 and the nature of the assessment tasks. For example, the dominance of Level 1 skills and content comments for Course B corresponded to the calculation and identification orientated class test questions. More than 40% of course content and skills related comments for course A and C included explanations. Test questions for Course A and the nature of report writing for Course C required discussions and interpretations. This clearly demonstrates that feedback may have different purposes, depending on the nature and purpose of the task.

In sum, course-specific content, skills and feed-forward comments, accompanied by explanations, indicate that students are frequently provided with valuable feedback, which may be used for the current task as well as for future tasks. The feedback provided to students predominantly focuses on disclosures of the strength or deficiencies of their work and directives of how to improve. Dialogically phrased comments and explanations in the form of hints and cues were very rare. This supports the notion that although the current literature on assessment and feedback advocates for dialogic approaches, practice still remains 'monologue' (Nicol, 2010; Sadler, 2010). Having painted this picture of the nature of feedback in the core courses, I now report on students' views on the feedback they had received. Interview and questionnaire data analysis resulted in three key ways students' experienced and viewed feedback as presented in Figure 3.1.

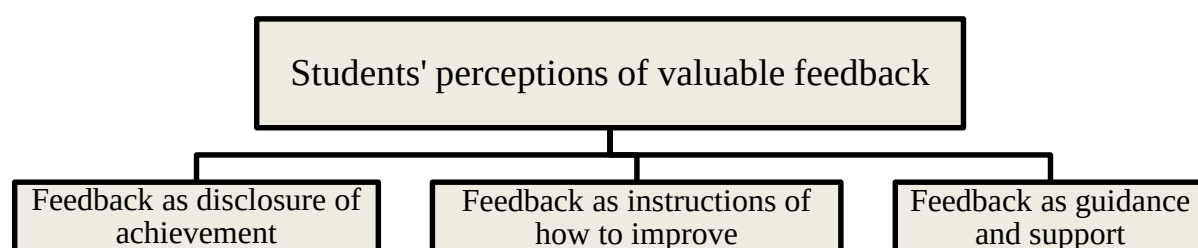


Figure 3.1 Students' perceptions of assessment feedback

3.6.2 Feedback as Disclosure of Achievement

Students in this study overwhelmingly viewed feedback as being told what was correct or

incorrect about their work. These disclosures, identification of errors and indications of achievement were mostly furnished through symbolic annotations (e.g. ticks, crosses, marks). Students viewed marks as a form of feedback that served as an indicator of their learning progress. For example, Sophie commented about how marks facilitated self-evaluation of her learning status.

“We got marks back on the assessment tasks, we knew how we were doing, and if we were improving or we weren't improving”.

For Sophie, marks gave her a sense of how well she was doing in meeting the course expectations. Marks are a form of feed-out because they provide information about achievement on a task in relation to the goal. Through this type of feedback, students may discern their progress, based on their performance. Contrary to the commonly held perception that students are merely interested in their marks (Bailey & Garner 2010; Carless, 2006), none of the students in this study indicated “marks only” as their best-preferred feedback format (Table 3.3). The majority of students (90%) preferred a combination of marks with “specific comments on different aspects of the task”, rather than marks only. Based on Figure 3.2 students viewed “comments indicating what they did wrong” as the second most valuable feedback type.

Table 3.3 Feedback presentation formats preferred by students

General comments and marks	3.3%
Tick boxes, general comments and marks	6.7%
Specific comments on different aspects of the task and marks	90%
Marks only	0%

Analysis shows that students are aware that marks on their own are not sufficient to guide them on changes they need to make to attain the required standards. That said, for a few students such as Hlompho, the focus was on using marks and comments to maximize their learning.

“Assessment feedback helped us in terms of improving our marks as well as to see where you made mistakes...if your focus was really on the right track”.

Research evidence indicates that providing specific task comments is more effective than providing marks only (Black & Wiliam, 1998). Even though students indicated in their questionnaire responses that “marks only” feedback was least preferred, 62% of them acknowledged that the assessment mark was still extremely important to them (Figure 3.2).

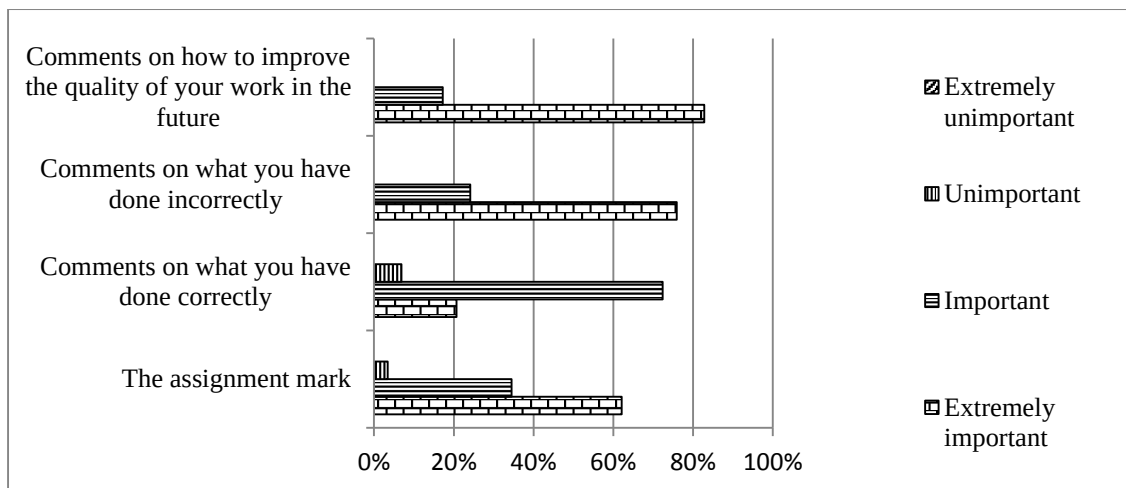


Figure 3.2 Students' rating of feedback comments

One of the significant findings of this study is that students seem to position themselves as the passive recipients of feedback, rather than as active participants or even producers of feedback. This suggests students' narrow view of feedback, as something that 'happens to them'. Perhaps this is because in reality the lecturer is dominant in making choices about assessment and feedback designs.

For the majority of the students their learning effort is almost exclusively, equated with the mark awarded by lecturer or teaching assistant. Nicol and MacFarlane-Dick (2006) posit that good feedback practice "delivers high quality information about students' learning and helps to clarify what good performance is" (p. 205). Marks are only able to ascertain implicitly whether there is a gap between the current and desired performance. However, they fail to provide information about the gap or the nature thereof.

The view of the mark awarded as indicative of feedback signifies different meanings to different students. For some students, the mark is the initial source of meaning, and the first point of engagement with feedback, the basis for them to read the latter. According to Carless (2006), marks have an effect on feedback utility. Analysis of the students' commentaries reveals a variable approach to using marks as a basis for engaging with the accompanying comments. For some students, if the performance on a task was deemed good or satisfactory based on the marks awarded, they were less inclined to engage with the written comments.

"I check my mark first if I did well, I generally do not look at what I did wrong. But, if I did badly, then I look at what I did wrong. I will go through it see where there are red

marks more specifically. I will look at it definitely like what I did wrong, if I get a low mark.” (Dorothy)

For seemingly independent students, feedback was viewed as advice rather than as instruction.

“I usually look at the comments very vaguely...I use the mark itself as more of a basis of whether I'm on the right track or not... If the mark is good, then I figure that my technique or my viewpoints are ok.... I go through it vaguely and not in terms of ‘Oh, that's what they want.’ I see their point as more of an opinion to do better or an opinion to consider. I do not see it as law”. (Scott)

In some cases, the mark awarded served as a basis for engagement and reflection. Students can decide whether to act on feedback or not. Their motives to do so or not may result from positive responses such as deep consideration of the feedback and reasoned rejection of it, or negative responses such as distrust of the provider of the feedback (Price et al., 2010). The withholding of marks to force students to engage with feedback as proposed by Taras (2003) might be an option lecturers can consider given that providing detailed feedback is time intensive.

Overall, marks emerge as a powerful and dominant measure of achievement. Students' focus on the mark may be interpreted as a sign of a surface or strategic approach to learning. However, students operate within larger university and societal structures where marks are highly valued hence their performance focus. Moreover, the motivation of achieving high marks may be considered part of a complex process where students make meaning of feedback processes. Being awarded marks alone as feedback does not seem to engage students in conversation about their work. Instead, this can be interpreted as feedback that solely informs/tells students of their progress. My view is that students' perceptions are a result of systems (societal and university/teaching approaches that lecturers use) which are predominantly marks-oriented. Although assessment is critical to teaching and learning, assessment design and implementation is often approached as a product at the end of teaching and learning processes.

Apart from using marks to indicate achievement, assessors used other symbolic comments to identify students' errors. In this study, ticks and crosses unaccompanied by elaborations elicited strong emotional reactions among some students. Some students in this study indicated their frustration and dissatisfaction with what they perceived to be cryptic feedback. According to some of these students, the telegraphic comments were ambiguous or lacked

details to help them improve. They felt that the lack of detail in these truncated comments rendered the comments unusable and disempowering.

The problems encountered by students when interpreting feedback have been highlighted in several studies, for example, (Duncan, 2007; Weaver, 2006). Ferguson (2011, p.56) reported that many students commented, “ticks and crosses without further explanations were useless”. According to Marshall (1998) cited by Ball, (2010, p.140), “no or yes” with no explanation are telegraphic and incomplete comments. Most of these telegraphic comments require further decoding and interpretations by students for them to be of any value. There were few instances in this study where students experienced symbolic feedback accompanied by explanations. The present study confirms previous findings and provides additional evidence that suggests some students’ views of symbolic comments including marks goes beyond just disclosures but that such comment also promote self-monitoring.

The aforementioned point is evident in cases where the type of assessment task students engaged in mediated some of their feedback expectations. A point in case was Sophie’s comment:

“It [assessment task] was mostly to do with keys and identifying things so they couldn't give us too much feedback. They either said you went wrong or you did not go wrong, but you knew which sections you needed to work on. So you could figure out which step you went wrong on and you knew which concepts you had to go over or check if you understood exactly what you were doing or if you didn't understand”.

This comment illustrates that Sophie’s expectation in terms of feedback was mediated by her perceived nature of the task. The comment above aligns with the 79% of the skills-related comments for Course B, which were of an identification nature. Interestingly, despite the comment also being of this nature, for Sophie it promoted self-reflection, self-assessment and self-correction. Contrary to the views of marks and symbolic comments as feedback that cannot alter the performance gap, Sophie’s comments clearly illustrate how such feedback can promote self-monitoring. Based on sustainable feedback principles, marks and symbolic comments are what Crisp (2007, p. 578) refers to as “unilateral pronouncement by assessors”. This implies that feedback is just “telling”. Nonetheless, findings in the study indicated that this type of feedback was surprisingly highly valued by students.

In sum, symbolic comments (e.g. marks, ticks) as feedback may be viewed as focusing on informing students about their status in relation to their achievement of the required

standards. Feedback as identification of errors means identifying the achievement status in relation to the goal without any corrective advice given (Sadler, 1989). However, the results of this study challenge the view that symbolic comments do not promote students' self-assessment, correction and self-regulatory capabilities.

3.6.3 Feedback as Instructions of How to Improve or Achieve Higher Marks

In this category of feedback, students valued feedback as information addressing their aspirations of improving their performance and marks. Figure 3.2 indicates that an overwhelming majority of students deemed "comments on how to improve" as extremely important. Nevertheless, a strong, mark-orientated view was evident from students' opinions on drafting and resubmission opportunities offered in the core courses. For example, Zinhle's motive for paying attention to the feedback was mainly to attain higher marks and less so on learning from feedback.

"My mark was good but I still wanted to resubmit... because she gave me feedback on my results. She wrote that I did not report as much as I should have. So I just put more stuff, I put more references and my mark went up... so, that was good. I always resubmit if given an opportunity to do so...because why not if they say your mark is not going to go down".

The above response is indicative of the responses given by most students and is similar to what students in Covic and Jones's (2008) study used resubmission options for. It is clear from Zinhle's comment that the performance and marks orientation draws attention away from deep learning as (her) focus was on gaining more marks. Despite the focus of some students on using feedback solely to improve their marks, feedback in the form of correction of errors came out as the most important aspect for the students.

When students were asked to rank the importance of different types of feedback, the majority (70%) of them indicated that written corrections on the scripts was the most important. This is consistent with the findings of Higgins et al (2002) where over 75% of their respondents rated comments, which correct mistakes, as important. However, what students prefer in terms of feedback is not in alignment with sustainable feedback principles. Feedback as consisting of corrections and editing solely from the teacher situates students as passive feedback recipients rather than as active generators and users of feedback. The results of this study indicate that majority of students in this study generally valued and appreciated detailed feedback telling them explicitly what they should correct.

“Like one of mine was ‘Fix your references!’ That was nice. They gave nice detail of what I needed to fix there”. (Kelly)

The use of the word ‘fix’ with reference to feedback by a number of respondents might indicate that students are stuck in the behaviourist receptive-transmission view of feedback (Boud & Molloy, 2013). Analyses of students’ comments suggest that students perceive feedback as a form of performance management that uses lecturers’ or teaching assistants’ learning direction or “telling” as a means of improving grades, rather than as a tool for broader learning and personal development. One wonders whether this type of feedback empowers students with strategies to deal with similar tasks in future.

“My TAs were very good about it. They made comments about everything. They helped... so that when you wrote your final report, you knew what to fix, what you didn't need to fix, what you could've left out, what you had to add, which helps a lot because your final is much better then.” (Sophie)

Although, Zinhle, Kelly and Sophie’s comments might highlight students’ need for some directive and guidance it might also be a sign of their over-reliance on the teacher for feedback (Evans, 2013). Alternatively, these students perceived directives as valuable quality feedback based on their individual needs. Black and Wiliam (1998, p.54) argue: “a student who automatically follows the diagnostic prescription of a teacher without understanding its purpose will not learn”. Marcia’s response supports this point of view:

“They don't have to tell you specifically exactly what you have to fix... just generally... ‘Your introduction does not have enough information’. Then you put in more information. Or ‘Fix your references’. They do not have to tell you how to fix your references... Just go and fix them, do your research and then you find out how to properly reference. They gave you enough information to fix stuff”.

The student who does not want to be told ‘how to fix references’ clearly shows her acknowledgement of her active role as a participant in the learning process. However, the majority of the students expressed the desire to be spoon-fed with correct answers or to be told exactly what to do. Nevertheless, high achieving students seemingly had a more learning oriented and developmentally focused view of feedback.

“I don't think it's critical about your marks... but I think is the way you're writing is developing... that would be very, very important to the way we think nowadays and the way we are prepared for the future as scientists”. (Scott)

The feedback focus for this student was more on mastering the subject knowledge and fundamental discipline-specific skills or ways of thinking and practising in biosciences (McCune and Hounsell, 2005). Furthermore, the comment also illustrates the role of feedback in how students make sense of their developing science identity.

To summarize, the evidence presented here reveals two different student perspectives. One group of students want to be told exactly what to do (prescriptive feedback) while the other group is asking to be given a vague or general idea so that they may self-correct. This possibly points to how diverse students' learning needs influence the type of feedback they value. The perceived sufficiency of detail in the feedback provided also depends on students' self-regulatory skills. According to Knight and Yorke (2003), if assessment is to be equitable, all students should receive feedback that is appropriate to their learning needs. However, realistically, the lecturer who is constrained by the massified and diversified classroom settings might find that such practices are problematic to implement. For feedback to be sustainable, the challenge for lecturers is how best to model and make explicit their feedback purposes in order to deal with the burdensomeness of giving detailed corrective feedback.

3.6.4 Feedback as Guidance and Support

In this category, very few students viewed feedback as more than just disclosures of what they need to fix. Students perceived written comments in the form of guiding, thought provoking questions, explanations and suggestions as feedback. Students viewed feedback not just as information but also as an interactional process. The use of questions can be considered as a move towards a dialogic approach to feedback, however in this study students had contrasting views about this type of feedback. For Sophie, questioning promoted self-reflections as illustrated by the comment below.

“There were some comments on where you could improve on what you did wrong ‘you said this wrong, how about doing it this way’. They often asked me ‘why you did something’. So it helped me think about ...okay why did I actually do this. Is there a specific reason why I had to do it this way? I did not think, last year I did not think I would use them. But this year I'm actually using stuff from them...” (Sophie)

For Sophie, the questioning triggered an inner dialogue (intrinsic feedback) in her mind around disciplinary concepts. It also encouraged the student to think deeper, which is empowering in the sense that the onus was placed on the student to further interpret and use the feedback. In addition, the student valued this type of forward looking feedback as she saw its relevance in preceding courses of study. Surprisingly, feedback content in the form of brief provocative questions (e.g. why, what, how) also evoked confusion and annoyance for Felicia.

Some lecturers will say ‘Wrong’ and put the word ‘What’. What is that? Or ‘why’ or ‘how?’ We do not know what that means. (Felicia)

For Felicia the comments were cryptic, meaningless and unhelpful. It might be that Felicia, like many other students who might view this type of feedback as unhelpful, is not competent to engage with this type of feedback. In this case the use of questions did not seem to serve their intended purpose, a finding supported by Mutch's (2003) contention that "such a [conversational] style might be adopted in the sincere belief that it will enhance the reception of feedback; it could be that, for some students it does just the opposite" (p36). If students are to make meaning out of feedback and in turn use it for their learning, then students should be taught how to engage with feedback (Sadler, 1989). Sadler contends that we often work on assumptions that when students are given feedback they will know what to do with it.

In proposing the restructuring of feedback towards dialogical orientation Nicol and MacFarlane-Dick (2006, p. 205) posit that, "good feedback practice encourages teacher and peer dialogue around learning". The comment below highlights the way in which peer feedback discussions can encourage perseverance and be motivational.

"I think it motivates you to do well... to do better next time... 'Cos..., you see someone else's paper, and then you like "No, I can do this! It motivates you". (Zinhle)

Alternatively, peer interactions may be viewed as an opportunity for students to use their peers' performances as a yardstick to measure their own performance. Additionally, this illustrates how feedback may encourage peer learning and activate students as instructional resources for one another.

One strategy adopted in Courses A and B to increase feedback dialogue was through whole-class test feedback discussion. Surprisingly, more than 45% of the students (based on questionnaire responses) placed less value on general feedback to the whole class, whether electronic or verbal. This was surprising because it would not be unreasonable for lecturers to regard general feedback as a useful teaching tool, permitting students to learn from peer errors. For Course A, lecturers asked students with 'good/correct' answers for particular sections of the tasks to share their responses with the rest of the group. Lecturers assumed that this process would allow students to compare their peers' 'correct answers' to their own work. On the one hand, some students did find it useful to listen to other students' answers since it helped them to clarify their own thinking in terms of assessment requirements.

"Because I failed that test... and the reason why I failed the test was I made a judgement call on some of the questions. Like, with the people reading out their answers to particular questions... what I realised was ... when I was in the test, I thought some of the

things that they mentioned, were not important for me to put in the test. It actually quite helped us to realise what was required". (Hlompho)

Nevertheless, on the other hand, for various reasons, some students did not find the session helpful. One reason was an aversion to the use of exemplars or model answers by Scott:

"In terms of this course they were teaching the entire block, that there could be more than one answer. I did not enjoy that we were kind of being told that 'Yes, that's a good answer'".

Scott perceived the 'correct answers' were the only definite answers. It might be that his reflection in terms of his achievement influenced his opinion. Other studies report similar mixed reactions to verbal group feedback. Ellery (2008) found verbal group feedback to be time-efficient, less personal, and that it encourages dialogue between lecturers and students. On the other hand, Orsmond, Merry, and Reiling (2005) found it to be less popular, irrelevant and ignored by students. Differing students' background and experiences could possibly lead to different perceptions and expectations. Orsmond and Merry (2011) advise that "if model answers are to be used, they should reflect sufficient variation to allow for learning" (p. 135).

Due to time constraints, during the oral group feedback session, students in this study were not exposed to different versions or ways of answering the questions, nor did they have the opportunity to engage with lecturers by questioning the reasons why the exemplars were deemed to be of high quality. This is probably why Scott viewed the approach as being prescriptive. With regard to provision of marked exemplars, Sadler (1989, p.128) warns against problems of "copying and stimulation of convergence or stereotypes". Additionally, Handley and Williams (2011, p.98) warn against "provision of model answers as observing and imitating" which is not the same as learning from feedback. In questionnaire responses, only about 46% of the students in this study ranked model answers as important.

Students viewed feedback as a development process in the context of multi-staged assessment tasks. Students perceived formative feedback particularly related to the research report writing process and opportunities for drafting and resubmission highly valuable and usable. Of particular interest, is how marks continue to be the main determinant of student engagement with feedback even in formative assessment contexts.

"It depends. Like now with course Z, I look at my comments because I know that I have another big report to write. So I want to see where I made my mistakes and I want to get those marks next time. Um, unless it's something like I'm never going to do again... if it's like that one big report. I think it was the course C the last report I didn't even check the comments on the final, final one." (Zinhle)

Clearly, students engage with feedback when they perceive it to be of relevance to subsequent assignments. The effectiveness of feedback was evident from the fact that over 65% of the students indicated in their questionnaire responses that the feedback helped inform them regarding how to do better subsequently in all the courses. Nonetheless, there is a sense of dependency by students on staff for prescriptive feedback and the focus is on maximizing attainment of higher marks, as per Zinhle's comment. Students perceived feedback as unusable when viewed as serving summative purposes, and also when feedback was content-related and therefore perceived as not transferable to subsequent tasks. The following two examples clarify this perception:

"After receiving my resubmitted essay because it was exams... I didn't go back to the comments since that passed I didn't go back" (Hlompho)

"There were comments in the test script. Um, but I did not really look at it because I was not planning on... like going ... redoing the course... so I did not really look at it again. I don't think I even went over that paper for the exam... honestly." (Sophie)

Mann (2001) points out that where assignments become mere outputs, alienation rather than engagement ensues. Students alienated from assignments, which they regard as a "finished product", are hardly likely to be interested in the feedback, and similarly if the feedback is viewed as a product rather than part of a relational process, it is less likely to generate a response. When asked how often they used feedback comments from one assignment on the next piece of an assessment task, 50% of the students claimed that they always used the feedback whereas 40% often used feedback. Thus 90% of students do use feedback for learning. If lecturers were more aware of this, they might be inclined to spend more time giving usable feedback to students.

A number of factors mediated students' perceptions of the usability of feedback. The factors included its feed-forward nature, comprehensibility, purpose (formative or summative), and timing. Overall, despite the positive perception of students with regard to the quality of feedback, I have the sense that the majority of students used the feedback as a motivation to attain higher marks. This is understandable given the marks-oriented broader societal system which students are part of. The preference for prescriptive feedback by students indicates their performance orientation to feedback. Within the constraints of increased class sizes, giving detailed prescriptive feedback is not sustainable for lecturers. Hence, the call to alter the approach from feedback-as-disclosures of what needs to be fixed to the development of students' capability to self-assess (Sadler, 2010) has become an imperative.

3.7 Conclusion

The significance of this study is that it covered a spectrum of issues pertinent to assessment feedback within discipline-specific modular courses. I have provided insights into the nature of assessment feedback in the context of a massified and diversified HE and in line with the shift to sustainable sociocultural views of teaching, learning and assessment. The study reminds us of and provides valuable confirmation of findings in similar studies conducted in other contexts but not yet operative in the current South African HE context. The key strength of this study is my interrogation of some of the assumptions in the research literature about the value of marks and symbolic feedback comments. Additionally, the most notable aspect of the study is its adoption of a sustainable assessment feedback framework that can be used as a diagnostic tool for analysing context-specific feedback practices.

Throughout the discussion in this paper, I have highlighted what seems to be a students' dominant *feed-me* mind-set towards feedback. The majority of them preferred and valued prescriptive feedback, with few students acknowledging their active role in feedback systems. The prevalent provision of feedback in the form of corrections and editing ignores the active role of students as generators and users of feedback. Even though the literature highlights the possible opportunities of engaging in feedback dialogues, this study reveals few activities within the current courses' practices that are designed to promote dialogues and active student involvement. Overall, the study revealed little alignment between sustainable feedback practice principles and what students value, perceive and prefer (i.e. regard as relevant).

Considerations regarding the probability of implementing optimal dialogical practices that are sustainable, personalised, foster engagement and autonomy on the part of the students need to be viewed in relation to the systems in which teachers and students operate. A number of practices in these core courses present an opportune context for active involvement of students either through peer or self-assessment. For example, practices such as multistage writing, drafting, resubmissions, assessment rubrics and exemplars can make a difference in acculturating students into the ways of thinking and practicing in the discipline, but also in developing their self-regulatory skills. To optimize the adoption of the sustainable feedback systems, staff and students need to be assessment literate in how to give and receive feedback. However, given the modularised and team-taught setup in these core courses such

sustainable practices are more likely to be productive if approached more systematically rather than in individual courses.

Staff development activities may be devised to help lecturers reflect and rethink curriculum, course and assessment tasks designed to address the challenges identified. Such activities may also aid academics in purposefully creating assessment feedback systems that provide students with opportunities to develop self-judgment skills, more collaborative dialogues, peer-peer and student-teacher interactions. This will help lecturers in balancing the giving of explicit guidance and supporting students' development of self-regulatory skills. Lecturers could assist their students by modelling and communicating their reasons for adopting such practices.

Students on the other hand, through the promotion of assessment literacy, should be encouraged to take their active role as participants in assessment. Strong evaluation skills, confidence in the ability to self-assess and peer-assess are crucial in weaning students off dependency on lecturers for feedback. These two areas warrant more investigation as they hold the key to improving the provision of feedback-dialogues with the hope of improving the students' learning experience and engagement.

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CHAPTER 4

The Power of Emotions in the context of Students' Experiences of Assessment Feedback

Abstract

Although it is clear that students' emotions affect their motivation for learning and academic achievement, there is limited research on students' emotional responses to feedback and the effect of these on their learning and performance. Therefore, this paper draws on qualitative analyses of interview data collected from nine second-year bioscience students at a South African university to explore the emotional dimensions of assessment of their coursework. Different feedback situations, particularly with respect to the content and the manner in which feedback was given, aroused emotions ranging from cynicism to appreciation. Comments from students illustrated how the social dynamics of the assessment foregrounds issues of relations and mistrust/trust in feedback contexts. The paper concludes that shared understanding of the purpose of assessment between students and lecturers through dialogue is an important aspect of mediating emotional reactions and engagement with feedback.

Keywords: Assessment in higher education; effects of feedback; students' emotions; assessment-for-learning

4.1 Introduction

Assessment conversations between students and lecturers⁸ are an essential element of Assessment for Learning (AfL).⁹ Assessment for learning (aka formative assessment), refers to all activities undertaken by lecturers and their students to provide information intended to modify and enhance teaching and learning processes (Black & Wiliam, 1998). This information is generally referred to as feedback. Despite their importance in assessment, feedback practices remain a problematic aspect of student learning. This oversight has led to appeals for the re-conceptualisation of feedback practices in higher education. Moreover, if the effectiveness of feedback is to be enhanced, all of its dimensions need to be addressed. However, as pointed out in some review studies (e.g. Evans, 2013; Hattie & Timperley,

⁸ In this paper, teacher is used interchangeably with lecturer or academic.

⁹ In this paper, I use the terms assessment for learning and formative assessment synonymously.

2007) feedback practices are limited in that they mostly emphasise the cognitive and structural dimensions of feedback at the expense of the social and emotional dimensions. Empirical research on the latter dimensions of assessment feedback play a crucial role which until now has been overlooked (Cramp, Lamond, Coleyshaw, & Beck, 2012; Dowden *et al.*, 2013). Hence the calls for radical changes to feedback to enhance its effectiveness (Carless *et al.*, 2011). As a result of his study of the different perceptions of students and tutors towards the assessment and feedback processes, Carless (2006) suggests that the “emotional side of assessment is worth further investigation” (p. 23). Furthermore, Pekrun *et al* (2014) conclude that there is a conspicuous lack of research examining the impact of feedback practices on students’ emotions and achievement goals. A few research studies (Carless *et al.*, 2011; Värlander, 2008; Yang & Carless, 2013) have hinted at the effects of assessment feedback on students’ emotions but nothing to date has dealt with this aspect in depth.

For example, Yang and Carless (2013) suggest a feedback triangle framework that includes a social-affective dimension. Värlander (2008) tentatively suggests ways in which students’ emotions could be taken into account in feedback situations in higher education. She suggests “feedback preparation activities” and “feedback-on-the-feedback” activities to promote active discussions and dialogue between lecturers and students. However, despite these attempts to address this area, there is a paucity of empirical work focusing on students’ emotions in feedback situations. It appears that most of the existing research studies on students’ emotions have focused on emotions such as test anxiety (Zeidner, 2007) and emotions related to learning activity (Pekrun, Goetz, Titz, & Perry, 2002; Pekrun & Stephens, 2010) rather than emotions which emerge as a direct result of feedback. This has exposed an underexplored area of higher education requiring research (Värlander, 2008).

To date, there has not been an extensive investigation on students’ emotional responses to assessment feedback in South Africa. This is an oversight because, in the massified and diversified SA higher education context, students’ emotional well-being may be linked to socioeconomic disparities and financial situations. The majority of these students have been through rural and working-class schooling, and then in the higher education environment they are further disadvantaged by learning in a second language. Moreover, most of them are the first generation in their families to attend university which means that they lack social and cultural capital (Slonimsky & Shalem, 2006). Financial investment by their families and communities into their education is typically immense. This has resulted in an emotionally

demanding pressure on students to succeed. Therefore, their predispositions, learning approaches and goal orientations often influence their value judgements of positive feedback that would enhance attainment of their life goals and future career opportunities or employment. This background of students in the SA context tends to influence their emotional reactions to feedback. In addition, students' emotional response to the feedback could in turn affect their learning so that they might not benefit in the way the teacher intended or anticipated

Therefore, in light of the situation in the South African higher educational sector, I have explored the incidence, nature, sources and roles of students' emotions in feedback situations. The aim was to investigate the role of emotions as a factor in students' learning and achievement. In the next section, I draw on the relevant literature to explain the concept of emotion and discuss the theoretical basis concerning the nature and sources of students' emotions in feedback situations.

4.2 Emotions as a *critical* factor in feedback situations

Emotions are multifaceted and involve coordinated psychological processes that include affective, cognitive, motivational and physiological phenomena (Pekrun et al., 2002). That is, emotions are “appraisals or value judgements which ascribe to things...outside the person's own control [and are of] great importance for that person's own flourishing” (Nussbaum, 2001, p. 4). Three elements (appraisals, control and flourishing) in this description relate to Pekrun's (2006) control-value theory of achievement emotions. This theory describes an individual's control, expectancy and value appraisals as proximal determinants of emotions.

The idea of value appraisal would highlight the importance and extent of the value that a student assigns to feedback received. One might surmise that the emotions students experience when receiving feedback is largely influenced by the value they place on the feedback. Pekrun and Stephens (2010) characterise and categorise these feedback-linked emotions either positive or negative emotional experiences. For example, the emotions popularly referred to as negative include experiences of anger or sadness whereas those referred to as positive include experiences of happiness and joy. Control appraisal relates to students' situational perceptions; that is, their sense of being in or out of control of feedback

practices (activities) or outcomes. Nussbaum's (2001) definition the concept of *things* emphasises the link between emotions and external objects that are not entirely controlled by the individual. Objects in this context refer to feedback content, strategy, timing and outcomes. The notion of flourishing is associated with students' wellbeing and achievement of their goals. In this study, I consider students' emotions as appraisals of feedback objects, activities and the outcomes of students' learning and achievements.

One of the crucial variables highlighted by Pekrun (2011) in the learning environment is "feedback and the consequences of achievement" (p. 35). Students invest emotionally in their assessment tasks, with high expectations for positive achievement rewards (Carless, 2006). Falchikov and Boud (2007) regard the emotional experience of assessment feedback and grading as complex. This complexity, they argue, is a function of relationships that include students and other people, the judgements made about them, and the processes of the judgements (p. 144). In dealing with the complexity, feedback should involve "dialogic processes and activities" meant to "support and inform the student on the current task, whilst also developing the ability to self-regulate performance on future tasks" (Carless *et al.* 2011, p. 397). By this, they mean that interactive exchanges and discussions where interpretations, meanings and expectations of assessment processes are clarified can support students in taking ownership of their own learning.

In contributing to this debate about emotions, Crossman (2007) emphasises the importance of student-staff assessment relationships and opportunities for feedback dialogues. In the same vein, Gipps (1999) encourages relationships that are based on power *with* rather than power *over* students. Emotions are inherent in power relations within assessment practices (Higgins, Hartley & Skelton, 2001; Zembylas, 2003), hence the assertion that assessment is an "emotional practice" (Steinberg, 2008, p. 42) and that "receiving feedback is also an emotional business" (Higgins, 2000, p. 5). In addition to the role of emotions in assessment, theories of emotion reveal that emotions formed in social relationships and interactions play a key role in the construction of students' identities, sense making, self-esteem and sense of belonging (Beard, Clegg, & Smith, 2007; Zembylas, 2003). This suggests an inextricable web of interplay between power relations, emotions and the formation of student identities.

4.2.1 The influences of student emotions on learning and academic achievement

The most important processes affected by academic emotions include cognitive resources, motivation and effort as well as the use of cognitive learning strategies and self-regulation of learning (Pekrun & Stephens, 2010). Positive activating emotions, such as enjoyment, hope and pride, can enhance intrinsic motivation, effort and self-regulation (Pekrun, 2011). In their study, Trigwell, Ellis and Han (2012) found that students who experience positive emotions are likely to adopt a deeper approach to learning. They argue that these emotions are associated with higher achievement scores.

On the other hand, negative and distracting emotions have been associated with reduced effort, lower performance, increased external regulation, and decreased self-regulated learning strategies (Pekrun, 2011). Negative emotions emerge as a result of excessive teacher regulation or guidance and can impede or disrupt learning (Carless, 2006; Dirkx, 2008; Pekrun et al., 2002). Test anxiety and stress can reduce learning memory, leading to an impairment of performance (Pekrun et al., 2002; Zeidner, 2007). Such negative emotions are often associated with superficial learning and can threaten students' self-esteem (Crossman, 2007; Falchikov & Boud, 2007). Consequently, emotions are essential resources that may enhance or constrain assessment and students' feedback experiences (Dirkx, 2008; Värlander, 2008). It is for this reason that this study which investigates students' emotional responses to feedback, has the potential to expand our knowledge on the effect of emotions on learning and could suggest ways in which feedback should be delivered to improve performance.

4.3 Purpose of this study

In this study, I built on the research outlined above to examine the emotional experiences of South African university students in formal feedback situations. Grounded in Pekrun's control-value theory of achievement emotions described above (Pekrun, 2006), the study attempts to answer the following research questions:

- What emotions do students experience in formal assessment and feedback situations?
- What are the causes of student emotions in formal assessment feedback?
- What are the possible effects of the emotions identified in this study on student learning and academic achievement?

The findings of this study will highlight the impact and effect of lecturers' feedback on students. This, in turn, could promote better learning outcomes for students especially if the findings could be made explicit to students to prepare them emotionally for future learning challenges.

4.4 Methodology and context

This interpretative-qualitative study is part of a larger exploration of second-year biosciences students' assessment and feedback experiences in three compulsory courses. The seven-week courses chosen for this study are offered in the School of Biological Sciences as part of a Bachelor of Science degree with Biology as a major at a South African university. Academic performance in these courses is of paramount importance and has implications for students' progression into third year, attainment of the degree and consequently for their future careers. Approaches to teaching in these courses include team teaching (two to five lecturers each teaching specific topic/s), weekly practical sessions and fieldwork projects. Assessment strategies include practical or research work reports, class tests and end-of-course written examinations.

4.4.1 Data gathering strategies

Of the 34 students who participated in the study, nine volunteered to be interviewed (six individual interviews and one focus group of three students). The interviewed sample for whom pseudonyms are used was made up of one male, Scott, English First Language (EFL), a high achiever; and eight females, three English Second Language (ESL) – Hlompho, a low achiever, and Zinhle and Pumla, average achievers - and five EFL average and high achievers, Marcia, Kelly, Felicia, Dorothy and Sophia. The duration of the semi-structured interviews was between 30 and 60 minutes. The research complied with the ethics approval granted by the university ethics committee.

4.4.2 Data analysis

Data collected through interviews were transcribed and coded into various themes based on the expressed and implied emotions. In the process, causes of arousal of emotions were identified and inferences drawn from the data. To explore the various emotions experienced

by students in assessment and feedback situations, I identified interview texts that I interpreted as expressions of emotional experiences and tones. Turner's (2010) four primary emotions, namely satisfaction-happiness, aversion-fear, assertion-anger, disappointment-sadness, and Damasio's (2000) self-conscious or secondary emotions (embarrassment and pride) were used to categorise emotions. Table 4.1 presents extracts exemplifying the emotion coding process. Cynicism, which does not feature in either Turner or Damasio's categorisation, emerged as an important emotional reaction in this study.

Table 4.1 Coding of emotions

Emotions	Description of emotion category	Example (unedited transcript extract; emphasis added)
Satisfaction-happiness	Reported feelings of appreciation, contentment and enjoyment	"My teaching assistants ... made comments about everything. They helped ... so that when you wrote your final report, you knew what to <u>fix</u> , what you didn't need to fix, what you could've left out, what you had to add, which helps a lot because your final is much better then." (Sophie) XPTSP001
Disappointment-sadness	When students reported feelings of unhappiness, contempt, disinterest, dispiritedness and discouragement	"I thought I knew what was expected but when the test and exams [feedback] came back ... I guess I did not understand what they wanted from us. They will say that you did not answer the question you did not give them what they wanted. I never really get what lecturers want." (Hlompho) XPTH002
Assertion-anger	When students reported feelings of frustration, annoyance and anger	"Professor G called people [peers, students] up to say their answers to get a better idea of what was required ... but for me that wasn't very beneficial because <u>I do not like learning in that way</u> " (Scott) XPTS003
Aversion-fear	When students reported feeling anxious, stressed, uncertain, doubtful, insecure and confused	"Sometimes they use scientific terms and you're not really sure what that means or they write a comment like, this is not coherent. I think comments on the style of writing and the format is really important". (Zinhle) XPTZ004
Embarrassment	When students reported feeling embarrassed	"I don't enjoy peer assessment and feedback because it's very subjective and it's embarrassing to some degree" (Scott). XPTS005
Pride	When students reported feelings of pride, felt confident and being motivated.	"Very good ... it is more like Wow! That means that I understand. If I study more then I'll understand even better, so it gave me some <u>kind of motivation</u> ." (Pumla) XPTP006
Cynicism	A feeling of mistrust, sarcasm or scepticism	"When someone that is roughly the same intelligence as you assesses you, you do not feel that they will give you as much information back as a lecturer (Scott). XPTS007

This initial categorisation of emotions served as a starting point for further analysis, as provided in Table 4.2. There, I present conceptualised emotions using the three-dimensional

taxonomy of achievement emotions devised by Pekrun (2011). This taxonomy allowed me to distinguish between the three dimensions of emotions, namely valence (positive vs. negative), activation (activating vs. deactivating) and object focus (feedback content and strategy). The object focus dimension applicable to this study is a combination of feedback activities and outcomes. I used the framework offered by the control-value theory of achievement emotions by Pekrun (2006) to analyse the antecedents and effects of emotions experienced in the assessment feedback contexts.

Table 4.2 A 3D taxonomy of feedback emotions

Feedback focus	Positive (pleasant emotion)		Negative (unpleasant emotion)	
	Activating	Deactivating	Activating	Deactivating
Feedback content and function	Pride Appreciation Satisfaction-happiness	Contentment ¹⁰	Anger Fear Anxiety	Disappointment Hopelessness
Feedback strategy	Satisfaction-happiness Appreciation	Contentment	Anger	Cynicism Embarrassment Disappointment

(Adapted from Pekrun 2011, p.25)

To conceptualise feedback objects, I made use of three feedback facets: feedback content, function and strategy. Descriptions coded into the feedback content included informational content at task, process, self and self-regulation levels answering the three feedback questions, “Where am I going? How am I going? and Where to next?” (Hattie & Timperley, 2007, p. 86). In fact, the answers to the three questions ties in with feedback functions. Firstly, feedback can be used to clarify the learning goals. Secondly, feedback can inform the student about their progress towards the goals. Lastly, feedback can be forward looking where actions are suggested on how to close the gap between actual and desired performance (Sadler, 1989). These various forms of feedback can be implemented in various forms. Some of the strategies can include iterative dialogic processes, different feedback modes, variable timing of feedback and alternating between peer, self and teacher feedback providers (Shute, 2008). It is from this conceptualisation of feedback, using a variety of categories of emotions and drawing from the principal theories, that I have provided a rich analysis of the data.

¹⁰ The interpretation of deactivating depends on the context or situation. For example, contentment may be beneficial by reinforcing long-term motivation to invest effort in future learning (Pekrun *et al.* 2002).

4.5 Findings

Table 4.3 is a summary of the emotions that I identified and the feedback that had triggered them in terms of all the themes discussed in this section. This section starts with an overview of the emotions identified, followed by a discussion on the causes or triggers of the emotions. In the discussion, I have highlighted the functionality and implications of these emotions for learning and academic achievement. I have done this by drawing from students' narratives and from theories pertaining to achievement emotions.

Table 4.3 Emotions and their feedback antecedents

Emotions	Feedback objects (feedback content, strategy and strategy)
Satisfaction-happiness	Dialogical feedback, feedback about self-regulation, feedback on how to close the gap between current and desired goals, directives on how to close the gap
Disappointment-sadness	Negative feedback outcomes or failure
Assertion-anger	Lack of information on how to close the gap between current and desired goals Cryptic or ambiguous feedback, e.g. symbolic notations, one-word feedback (why, yes, no) Identification of errors or praise without any explanations Feedback that does not meet students' needs or learning preferences
Aversion-fear	Timing of feedback Lack of feedback focusing on processing of task in relation to future tasks
Embarrassment	Peer feedback
Pride	Praise linked to positive feedback outcomes/success Praise coupled with constructive criticism
Cynicism	Distrust in feedback provider

4.5.1 The feedback-related emotions experienced by students

Table 4.3 summarises the variety of emotions that students experienced in formal feedback situations. In relating his feedback experiences in the core courses, Scott was the most negative in terms of his experiences. As Scott is a high achiever, this finding is in direct contrast to Trigwell, Ellis and Han's (2012) assertion that high achievers in a course generally display positive emotions. Scott was cynical (sceptical or mistrustful) about the feedback he received from the lecturer. Cynicism is an emotion seldom reported in the literature on so-called academic emotions. It is possible, perhaps, that based on his personality and high achievement he had higher expectations of both himself and the feedback.

All the participants expressed both positive and negative emotions, except for Sophie, who expressed only positive emotions (happiness-satisfaction and contentment). Most of the

participants were highly appreciative of the feedback they had received. This might indicate that the feedback provided was generally in line with students' needs and expectations. Nonetheless, there were instances where a mixture of emotions was experienced in a single event. For example, students were both angry and frustrated when they had failed and had not received any feedback. This is indicative of students' diverse feedback expectations.

However, while it was interesting to explore what emotions were triggered by feedback it is necessary to explore in detail the feedback objects (content, strategy and function) and students' emotional response to such objects. The four emergent themes arising from the synthesis of relations between feedback *objects* and identified emotions were the following:

- (1) Emotional responses to feedback outcomes (i.e. success or failure);
- (2) Emotional responses linked to feedback strategy; in particular, timing and format of feedback;
- (3) The mixed emotional responses around feedback content and function; and
- (4) Relations and trust issues in receiving feedback.

4.5.2 Emotional responses to positive and negative feedback outcomes

Assessment outcomes (marks) are the most common type of feedback in learning situations. Marks provide information pertaining to the correctness of students' responses and progress in achieving the learning outcomes. Marks are also linked to potential progression to the next year and to the possibility of getting bursaries, sponsorship. Pumla and Dorothy expressed feelings of pride when they obtained a high mark. Pride is a positive activating emotion. According to Pumla, a sense of pride and confidence linked to feedback outcomes was attributed to her own efforts (XPTP006 in Table 4.1). However, marks were not the only motivating factor as can be seen in Pumla's comment. She considered that the comment "very good" was an affirmation of her perception that she was in control of her learning. The positive feedback not only intrinsically motivated this student; it also confirmed her knowledge and anticipation that she would master the discipline. Pride experienced by these students seemed to motivate them to invest more time and effort in their learning.

Pride and confidence are positive emotions founded on recognition and acceptance in social relationships between student and teacher or other students (Barbalet, 1998). In such

circumstances, confident students perceive that their learning trajectories are fully under their control. Williams and DeSteno (2008) regard pride as a social self-conscious emotion that may well drive students' perseverance behaviours for the need to be accepted in the community of practice. Based on the limited empirical evidence of the effects of students' positive emotions in higher education, Pekrun and Stephens (2010) single out pride as the activating emotion that correlates positively with study interest, effort and self-regulation of learning.

Interestingly, while it is obvious that praise would promote a feeling of pride, my study has established that "pride" can be elicited from other types of feedback. For example, from Dorothy's comment shown below, it appears that constructive criticism are worthwhile because they can give students a sense that they can improve and hence feel proud about their potential.

"Something like 'Good' does wonders for my self-esteem. Then they say ... 'You can improve on this. This is how you do it.' I think it is very important. Do not just mark me wrong. Tell me why I am wrong. So I think definitely giving constructive, critical feedback is good." (Dorothy)

Dorothy, and probably other students in these courses, appeared ready to hear both constructive criticism and high quality information about her learning. The excerpt highlights the role of feedback in developing students' self-efficacy. Nicol and Macfarlane-Dick (2006) regard "good feedback practice as encouraging positive motivational beliefs and self-esteem" (p. 205). This seems to be the case where praise is related to task processing, as in Dorothy's comments. On the other hand, praise related to self or merely general praise is unlikely to be effective; it does not address any of Hattie and Timperley's (2007) feedback questions. This kind of feedback angered and annoyed Scott.

"They say 'Good' but you don't actually know what part they are referring to and what you have to improve on as such. Like you would get 'Good' and then you would get eight out of ten and you don't know to improve to get ten out of ten".

According to Scott, this kind of feedback does not bridge the gap between his current and desired performance (Nicol and Macfarlane-Dick 2006; Sadler 1989). This type of comment, which he perceived as worthless, prompted Scott's anger and annoyance. Lecturers' awareness of students' emotions, and ideally of their personalities, when giving feedback can be worthwhile in cases such as expressed by Scott. A high achieving student, such as Scott, may expect a more intelligent, nuanced and informative comment than a simple affirmation. Yet this may be a generalisation, as Pumla, by contrast, was motivated by this simple

encouragement of ‘good’. Lecturers might not see the need to provide detailed comments in cases of good performance but for these students justification of why they did not get full marks might be crucial. My argument is that lecturers’ knowledge of their students can be beneficial if they are to give the most meaningful feedback or alternatively create opportunities for one-on-one discussion. Though there may be a strong case for provision of explanations for marks awarded, the practicality faced by lecturers particularly in large classes might be daunting.

In summary, a simple comment praising some aspect of the work, e.g. “good”, resulted not only in pride, but also in anger and annoyance. This varied response depends on the individual student’s value judgement of feedback in advancing their learning. Despite some meta-analyses reporting ineffectiveness of praise feedback (e.g. Kluger and DeNisi 1996), there is a view that praise related to task processing and completion might enhance students’ confidence, motivation, effort, flourishing and consequently academic achievement (Gamlem & Smith, 2013; Williams & DeSteno, 2008). Overall, the pride experienced by Pumla and Dorothy echoes control-value theory assumptions, and is seen as related to intrinsic motivation, effort and self-regulation.

Students who did not achieve a passing grade generally experienced unpleasant emotional reactions. Pumla expressed hopelessness because of her persistent failure in one of the core courses. Her apparent lack of interest and negative feedback outcomes led to abandonment of effort in that course.

“It was just because I had to do two majors thus why I did course E.” “Well, here’s the thing about course E, after that test I already gave up on it ... I was thinking this is just not working for me. I remember when I was writing this [test], really I was just writing for the sake of just writing”. (Pumla)

Her use of words implies an unfathomable process on which she just simply gave up. According to Pekrun and Stephens (2010), hopelessness is a negative deactivating emotion that reduces both intrinsic and extrinsic motivation. Frustration and disappointment were reported in cases of failure and when feedback outcomes were inconsistent with students’ expectations or self-feedback.

Hlompho experienced anger, sadness and frustration, not only because she had failed, but also because of the feedback she received on the content of her responses in the assessment

task (XPTH002 in Table 4.1). Although Hlompho was disappointed about failing, she shifted the blame onto the lecturer rather than placing the outcome on her own inability to address the assessment requirement and to answer questions. This reaction seemed to result from the feedback, which had not addressed the content of her responses in the task. The feedback therefore seems to have missed its mark and hence caused negative emotional experiences. In cases of failure, unclear evaluative feedback seems likely to exacerbate negative emotional reactions.

Dorothy expressed disappointment, anger and frustration when failure was unaccompanied by feedback.

“I remember being quite disappointed that I had failed the exam because I had studied quite hard. So, I do not know why I failed. It sucked, obviously.”

These emotions were elicited by the mismatch between the level of emotional and psychological investment in preparing for an assessment and its accompanying outcome and feedback. Dorothy and Hlompho’s anger signals the obstruction of goal attainment and stems from perceptions of unfairness. Pekrun and Stephens (2010) suggest that functional mechanisms of achievement-related anger in learning are complex. However, they claim that “anger is detrimental for motivation and performance under many conditions, but can translate into increased task motivation when expectancies for ... success are favourable” (p. 270).

Overall, the lack of attainment of a certain level of expected achievement, unhelpful feedback comments and perceived lack of control appear to be the main sources of the anger and frustration experienced by Dorothy and Hlompho. This highlights the importance of awareness in lecturers that negative feedback outcomes, without information about what students need to do and how they should respond in future related tasks, will certainly arouse unpleasant emotions. Negative emotional experiences can exert a “lingering influence on students’ personal and academic development” (Falchikov & Boud, 2007, p. 152). Consequences of failure, especially in the core courses, are detrimental to students’ academic progress, and feedback needs to be well managed. Hence, the challenge is to make the perceptions and expectations of assessments held by academic staff known, understood and used by students. Improving the time students spend actively engaged in tasks, opportunities

for practice, self-assessment and feedback dialogues may aid in aligning their assessment experiences and perceptions to those of their lecturers.

4.5.3 Effects of feedback strategy on students' emotions

The format of an assessment task and the communication of the assessment requirements have an impact on students' perceptions of assessment and ultimately affect their engagement and performance. The case in point is in tests and examination settings where the stakes are high and feedback outcomes act as a gatekeeper to students' study progression and careers. Students in this study generally perceived examinations as an ineffective learning tool due to the lack of appropriate feedback. This was evident from Dorothy's earlier comment. Zinhle, for example, is aware that assessment formats can have an affective impact on their emotional well-being.

"Like in exams, especially if you are under pressure, you just can't remember that one word and you're like 'Oh my gosh...' And I... you can kind of see it but you can't remember it."

According to Pekrun (2011), negative activating emotions such as anxiety reduce cognitive resources needed for engaging with the task. Zinhle's comment highlights the limitations of time-constrained tests and examinations, stemming from their heavy reliance on short-term memory for success. Overall, the majority of the students appraised these types of assessment tasks as inappropriate in their journey towards becoming scientists indicating their commitment to their studies and their desire to improve or achieve their goals

It was satisfying for students to receive timely, detailed and formative feedback, especially in the context of multi-staged report writing activities or weekly practical tasks. Students were highly appreciative of receiving formative feedback on drafts and having opportunities to resubmit their research reports based on the feedback received. They perceived these feedback activities as manageable, valuable and as confidence boosters. These low-stakes tasks, which provided students with information about their progress and achievement, were crucial in enhancing their motivation and self-esteem.

When students were given test feedback sessions in one of the courses, contrary to what might have been intuitively expected, students expressed many negative emotions like depression, stress, frustration and despair

“You know I think for most of us as much as it can be very helpful because you can understand that this is what they want from a question, I think that half of us were kind of depressed because we’ve realised that we’ve actually just plugged a test and now we’ve got to try and make up for it. I think half of us do not listen. Then you get to the exam and you realise ‘Oh flip, I should have been listening’”. (Kelly)

This is a crucial comment because it illustrates how negative emotions distracted attention from relevant instruction. In addition, it illustrates how these emotions can actually block thinking and subsequent engagement and in this way affect future learning. Stough and Emmer (1998) reported similar results when they explored students’ emotions generated in a test feedback situation. They indicate that the emotional intensity of having their tests returned with the follow-up discussion occurring in the same session, often made students confused, argumentative or too upset to speak. In that study, students demonstrated a lack of interest in the test feedback sessions and did not learn from such session. Stough and Emmer suggest, “students who experience strong negative emotions during a test feedback session may require more time to process feedback information” (p. 359). Despite students acknowledging the benefits of a feedback session, their emotional experiences at that time did not encourage learning from the feedback. The emotional upheaval evident in a test feedback situation might have been due to its perceived summative nature. Nevertheless, it is important that lecturers are aware of the effects of giving feedback just after results had been received. In light of this, one might recommend that feedback sessions be held before marks are released.

In the same test feedback context, Scott was annoyed by model answers (see XPTS003 in Table 4.1). He justified it as follows:

“In terms of this course they were teaching the entire block, that there could be more than one answer. I did not enjoy that we were kind of being told that ‘Yes, that’s a good answer’”.

One might surmise that some students expected more discussion around potential answers to questions. That being said, some students did realise the potential formative nature of the tests in relation to the final examination. Kelly’s earlier comment highlighted how test feedback sessions could help clarify the standards required. In addition, using peers’ responses to tasks modelled the quality of product required and contrary to Scott, students like Zinhle were happy with opportunities for peer feedback in a general test feedback situation.

“It was good for us, who didn’t really do well, to hear what other people wrote...”

Peers and lecturers as significant members of the community of practice can serve as tools or form a support base in feedback situations. Feedback practices should allow for the use of tools to produce best performance. According to Nicol and Macfarlane-Dick (2006, p. 205), “good feedback practice encourages teacher and peer dialogue around learning”. The test feedback situation addressed the dialogic and teacher-peer interactions aspects of feedback.

To sum up, the way in which students appraised various feedback strategies aroused mixed emotional responses. This points to the need for lecturers to be conscious of the different personality types they are dealing with. Lecturers should strive to accommodate for the diversity in students’ preferences and needs. Overall, high stakes summative tasks were linked to stress and anxiety whereas low stakes formative tasks were highly appreciated by students. This last point emphasizes the value of formative assessment, particularly if feedback is effective.

4.5.4 Effects of feedback content and function on students’ emotional experiences

The focus of feedback can be at four levels: task/product, process, the self (personal) and metacognitive levels such as fostering self-evaluation and reflection (Hattie & Timperley, 2007). All the participants expressed positive activating emotions of satisfaction and happiness when they received feedback that focussed on all four levels. High achievers enjoyed and preferred feedback focusing on the level of self-regulation. Generally, happiness and satisfaction were associated with situations where students perceived feedback as valuable for their learning. Students valued feedback that included information on the correctness of the responses; on errors made as well as elaborated feedback including explanations, suggestions and advice. Most students appreciated detailed corrective feedback indicating what they did wrong.

“They gave back very constructive feedback, like ‘this is what you need to work on; this is why you didn’t get the marks.’ So, going forward I had that in my mind, I had learned from that, and I learned now what mistakes to look out for”. (Dorothy)

Dorothy’s comment underscores how feedback addressing all the three feedback questions elicited positive emotional responses. The feedback prompted an inner dialogue that enabled her to become more conscious in the future. She was able, in this instance, to steer and take control of her own learning. Feedback on processing of task and self-regulation levels in this case clearly aroused pleasant activating emotions. This finding concurs with Pekrun (2011)

whose research established that satisfaction-happiness emotional responses promote the attainment of goals and maintain cooperative relations.

The role of feedback can also be classified as either being directive or facilitative (Gamlem & Smith, 2013; Shute, 2008). Directive feedback provides students with specific information on what needs to be corrected or revised. Facilitative feedback, on the other hand, provides comments and suggestions to guide students in their own revision. There were indications of mixed emotional responses to directive feedback based on students' appraisals of the value of feedback. Some students were pleased and appreciative of such specific directive feedback (XPTSP001 in Table 4.1). Despite this being indicative of the general feeling in the class, Marcia, however, expressed resentment and disapproval of what she referred to as "spoon feeding":

"But I think... they don't have to tell you specifically exactly what you have to fix because I feel a lot of the time we like to be spoon-fed too much. We do not like to think for ourselves."

Marcia was satisfied with substantial facilitative feedback prompting self-regulation and reflection opportunities. She was appreciative of feedback in the form of cues, hints and prompts. This indicates that "students are already engaged in self-regulation but that some students are better at self-regulation than others" (Nicol, 2009, p. 338). Marcia and Sophie's (XPTSP001) differing emotional responses reflect a contradictory understanding of the function of feedback and to some extent their self-regulating abilities. Nicol and Macfarlane-Dick (2006) posit that apart from helping students achieve the expected outcomes, feedback should assist students to develop self-regulation capabilities. Acknowledging the active role of students in feedback will enable them to use the feedback to promote their learning. However, the challenge for lecturers in a massified course is how to strike the balance between giving directive and facilitative feedback as well as to address individual preferences for feedback strategies.

Students who relied solely on the lecturers for feedback reacted negatively when they could not decode feedback messages. Anger, frustration and annoyance were the key emotions associated with symbolic feedback (e.g. ticks, question marks or crosses) and one-word type feedback. The following comment by Kelly illustrates the perceived inaccessibility of symbolic feedback:

“But often it was just a case of a tick or cross. Right! Wrong! Right! Wrong! So you didn’t know where you made the mistake. Sometimes they’ll give you a little bit of something ... ‘It’s quite ambiguous’ so you’re like, well what am I supposed to do with this now? That is a fantastic comment. I know I should have written more. But what should I have written?”

Kelly was confused and frustrated by the inability to decode and make sense of these forms of feedback. As in other research studies (Dowden et al., 2013; Ferguson, 2011; Gamlem & Smith, 2013), students reacted negatively when feedback lacked substantial detail or was perceived to be ambiguous or cryptic. Clearly, Kelly craved more directive feedback which was in direct contrast to Marcia who stated that she didn't want to be spoonfed. Surprisingly, feedback content in the form of provocative questions also evoked confusion and annoyance from Felicia.

“Some lecturers will say ‘Wrong’ and put the word ‘What’. What is that? Or ‘why’ or ‘how?’ We do not know what that means. What do you need me to fix ... to make it better? Sometimes you get this underline, like red line, and you think, ‘What are you talking about?’”

The “what, why, how” type of feedback might be interpreted as a form of dialogic feedback. Whilst the literature advocate conversational toned, unanticipated emotional reaction mentioned by Felicia indicates the complexity lecturers face in providing feedback. For Felicia, the comments were cryptic, meaningless and unhelpful. The “underline and red line” all hint at a negative emotional response to feedback. These negative emotions may lead to reduced engagement with feedback or total ignorance about and abandonment of feedback. What makes the issue of feedback so contentious is that another student, Marcia was content and pleased with these forms of feedback and perceived them as prompting self-reflection and regulation.

“So even though I think sometimes a cross wasn’t helpful in some situations, I think it also forces you to think for yourself. But it gives you a chance to actually sit there and go ‘Okay, but what did I do wrong?’”

Both Marcia and Scott were content and satisfied with what Felicia and Kelly perceived as meaningless feedback. For Marcia and Scott this also presented an opportunity to initiate feedback dialogue with the teacher or teaching assistant. Feedback dialogues can certainly be a rich form of learning in student-teacher relationships where collaborations are core.

Dialogic feedback is worth discussing at this point. In cases where feedback is perceived as dialogue, students might see themselves as sharing the power and responsibility for learning with the teacher. Feedback dialogues include all forms of different interactions among the

various role players. These dialogues have considerable possibilities for eliciting aligned feedback perceptions and judgements and ultimately shifting students' actions to the desired performance. Lecturers might consider reconceptualising feedback more as iterative dialogical exchanges as a way of reducing students' negative emotional reactions. The challenge for lecturers is to strike a balance between giving substantial feedback but also not undermining students' autonomy as their own feedback providers.

Feedback on development of skills can be regarded as essential for developing autonomy and competency in the discipline. However, feedback that focused on skills elicited mixed emotional reactions from some students participating in this study. For example, some of the emotions linked to skills feedback, particularly grammar and language use were negative deactivating emotions and negative activating emotions. Scott, in particular, was disappointed and annoyed at not getting feedback on content- related concepts.

"I was mostly just corrected on my grammar and stuff like that ... and my wording and such. Which I don't know if that such a good thing and that I was on the right track and that's why they didn't correct me, but in that case they didn't really say 'Good point!' you know..."

Moreover, this could be an expression of an emotional reaction where this student views the comments as merely picking on an issue that he does not consider being important. In such cases, the feedback is ignored, irrespective of its potential usefulness in learning. That being said, for students like Zinhle, who was an English Second Language speaker, fear and uncertainty arose when she did not receive mechanical feedback (e.g. citing, referencing and language use). She specifically valued feedback on language in general as well as on discipline-specific language. She expressed her concerns and uncertainty about such feedback in respect to her development of the necessary academic literacy (XPTZ004 in Table 4.1). This once more highlights the difficulties in dealing with students with different backgrounds and needs, and attests to the value of dealing with individuals rather than applying a one size fits all approach when providing feedback. However, in the context of the large classes which are currently the norm in these courses, the role of the teacher has become exceedingly difficult.

Emotions such as uncertainty and worry distract attention from learning. In the diversified South African higher education landscape, with increased enrolments of English second language students, comments on communication cannot be downplayed. Students are aware

of the “rules of the game” (correct and acceptable procedures) in scientific writing. Therefore, value attached to feedback on language, spelling and grammar might be of significance to these students’ progression towards their life goals.

Overall, with regard to the function of feedback, the value of the informational content in addressing the performance gap was the major cause of both positive and negative emotions. Mixed reactions to the same feedback facets and dimensions might possibly be explained by students’ achievement goals and their different biographies, which are not addressed here. However, it may be inferred from the students’ comments that high achieving students with learning/mastery goals were pleased, satisfied and appreciative of feedback in the form of suggestions prompting self-regulation. On the other hand, students with performance goals were angry, frustrated and annoyed when they did not receive directive/corrective feedback that helped them attain good marks. The need for differentiated feedback practices is important because students enter higher education with differing abilities, capacities, and willingness to self-regulate. The question is whether lecturers are empowered to cater for such diversity while not overlooking the need to address the aim of developing lifelong learners.

4.5.5 Relations and trust in feedback as antecedents of negative emotions

Trust between lecturers and students and students and their peers is salient in the context of formative assessment. Students will only act on what they consider trustworthy information. Scott expressed cynicism in relation to peer and teacher feedback (see XPTS007 in Table 4.1). Additionally, embarrassment and mistrust were some of the emotions he expressed in relation to peer feedback. Scott’s discomfort and scepticism about peer feedback is similar to what was reported by Liu and Carless (2006) who found that perceived expertise and power relations were the possible reasons to students’ resistance to peer assessment.

Scott perceives criticism from peers as a socially uncomfortable and embarrassing situation. Embarrassment as a self-conscious social emotion is likely to be substantial and distracting. Fairness and subjectivity might also arise in high stakes summative assessment contexts and in cases where assessment criteria are not clear. Scott’s comment emphasises the power/trust issue between peers; therefore, students could view peer feedback as embarrassing, invalid,

frustrating and unwelcome. Furthermore, Scott's mistrust of teacher feedback is associated with a lack of shared understanding of assessment criteria:

"Report writing is one person's idea of a report, how it should be done, compared to yours, from their point of view. If your report is similar to what they thought the report should be done, then you'll get a good mark, versus if you approached it differently. Then you would get a different mark."

While fear and mistrust amongst and between lecturers and students are potential barriers to effective dialogue, student-student interaction through peer assessment is valuable in increasing student participation in the assessment practice (Yang & Carless, 2013). Carless (2009, p. 87) posits that trust and mistrust impact significantly on the implementation of effective learning-orientated assessment (LOA) practices. Hence, training and support in peer feedback is crucial to manage the issue of cynicism and trust around feedback.

Therefore, to sum up, while students see the value of peer and self-feedback, issues of self-confidence and trust are of major concern. The complexity of the "how" of giving and receiving feedback is evident in the varied emotional experiences of students. Clearly, the potency of feedback in learning and academic achievement depends on a number of factors, including context, students' and lecturers' attributes and skills.

4.6 Conclusion

My intention in this paper was to illustrate that emotions that manifest in assessment and feedback contexts are of paramount importance to learning. This study on the incidence, nature, antecedents and consequences of emotions in feedback situations is crucial for understanding how feedback may promote positive emotional experiences. Students' emotional responses to feedback are a critical factor in learning as they may enhance or inhibit their performance. The research presented here expands research work on emotions and feedback in two important ways.

Apart from the basic categories of emotions reported in the research literature such as test anxiety, the findings of this study indicate that feedback *processes* influence or evoke other emotions as diverse as cynicism and appreciation. In addition, beyond *outcome* feedback (success versus failure), it is apparent that students' expectations, their perceived control over the feedback they receive and their appraisal of the value of feedback *content and strategy*

profoundly influence their emotional experiences. The idiosyncratic analysis of students' emotions paints a picture of a complex interplay between individual and contextual (feedback) antecedents.

Whilst admittedly these student voices on emotional reactions to feedback come from a small and rather selective sample of students, they offer some useful and important insights into the emotional dimension of feedback. The divergent emotional reactions reported in this study enrich our understanding of assessment in diverse assessment settings. Consequently, a number of lessons from this study to align actual practice with proposed sustainable feedback models can be learned. The models posit that feedback is sustainable when it supports development of students' self-monitoring and self-regulating capabilities. This implies that any emotionally sound feedback environment will be cognisant of power (negotiated roles) and trust issues amongst students, their peers and their lecturers. This will in turn promote assessment landscapes, which create opportunities to implement quality feedback practices such as dialogic interactions, peer feedback and self-assessment.

It is therefore imperative that lecturers create opportunities for practices that promote shared understanding of course goals, assessment criteria and expected standards. Transparent and explicit standards may help in managing students' expectations; especially in cases of feedback outcomes. Crucially, the differing perceptions of feedback between lecturers and students need to be well managed as they have the potential to evoke negative emotions. Promoting students' self-regulatory abilities is another mechanism which may be invoked to reduce inducing negative emotions. That is, when students perceive that they are in control of the situation and are capable of regulating their learning, positive emotional experiences will increase. This translates to the role of the lecturers in finding ways to design assessment opportunities for interaction and dialogue that will help students close the gap between their current and desired performances.

In conclusion, the management of students' control and expectancy appraisals of feedback is an imperative professional capability for lecturers. In addition to creating awareness amongst lecturers about the emotional aspect of assessment, teacher professional development can assist lecturers in effectively implementing pedagogical activities that promote sustainable feedback. While this paper has focussed on the needs of students and the emotions provoked by the feedback they receive, there has been little recognition given to the emotions

experienced by the lecturers. Future research should therefore probe the emotions experienced by lecturers in giving feedback. This is an important dimension to consider because it will give us insight into the nature and sources of students' and lecturers' emotions. Lecturers' understanding of both their own emotions and those of their students is crucial in mediating the iterative dialogical exchanges if feedback is to enhance learning.

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CHAPTER 5

Insights into university teachers' conceptions and practices of assessment in bioscience courses

Abstract

A key characteristic of learning-oriented assessment is the design and implementation of assessment tasks that support students in their current learning whilst also promoting their future learning capabilities. Some lecturers may be unconsciously using this approach and yet might not be familiar with the concepts and theories underpinning learning focused assessment. Alternatively, even if they know the theory, they might not be able to formally or strategically put it into practice. Compounding the issue is that these lecturers are situated in complex socio-cultural contexts that could potentially impact on their assessment practices. In an attempt to understand the complexities inherent in learning-oriented assessment, a multiple case study was undertaken in order to examine how four second-year lecturers at a South African university understand assessment in general. That is I attempt is make the link between lecturers' conceptions and practice of assessment, and the factors that contribute to their practices of assessment. The data used in the study came from interviews and course documents used by lecturers in three selected bioscience courses. Cultural-historical activity theory was used as an analytical tool illuminating lecturers' complex understandings of assessment that are influenced by a combination of departmental/course and personal level factors. The paper concludes with implications and recommendations that take into account the factors most influential to lecturers' assessment practices.

Key words: Conceptions of assessment; assessment practices; science learning; activity systems theory; learning-oriented assessment

5.1 Introduction

Over two decades ago, Boud (1990) identified a disjunction between university lecturers' assessment practices and their high-level course objectives for higher education. In light of this, this paper aims to contribute to the understanding of the perceived gap between lecturers' intentions and practices. In particular, the study probes lecturers' rationale and practice of assessment of students' learning in the changing landscape of assessment of science teaching and learning in higher education.

In South Africa, the massification and diversification of higher education has meant that many students are under-prepared for learning at tertiary level. This emphasizes the need for a fresh look at university teachers' instructional practices and in particular, assessment practices which are central to student learning in different contexts. The Council on Higher Education (2004) has recommended that assessment should be an important vehicle in post-apartheid educational reform. However, Scott, Yeld and Hendry (2007) have argued that this may not be the case, as diversification of student intake in some cases "has not been matched by institution-wide modification of educational approaches" (p40) and in particular in assessment practices. Scott et al. report that lecturers generally lag behind in terms of professional assessment knowledge and the "appropriateness of the content and assessment methods" they use in their courses (p40).

The envisioned changes in assessing for conceptual understanding in science and the concomitant challenges for higher education make it imperative for us to understand the current lecturers' conceptions of assessment in order to identify barriers that may be inhibiting the adoption of more appropriate science learning and teaching methods, and assessment processes. This type of research is important, because while studies concerning higher education lecturers have focused intensively on learning and teaching (Kember & Kwan, 2000; Trigwell & Prosser, 1996), there has been no emphasis on exploring their conceptions and practices of assessment. This oversight has, to some extent, undermined the importance of assessment as leverage for improving undergraduate science teaching and learning approaches.

In this study, I have therefore explored bioscience lecturers'¹¹ conceptions of assessment and some of the socio-cultural-historical contextual factors mediating their assessment practices. The focus in this study is primarily on the design of the assessment system, rather than on the broader educational programme or teaching and learning system within which it operates. However, throughout the chapter my analysis and discussion will at a general level focus of the role of assessment in a broader teaching and learning system.

¹¹ The terms teacher, lecturer and academic are used interchangeably.

The research questions asked in this study were the following:

- What are bioscience lecturers' conceptions ¹²of assessment?
- What is the rationale for the lecturers' assessment practices?

Understanding *how* lecturers perceive *what* and *why* they assess the way they do should provide insight into their practices and assist in the provision of relevant educational development for students' learning regarding their assessment approaches. However, understanding assessment practices in complex sociocultural contexts requires appropriate theoretical tools and concepts. In light of these research questions, the cultural historical activity theory (CHAT¹³) which is fundamentally concerned about socially and culturally mediated and object-directed activity was adopted as a *tool* to explore lecturers' assessment conceptions and their practices. First, I briefly discuss the evolving assessment practices in science teaching and learning in the literature. Next, I unpack some key principles of the third generation activity system theory (Engeström, 2001) to provide an understanding of the complexity of science lecturers' assessment practices and their interrelatedness to learning and teaching in higher education courses. Finally, I discuss the findings and conclude with recommendations for further study.

5.2 Trends in science learning and assessment

One key trend in assessment of science learning is the move towards more learning-oriented forms of assessment (Bell, 2007). Teachers across various educational sectors are being required to use assessment for multiple purposes. Newton (2007) identified three levels of assessment purposes, namely: judgement, decision and impact levels. Traditionally, assessment was predominantly geared at a judgement and decision level which relates to marks generation, certification and accountability purposes. However, there has been a move away from this approach with an increased emphasis on the impact level, which relates to the learning aspect of assessment. According to Newton (2007), the *impact* level “concerns the intended impacts of running an assessment system (e.g., the purposes are to ensure that

¹² Teachers' “conceptions of assessment” in this study draws from Pratt's (1992, p.204) definition of conceptions as “specific meanings attached to phenomena which then mediate our response to situations involving those phenomena” ... In this case it refers to teachers' understanding and knowledge of why, what, how and when to assess, and how to interpret data from students' assessment.

¹³ CHAT is used interchangeably with activity theory

students remain motivated, and that all students learn a common core for each subject)” (p 150). Assessment systems that promote higher order learning align closely to formative or learning-oriented assessments. Such assessment embrace “...flexible, integrative, contextualized, process oriented, criteria referenced and formative” approaches (Ellery, 2008, p. 421).

In this study, formative assessment is defined as by Sadler (1989) as an assessment “concerned with how judgements about the quality of student responses (performance, pieces, or works) *can* be used to shape and improve the students’ competence...” (p120). Formative assessment is often used interchangeably with ‘assessment *for* learning¹⁴’ (AfL). Other related terms include ‘learning-oriented assessment’ (LOA) and ‘assessment as learning’. In attempt to avoid being entangled in the web of definitional issues and dichotomisation of formative and summative¹⁵ purposes of assessment, I adopt the term learning-oriented assessment (LOA) as proposed by Carless (2007). LOA essentially focuses on the learning dimensions of both formative and summative assessments. Hence, one of its key principles is that all ‘assessment tasks should be learning tasks’ (Carless, 2007, p. 60).

The central premise in this paper is that assessment must serve a formative role (facilitating learning) as well as a summative role in order to certify learning. The reason for the mismatches between lecturers' and students' conceptions of assessment, which have been reported in the literature (Carless, 2006; Maclellan, 2001) might be due to the difficulty of understanding and addressing these two purposes of assessment. This may be made worse in contexts in which students have been previously disadvantaged educationally, such as in the South African education environment. It is therefore important, in the first instance, to examine and understand lecturers' conceptions of assessment. An understanding of their conceptions, would allow us to build on them, support them and provide appropriate staff development interventions.

Globally, science teachers are faced with the challenge of using assessment to develop students' knowledge, skills and competences for the 21st century and beyond (Hanauer & Bauerle, 2012). This shift in science education has informed, and is being informed, by parallel shifts to address multiple goals of science learning and higher education learning and

¹⁴ Assessment *for* learning primarily for formative purpose

¹⁵ Assessment *of* learning primarily for summative purpose

teaching in general (Bell, 2007). Despite these shifts, there is still a general perception that science learning, teaching and assessment in higher education privileges content retention over conceptual understanding and skills development needed for 21st century science practice (Hanauer & Bauerle, 2012; Klassen, 2006). In most cases, assessment of science learning in undergraduate courses is targeted predominantly at the comprehension or application levels (Hanauer & Bauerle, 2012). However, scientists are required to be well equipped with higher order skills, such as critical thinking and lifelong learning; hence, educating future scientists or scientifically literate people requires a shift in the nature of assessment in science education. Notably, designing assessment tools to assess these 21st century skills can be a significant challenge for most university teachers (Brownell & Tanner, 2012).

The view of assessment as an evolving social practice supports my argument in this paper that cultural historical activity theory (CHAT) provides conceptual and theoretical tools to understand assessment systems. In adopting CHAT, there are a number of implications for conceptualising assessment practices. These implications are addressed in the next section.

5.3 Assessment of science learning as an activity system

An activity system is a collective, motive-oriented and tool-mediated system operating interactively within a network of other activity systems (Engeström, 2001). Assessment can be viewed as an activity system operating within a network or ecosystem of learning and teaching systems and within a broader higher education system. That is, we can only understand assessment as a subsystem operating within a larger sphere of the whole teaching and learning system. In the third generation activity theory (Engestrom, 2001) principles of object-oriented activity, multi-voicedness, historicity, contradictions and possibility of transformations of activity systems are incorporated to explain the complex nature of an activity. In considering assessment as an activity system (see Figure 5.1), two main objects (motives) of assessment anticipated are assessment *for* and *of* learning.

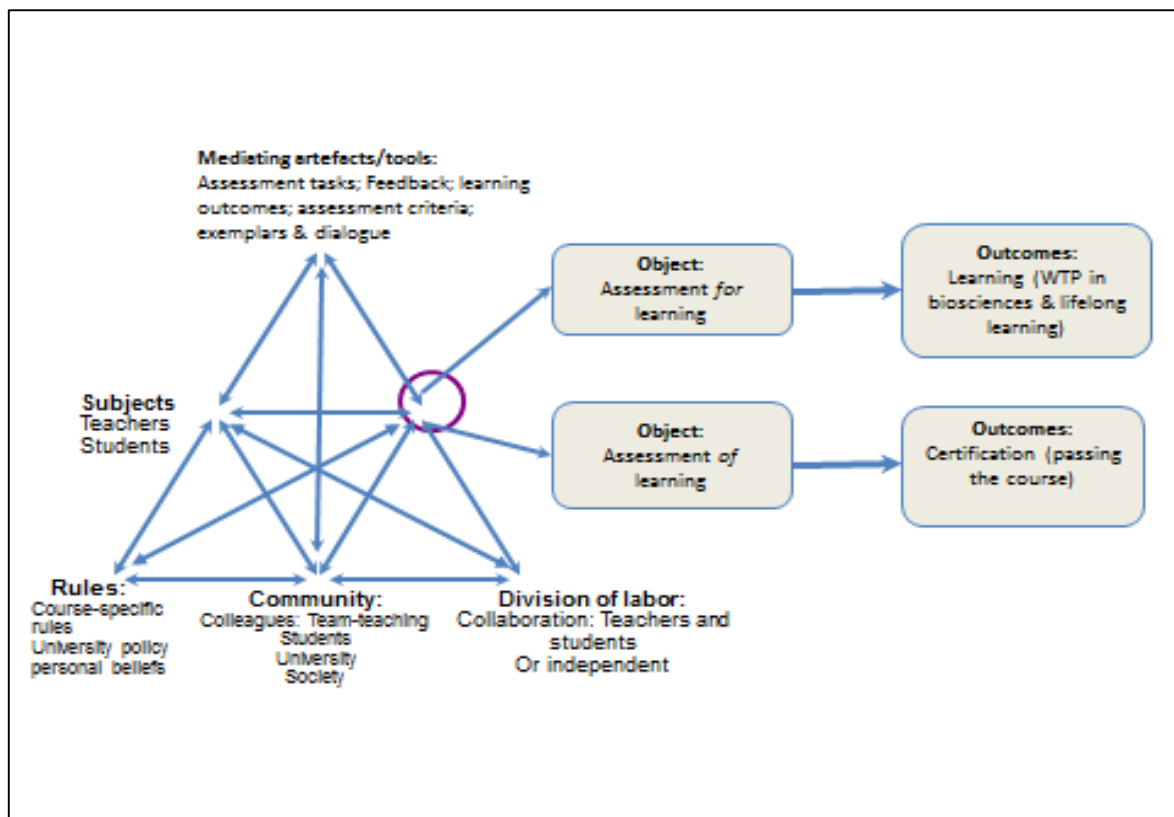


Figure 5.1 Assessment as an Activity System (adapted from Engeström, 2001)

The presence of the two *objects* in assessment activity systems relates to the historicity of activity systems, which CHAT accommodates in its explanatory capacity. The principle of historicity argues that activity systems evolve over time as new reforms, technologies and learning theories emerge. In the previous section, I outlined the evolving nature of assessment practices from measurement towards more learning-oriented approach. Nonetheless, it is important to note that conceptualisation of the role of the assessment in learning “is still both conceptually and practically ... work-in-progress” (Bennett, 2011, p.21). The move towards more learning-oriented assessment systems operating alongside measurement-oriented assessment systems can manifest as challenges and tension in assessment processes. For example, contradictions might arise due to shifts from individual (i.e. a subsystem) to collaborative learning (interaction of subsystems) and or new tools are introduced into the system. This multitude of factors within systems adds to the complexity of assessment as a system.

Another principle of CHAT that addresses the collectiveness of activity systems is the notion that the activity system is multi-voiced embracing multiple perspectives, traditions and interests within a community. The collectiveness of activity systems implies that an

institutional object of assessment can be interpreted differently inviting multitudes of actions and outcomes. In the activity theory, analysis of subjects' (lecturers) actions with their own motives and needs is both at an individual and collective level. That is lecturers draw on their personal attributes but are also mediated by both conceptual and structural artefacts located within the community in transforming the object of the activity into outcomes. The community, in this case be it the school or university, through its rules, norms or social stratification or division of labour shapes the nature of the activity.

According to Bronfenbrenner (1977), human activity must be examined in relation to institutional arrangements or contexts in which it occurs and the relations and interconnection among those surroundings. Bronfenbrenner posits that an "individual's ecological environment can be conceived as a nested set of systems each contained within the next" (p.514). He referred to these systems as micro-, meso-, exo-, and macrosystems. Bronfenbrenner's ecology model of development reflects reciprocal influences of individuals and their environments. The model offers a holistic approach to understanding the entire teaching and learning context as a mediator of assessment practices and perceptions. The comprehensive nature of the fusion of CHAT and Bronfenbrenner's ecological systems theory was adopted in this study. The synthesis of the two theories was deemed appropriate in examining lecturers' practices and conceptions of assessment while taking into account their immediate and distant broader teaching and learning contexts in which they operate.

Drawing on from CHAT while simultaneously using what looks like a simplified version of Bronfenbrenner's ecological systems model¹⁶, Fanghanel (2007) postulated a framework of seven filters which mediate ways in which lecturers conceptualize teaching, learning and assessment (Figure 5.2). The seven filters operate at macro (institution, external factors, academic labour and research-teaching nexus), meso (department and discipline) and at micro (individual pedagogical beliefs, experiences) levels. At the micro or personal level, lecturers use their views about effective learning and teaching, as well as their values and principles about science learning and assessment, to guide their decisions when implementing assessments in the courses they teach. This decision processing is central in Abell and Siegel's (2011) Science Teacher Assessment Literacy Model (STALM), which demonstrates the interplay of lecturers' conceptions in their assessment practices when they explain their

¹⁶ In the simplified version of Bronfenbrenner's model, the exosystem level is regarded as part of the meso system level.

assessment purposes, the content they select to assess, the methods they use, through to their interpretations of assessment outcomes and their feedback. In addition to a personal pedagogical view, lecturers' experiences in teaching/assessing as well as their own experiences as students mediate their assessment conceptions and practices (Kreber, 2010).

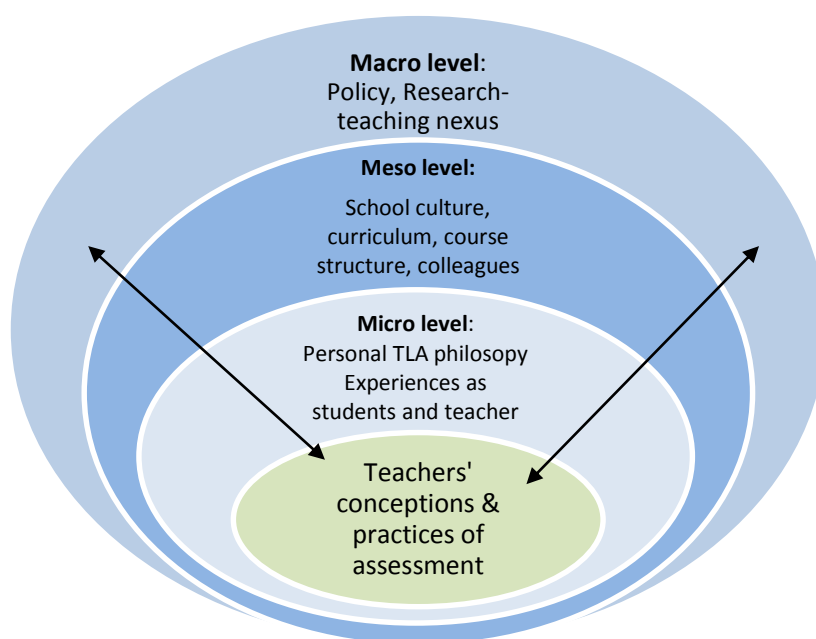


Figure 5.2 Factors influencing academics' conceptions and practices of assessment

At a contextual level, meso and macro filters influence lecturers' assessment conceptions and practices (Figure 5.2). For example, particular teaching, learning and assessment practices and processes are attributed to specific disciplines or domains (Virtanen & Lindblom-Ylänne, 2010). This assertion is understandable considering the time that these lecturers have experienced assessment as students and then as lecturers of science. In addition, assessment practices may also relate to the local culture of the departments or university structures (Kreber, 2010). A case study by Jawitz (2008) highlighted how relationships between colleagues, opportunities for conversations about assessment and the alignment of assessment practices with the kinds of capital valued in each context influenced the way teachers conceptualized and approached assessment (p. 1006). This implies that the relationship between various factors at both macro and meso levels will probably have an influence on science lecturers' conceptions and practices of their assessment of students' learning. However, this relationship is still blurred and unclear.

Therefore, in this study, I have explored the mediators of lecturers' conceptions and practices of bioscience assessment based on the synthesis of CHAT and the ecological systems theory. My main assumption is that prior conceptions and experiences shape practices in some way. However, the challenge is to establish how this happens. I therefore propose that we move away from single categorizations of conceptions and practices as they limit the capturing of the complexity in lecturers' conceptions. With this approach, we can access and present diverse, rich and idiosyncratic lecturers' assessment practices within specific cultural and historical assessment contexts. In light of this, I view both CHAT and the ecological systems theory as the most appropriate tools to understand this complexity of assessment systems.

5.4 Methodology

This exploratory qualitative multiple-case study involved four university bioscience teachers. A case study design provides the means for an in-depth understanding of the practices of each individual teacher within a "real" environment (Stake, 2006). That is, this design allowed for the exploration of the association between individual lecturers' context-specific assessment conceptions and their practices. Comparison of some aspects between cases provided a richer understanding of the nature and sources of these lecturers' assessment conceptions and practices.

5.4.1 Study context and participants

This study was conducted on lecturers of three core second year bioscience courses at a research-intensive South African university. These courses, each lasting seven weeks, which include practical work, are designed to give students a solid grounding in the fundamentals of specific biological concepts. The lectures and guided inquiry practical work activities are team-taught by two to five lecturers who take turns in teaching their specific topics of expertise. Depending on the topic presented, each teacher spends between one and three weeks with the students. In all three of the courses, teaching assistants ¹⁷(TAs) served as facilitators for practical sessions and were responsible for marking and giving feedback on the research/practical reports. All the courses hold mid-course class tests and end-of-course examinations.

¹⁷ TAs are postgraduate students who have little teaching and assessment training.

Four science lecturers (given the pseudonyms Freda, Johnny, Kelvin and Chris) were purposively selected based on their involvement in teaching one of the three core second year BSc (biology major) courses. At the time of the interview, Freda was in her second year of teaching; Johnny was in his fourth teaching year; Chris had more than five years' tertiary teaching experience as well as a higher education teaching diploma in addition to qualifications in the discipline. Kelvin had fifteen years teaching experience, four of which were at university level. All the participants had attended teacher professional development courses offered by the university and were relatively inexperienced at teaching at higher education level.

5.4.2 Data sources and analysis

Data for each teacher was collected using two sources: course documents (e.g. course outlines and copies of assessment tasks and marked students' work) and interviews. Course outlines drawn up by course coordinators in consultations with the teaching team were analysed to determine what information had been conveyed to students. For the four lecturers interviewed in this study, topic specific outline documents provided valuable insight into lecturers' intentions and plans for assessment. Practical work activities (from laboratory and field project reports), as well as test and examination papers were used to examine data for assessment practices. Students' scripts and research/practical reports were analysed to explore the feedback they received. The University's student assessment policy was critically examined to explore its purposes and to ascertain to what extent lecturers were aware of its content and if they had taken cognizance of it. All of these instructional and administrative documents were used to ascertain the lecturers' assessment practices and to validate lecturers' self-reported practices.

Interviews with lecturers provided data on their conceptions of assessment and practices. Two semi-structured interviews, audio taped and later transcribed verbatim, were conducted with each participant. The second interview was a form of member checking, to establish the credibility of the findings based on the interview transcriptions, data interpretations and findings. Participants were given an opportunity to comment on the research findings, interpretations, and conclusions.

I analysed interview transcripts by means of a structured coding scheme based on the conceptual framework of the study. I conducted a content analysis of all the transcripts. Through the rereading of the analysed content of the interview transcripts, the coding, categorisation and comparisons among categories several themes emerged. Participants' statements were also coded in line with the key theoretical concepts of the activity theory. Using the constant comparative analysis method (Merriam, 1998), data was reviewed from all the sources and initial content codes were identified for each category.

Using the CHAT language, a within-case analysis for each teacher was done to identify objectives that directed the teacher's (subject) actions (assessment practices). Each case was further analysed to explore how the lecturers' assessment practices were mediated by tools and artefacts (instruments) and by the community within the activity system. Furthermore, I explored how norms of the community (rules) and roles or collaborations within the community (division of labour) shaped lecturers' actions. The main intention was to understand the multiplicity and interdependency of factors accounting for how each teacher conceptualizes and approaches assessment rather than to classify lecturers into categories of conceptions and practices. Additionally, my intention was to analyse the tensions and challenges within assessment systems.

After all the cases were individually analysed, the similarities and differences across all four cases were examined to determine whether conceptions and views could transcend the views of individual participants. The focus of the cross-case analysis was placed on various factors identified from the conceptual framework, with emphasis on the similarities across the cases regarding the phenomenon and factors of interest (Stake, 2006). The cross-case analysis resulted in two main assertions, which are discussed in the next section. Descriptive and explanatory statements, together with interview excerpts, are used to support the inferences drawn from the data. In addition, I identified aspects of the lecturers' conceptions and practices that address the learning-oriented assessment principles.

5.5 Findings and discussion

General findings from document analysis showed some consistency between lecturers' assessment practices and the university assessment policy. The policy's aim "is to provide flexibility for different assessment systems, but within a framework of current philosophy on

student assessment, which emphasises frequent assessment with substantive developmental feedback, criterion referencing related to outcomes, and the use of a variety of assessment methods when appropriate” (Wits, S2013 p.1). In all three of the courses, a within-course class test and end-of-course examination system was adopted. A mid-course class test was both part of the formal coursework assessment and a component of a frequent and on-going assessment system that provided feedback to students. The class test was used for summative purposes and contributed to the overall course mark. In cases where students were required to write essays and research reports, assessment criteria or marking rubrics were provided as per policy requirements. The course descriptors provided to students offered information about the learning outcomes, assessment activities, standards and expectations. In the next section, I make two assertions that directly address this study’s research questions.

5.5.1 Assertion 1: Lecturers’ improvement (formative) and measurement (summative) conceptions of assessment are interwoven and co-exist in a complex and multifaceted way.

In this study participating lecturers regarded different forms of assessment as interdependent and interactive. This confirmed their multiple goals of science teaching that included their course specific goals, broader higher education goals and affective domain goals (e.g. appreciation, interest). All of the four lecturers saw their roles as that of inducting students into the ways of thinking and practising in the discipline (McCune & Hounsell, 2005). This is reflected by some of their practices linked to the research report writing assessment activities. For example, producing a scientific report through draft-feedback cycles resembles, to some extent, academics’ work in producing a paper for publication (Boud, 1990).

In their assessment vocabulary, terms such as formative and summative assessment were not used when interviewed. Nonetheless, they were fully aware of the need to use assessment for multiple purposes. Of significance for assessment *for* learning concept, is that all these lecturers’ practices reveal a common view of using assessment to promote student learning. Lecturers are influenced differently by what they observe and judge in their duties as assessors of learning. These differences and the empirical data collected in this study reify the notion that assessment is complex. This complexity goes beyond the strong dichotomy

between the formative and summative orientations of assessment as portrayed in the research literature.

Assessment for measurement and accountability purposes: In all the cases, lecturers used assessment to meet the professional obligation to certify students' mastery of material. In doing so, lecturers drew on a number of mediating artefacts (tools or strategies). Although two of the four lecturers had reservations about tests and examinations, they used these assessment methods to fulfil the measurement role. For example, Johnny employed tests "*to judge how well they [students] were learning and mastering the material we taught them*" and utilized an end-of-course examination "*so we can measure how well they did in the course and what they learned*". Likewise, Chris used assessment as a motivational tool but still considered it to have a summative purpose. He maintained that assessment is "*almost like a carrot for students to work. If there was no incentive to pass the course and get the degree, then there might be less of an inclination to actually do it*". Both of these lecturers therefore use assessment to hold students accountable for learning.

Despite lecturers' summative, measurement view of assessment, three of the four lecturers (Freda, Kelvin and Chris) also perceived that mid-course class tests could assist with learning. According to the lecturers, tests provided students with information about their learning gaps. This assertion is similar to Bennett's (2011) contention that the same mediating tools might be used for both summative and formative purposes, but how and when they are used can be different thus leading to different outcomes. However, Johnny questioned the use of these assessment tools when he said: "*I think performance on a test does not necessarily measure understanding. It does measure what they have memorised and it does not necessarily measure what they understand*". This criticism has also been raised in the literature about the validity of timed tests and examinations.

Assessment as a tool for improving learning: All these lecturers' practices reveal a common view of using assessment to promote student learning. Strategies used as mediating tools to achieve the student-learning motive varied. What was common about the strategies these lecturers adopted was the need to support student knowledge and skills acquisition through the provision of feedback and sharing of assessment expectations. For example, Freda made use of in-class questioning, resubmission and drafting options for learning purposes. According to her, resubmission and drafting options implemented as part of her instruction

were “to give students an opportunity to internalize the feedback and to work on their mistakes”. In explaining her in-class questioning approach, Freda said she used questions to direct small group discussion. Collaborative learning is one of the key components of assessment as a social practice within the sociocultural theory. For Freda, group discussions allowed students to learn from one another as well as from the teacher, and helped all students to engage with the course content. Freda’s strategy is similar to peer instruction as described by Crouch, Watkins, Fagen and Mazur (2007), where lectures are interspersed with questions designed to reveal common misunderstandings and promote feedback dialogues.

Chris held a similar view because in one of his major assignments he gave the students the option of submitting drafts of an essay. He insisted that, “*students will learn more from drafting than writing a once off essay where all they see is a mark. They are not going to read what they have written again.*” According to Chris, “*feedback on drafts is to help students, put them on track about their learning and help them develop the necessary skills*”. In a similar vein, Kelvin designed some “formative only” practical tasks solely to support students’ development in course specific skills. In addition, he used exemplars of projects completed by previous students to clarify assessment expectations. Johnny adopted a multistage report-writing task, offering feedback at each stage. The primary aim of this assessment strategy was to help students improve their learning and writing by providing them with the necessary guidance in the form of feedback. In this case, students were given formative feedback to assist them in producing the final summative report.

Analyses of all of these lecturers’ feedback practices, based on students’ marked work, indicated that the forms of feedback included identification and correction of errors and suggestions for how to address the knowledge gaps. Apart from the written comments, oral test feedback sessions were held in two of the three courses. A test feedback session’s purpose, explained Freda, was “*to show students what we were expecting from the test so that hopefully by the time the exam comes they could know how to answer certain questions and get better marks*”. The multistage writing and the test feedback clearly indicate harmonised interactions between summative and formative practices and are in line with principles of using ‘feedback as forward looking’ and ‘assessment tasks as learning tasks’.

Assessment as tool leading to improvement of teaching: Chris, Freda and Kelvin emphasised that they also used assessment information to evaluate the effectiveness and quality of their

teaching. Even though Chris complained profusely about the marking, he commented, “...is not just for the mark that we’re giving them, but it contributes feedback into your teaching. I get an interpretation of what I am teaching and how the students are responding to that. However, I do not need to mark a thousand scripts to do that”. Assessment feedback gave these lecturers an indication of the students’ understanding and directed the pace and direction of their instruction. Chris’ comment clearly points to the link between assessment and teaching where feedback arising from a formal assessment practice influences how he adjusts his teaching practices. Similar to Chris, Freda explained her informal assessment approach as follows: “Whenever I choose a new topic in class I put questions to them. So that’s to encourage discussions in class and I also try to give them exam-like questions, where I might just put a couple of questions up and I give them time to work in small groups. I then try to get feedback from them and then we discuss it together”. She commented that this helped her understand “if they [students] understand what I’m trying to get across to them or if something maybe needs to be explained better again”. These lecturers expressed their views of assessment as explicitly being a learning situation for both the teacher and students. Assessment information as personal reflection clarified for the former what they needed to do in order for the latter to be more successful.

Assessment as supporting lifelong learning capacity: Three of the four lecturers (Johnny, Freda and Chris) emphasized the importance of assessment and teaching of scientific processes or methods over discipline content knowledge. In addition, these three lecturers acknowledged that assessment is also about developing lifelong skills rather than leading purely to the identification and correction of errors and measuring learning achievements. Freda’s questioning of the ‘content-driven’ nature of the course curriculum emphasised that she considered that her role was to “teach students to be more critical of what they learn”. Her student centred view illustrates her assertion, explained as, “I think we should give them a strong background not necessarily content specific, but give them the ability to know how to learn new things”.

In relating lecturers’ assessment conceptions to practices, the data revealed the varied assessment strategies (mediating artefacts) used by these lecturers to fulfil the two main purposes of assessment (certification and learning). The varied assessment approaches these lecturers adopted indicate their response to the contextual challenges within their teaching systems. The need for differentiated practice is also important because with massified HE

teachers need to cater for students with differing abilities, capacities, and expectations. It was, however, evident that lecturers found it challenging to create assessment opportunities for students to develop learning autonomy. For example, Johnny had been aware of this oversight and the challenge of this aspect which he verbalized as: *“We can't teach students all the facts that they need to know, that stuff changes, science changes. The skills sets that they will leave here with change but what they need to do is to accommodate for that change... is to teach them to adapt. But how to bridge the gap between filling their minds with stuff and giving them capacity is something I am struggling with”*. What Johnny is highlighting is that the rapid pace at which biosciences knowledge is developing means that curricula and instructional practices have to evolve continually.

Just as science knowledge changes, the CHAT framework views assessment, teaching and learning as dynamic and evolving activities. From this perspective, the major challenge appears to be the reconceptualization of the role of lecturers and students in assessment systems in the 21st century. All of the lecturers involved in this study acknowledged that there were contradictions and tensions evident in fulfilling the various purposes inherent in higher education assessment practices. This has made it clear that a multidimensional view of assessment is needed to address the multiple goals of science teaching and learning. That is, lecturers can explore diverse approaches to assessment to address the science learning goals and students' diverse needs. However, the university-wide system of often overburdening academics and emphasising measurable products sometimes mitigates against this.

Traditional views of assessment that reinforce the hierarchical nature of teacher-student relationship, place the teacher as the only valid assessor and provider of feedback. However, when assessment is considered from a CHAT perspective, it is clear that the division of labour requires collaboration and negotiation of power amongst the teacher and students. Such relationships are deemed conducive for the use of assessment to support self-regulation, self-monitoring and lifelong learning attributes which form part of the goals of science and higher education learning. For example, lecturers can involve students peer and self-assessment in promoting such attributes. However, I also need to acknowledge the mixed opinions about the value of peer and self-assessment reported in the research literature.

Despite the mixed opinions regarding the value of peer and self-assessment on student performance there is growing support for the use of these strategies to promote student self-

regulatory practices (Evans, 2013). With regard to the active involvement of the students in assessment, two of the four lecturers in this study expressed reservations about self and peer assessments. One teacher contended that “*students are not mature enough to assess themselves or peers, and they don’t know a lot about the topic yet*”. Advocates of peer and self-assessment like Boud (1990) point out that “an assumption that students are unable to make judgements undermines their capacity to do so” (p109). However, the research literature reports on similar doubts and concerns regarding students’ ability to assess and give feedback (Lui & Carless, 2006). The accuracy of marking highlighted in the abovementioned comment points out to the need for using peer assessment for formative purposes rather than summative purposes. Additionally, the comment highlights the need to train and support students in giving feedback. Even though the importance of training students in assessing and giving feedback is emphasised throughout the literature, training on its own might not be sufficient. Peer and self-assessment as part of an assessment system in alignment with teaching and learning systems need to take into account the individuals and contextual variables.

Overall, all the four teachers enacted their multiple conceptions of assessment based on what they perceived to be appropriate for this cohort of students and what seems viable in the contexts they operated.

5.5.2 Assertion 2: A number of factors at macro, meso and micro levels influence lecturers’ assessment decision-making.

Assessment as a social practice is constituted at the intersection of micro (individual), meso (interactions at course and departmental level) and macro (institutional and societal) levels. That is, assessment operates within the constraints and affordances of the larger educational and societal systems. Therefore, we can only properly understand assessment and its associated feedback practices if we take into account the social, cultural and historical contexts of its operation (Gipps, 1999). That is, as outlined in Bronfenbrenner’s (1977) ecological system model, assessment activity must be examined in relation to contextual arrangements and in relation to the overarching educational system.

At macro level, the teaching-research orientation of the university and institutional student assessment policy seem to exert minimal influence on how the lecturers conceptualize assessment. Even though the university’s positioning as a research-intensive entity generally

had minimal influence on how the four lecturers viewed assessment and learning one teacher commented on this issue. Chris perceived teaching as secondary and commented, *“The University focuses on saying, you have to publish and you’ve got to teach. However, the emphasis comes on the research and the publishing. When it comes to the crunch ... the publications are what matters”*. The lecturers acknowledged the pressure on them for greater research productivity. However, they all fully embraced their academic identity as both researchers and lecturers. Kelvin commented: *“I choose to work in a university and not at a research institute because I love teaching and interacting with students but I want to be out there doing research as well”*. In all the cases, lecturers claimed that their teaching benefited from their research because *“it makes my teaching very personal, I can explain things from different angles based on my research activities”* (Kelvin). These lecturers regarded research and administrative obligations as part of their professional duties. Clearly, lecturers’ views of the roles will influence how they engage with learning and assessment issues.

In a collective assessment system, different students come in with different motives and needs. The four participating lecturers seemed to be aware that not all the students registered for these courses might be interested in a future career in research. In light of this, they all expressed their reservations about the school's aim of preparing “research ready” students. In Chris’ opinion: *“we rather encompass more a ‘big-wide-world ready’ rather than ‘research ready’. What good is being ‘research ready’ going to do to someone who is working somewhere where they are not doing research?”* This view aligns with his subscription to addressing broader education goals such as enabling *“students to move up in the different level of thinking”*. Therefore, despite the views of the school in which they were teaching, these macro level factors seemed to have a minimal effect on lecturers’ assessment decision-making processes.

It was evident that the lecturers in this study were not familiar with some aspects of the institution’s assessment policy and hence not fully aware of the flexibility advocated by the policy. For example, Johnny was of the view that *“the university requires us to do the final exam”*. However, analysis of the university assessment policy reveals the opposite. For example, final examinations have been de-emphasized and may even be eliminated where deemed appropriate. It may suggest that lecturers are actually not familiar or influenced by the specifics outlined in the assessment policy but by what is happening within the school.

A medley of factors at the intersection of meso and micro levels appears to have exercised a more pervasive and potent influence on lecturers' conceptions and practices. In fact, there is compelling evidence that lecturers' intentions are often more compromised by meso factors than simply by their beliefs and values.

At meso level, lecturers' assessment practices manifest as part of the school culture and, more specifically, course specific structural factors. Within the context of the core courses, participants were greatly influenced by interactions with colleagues and the drive to induct students into disciplinary ways of thinking and practising (McCune & Hounsell, 2005). Status and power relations within the course team structure were some of the issues mentioned by one of the four lecturers. The teacher in question who at the time of the interview felt less experienced was of the view that senior and more experienced team members had more say of how the courses should be structured than junior and less experienced lecturers whose voices were often overlooked. Overall, collegial co-operation or exchange among departmental colleagues seemed to be one strategy of promoting the conceptualization and enactment of assessment practices.

Course structure (duration, team teaching and class sizes) and course specific goals (set curriculum demands) were central to how all the lecturers enacted their conceptions of assessment. In these core courses, the course coordinator decides on the sequencing of the required topics and the duration of the topics offered. Some lecturers only teach the course for one week. All the lecturers mentioned that course specific requirements and course setup were amongst the key factors mediating their practices. The set curriculum in the core courses seemed to limit their enactment of their assessment conceptions compared to the flexibility they were accorded in their specialist courses.

All of the four lecturers in this study mentioned how assessment systems played out differently in a course taught individually (i.e. by one academic only). The duration of the course and the number of lectures each teacher gave in the courses seemed to be major impediments to lecturers' implementing their ideal practices. According to Chris, *"I do not really have enough time to start getting them to think differently about the knowledge provided"*. Freda saw the issue of time differently when she mentioned that *"we need to get away from the thing that we need to cover this content and there is no time for on-going*

assessment. Rather we cover less and have more time for constructive feedback between you the teacher and students”. A number of tensions and challenges surface in this respect.

On one hand, the challenges are related the time needed to effectively address the reforms in science learning, teaching and assessment of developing lifelong learners. On the other hand, institutional issues such as massification and diversification of student body pose a number of challenges. The need for differentiated practice is important under the current contexts where students enter HE with differing abilities, capacities and willingness to self-regulate. However, according to all the lecturers, time constraints and large class sizes were barriers to giving frequent, individualised and detailed feedback as they would have like to. Consequently, teaching assistants with minimal pedagogical training and experiences are employed to give feedback. As a result, students are provided with different qualities of feedback.

Another issue that surfaced from the interview sessions was that academics sometimes reproduced assessment practices developed previously, without questioning their appropriateness. For example, Johnny had adopted some sound assessment strategies (e.g. use of learning outcomes, self and peer assessments). However, he revealed that he had inherited these when he started teaching in the course, and it emerged that even though he saw the value in such practices he had no clear rationale/justification for adopting them. In this case, *“how things were done previously”* (historical) influenced his adoption of these practices. Chris justified his adoption of assessment strategies when he said: *“by default, I rely on tests and exams to assess student learning. I kind of buy into what everybody (cultural) [course team] in the course is doing. In core courses it’s quite different because there is a curriculum that you kind of need to stick to”*. Thus, it is evident that, even though Johnny and Chris had reservations about using class tests and examinations, arguing that their time-limited nature could not adequately test for skills like independent critical thinking and creativity, they adopted them as assessment strategies in the core courses because of historical reasons and due to departmental pressure. Once again, the fact that these lecturers were only teaching for few weeks in the core course may suggest that they had little influence over the assessment strategies.

Academics are immersed in sets of practice which have historical and cultural dimensions, hence their views that *“this is the way things are and have to be”*. Therefore, to summarise,

recurrent practices deeply rooted in the collective culture of the departments and teaching teams in which academic staff belong influence what lecturers regard as appropriate (Trowler & Cooper, 2002).

At micro level, these lecturers drew on a wide range of personal knowledge, training, experiences and beliefs in making assessment decisions. All the participating lecturers displayed a broad learning vision for students, a global understanding of university educational goals, a sense of professional responsibility, but also of having the academic freedom to do what is required to facilitate student learning. Personal factors, such as their experiences as students and experiences in their current teaching, appeared to have influenced their assessment conceptions and practices.

For example, Johnny's multistage report writing strategy that takes a learning-oriented assessment approach was based on his own experiences. He described them as follows: *"I guess my own experience with learning to write, is that it is not something that can be taught in a lecture or sitting in one place in a theatre being told this is what to do"*. On one hand, Kelvin gave personalised feedback using students' names, drawing from his experiences as a student, because *"I know it did wonders for me when I was a student. It affected me in a positive way. When they said 'you could do better' and I thought then I will do better"*. On the other hand, Freda implemented in-class questioning and peer-learning strategies based on what she did not experience as a student but perceived to be good practice. She said: *"the university where I come from lecturers just lectured with no interactions like the one I see here. So I am trying to implement something I never had as a student."* This illustrates how life experiences can have a wide range of implicit and explicit influences on lecturers' conceptions and practices.

Training and professional identity: Discipline-related expertise played an important role in the selection of thinking processes that these lecturers wanted their students to acquire. They were all aware of the need to attract and prepare the next generation of scientists. In addition, they wanted to help all the students to achieve scientific literacy. This seems to stem from their strong science expertise, an understanding of the overarching conceptual coherence, progression, and the nature of their disciplines. Coil and Wenderoth's (2010) contention that successful undergraduate programmes in science enable students to think like scientists seems to resonate with the thinking of all four of the lecturers. For example, in terms of

science teaching goals Johnny emphasized: *“students should be able to do some basic skills that a scientist would have to do. So, being able to think about a question, that is relevant to science and how to phrase the question and how to think about the context of the question, how to take that question and turn it into some sort of study or action. I thought more about what specific tools in terms of reasoning skills and being able to solve scientific problems”*. Nevertheless, expertise and confidence in discipline-specific knowledge, which is the basis for the appointment of these lecturers, seems insufficient to encourage adoption of innovative practices. Within the assessment landscape, the demands on the lecturer to support students to engage in assessment and feedback exchanges are huge. It requires that lecturers have an understanding of academic and social needs of students.

According to Brownell and Tanner (2012) the majority of academics in teaching positions in the science field are science graduates trained primarily in research. Such training excludes the development of teaching identities that are crucial for lecturers in adopting pedagogical approaches that promote “ways of thinking and practicing” in the discipline. Lecturers such as Johnny demonstrate a desire for good pedagogical practice, but see their training as an impediment: *I came out of a college where I did research. Not that I do not enjoy teaching but like M is fond of saying we are all amateurs in this field. Not that we are not willing to try to do better, but for the most part we teach the way we were taught. We think about what worked for us and try to do that! Um, sometimes it works, sometimes it does not*. Despite the complexity of assessing student learning, for these university lecturers learning to do so seems largely to be “learning by doing”, intuitive or based on their own experiences of being assessed. Professional development training and initial pedagogical training (in the case of Chris) seem easily forgotten or ignored in most cases. Johnny and Chris’ commentaries suggest the absence of scholarly knowledge of assessment, and especially of assessment design that addresses higher order outcomes.

5.6 Conclusion

My intention in this study was to provide a deeper insight into the complex nature of assessment in general and the lecturers’ assessment conceptions and practices within an institutional and departmental context. It was therefore important that an all-encompassing framework was employed in answering research questions. CHAT, which incorporates the

activity theory, became an ideal option to explore lecturers' assessment conceptions and practices and their relationships in different contexts and at various levels of their activities.

What emerges from this study is that the multiplicity of science lecturers' learning assessment conceptions and practices need to be understood in terms of competing and conflicting demands. I have attempted to reveal the tensions and struggles that emerged for teachers as they navigated the assessment terrain as dictated by dominant socio-cultural-historical systems. For example, some lecturers' use of class tests and examinations was not their personal preference but they adopted these due to sociocultural influences within larger educational and societal systems. The assessment practices examined in this study embraced two of the learning-oriented assessment principles namely: assessment tasks as learning tasks and forward looking feedback. What became apparent is that there are pockets of learning orientated practices driven by individual lecturers. Therefore, it appeared that the assessment practices in this school were still focused solely on teacher driven assessment and feedback processes. Some teachers' concerns about students' ability to assess and give feedback may partly account for the lack of active student participation in assessment. However, it should be noted that implementing peer and self-assessment approaches in team-taught modularised courses might not be a viable options for individual lecturers.

The key finding in this study is that established teaching-learning assessment practices operating at meso level appeared to dictate how lecturers implemented assessment. Evidence presented in this study reveals that established practice largely dictates how things are done in the courses. Implicit regulatory course frameworks (largely tacit and unquestioned or uncontested) seem to minimize lecturers' sense of agency or control over established assessment practices. In most cases, these academics-as-assessors faced various challenges in the varied objectives of the assessment system. Lack of time or power to make changes and to some extent the acceptance of established practice impedes opportunities for staff to create space to try out new formative learning opportunities or to consider the influence of pedagogy and theory on their practice. These established assessment practices did not fully support innovations that individual lecturers personally wished to introduce in the courses.

Therefore, one could conclude that for learning-oriented assessment approaches to be entrenched at more than the individual teacher level, it is crucial that support is provided at course and departmental level. In addition, opportunities should be created for all lecturers

involved in teaching a course to get together to discuss these issues and together decide how and when alternative practices would be most appropriate. Nevertheless, at a basic level of educational professionalism, individual lecturers may make formative assessment effective, even within existing curricular structures and constraints. Lecturers may undertake personal initiatives by being motivated and willing to develop their knowledge and understanding of assessment methodology and feedback based on their students' needs. However, their sense of agency is needed to negotiate and challenge departmental contextual impediments to learning orientated assessment practices. One might conclude – or suggest – that educational development programs could be tailored to help and encourage lecturers to be self-aware about the nature of their conceptions, their social-cultural roots and the implications thereof. Hence, training programs could focus on assessment literacy for lecturers and support them in becoming effective, reflective practitioners.

Perhaps surprisingly, initial and continual professional development programs that do provide sound assessment workshops seem largely ineffective in enabling lecturers to implement the practices when back in their school context. In the school level teacher professional development literature, Supovitz and Turner (2000) alluded to the difficulty of changing classroom culture and teaching practice through short–one-off workshops. They reckon that classroom practices and cultures are mostly deeply affected after intensive and sustained staff development activities. This might be because lecturers are powerless to implement such practices in the broader school assessment culture. Therefore, there is a need to contemplate alternative ways to achieve professional development.

Academic developers seeking to encourage sound approaches to assessment may gain insights from this study about the constraints and enablers of learning-oriented assessment practices. Cognizant of the dynamics of interplay between personal and contextual factors, they should consider collaborative action research that engages lecturers in their departmental and course contexts. Such interventions should engage lecturers in iterative cycles of use of new assessment tools, reflection on their use and adaptations and revision of the tools. Based on this study's key finding that assessment practices are predominately influenced by courses and departmental culture, I suggest that established practice needs to be interrupted and reconceptualised for a change to occur.

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CHAPTER SIX

General discussion, conclusion and recommendations

Introduction

This study was about one aspect of the teaching and learning system namely, assessment and feedback systems. Understanding such systems in which lecturers and students interact was going to be complex if the approach was to have been monolithic. Due to the complexity of assessment, I had to approach this research from various angles. My approach was therefore varied (and specific for a particular focus) where I used different frames of reference in chapters 2 to 5. Each chapter has presented a paper, which answered particular research sub-questions. In chapter 2, I used the learning-oriented assessment ¹⁸(LOA) framework to explore and characterise assessment practices in the selected core bioscience courses as experienced by students. I need to emphasise that learning-oriented assessment is a pedagogical approach that cannot be separated from learning and teaching. In this study, I put assessment under the microscope using LOA as a tool to review how it contributes to learning and teaching processes and to expose the challenges of implementing learning-oriented assessment approaches.

In chapter 3, Sadler's (1989) and Hattie and Timperley's (2007) conceptualisation of feedback together with dialogic feedback (Carless, Salter, Yang, & Lam, 2011; Nicol, 2010) and sustainable assessment feedback (Boud & Molloy, 2013; Carless et al., 2011) concepts were used to analyse feedback experienced by students in these courses. Students' emotional experiences of feedback that emerged from the results outlined in chapter 3, was the point of focus in the paper presented in chapter 4. In that paper, Nussbaum's (2001) definition of emotions and Pekrun's (2006) control-value theory of achievement emotions were valuable in understanding students' emotional reactions. In chapter 5, I adopted a case study approach to understand lecturers' conceptions and practices of assessment and feedback using the cultural-historical activity theory as my conceptual framework.

¹⁸Learning-oriented assessment is about tasks that are foregrounded in order to create information to help future learning (Knight, 2006, p. 445). Carless (2014) defines learning-oriented assessment as assessment where a primary focus is on the potential to develop productive learning processes.

The purpose of this chapter is to reflect on the findings presented in the preceding chapters in order to answer the following overarching research questions:

1. What are the current assessment practices in selected bioscience courses?
 - a. How do bioscience lecturers conceptualise science-learning assessment?
 - b. What influences lecturers' decision-making about assessment practices?
2. What are students' views and experiences of assessment and feedback in biosciences courses?
3. What are the relations (if any) between students and lecturers' views of assessment and feedback practices?

Figure 6.1 illustrates my approach to answering these research questions.

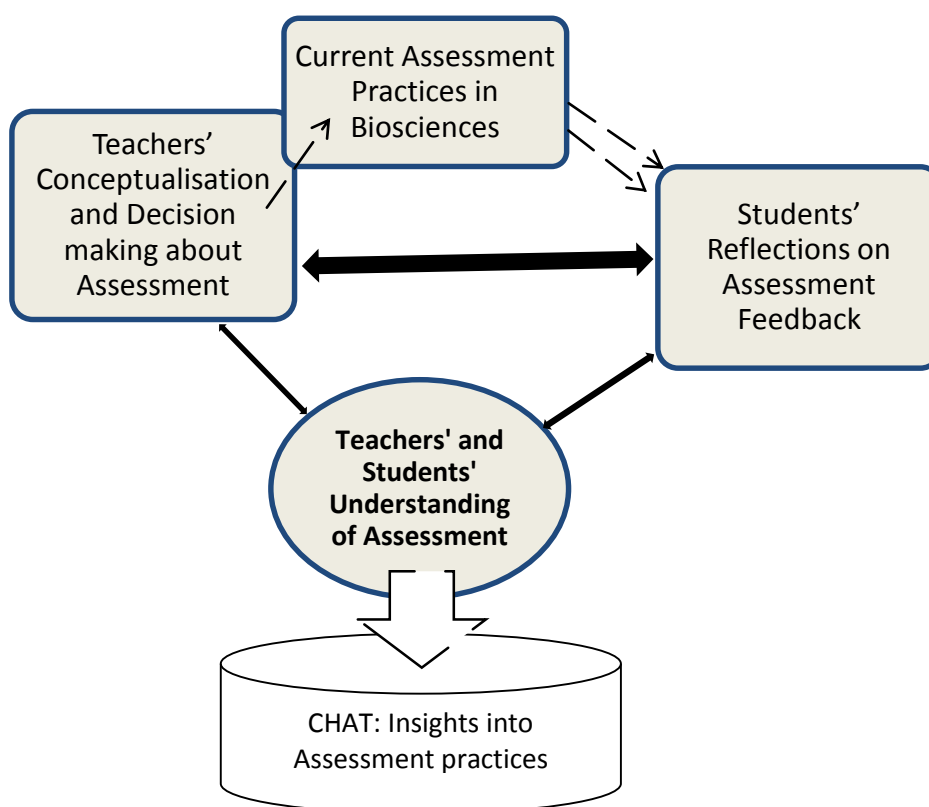


Figure 6.1: Consolidated synthesis of the research study

Briefly, the argument I make in relation to this study's overarching research questions is that current practices of assessment in the selected courses have been less effective in addressing diverse educational needs of majority of students, their expectations of higher education and

their future learning needs. Students' mixed and varied accounts of emotional reactions to these assessment and feedback practices are to some extent due to assessment systems overlooking students' personalised needs. The dominant preference of summative assessment systems in these bioscience courses indicates teachers' backgrounds or experiences about assessment or its practice. It is apparent that assessment practices in this higher education context have not evolved enough to keep pace with the changing contexts of education. The much publicised moves towards learning-oriented assessment approaches which calls for radical changes in lecturers and students' perceptions of the roles are apparently still not used especially to address the diversity of student cohort in higher education.

Although lecturers as designers of these assessment systems portrayed multifaceted conceptions of assessment, their practices do not reflect what the research literature tells us about effective assessment and feedback practices or indeed what they themselves consider to be ideal. Modular team-taught course structures, time constraints and historical school¹⁹ practices overwhelmingly account for inconsistency between lecturers' conceptions and practices of assessment. Overall, the lack of shared understanding between lecturers and students about the prioritisation of the various purposes of assessment; students and lecturers' perceptions of their own roles in assessment; differences between lecturers' perceptions and expectations in team-taught courses and expectation gaps between students and lecturers are the major sources of tensions in these course settings.

Social settings similar to assessment, teaching and learning environments by their nature reflect different cultures and histories. In the context of this study, the classroom is the setting in which students and their lecturers from different cultural, historical backgrounds of teaching and learning meet. It is important to understand from the outset that this is already a complex setting in which the very complex nature of assessment and feedback in biosciences core courses has been investigated. In light of this setting, I have used the all-encompassing cultural historical activity theory (CHAT) to examine the complexity of the assessment activity system. Next, I embark on a brief explanation of key aspects of CHAT followed by an analysis of the findings of the overarching research questions using CHAT as a frame of reference. Also discussed, are the strengths and limitations of this research. Finally, after

¹⁹ In this thesis, I use the term *school* for what could be considered a *department* in other contexts.

drawing conclusions from the research findings I discuss their significance and make recommendations for practice and further research.

6.1 Assessment and feedback interactions in classrooms

Higher education institutions are both a socio-cultural reflection of the wider society and a driver of change in society. These institutions are in many instances a reflection of what is valued in society. In this study, I view the university and its classrooms as a system of intellectual activity. Students and their lecturers are continuously engaged in interactions of teaching, learning and assessment. Apart from serving a crucial role in higher education learning and teaching contexts, assessment is meant to serve multiple purposes that can be interpreted differently by lecturers and students. The multifaceted nature of assessment makes it a complex process. Unravelling the complexity of how and why lecturers assess science learning the way they do and how students experience such practices of assessment requires a multidimensional framework. Cultural historical activity theory (CHAT) provides theoretical concepts for understanding the development and transformation of assessment systems in their broader institutional social and cultural contexts.

According to socio-cultural theories to which CHAT belongs, classroom activities function on multiple scales that are contextually or time related (Lemke, 2001). Contextually related scales take into account the ecosystem, community and the individual. Time related scales on the other hand are historical and evolutionary. CHAT considers both contextual and historical scales. These scales are relevant and appropriate in our quest to understand why current assessment practices in bioscience courses are the way they are. Moreover, for this study of assessment steeped in the complexity of cultures, histories and personalities, some theoretical concepts of CHAT are appropriate to explore assessment interactions between and amongst lecturers and their students at course level.

Key constructs of CHAT salient to this study are collective, object-directed and artefact-mediated practices in interacting assessment systems of lecturers and students (Fig 6.2). The concept of interacting systems not only foregrounds tensions and contradictions inherent in the multiple objects of assessment by the subjects (lecturers and students) but also reveals the historically evolving nature of activity systems. Teaching, learning and assessment

collectively are a system in the social and educational realm of a university. The current use of cultural historical activity theory in the literature tends to divert attention away from individuals' actions emphasising the collective social system (Edwards, 2005). However, my argument is that we cannot understand the collective without knowing about the individual parts of this collective (e.g. artefacts, subjects, rules etc.) as presented in figure 6.2. My premise is that lecturers and students are participants in an assessment social system. That is, I recognise the importance of lecturers and students and their contributions as individuals and as a collective in an assessment activity subsystem of a broader teaching and learning system.

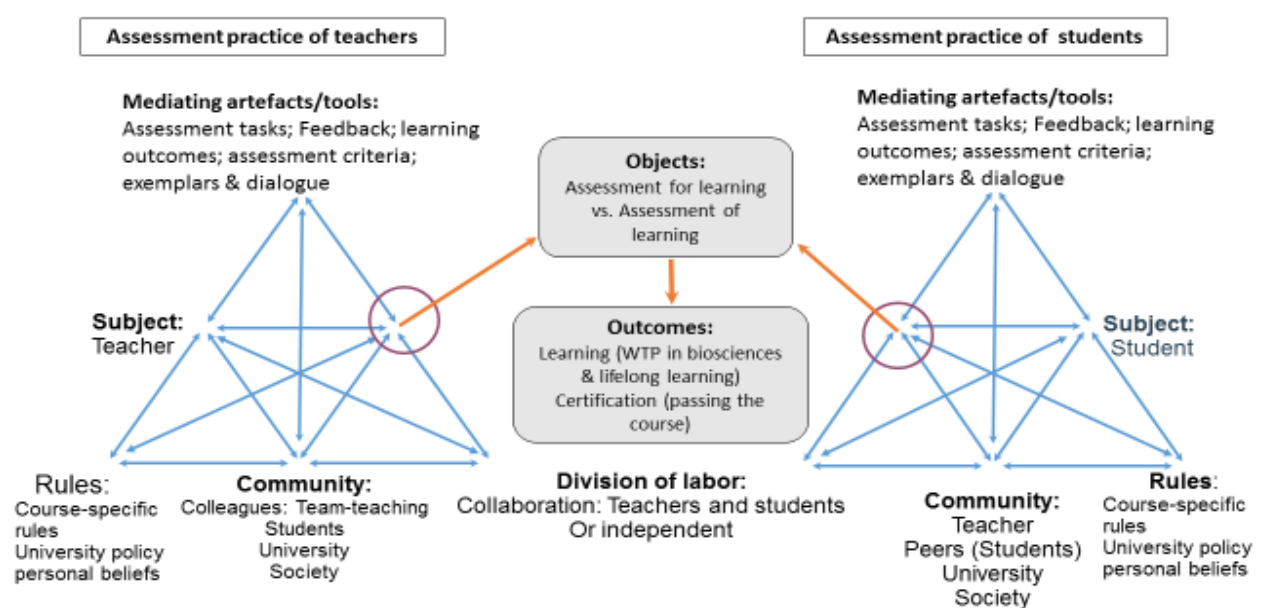


Figure 6.2 Two interacting activity systems of teachers and their students during assessment and feedback encounters (Adapted from Engeström, 2001)

According to Engeström (2001), the prime unit of analysis for understanding activity systems is their collectiveness and object-directedness. The two interacting and overlapping assessment activity systems in figure 6.2 demonstrate how lecturers and their students might interact collectively towards teaching and learning in a bioscience course. Locating assessment as a collective social system means it is an activity operating at an intersection of individual lecturers and students who bring into an assessment activity their differing motives and objectives. In the parlance of activity theory, lecturers and students take actions as directed and motivated by personal goals in order to satisfy their needs which may not

necessarily be shared. Thus in order to understand the activity of assessment and its related feedback, a situational analysis of the lecturers and students' object-directed actions is necessary.

Figure 6.2 illustrates the complex relationships between various elements in the students and lecturers' interacting assessment and feedback systems. In assessment, students and lecturers who are part of the wider academic community perform a number of actions (e.g. writing an essay or test, marking or giving feedback) to satisfy their motives or objectives of the activity. On one hand, lecturers' goal-oriented actions may be motivated by institutional assessment policies, teaching, and learning plans, school or disciplinary rules (explicit or implicit) or simply by their personal commitment to enrich the students' learning experience. Students' actions on the other hand may be influenced by their personal histories, experiences and goals. Apart from personal factors, other mediators of the activity include the *rules* underpinning the institution assessment activities (e.g. course structures, marks, class sizes, etc.), the established *division of labour*, and the *mediating artefacts and tools* available at community level.

To comprehend the assessment activity in its totality, one must understand the artefacts that mediate the actions taken by lecturers and students. Wertsch (1998) puts it clearly, when he says "agent-acting-with-mediational-means" is the basic unit in describing human activity (p.485). In activity systems, lecturers and students can use *cultural and conceptual mediational artefacts or tools* as a means of addressing the objectives of an activity system. In the case of assessment activity, lecturers and students can use a wide range of tools (e.g. tests, essays, explicit learning outcomes, assessment criteria, exemplars and dialogic feedback) to address the various purposes of assessment. It is worth noting that artefacts do not only entail material or conceptual tools but also encompass social structures (Hora & Ferrare, 2013). For example, explicit and implicit *rules* in which the community (school) operates and the *division of labour* reflecting the roles lecturers and students play within an assessment system mediate the enacted assessment and feedback practices. All of these multiple mediators occurring within cultural and historical contexts shape lecturers and students' objective-directed actions.

Over time, the objectives of an activity system change. This change might in turn transform the activity system. CHAT's principle of historicity helps us understand tensions that arise in these evolving activity systems. For example, historically assessment was usually used solely for measuring students' achievement at the end of a teaching episode. However, the current view of assessment is that it is used to help students and teachers learn. Hence, the notion of learning oriented assessment is for enhancement of both teaching and learning. Due to the change of how assessment is viewed currently, multiple or overlapping purposes of assessment which need to be catered for in assessment systems may present *tensions* and *contradictions*. For instance, using an assessment task for both measurement and for learning can create confusion and frustration amongst students. In the case of assessment, "an expansive transformation is accomplished when the object and motive of the activity [assessment] are reconceptualised to embrace a radically wider horizon of possibilities [such as for learning purposes] than in the previous mode of the activity [measurement purpose]" (Engeström, 2001, p. 137). In light of the underpinning principles of CHAT, it is evident that CHAT is an appropriate framework for analysis of the findings of the overarching research questions. Next, I analyse the answers to the research question using CHAT as a frame of reference.

6.2 A sociocultural-historical explanation of assessment and feedback discourse in a bioscience courses

To answer the research question: '*What are the current assessment practices²⁰ in selected bioscience courses?*' and its accompanying sub-questions, I draw on data presented in chapters 2, 3 and 5. Assessment practices in the bioscience courses are teacher-driven and predominately focus on assessment *of* learning (summative) rather than assessment *for* learning (formative). That is, both assessment tasks and feedback practices seem to be more focused on the end-product which are marks rather than on the process of learning. In addition, these assessment systems are limited in supporting lecturers in fully enacting their conceptualisation of assessment. Furthermore these systems are limiting lecturers in supporting students with diverse learning needs and preferences. Notably, these assessment

²⁰In this study, current assessment practices refers to assessment as practiced at a particular time of its evaluation such as at the time this study was conducted.

practices are discordant with some of the principles of effective assessment and feedback practices we read about in the research literature.

The findings presented in chapter 2 indicate that high stakes mid-course tests and end-of-course examinations contributed at the least 50% to the final course mark in all the three courses. In relation to coursework, besides fulfilling their primary formative purposes, all the coursework tasks were essentially summative in their purpose. Coursework marks accumulated throughout the courses formed part of students' final course marks. For example, weekly practical or laboratory reports primarily designed for formative purposes also contributed towards the final course mark. All of these findings indicate that assessment in these courses was more summative. My main concern is that features and benefits of the formative and learning focused aspect of assessment (e.g. provision of feedback) in tests and coursework are most likely to be lost if they are assimilated into a summative assessment.

Both summative and formative assessments can be formative in nature if used by teachers to adapt their teaching, and for students to improve their learning. However, the blurred lines between formative and summative tasks in these courses seem to limit students in understanding the purposes of various assessment tasks and feedback. For example, lecturers designed mid-course tests with the intention not only for summative purposes but also to give students feedback to be used in preparation for examinations. However, the majority of students ignored the formative aspect of class tests and just concentrated on the marks awarded. In some cases, students alluded to ignoring the written comments if their marks were perceived to be good. In cases, where lecturers designed multi-staged activities or gave students drafting and resubmission opportunities, some students used these activities solely for improving their marks rather than using this as a learning opportunity. All of these instances where students overlooked formative feedback from summative tasks or used feedback from drafts or resubmissions solely to improve their marks support my view that current practices are orientated towards summative assessment.

In light of CHAT, the heavy reliance on timed mid-course closed book tests and end-of-course examinations indicates that traditional assessment processes continue because of their long established history. Apart from traditional practices continuing within courses because they are inherited, lecturers have limited contact time with students to bring about changes they consider important for enhancing learning. The on-going historical influence of the

summative orientation to assessment is evident in the way tasks for formative purpose are used. A lack of clear integration between coursework assessment tasks designed to facilitate learning and the exam/tests designed to measure current learning in these courses poses a challenge in using assessment to facilitate learning. I do acknowledge that it is possible for an assessment to have both formative and summative aspects, but when the summative aspect is dominant, the formative aspects are often not realised.

In relation to feedback, the outcomes of the analysis of feedback practices presented in chapter 3 indicate dominance of summative-type feedback, which might orient students to achievement rather than to learning approaches to assessment. Students in these courses experienced teacher-provided feedback mainly in the form of marks and symbolic notations (ticks and crosses) which I regard to be disclosures of achievement or non-achievement and not feedback. Based on the literature, feedback is not feedback unless it closes a ‘gap’ between current performance and expected standards and produces changes in student’s future learning and in particular self-regulatory capabilities (Sadler, 1989). The prevalent provision of feedback in the form of corrections and editing predominately focuses on addressing the current learning gap and ignores students’ self-evaluation capabilities.

Despite the fact that the majority of the on-script written comments were of a telling-nature (telling students directly that it is wrong), there were few instances where lecturers elicited self-assessment from the students through questioning. For example, comments like ‘why, how about...?’ (Section 3.6.1) might prompt students to reflect on what they did. Limited questioning type feedback and the dominant telling type feedback are discordant with the current thinking of assessment of assessment as communication or dialogue. My findings reveal that few activities within the current courses’ practices were designed to promote dialogues and active student involvement. Overall, the current practices are generally discordant with sustainable assessment and feedback ²¹ principles.

A central aspect of sustainable assessment and feedback, which is the development of students’ self-regulation capabilities, is limited in these courses. For example, the

²¹Sustainable assessment and feedback is defined as ‘dialogic processes and activities which can support and inform the student on the current task, whilst also developing the ability to self-regulate performance on future tasks’ (Carless, et al., 2011 p.397).

categorisation of feedback comments outlined in Table 3.1 indicates that forward-looking type feedback comments accounted for only 11% of analysed comments. The scarcity of dialogic feedback geared at actively engaging students in order to help them develop self-assessment capabilities is the basis for my argument that current practices cannot be sustained. Current practices still locate responsibility for assessing and giving feedback solely in the hands of lecturers and relegate the students' role to one of receivers. These practices undermine learners' ability to be self and peer assessors and feedback providers. However, I need to stress that the results of this study indicate that implementing dialogic and collaborative assessment designs presents difficulties for students and lecturers in the current HE context.

Based on preference for traditional ways of assessment in these courses my argument is that students are peripheral participants in these current assessment practices. That is, students are still left out in explicit formal self and peer assessment. Implementing participative assessment strategies in which students are encouraged to participate and interact, requires effort from both lecturers and students. From a CHAT perspective, assessment activity as a collective system should involve both lecturers and students. What is apparent in current assessment practices in these courses is the lack of crucial change in division of labour for a collective shared assessment practice between lecturers and students.

Having painted the picture of the assessment landscape in the core courses, of interest now is how the current practices came to be. CHAT allows us to understand the structural determinations of current assessment practices and the tensions that emerge in activity systems. As lecturers are the designers of these assessment environments, I therefore address the questions: How do lecturers conceptualise assessment and what influences their decision-making about assessment practices? Findings reported in chapter 5, revealed that lecturers conceptualised that the main purposes of assessment were for measuring achievement (summative assessment); for supporting learning (formative assessment) and for developing graduate attributes such as life-long learning and self-evaluation capabilities in students. These purposes of assessment are inextricably woven together and, given the modularisation and team-taught course structures, it is probably impossible to separate them in practice.

The problem is that although these higher education lecturers want students to achieve higher order level learning, they continue to use assessment practices that are not effective at promoting such learning. During the interviews, lecturers referred to higher level learning goals such as critical thinking and lifelong learning but their assessment practices predominately catered for summative purposes. The nature of timed tests and examination as I have indicated in Chapter 2, mean that testing is often more at comprehension or application levels than at higher cognitive levels like evaluation. Clearly, there is misalignment between lecturers' intentions and their practices in terms of making students take responsibility for their learning. Boud and Falchikov (2006) warn that "without having the development of students as assessors as a clear goal translated into specific practices we may end up inadvertently undermining what we are trying to achieve" (p. 404). That is, it is essential to ensure alignment between lecturers' intentions and practices.

The findings presented in chapter 5 indicate that what is assessed and how it is assessed is not only framed by lecturers' personal beliefs but relies on a combination of cognitive, sociocultural and contextual mediational factors. Some assessment practices related to coursework that were developed by individual lecturers reflect their personal choices. Decisions around coursework assessment tasks were based on lecturers' pedagogical beliefs and their views about students and their needs. However, personal factors also seem to hinder lecturers in enacting their intentions. For example, Johnny, one of the lecturers I interviewed for this study, alluded to his lack of training on how to use assessment to develop graduate attributes such as critical thinking and lifelong learning. Lack of training is likely to lead lecturers to overlook such learning in their assessment design.

To achieve sustainable assessment practices, the onus is on the lecturers to create opportunities for students to learn how to assess and to practice assessing and providing feedback to themselves and peers. Although support for peer and self-assessment has grown within international educational research over the past two decades, it appears that such practices have not yet had a significant impact on these lecturers' practices. The evidence presented in this study suggests that both lecturers and students are not comfortable with the ideas of peer and self-assessments. For example, some lecturers had negative attitudes and mistrust regarding self and peer assessment, which led to such practices not being explored in their assessment designs. The reality here is that such discomfort and mistrust concerning this form of collaborative assessment designs limits the possibilities of achieving sustainable

practices. Nonetheless, apart from the social dimensions underlying lecturers' personal intentions and actions, I also identified cultural and contextual factors as having a major influence on the adopted summative assessment practices.

In relation to my claim that the current assessment systems do not support lecturers, I want to draw on findings on contextual factors mediating lecturers' assessment decision-making identified in chapter 5. The nature of the core courses (multi topics and lecturers) and their aim to address mastery of fundamental processes, skills and concepts significantly influence lecturers' assessment decision-making processes. Some of the current assessment and feedback practices clearly indicate the drive by lecturers to develop students' ways of thinking and practising (WTP) in biosciences (McCune & Hounsell, 2005). For example, the field and research reports used in the courses acculturate students into the WTP in the discipline. While collegiality and interactions at disciplinary, school and course level may appear to be essential enablers of assessment professionalism it can also be manifested as maintaining the tradition, or doing what everybody is doing.

It is evident from the interviews, that lecturers have leeway with regard to course work related assessment decision making. Interestingly, lecturers' autonomy in determining their course work aspect afforded them freedom to do "learning focused assessment tasks". However, they felt obliged to comply with the perceived mandatory test and exams components of the course. Some lecturers felt they needed to keep the tradition in the courses going. For example, lecturers (Chris and Johnny) felt obliged to use tests and examinations even though they felt restricted by these existing cultural tools. At course level, resiliency of tools such as timed tests and exams bring tensions into a system where lecturers are striving to address emerging assessment for learning 'objective' of the system. The lack of a shared holistic approach to assessment and feedback among teaching teams in these team-taught course results in disconnected assessment systems.

Iterative cycles of dialogic assessment and feedback implied by assessment for life-long learning are not plausible in these seven-week team taught courses unless a coordinated holistic approach to assessment is taken amongst the teaching team. My findings (chapter 5) indicate that contextual realities at course level fail in supporting lecturers' move towards learning-oriented assessment (LOA) practices. Lecturers in the core courses have limited

contact time (1 – 3 weeks of contact) with the students. This constraint reduces the time and opportunities for lecturers to put into action their desires of using assessment for learning. Additionally these constraints do not afford lecturers the time to create space and culture necessary for achieving formative assessment. Establishing appropriate culture and the necessary tools for LOA within modularised and team-taught courses requires time. Lecturers and students need time to build students assessment literacy and trust amongst students and between students and lecturers. The course structure limits lecturers' risk-taking by lecturers and does not encourage them to try out innovative approaches. It also restricts the time available to reflect on new approaches they might have introduced.

The current assessment system does not allow students to develop a clearer understanding of how they can personally improve their learning with the guidance of the individual teacher or team of lecturers. Instead, the system focuses on helping students to improve their marks. Overlooking students' needs and preferences, and the social relational dimension of assessment undermines the potential of assessment in supporting students' active engagement in assessment and feedback activities. Giving students opportunities to develop self-evaluation and self-regulation capabilities will enable them to participate fully in assessment helping them to understand the complex nature of assessment. Such practices have a potential of socialising students into the ways of thinking and practising in science.

In sum, this research highlights the challenges, complexity and dynamics of assessment decisions lecturers make in their courses. The assessment practices in the courses are clearly geared at supporting students in acquiring discipline-specific skills and knowledge. However, the assessment environment in these courses does not contribute to addressing the higher education aim of developing independent and lifelong learners. The current assessment system does not allow students to take responsibility for their learning. At the same time, current practices do not help lecturers develop clearer ways of using assessment for student learning. In my opinion, the historical dominance of summative assessment together with the contextual realities come out strongly in this study as jeopardising lecturers in putting into practice their intentions of enabling students' learning through assessment. To address the current challenges in relation to assessment, lecturers' awareness of students' experiences and reactions will put them in a better position to review these contextual factors in pursuing sustainable learning oriented teaching and assessment approaches.

Students' Reflections on their Assessment and Feedback experiences

Findings presented in chapters 2 and 3 responding to the research question: 'What are students' views and experiences of assessment and feedback in biosciences courses?' indicates varied and personalised students' views of assessment and feedback. A key finding presented in chapter 3 regarding students' views of assessment practice, is that students' goal orientation or motivation, intentions and needs impact on whether they react negatively or positively to the feedback they receive and to the assessment strategies used. Despite the variation and personalised students' assessment experiences, these experiences can be polarised as measurement and learning-oriented. Generally, students felt that tests and examinations seem to have no purpose other than for measuring their learning. On the contrary, students viewed assessment tasks associated with research or laboratory investigations as contributing to their development as future scientists or what McCune and Hounsell (2005) refers to as ways of thinking and practising in biosciences. While not ignoring the possible influence of students' prior educational experiences, my main claim here is that what students experience in terms of teaching and assessment in the current courses orientates the majority of them towards performance goals.

The findings presented in chapter 2 indicate that students' assessment experiences overlapped with what was evident in assessment practices used in the courses. As I have indicated in the previous section, the current assessment practices focus on summative rather than formative assessment. Performance goals displayed by students in this study might reflect their experience of a predominately summative oriented assessment system. I am not pretending that marks are not important especially in the context of this study. However, my argument is that if students regard performance as the all-important aspect of assessment above learning, they will in turn appraise all assessment activities in relation to achieving high marks. The overwhelming preferences of students for prescriptive feedback, corrective feedback and a performance-oriented approach to formative assessment support my claim that students are orientated towards their assessment marks. Students want to be coached in the form of feedback on how to learn to perform (i.e. attain high marks). That is, students want to simply act on what they are told to do rather than evaluating feedback for future learning (Orsmond & Merry, 2011). Perhaps, it might be the case that students are reflecting what the university and/or society consider as all-important (marks)? Using Bronfenbrenner's (1977)

phenomenon of reciprocity, this might also be indicating the influence of students' perceptions of assessment on the how teachers enact their assessment conceptions.

Apart from the societal factors, a range of factors can influence student perceptions of assessment. Students' personal factors, lecturers' factors, assessment task design and contextual factors contribute to how and the extent to which students view and react to assessment and feedback practices. CHAT helps us understand that students' perceptions are framed in contexts of the assessment systems in which they are engaged. That is, students' perceptions of assessment are a result of a dynamic interaction between assessment contexts and individual attributes. Given the individual nature of assessment experiences, it is perhaps unsurprising to find that the value of different feedback and assessment methods varied from one student to another. For instance, whilst some students found oral group feedback, model answers and exemplars helpful, others found them frustrating and depressing. Students react negatively or positively to the feedback they receive depending on their beliefs of teaching and learning relations and responsibilities and most importantly their expectations in terms of the outcomes of their learning.

With a diverse student body in terms of prior education, learning needs and expectations of higher education, the diverse and mixed range of emotional experiences reported in chapter 4 are inevitable. These findings further support the idea that emotions are critical in assessment settings but also extend our knowledge of the range of emotions students experience and the antecedents of the emotions. Students' emotional experiences of assessment and feedback spanning from "pride, satisfaction-happiness, appreciation and contentment" to "cynicism, anger, fear, disappointment and hopelessness" attest to the individualised nature of experiences. Using assessment and learning to promote equality is at the heart of the many challenges in the context of post-apartheid South African higher education. The majority of students in the current South African context come into higher education with expectations of primarily obtaining good marks and graduate (few stress employability skills) in order to secure a good employment and to justify investment in higher education by their families. The gap between students' needs and what learning and assessment offer students in achieving their goals is the major source of emotions reported in this thesis.

Roth's (2007) contention that "emotions reflect the relationship between motives (needs) and success or the possibility of success, of realising the action of the subject that responds to

these motives” (Leont’ev, 1978 cited in Roth, 2007 p.45) enabled me to see the link between CHAT and emotions. From a CHAT perspective, emotions represent a relation between the motives/needs of an individual, her/his goal-directed actions and outcomes in a particular context. That is, I was able to see how the diverse needs and motives students have in partaking in assessment and feedback linked to their emotional reactions to such processes (Table 4.3). My findings indicate that in instances where assessment practices failed to meet students’ needs or ensured them of possibilities for success negative emotional experiences such as anger, hopelessness and disappointment ensued.

The preponderance of negative emotions reported in chapter 4, undoubtedly gives reason for concern. Lack of shared understanding between students and lecturers leading to students’ poor performance which in turn resulted in frustrations, hopelessness and in some cases intentions of abandonment of studies is concerning. Despite the provided feedback and the transparent learning outcomes and assessment criteria, some students in this study remained confused about what was expected of them in assessment. It might suggest that students possibly come into assessment systems with unrealistic expectations. Another possibility is that students are not adequately supported in utilising criteria or feedback. Hence, they are failing to use or even recognise the feedback to make connections between feedback and the work they produced and to ultimately self-correct.

The analysis of students’ reactions to assessment and feedback undertaken in this thesis, demonstrates that the power of assessment and feedback in supporting students’ learning and academic performance is not only about the how (strategy) or the what (content) dimensions of assessment but is about how students value and engage with such processes in meeting their needs and goals. That means that, the value or effectiveness of assessment and feedback resides in the way a student interprets these processes. The considerable variations in what students view as effective assessment and feedback implies that offering diverse assessment strategies could benefit many students. It is also imperative that students’ control and expectancy appraisals of assessment and feedback, which are the main causes of emotional responses to assessment, be properly managed through assessment literacy development.

Re-engineering of an assessment culture where assessment and feedback understanding is mutually shared between students and lecturers is essential for students’ active participation in assessment. With current student numbers and growing student diversity, the provision of

effective feedback is a significant workload factor for lecturers. A major casualty is the amount and quality of feedback given to the student, which might predictably have negative effects. This makes a valid case for supporting students in developing self-evaluation capabilities. Students' emotional reactions to assessment and feedback offer important insights to lecturers wishing to use assessment for learning purposes. This study highlights that for some students negative emotional reactions to assessment and feedback can taint the overall learning experience. In sum, the most important aspect emerging from this study is that the approach to understanding the student assessment experiences, by focusing on the content/cognitive dimension (what of assessment and feedback) and a strategic dimension (how of assessment and feedback) while overlooking the social relational dimension, does not provide an accurate reflection of what is actually happening.

Lecturers and Students' understanding of assessment

The findings from chapters 2 to 5 help us answer the research question: What are the relations (if any) between students' views and experiences of assessment and lecturers' conceptions and practices of assessment? Students and lecturers generally share the same views on some aspects of assessment and feedback. For example, lecturers and students seem to agree that traditional closed-book time-constrained examinations are irrelevant and inappropriate in supporting student learning and development. Interestingly, both lecturers and students had reservations about self and peer assessments. Potential benefits of implementing self and peer assessment appear to be overshadowed by concerns relating to social relations, trust and self-confidence between and amongst lecturers and students.

Literature on assessment for learning promotes peer- and self-assessment as strategies that actively involve students in the process of assessment. Interestingly, some lecturers alluded to their mistrust of student capability to assess their own work and their peers' work. The evidence presented in chapter 3 and 5 suggests that implementing collaborative assessment and feedback approaches seem to present difficulties for students and lecturers. Likewise, data presented in chapter 4 suggest that students are reluctant or lack confidence in their ability and/ or their peers' ability to assess. Both lecturers and students might have had little experience of this type of collaborative assessment approaches as part of the learning-teaching environment. All of these may be due to lack of assessment training and support in using assessment tools.

Even though it might seem like an over-generalisation, cynicism by one student about teacher feedback can pose a huge challenge in using assessment for learning. However, it is not surprising that students might be responding this way in these course environments. This is because, the course structure (team teaching and duration of course) does not afford students opportunities for interactions and engagement in a socially trusting context. It thus appears that the reconstruction and negotiation of classroom division of labour and social relations is needed to address trust issues in assessment. Lecturers and students need to see assessment and feedback as integral iterative elements of teaching and not as an add-on (Hounsell et al., 2008).

Whilst both lecturers and students share the view that assessment is for supporting and measuring their learning, a few differences in their assessment interactions emerged. The primary cause of dissonance between lecturers and students in assessment contexts is when there is an expectation gap between students' anticipations and their actual experiences in the assessment system. This study's finding that lecturers' intentions when designing assessment activities and giving feedback is not accurately perceived and acted on by students is consistent with findings of studies by Higgins, Hartley and Skelton (2002) and Orsmond and Merry (2011). In some cases, students might be using assessment tools differently from what was intended by their lecturers. For example, students might use criteria or standards as a device to meet their performance goals instead of using it to internalise standards and in order to become more self-regulating and independent learners.

The discrepancy between student and teacher perceptions might signal that students do not have an accurate or complete picture of purposes of assessment in their disciplines entails. Perhaps the most compelling finding linked to the discrepancy is that students do not view assessment and feedback as offering them opportunities to achieve their goals - be it performance or learning goals. The findings drawn from chapters 2 to 5 also indicate that views amongst the lecturers and students about the prioritisation of the purposes of assessment and their roles in the assessment system were the major source of tension.

Another point to consider is that the discrepancy can also be the result of lecturers' assessment decisions and implementation based on their unclear conceptualisation of assessment or due to contextual constraints such as modularisation. Lecturers often work on

assumptions, for example, that giving feedback and assessment criteria automatically means that students will be able to engage with such processes. For lecturers the effort put into using assessment to support student learning might not be seen as such by students when their focus is on marks. Giving quality feedback might be challenging if students are not trained to engage with such feedback, or if assessment criteria are not understood. For students to develop appraisal expertise such as quality and criteria to be able to give feedback and to understand feedback messages appropriately lecturers need to give them the necessary support (Sadler, 2010).

From a CHAT perspective, lecturers and students will not necessarily have identical goals, nor will they necessarily share the same beliefs or values about assessment. The principles of a collective and multi-voiced activity system have implications for multiple interpretations of the objectives of assessment in a community with multiple views, histories and motives. However, for collaboration to occur there must be a degree of *overlap in goals* and willingness to attempt to understand the perspectives of others. Clearly, a functional activity system will require on-going negotiations in aligning heterogeneous subjects' voices, traditions, interest and goals as a way of addressing the emotional aspect and achieving shared understanding. The assessment and feedback dialogues I mentioned earlier are critical in aligning the mixed voices. If the quality and effectiveness of feedback is to be improved, lecturers and students need to have a shared understanding of criteria for success.

A common understanding of assessment requires mutual trust and on-going dialogue between students and lecturers. Overcoming the mind-set that assessment is the teacher's sole responsibility remains a major challenge in higher education systems. Lecturers acknowledge that students should take responsibility for their learning and be active participants in assessment activities. However, this study highlights a number of hurdles lecturers and students must overcome for learning focused assessment to be entrenched in course settings. The majority of students in this study do not fully appreciate their role in assessment. Lecturers may be relatively unaware of some of these complexities and may lack strategies to help students take responsibility for their learning. Dealing with issues of dissonance is a complex matter with no clear-cut fix but the starting point might be in lecturers' assessment design and practice. Nonetheless, the tensions and challenges identified in this study serve as a basis of the proposed framework outlined in the next section which intends helping lecturers in designing assessment systems in their courses.

6.3 Towards a framework for a coherent approach to assessment and feedback in classroom discourse in diverse social contexts

I started this research curious about how principles of effective assessment and feedback proposed in the literature apply in bioscience courses. The insights I gained throughout this research indicate that these principles of good practice are often not easily transferable to local settings. The principles and frameworks of ‘good’ assessment practice tend to focus solely on the students/lecturers and their actions but ignore the sociocultural and historical influences of their actions. Based on the insights I gained from this research I propose a framework which will help various stakeholders in assessment to gain insights on the affordances and constraints to the decision-making processes related to assessment and feedback activity in their own contexts. The assessment system-of-practice framework (see Table 6.1) will help higher education lecturers to review their current assessment and feedback practices.

My proposed assessment framework draws from my empirical findings and uses some of Hora and Ferrare's (2013) instructional systems of practice framework concepts. Hora and Ferrare's framework focus on the “dynamic interplay among actors, artefacts, and tasks that constrain course planning and classroom teaching” (ibid, p.212) whereas my proposed ASP framework focuses on assessment design and implementation. The stimulus questions included in the ASP framework provide a valuable way to initiate discussions among teaching teams and to capture relevant evidence identifying current practices and possible actions. This can also serve as a basis for researchers in designing interview protocols for researching assessment. The framework offers an opportunity for lecturers to reflect on what is working well and what needs to change.

The assessment system-of-practice framework presents assessment as a multifaceted practice that encompasses dynamic interactions among actors (students and lecturers), mediating artefacts (personal and contextual) and assessment system design and implementation. That is, lecturers' assessment enactments and students' experiences thereof are seen as situated in local milieus mediated by both personal and social factors. Essentially, the framework is proposed from a fundamental position that a shared understanding among participants is the

cornerstone to addressing the tensions inherent in multi-voiced, collective and evolving assessment systems.

Table 6.1 The Assessment Systems-for-Practice (ASP) framework

1. Understanding the OBJECTIVE of the assessment activity, (What is assessment for?) • Using all assessment tasks for learning purpose (LOA) for both students and lecturers • Addressing the multipurpose of assessment - foregrounding the formative function in all assessments while fulfilling the summative aspect Using the <i>object</i> of activity to design and implement assessment and feedback activities – Practices/actions Framing and using assessment and feedback activities for student learning and active engagement	• <i>Cognitive dimension:</i> What is assessed? Course intended learning outcomes – ‘ways of thinking and practising’ (WTP) in the discipline; self-evaluation capabilities & lifelong learning (HE goals – graduate attributes) • <i>Structural dimension:</i> How to assess, when to assess, alignment of learning outcomes and assessment methods • <i>Social relational dimension:</i> Who assesses and gives feedback? Collaborative assessment, lecturers, students – self & peers • How is assessment information shared? Feedback, sharing learning intentions and criteria, transparency, dialogues • How is assessment and feedback information interpreted and used by lecturers and students? • Recognising diversity - Support for all students based on their needs and diverse preferences.
2. Understanding the SUBJECTS (actors) as part of the larger assessment activity system	<i>Micro level:</i> Lecturers and students personal understandings of assessment and feedback • Who are these students and lecturers in this assessment system – what are their values, beliefs, goals, motives, needs, experiences and understandings of assessment and feedback. • What are the roles of lecturers and students (or their perceived roles) in the activity system (division of labour and power relations)? • Is there a shared understanding of assessment and feedback between students and lecturers?
3. Analysing CONTEXTUAL factors <u>mediating</u> assessment actions and reactions	<i>Contextual -Meso level:</i> • Disciplinary socio-cultural-historical factors: Nature of knowledge, reforms in learning in the discipline • Departmental/School sociocultural factors: Collegiality, explicit & implicit rules, norms, assumptions • Course structure: curriculum, class size, team teaching, student- student/student-teacher interactions <i>Contextual - Macro level:</i> Institutional & Professional bodies • Teaching vs. research focus • Policies, mission statements, graduate attributes, strategic plans etc. • Board examination or accreditation bodies etc...

The first aspect of the framework is about understanding that the primary objective of assessment as learning should guide assessment system design. While there are many obvious tensions for lecturers in addressing the multiple purposes of assessment, the various purposes are likely to be addressed through an assessment design which balances and integrates the school and student needs. A learning-oriented approach to assessment design should afford opportunities for assessment strategies to address the discipline specific goals and general higher education learning goals. The design aspect of assessment has three dimensions: cognitive, structural and social relational dimensions. The cognitive dimension of assessment design will focus on the course intended learning outcomes (knowledge and skills). The structural dimension of assessment design focuses on assessment and feedback methods utilised and the timing of the various activities. The social relational dimension addresses the aspect of students' roles in participating and engaging in the collective activity. Hence, for this dimension shared understanding among participants in the activity system is of paramount importance.

The second aspect of the framework is about understanding the subjects (lecturers and students) who are supposed to act as a collective in an activity system. Students and lecturers may view and prioritise the objectives of assessment differently according to their individual's role and motives. On one hand, lecturers' identity and training (teacher vs. researcher); experiences (as teacher or student), beliefs, values are some of the key mediating factors in how they understand assessment. Students' needs, on the other hand, are diverse and personal. Students need to be supported in mediating between their own culture, learning and histories in order for them to fully engage in productive learning. In recognising the importance of student autonomy, we need to acknowledge the dilemma that students will not necessarily perceive assessment and feedback as anticipated by their lecturers. Hence, addressing all the three dimensions of assessment (cognitive, structural and social-emotional) design will help in achieving shared understanding between lecturers and students.

The third aspect of the framework is about reflecting on contextual factors mediating assessment practices at different system levels. Context blends institutional, disciplinary/school and course level historical and sociocultural factors that situate particular assessment practice. An institution is an interactive system that provides lecturers and students with assessment guidelines. Such guidelines provide a coherent set of principles and procedural knowledge about assessment. However, guidelines can be interpreted differently

by lecturers, which may impinge on students' perceptions of assessment. Disciplinary, school and course level culture, norms and rules (explicit and implicit) affect the lecturers' assessment enactment strategies. Practical constraints such as the course structure (e.g. class size, team teaching, modularisation and course duration) seem to be an impediment in implementing learning focused assessment approaches. Lecturers need to be cognisant of the interactions of all the factors in designing learning-focused assessment systems.

Insights about assessment practices gained in this study are critical in informing efforts to improve the use of assessment for learning purposes. The assessment system-for-practice framework and supporting evidence discussed above do have implications for policy and practice.

6.4 Significance of the findings for assessment practice at micro (personal), meso (school) and macro (university) levels

The evidence provided by this study illustrates how the relationship between lecturers' conceptions and practices of assessment are multifaceted, complex and context dependent. Researching lecturers and students' perspectives of assessment has led me to construct a useful lens for seeing the dynamics of assessment conceptions and practices. This study on the situated assessment practices within bioscience core courses can be used as a foundation for designing appropriate interventions that are more closely aligned with the realities and constraints of existing practice. The assessment system for practice framework with its strong CHAT component can also be used as a roadmap for identifying specific factors that can be maintained and shared within communities of practice.

Micro level - students: Through assessment and feedback design, lecturers can effect a change in students' view of assessment. Students need to be assessment literate and to understand assessment criteria and standards, in order to direct their learning. If school cultures emphasise individual achievement to the detriment of collaborative approaches, the potential of peer feedback for learning may not be realised. Mediating tools like self and peer assessment will only work effectively when assessment culture is changed and importantly when trust issues are addressed. Additionally, adopting such tools requires training for both

lecturers and students. Students' agency in taking their roles in the system is of paramount importance.

Micro-level lecturers: CHAT can be a useful reflective framework for individual lecturers to analyse and understand the complexity of assessment practices within different courses. In this way lecturers will view their actions as avenues for possibilities and transformations of their teaching and assessment practices. Assessment and teaching are complex and dynamic activities. They require lecturers to develop robust expertise in order to best promote and facilitate student learning. The teacher remains powerful in relation to disciplinary knowledge and assessment criteria. However, lecturers need not only understand the course specific content knowledge and skills, but also understand how to assess such knowledge in different students with varied needs and motives, cultures and histories. Academic developers could consider providing professional support for academics which would allow them to develop discipline-based assessment using the ASP Framework. Despite their high levels of academic expertise in research, some lecturers in this study did allude to their lack of experience and training with how to assess high levels skills such as critical thinking, metacognitive and student self-regulation processes and would have appreciated this type of support. Lecturers' existing skills sets, craft knowledge and challenges identified in this study can be a foundation upon which professional development activities can be built.

Meso level: Based on the structural and practical constraints inherent in modularised courses I suggest a whole program and course design approach to assessment. Students need to be inducted into assessment practices and made aware of the challenges and opportunities of using assessment to enhance their learning. This requires both professionalization of lecturers as well as helping students understand and appreciate the ideas of learning oriented teaching and assessment. It might be more valuable to develop collaboratively a few effective assessments to use during a level of study rather than putting a lot of effort, time and energy in developing many different kinds of assessments during the core courses (level of study).

Due to the duration of the core courses opportunities for practice in using some of the new tools will be a challenge in terms of continuity in team-taught courses if a collaborative approach is not in place. A holistic integrated approach to assessment that involves co-operation between lecturers teaching different parts of these courses is therefore crucial. Course coordinators can play a crucial role in facilitating such integrated assessments.

Collegiality, collaborations and interactions at school and course level appears to be essential enablers of assessment professionalism. It is for that reason that opportunities in terms of time and space need to be provided for staff to collectively engage with assessment design issues within the course and across the level of study and the entire programme. That is beyond examination meetings, dialogue needs to centre around assessment assumptions on which lecturers base their practices. Currently, some lecturers in the core courses are questioning the relevance of tests and examination. This can open conversation of how best to use assessment for learning purposes within the context of specific courses.

To challenge the status quo, collective agency from all lecturers within the programme is necessary in order for disciplinary and school culture to change to be more in line with learning focused assessment. According to Engeström (1999), “The expansive cycle begins with individual subjects questioning the accepted practice and it gradually expands into a collective movement or institution” (p.383). This research has shown that some lecturers have entered this cycle. What is required now is expansive transformation from individual teacher initiatives toward collective actions at course and programme levels. In the South African context, an assessment system characterised by social, cultural and historical diversity continues to be a challenge. We need to provide flexibility for the resourceful and innovative teacher. Such a teacher is willing to take risks to overcome contextual or logistical barriers in a quest to do what they think will impact positively on their students learning.

Sociocultural change and staff development are required to implement learning focused assessments that shift the balance of power from lecturers towards students. Within a complex multi-perspective model of assessment encompassing assessment of learning, assessment for learning and assessment for lifelong learning striking the balance between all these components is a necessary challenge. Approaching assessment innovation from multiple perspectives may create beneficial synergies which enhance the overall student experience.

Macro level: Improving teaching, learning and assessment is not so much the responsibility of individual lecturers only but requires school level and institutional-wide support. In a research-intensive university, academics simultaneously engage in interacting, yet at times conflicting activities, such as ‘teaching’, ‘research’ and ‘administration’. However, the emphasis on research productivity in promotion often takes precedence over teaching. As a

result of this, lecturers may lack the motivation to engage in scholarship of learning and assessment. The university, through its promotion and reward structures, needs to acknowledge effort and innovations taken by lecturers in using assessment to respond to students' needs. Nonetheless, without a supportive policy framework and incentives, it is unlikely that scholarship of learning-oriented assessment will achieve sufficient support. Opportunities for e-assessment where automated feedback can be generated can help lecturers deal with the work load involved in giving feedback. Dialogical assessment and feedback spaces can also be explored through chats and blogs on the e-learning platforms. However, all of these require institutional support in terms of financial investments and training for both lecturers and students.

6.5 Limitations of this research

This study presents significant findings pertaining to lecturers' conceptions of assessment and their students' experiences and perceptions of assessment and feedback. The use of a mixed method approach drawing on both learning-oriented assessment and cultural-historical activity theory offers a novel and comprehensive way of understanding the dynamics at play in assessment activity systems. Through this approach, I was able to illuminate nuances of the contextually embedded tensions and challenges inherent in the many layers of assessment activity in which students and lecturers participate. Multiple data sources provided a more complete and nuanced analysis of assessment practices. Research approached from multiple perspectives can help to highlight effective synergies and complex conflicts, or foreground previously neglected assessment issues such as the emotional impact of assessment.

The research presented in this thesis refers to specific contexts of assessment and feedback practices and to specific groups of students and lecturers; as such it does not make claims of generalizability. Nevertheless, I believe that this research makes a valuable contribution to our understanding of the complexity of assessment from lecturers and students perspectives.

Certain limitations of the research need to be considered particularly with reference to its generalizability.

- Due to the nature of this research approach adopted, I relied on formal aspects of assessment that excluded informal assessment practices that might have occurred

during lectures and practical/laboratory sessions. Even though lecturers mentioned the classroom interactions, which can be regarded as formative assessment, the focus in this research was on formal assessment.

- The timing of administration of the student questionnaire at the end of the 1st semester was a limitation as I could only capture students' perspectives of assessment based on their experience in two of the three courses. However, this might also be construed as an advantage because the data was used as a basis for the interview conducted after the students had completed all the core courses.
- Participation in the study was voluntary, hence despite persuasions and use of both electronic survey and paper-pencil formats of the questionnaire the overall completion rate was 49% of the total enrolment in the core courses. The students who completed the questionnaire and volunteered to be interviewed were possibly a self-selecting group. Even though the interview data represent the diversified voice of the students encompassing low, average and high achievers it does not however present the entire voices of students enrolled in the core courses.

Notwithstanding these limitations, the study makes a noteworthy contribution to our understanding of students' emotional experiences in assessment feedback contexts. In this study, in-depth interviews were ideal for eliciting rich situational descriptions of students and lecturers' experiences. An advantage of this method, however, was the retrospective focus as well as the dependency on students' and lecturers' ability and willingness to remember and recount assessment and feedback situations. During the interviews, I relied on students to recall particular events in the various courses. Because I felt that a reliance on remembered perceptions might be a limitation in terms of the accuracy of recall, course materials and some of their submitted marked work were used to jog their memories. My assumptions were that, interviewees would honestly share with me how they remembered thinking and experiencing assessment and feedback practices in the courses. In addition, the time lag was short enough for them to recall and provide details of their experiences. Additionally, students would be more inclined to be honest as events were in the past and will no longer have any influence on their performances.

6.4 Recommendations for future research

As with most research endeavours, the proposed framework and its supporting empirical evidence open up avenues for future research. Apart from serving as a reflection tool for lecturers, the assessment systems-for-practice framework can also be used in constructing research instruments for studying assessment practices as part of the teaching and learning system.

This study has identified several important areas in which additional research is needed. Firstly, the emotional dimension of assessment feedback emerged as the most significant aspect of this doctoral study. Although this study has highlighted students' emotional reactions to feedback and assessment, it is felt that more in-depth research is needed to explore the longer term consequences of the emotions experienced. It will also be beneficial to explore lecturers' emotions in assessment and feedback provision processes. Secondly, while researchers studying emotions in educational environments have concentrated on either students' emotions or on lecturers' emotions they have only rarely considered linking both the students' and lecturers' emotions. This suggests that multi-perspectives may be required in order to gain insight into this emotionally loaded interactional process between lecturers and students in assessment and feedback contexts.

Finally, a longitudinal study examining how lecturers' and students' conceptions and practices change over time and across various courses would be valuable. More consideration should be given to the relationship between students' usage of feedback and their academic performance. From the currently available research, provision of feedback based on the models and frameworks of 'good' assessment and feedback practices seems not to necessarily lead to envisaged improvement. Therefore, more work needs to be explored in line with the current models/frameworks of sustainable assessment and feedback practices.

6.7 Final word

The findings from this study make two noteworthy contributions to our understanding of the complexity of assessment and feedback practices at course level. While previous research has established that assessment is full of complexities few have pointed out that assessment practices are often simply implemented with the focus of the maintaining norms and cultures.

Firstly, using CHAT as a frame of reference allowed me to illustrate that school and course level historical norms and values, undoubtedly influence lecturers' assessment decision making. Secondly, this thesis sheds light on the diverse and varied emotions students experience in assessment and feedback processes.

My development through the research process was an evolutionary process in my thinking about assessment of science learning. The process was complicated by my initial naïve understanding of assessment, research and in particular research writing. However, my interest in assessment for learning motivated me to forge ahead. I faced a number of challenges as a researcher among them dealing with positioning my voice amongst the vast pool of research literature, choosing theoretical and analytical frameworks, but the hardest part was communicating my ideas. Through all those obstacles I believe that I have somewhat contributed to understanding the complexity of assessment. This also gives me more confidence on my continuing journey of unravelling the complex aspect in learning.

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APPENDIX A: Assessment Perceptions and Experiences Questionnaire

Section 1: Experiences of assessment

Please respond with respect to your perceptions and experiences of assessment in two of the core courses Course A (APES2...) and course B (APES2....)

Please check with X the appropriate box to indicate your level of agreement with each statement.

	Course A							Course B						
	Strongly agree	Agree	Unsure/Neutral	Disagree	Strongly disagree	Mean score		Strongly agree	Agree	Unsure/Neutral	Disagree	Strongly disagree	Mean score	
Assessment tasks and learning														
1. Assessment tasks were based on what was taught in lectures.														
2. Preparing for an assessment task was mainly a matter of memorizing rather than understanding.														
3. I learnt a great deal from doing the assessment tasks.														
4. Doing the assessment tasks brought things together for me.														
5. Assessment tested my ability to apply what I know to real-life situations.														
6. The sheer volume of work in this course meant I couldn't understand it all thoroughly.														
7. I try to guess what will be in the tests/exams and focus on that.														
Transparency of assessment														
8. The aims and objectives of this course's assessment tasks were made very clear.														
9. When I tackled an assessment task it was not clear at all what would count as a valid answer.														
10. The assessment tasks had very clear instructions about what one is expected to do.														
11. How the assessment tasks were marked was made very clear.														
Feedback														
12. On this course I got plenty of feedback on how I am doing.														
13. Feedback on my work was usually provided only in the form of marks.														
14. The feedback came back very quickly.														
15. When I got things wrong or misunderstood them I didn't receive much guidance in what to do about it.														
16. Whatever feedback I got came too late to be useful.														
17. Once I have read the feedback I understood why I got the mark I did.														
18. The feedback helped me know how to do better next time.														

Assessment strategies													
19. It would be possible to get through this course just by working hard around test/exam times.													
20. The course uses a variety of assessment methods.													
21. Assessment was progressive and spaced over reasonable time.													
22. To do well in assessment in this course you need to have good analytical skills.													
23. The assessment tested our understanding of key concepts in this course.													
Skills I've gained in this course													
24. I have been encouraged to use my own initiative.													
25. I feel that I can take responsibility for my own learning.													
26. I have become more willing to change my views and accept new ideas													
27. I am able to bring information and different ideas together to solve problems.													
28. I have developed my ability to communicate effectively with others.													
29. I have learnt to become an effective team or group member.													
30. Assessment helped me clarify what I did NOT know.													

"Assessment tasks" refers to tests, assignments, exams, orals, lab reports etc.

Section 2: Perceptions of assessment practices

Please tick the appropriate box

Purposes of assessment

Assessment is used to:	Frequently	Sometimes	Never	Don't know
Motivate learning				
Score/rank achievement				
Diagnose strengths/weaknesses				
Evaluate teaching				

Content of assessment

Assessment focuses on the	Frequently	Sometimes	Never	Don't know
Remembering of knowledge				
Understanding of knowledge				
Presentation of knowledge				
Application of knowledge				
Analysis of knowledge				
Synthesis of knowledge				
Evaluating of knowledge				
Creation/development of knowledge				
Skills (General or discipline specific)				

Assessors

Assessment is carried out by	Frequently	Sometimes	Never	Don't know
Self				
Peers				
Lecturer/Tutor				

Modes of assessment

Assessment is through	Frequently	Sometimes	Never	Don't know
Oral presentations				
Essays				
Multiple-choice questions				
Short answer questions				
Laboratory reports				
Field project reports				
Research reports				
Closed book tests/exams				
Open book tests/exams				

Marking of assessment

Marking	Frequently	Sometimes	Never	Don't know
We knew what we will get marks for				
We were not aware of the mark breakdown (implicit criteria)				
Counted towards final class mark				
Did not count for marks				

Value of feedback

Feedback	Frequently	Sometimes	Never	Don't know
Is helpful in its detail				
Enables understanding of assessment				
Improves learning				
Prompts discussion with tutor or peers				

Section 3: Open question

This section gives you the opportunity to highlight any specific assessment features of the two courses that helped or hindered your learning.

APPENDIX B: Students' interview schedule

Hello, my name is Mapula. I would like to thank you for your time and willingness to participate in this study. I will be asking you several questions on which I would like your honest opinions.

Sample guiding questions and prompts

Aims of the course and assessment

- What kind of a course/s (mention the name of the course) is this? What is your overall impression of the course? Did you enjoy the course? How would you describe it to a friend who was thinking of taking it?
- What sort of work do you do for this course? What sort of assessment is there in this course? What do you consider the purpose/s of these forms of assessment?
- Is it the same as the assessments you normally have or is it different? (How does the assessment in this course compare with assessment you have experiences in other courses? How different or similar?)
- How consistent are the course objectives and the actual objectives addressed by the assessments? How compatible (congruent) in your view are what is said to be important and what actually is assessed?

Purpose and authenticity of assessment

- How confident were you that you knew what to do for this assignment/exam/final project report?
- How did you go about tackling the assignment/exam/final project? How did you manage your time and decide what to do?
- What do you think a student needs to do for this assignment/exam/final project in order to do well?
- What do you see as the point of doing this assessment (point out various course assessment tasks)?

- Do you think that these assessment tasks were helpful to you in relation to your course as a whole? In what ways, if any, did the assessment in this course help your learning, hinder your learning, or was not relevant to your learning?
- What do you think about the “fairness” of the assessment? Difficulty? Marking procedures? Justification of marks?
- What are your perceptions of the relative timing and sequencing of assessment tasks in this course?

Support/guidance and feedback provided

- When you started the course how confident were you that you would do well on it?
- Did you feel more confident as the course progressed? (What made you to feel more or less confident?)
- Did everybody know what they were supposed to be doing in this course?
- What do you think about the feedback you received on your assessments? What is your perception of the type or extent of informal assessment or feedback systems (peer interaction, unmarked tasks) in this course?
- What kind of feedback was provided, apart from formal marked assessment, for students to get feedback on “how they are doing”? How easy was it to know if you were, personally, on the right track? Did you get feedback/support from your tutors/other students?
- Did you decide to do anything as a result of the feedback?
- In this course, how important were the other students in helping you to learn?

Self direction and autonomy

- To what extent did you feel you could manage your own work and make decisions on how to do things in this course?
- What is your opinion of the level of involvement or participation you have as students in the assessment process?

- Do you think that this assessment was helpful to you in relation to your future career or things you might do beyond university? (In what ways?)
- Are there any comments that you would like to make regarding assessment in this course?

Thank you

APPENDIX C: Teachers' interview schedule

The interviewee is requested to bring samples of their assessment tasks.

Hello, my name is Mapula. I would like to thank you for your time and willingness to participate in this study. I will be asking you several questions on which I would like your honest responses and views.

Sample guiding questions and prompts

Aims of the course and assessment

- Can you tell me a little more about this course? How would you describe it to a student who was about to take this course?
- Are there particular ways of thinking or specific skills which are crucial to doing well in this course (Do you have stated course outcomes/objectives, can I see them)? Are the students given the course outcomes?
- Could you tell me more about assessment procedures used in this course? How does it work? How does the assessment test the understanding and skills you mentioned earlier?
- What types of assessment methods do you use to assess your students and why? Looking at the assessments in this course (referring to assignments, quizzes, projects, examination papers, etc.), how well do you think they relate to what you expect students to learn? What were you trying to assess with these questions?
- Are these assessments the same as the assessments they normally have or is it different? (How is it different?). Has it changed since last year or over the last few years?
- Can you tell me briefly about your views on student assessment (ideal and working), how do you conceptualise assessment tasks and why? Why do you assess the way you do?

Support/guidance and feedback provided to students

- How do students know what they are supposed to be doing in this course?
- Are students informed about assessment purpose, requirements and expectations and how are they informed? Are the assessment standards and criteria clear and explicit? Is the marking process explained to students and when and how is it explained?
- What opportunities are there for feedback dialogue around assessment tasks in your course?
- To what extent do students in your course have opportunities to engage actively with goals and criteria before, during and after an assessment task?
- In what ways are opportunities for *timely and helpful* feedback provided to students? What forms/types of feedback are students exposed to?
- What do you do to promote that feedback attended to and acted upon by students in your course, and if so, in what ways?
- To what extent are there formal opportunities for self-assessment or peer-assessment in your course?
- Which do you expect will have the greater impact on student learning -the formative or the summative feedback? To what extent are your summative and formative assessments aligned?

Self direction and autonomy

- To what extent are students empowered to be able to manage their own work and make decisions about how approach the assignment/exam/final project in this course?
- What has marking students' work taught you about your students?
- To what extent do your assessments and feedback processes inform and shape student learning and your teaching?
- Are there any comments that you would like to make regarding assessment in this course?

Thank you

APPENDIX D: Teachers' information sheet and Consent form

Hello, I am Mapula Matimolane, and I am conducting research as part of my PhD study at the University of the Witwatersrand.

My research is about assessment practices in the second year compulsory courses offered in the School of Animal, Plant and Environmental Sciences. This study aims to investigate students' and staff experiences and perceptions of assessment practices. As part of the research academic staff will be interviewed about their assessment practices. Students will be asked to complete a questionnaire and to partake in group interviews focusing on their assessment experiences.

You are invited to take part in this research study. Participation in this study will involve being interviewed for about one hour at a time convenient to your schedule. To ensure the accuracy of your input, I would ask your permission to audio record the interview. The audio-recorded interview will not be heard by any people other than me and the recordings will be destroyed once transcribed. The transcripts will be safeguarded from unauthorised access.

All the information you provide will be kept confidential, and when published in a thesis research reports or articles, codes or pseudonyms (another name) will be used. The records from your participation may be reviewed by people responsible for making sure that research is done properly.

Please understand that **your participation is voluntary** and you are not being forced to take part in this study. If you agree to participate, you may stop participating in the research at any time. If you choose to discontinue with the study you will NOT be prejudiced in ANY way.

If you have concerns or questions about the research you may contact me on (011) 717 6483 or at mapula.matimolane@wits.ac.za or my supervisor, on (011) 717 6033 or at Moyra.keane@wits.ac.za.

Kind regards

Mapula Matimolane

Consent form to act as a subject in a research study

CONSENT FORM

I confirm that I have read and understand the information sheet for the above study.

I understand my participation is voluntary and that I am free to withdraw at any time, without giving reasons.

I understand that my participation will remain confidential and agree to the use of pseudonyms in published material.

I hereby agree to participate in the interview/discussion.

Signature of participant

Date:.....

APPENDIX E: Students' Information Sheet and Consent form

Hello, I am Mapula Matimolane, and I am conducting research as part of my PhD study at the University of the Witwatersrand.

My research is about assessment practices in the second year compulsory courses offered in the School of Animal, Plant and Environmental Sciences. This study aims to investigate students' experiences and perceptions of assessment practices. The research is about students' opinions and views of assessment strategies used including feedback, assessment criteria, and aims and purposes of assessment tasks. As part of the research academic staff will also be interviewed about their assessment practices.

You are invited to take part in this research study. Participation in this research will involve completing a questionnaire on your experiences and perceptions of assessment. If you agree to take part in this study, you will be asked to anonymously (not including your name) complete a questionnaire that may take up to 40 minute.

I am also asking you partake in one group interview for approximately one hour and to give me permission to tape record the interview. To ensure the accuracy of your input, I would ask your permission to audio record the interview. The tape-recorded group interview will not be heard by any people other than me and the recordings will be destroyed once transcribed. The transcripts will be safeguarded from unauthorised access.

All the information you provide will be kept confidential, and when published in research reports or articles, codes or pseudonyms (another name) will be used. The records from your participation may be reviewed by people responsible for making sure that research is done properly.

Please understand that **your participation is voluntary** and you are not being forced to take part in this study. Choosing not to participate will have no consequences for you or your performance in the courses in question. If you agree to participate, you may stop participating in the research at any time. If you choose to discontinue with the study, there will be no penalties and you will NOT be prejudiced in ANY way.

If you have concerns or questions about the research you may contact me on (011) 717 6483 or at mapula.matimolane@wits.ac.za or my supervisor, on (011) 717 6033 or at Moyra.keane@wits.ac.za.

Kind regards

Mapula Matimolane

APPENDIX F: Example of Lecturer interview transcript and coding

Code Family: Assessment approaches used

HU: Case J
File: [C:\Users\00000604\Documents\Scientific Software\ATLAS.ti\TextBank\Case J.hpr6]
Edited by: Super
Date/Time: 2012-07-12 14:29:07

Created: 2012-07-12 14:04:15 (Super)
Codes (9): [Alignment] [assessment task] [Dialogue] [Feedback] [Format of feedback] [Formative assessment] [Peer assessment] [research readiness] [Self assessment]
Quotation(s): 12

P 1: J transcript.rtf - 1:13 [Yes, but I have to admit that ..] (21:21) (Super)

Codes: [Alignment - Family: Approaches used to assess] [Learning outcomes - Family: What is assessed] [Practice]
No memos

Yes, but I have to admit that I did not sit down with this thing and say ok, how can I get students to demonstrate knowledge and application of phenomenal concepts and principles. I guess I sort of thought of it in a bit of more non discreet way in terms of demonstration of key scientific reasoning skills. No, no I didn't sit down and look at this things say how do I incorporate the ability to do this things in my course, and how do I assess the students to show that they can demonstrate key scientific reasoning skills. Aside from the usual thing of giving them information and asking them to give it back to us on a test, sometimes giving them questions that are little bit beyond what we specifically asked ahh.....

P 1: J transcript.rtf - 1:17 [ok we did a class test about h..] (29:29) (Super)

Codes: [assessment task - Family: Approaches used to assess]
No memos

ok we did a class test about half way through.

P 1: J transcript.rtf - 1:19 [We can get to that. Ok the pla..] (35:35) (Super)

Codes: [assessment task - Family: Approaches used to assess] [Feedback - Family: Approaches used to assess] [Formative assessment - Family: Approaches used to assess] [Research report writing - Family: What is assessed]
No memos

We can get to that. Ok the plan so what we actually had them write an introduction section and they get feedback on that no mark and an opportunity to redo that. That went into the final report. We had them write a methods section same things feedback no mark an opportunity to incorporate that feedback into a final report. We then run out of time. It was taking basically two weeks to go through the whole cycle. They handed in a week later it takes a week for the TAs to mark and provide it back to them. And after you have done that there were only a couple of weeks left, three more section and give them enough time and almost into exam time. So we stopped at the methods' and we said we tried to give them as much information or information to take the rest of the..... stepping back we....after the methods prac they did a field trip they collected the data. From there thus where we did, Mary did kinda of is actually a model lecture rather than a hands-on interactive kinda of a thingbut teaching them what goes into the results section what goes into the discussion section and having them go ahead and do the rest, so they incorporated feedback from the first two parts and for the last results and discussions and putting it all together they did that for the first time. Ehh we got them work on the final product. The goal

APPENDIX F: Example of Lecturer interview transcript and coding

originally was to do that for every section.

P 1: J transcript.rtf - 1:21 [guess my own experience with l..] (41:41) (Super)

Codes: [Assessment preferences - Family: Factors influencing practices] [Feedback - Family: Approaches used to assess] [Justification generic skills - Family: Factors influencing practices] [Professional development - Families (2): Factors influencing practices, Issues] [Views]
No memos

guess my own experience with learning to write, is that is not something that can be taught in a lecture or sitting in a one place in a theatre being told this is what to do. It doesn't even really work giving them this APES writing thing and I gave them parts of it not the whole thing because is a little big and daunting. Because my feeling is that don't they will read it but they will not understand what they reading and be able to implement it the way we think they should just because they don't have the experience with it. So having them doing it once and pointing out ok where they did not what the guide said, or what we told you in the prac or whatever. This is how to fix it gives them a chance to try it and get some feedback and try it again. I guess what I am trying to say is that much of my own experience with writing was a lot like that. My father taught me to write. He was a real master about it. He gave me papers to write and he scribbled all over them on it gave it back to me. But I learned how to write is something that they turn out not to learn at secondary school as much as they should. Ahh I think that was somewhat confirmed when these guys from North Carolina came and said we got evidence that this works the scientists that study how students learn say this works, they tend to learn best if they practice get feedback and practice again. So thus why I did it that way, I thought that will be the most effective way for them to learn how to write.

P 1: J transcript.rtf - 1:22 [I guess is to sort of to direc..] (43:43) (Super)

Codes: [Feedback - Family: Approaches used to assess] [Purpose of feedback - Family: Factors influencing practices] [Quality of feedback]
No memos

I guess is to sort of to direct them towards what we think they should be doing and to help them to understand why they doing it that way. Because doing it once you know, doing it and getting feedback tells them what they doing wrong. But for them to take that into a better product next time requires them seeing what to look out for. So I...the TAs I worked with did most of this. I tried to emphasise was constructive feedback. Eh.....

P 1: J transcript.rtf - 1:23 [So I could for instance ask th..] (47:47) (Super)

Codes: [Format of feedback - Family: Approaches used to assess] [Quality of feedback]
No memos

So I could for instance ask them to, this is all done electronically, and they will put comment bubbles in from word. Fill the margins with comments let them know each and everything they do wrong. I think that overwhelms students and does not do a good job of telling them of giving them sort of a clear direction of how....of how to improve next time. It gives them a lot of information and I suppose a lot of students will take that I do whatever they could do with it. But what I try to direct the TAs to do is to was to give two or three substantial comments that would help the students take what they have now and make for instance 10% better for next time if they had to hand it in next time. So I guess with sort of approach my goal was to give two or three things that students could easily grab onto and use to improve for next time, rather than just being showered with everything that they did wrong. Ehh I don't know how well that worked, I didn't have time to go back and see. I think that certainly saves, I think putting three or four comments instead of everything is a lot more time effective for teaching staff who

APPENDIX F: Example of Lecturer interview transcript and coding

already are overwhelmed with teaching obligations and TAs who have their own things to do that is not teaching. I don't know if is a good way of doing it or not, it seemed to make a lot of sense to me.

P 1: J transcript.rtf - 1:24 [I guess is up to them. I feel ..] (51:51) (Super)

Codes: [Dialogue - Family: Approaches used to assess] [Student support]

No memos

I guess is up to them. I feel if they need to ask or talk, if they see comments they don't understand them eh or feel that like they need to talk about them is sort of up to them to talk to their TAs about them. That is kinda of not made explicit we assume that they should know that they can talk to us if they need to.

P 1: J transcript.rtf - 1:26 [Ahmm..Just really a snippet in..] (54:57) (Super)

Codes: [Formative assessment - Family: Approaches used to assess]

No memos

Ahmm..Just really a snippet in terms of the policy they promoting what they call formative assessment.

26J: Yee....I have heard of that word.

M: Do you know what formative assessment is all about?

27J: No, not really.

P 1: J transcript.rtf - 1:27 [Yes. They do both. Self? What ..] (61:61) (Super)

Codes: [Peer assessment - Family: Approaches used to assess] [Practice] [Self assessment - Family: Approaches used to assess]

No memos

Yes. They do both. Self? What do they do? This is something that Terry passed on to me as well. And it has more to do with the group stuff that they do. So they assess their group and they assess themselves a lot of them don't bother to do, or well I kinda push them to do it. But they always don't assess themselves. I think a lot of them took it very seriously, they just gave their buddies 10/10 and gave themselves 10/10. Some of them did take it seriously I think I could sense that some of the group members were not pulling their weight and that sort of worked to other members and that came through the assessment. So they do that, I had them do that mainly for the field work and all the pracs were all done in groups. And the other thing you asked me to do about assessing how well they did the final report I wouldn't have done that if you haven't asked. So I guess those are the only things we do.

P 1: J transcript.rtf - 1:29 [me of them are sort of shy in ..] (65:65) (Super)

Codes: [Self assessment - Family: Approaches used to assess]

No memos

me of them are sort of shy in saying how good they think they did a lot of them are absolutely are but I am not sure there is a broader reason to why they did not assess themselves. They may have just not picked up that point on they missed a lot of things which the other groups did and may that was also one of those.

P 1: J transcript.rtf - 1:30 [Final exam] (71:71) (Super)

Codes: [assessment task - Family: Approaches used to assess]

No memos

APPENDIX F: Example of Lecturer interview transcript and coding

Final exam

P 1: J transcript.rtf - 1:36 [what are your views about the ..] (86:87) (Super)

Codes: [research readiness - Families (2): Approaches used to assess, What is assessed] [Views]

No memos

what are your views about the current assessment practices within the school and how they feed into,...the school talks about trying to preparing research ready students. What are your view about practices and how we trying to achieve that?

42J: Ahmm... For just in my course? I think I am trying to think of how in terms of judging research readiness, in terms of what the honours group is like every year. And is always such a mix across the years. We get some students who just barely made it through to honours and who definitely will never be ready to be researchers. And others who that could probably have started their master's degree right out of their third year. So across that broad range of variation there are students coming out of their undergraduate who are capable of going into a postgraduate programme and able to be successful at that. So if thus the goal then I think we doing okay. I actually, and I know M has mentioned this at various meetings in the past that we shouldn't be pushing research readiness

Code Family: What is learned and assessed?

HU: Case J

File: [C:\Users\00000604\Documents\Scientific Software\ATLAS\TextBank\Case J.hpr6]

Edited by: Super

Date/Time: 2012-07-12 14:38:27

Created: 2012-07-12 14:07:39 (Super)

Codes (6): [Generic skills] [Knowledge specific outcomes] [Learning outcomes] [research readiness] [Research report writing] [Skills]

Quotation(s): 13

P 1: J transcript.rtf - 1:2 [terms of the theory, they shou..] (7:7) (Super)

Codes: [Knowledge specific outcomes - Family: What is assessed]

No memos

terms of the theory, they **should be able to talk** about the hierarchy, in ecology we consider it to be, so we look at it in terms of the levels of organisation from individuals, to individual families, to populations, to communities, to ecosystems and environments. **They should be able to talk** about that hierarchy and what each level of the hierarchy involves. **They should be able to know** which of processes are relevant at each hierarchy, so that they mortality... births and deaths kind of occur at the individual level of the hierarchy, that the predator prey interactions occur at the population level of the hierarchy, that nutrient cycling occurs at the ecosystem level of the hierarchy and so forth. And **be able to talk** in some detail about the importance the processes and factors that determine the rate of such processes. So that's kind of the main part. So. So to me thus **understanding broadly** how ecology works, how this field works. And how we view the theory and information that occurs in that field.

P 1: J transcript.rtf - 1:3 [they should be able to talk] (7:7) (Super)

APPENDIX F: Example of Lecturer interview transcript and coding

Codes: [Learning outcomes - Family: What is assessed]
No memos

they should be able to talk

P 1: J transcript.rtf - 1:4 [should be able to talk] (7:7) (Super)

Codes: [Learning outcomes - Family: What is assessed]
No memos

should be able to talk

P 1: J transcript.rtf - 1:5 [should be able to know] (7:7) (Super)

Codes: [Learning outcomes - Family: What is assessed]
No memos

should be able to know

P 1: J transcript.rtf - 1:6 [be able to talk] (7:7) (Super)

Codes: [Learning outcomes - Family: What is assessed]
No memos

be able to talk

P 1: J transcript.rtf - 1:7 [Secondary objectives are thing..] (7:7) (Super)

Codes: [Skills - Family: What is assessed]
No memos

Secondary objectives are things like, be able to do some basic skills that an ecologists will have to do. So being able to think about a question that is relevant to ecology, and how to phrase the question and how to think about the context of the question. To take that question and turn it to some sort of study or action. How does one go about planning a study to try to answer the question? A bit of basic in the field or whatever hands-on, applied sort of information how to collect data, how to do it in a way that is relevant to the question and the methods and objectives of the study. How to deal with the data once is collected, enter it into a spreadsheet, doing some basic analysis. And how analyse and interpret and turn that turning numbers I guess into a written description and interpretation of the patterns that come from those numbers and what they mean in biological sense. So all in all are the step of the scientific process and be able to take that a write it, so this is one of the objectives into a report were they go through each one of those steps and they communicate that in a written form.

P 1: J transcript.rtf - 1:8 [taking that or relating it to ..] (9:9) (Super)

Codes: [Skills - Family: What is assessed]
No memos

taking that or relating it to the principles and theory in ecology. There is a specific skill of being able to dig a hole in the ground and interpret what they see there.

P 1: J transcript.rtf - 1:9 [Like problem-solving and lifel..] (11:15) (Super)

Codes: [Generic skills - Family: What is assessed]
No memos

Like problem-solving and lifelong learning and critical thinking, is that..... you trying to direct me without directing me

APPENDIX F: Example of Lecturer interview transcript and coding

M: Ja , I mean if you think.....do you think those are very critical... for an ecologists for example.

5J: Absolutely. In fact I think that those are more important than teaching them facts.

M: Okay

6J: Mainly because we can't teach students all the facts that they need to know, that stuff changes. Science changes, ecology changes, the skill sets that they will leave here with change, but what.....they need to do or what we need I guess to accommodate that change is to do is to teach them to adapt to it.

P 1: J transcript.rtf - 1:12 [t does in a way. I mean I see ..] (16:19) (Super)

Codes: [Learning outcomes - Family: What is assessed]

No memos

t does in a way. I mean I see you got learning outcomes stated to the students I mean for your course.

7J: Yes, can I look at that.

M: And that is given to students?

8J: Yes, I will not be surprised if to be honest....this might sound horrible when I say this but to be honest this is left over from not left over but is important but I put in because it was in the last one I that I did and it was in there because Terry put it in there.

P 1: J transcript.rtf - 1:13 [Yes, but I have to admit that ..] (21:21) (Super)

Codes: [Alignment - Family: Approaches used to assess] [Learning outcomes - Family: What is assessed] [Practice]

No memos

Yes, but I have to admit that I did not sit down with this thing and say ok, how can I get students to demonstrate knowledge and application of phenomenal concepts and principles. I guess I sort of thought of it in a bit of more non discreet way in terms of demonstration of key scientific reasoning skills. No, no I didn't sit down and look at this things say how do I incorporate the ability to do this things in my course, and how do I assess the students to show that they can demonstrate key scientific reasoning skills. Aside from the usual thing of giving them information and asking them to give it back to us on a test, sometimes giving them questions that are little bit beyond what we specifically asked ahh.....

P 1: J transcript.rtf - 1:19 [We can get to that. Ok the pla..] (35:35) (Super)

Codes: [assessment task - Family: Approaches used to assess] [Feedback - Family: Approaches used to assess] [Formative assessment - Family: Approaches used to assess] [Research report writing - Family: What is assessed]

No memos

We can get to that. Ok the plan so what we actually had them write an introduction section and they get feedback on that no mark and an opportunity to redo that. That went into the final report. We had them write a methods section same things feedback no mark an opportunity to incorporate that feedback into a final report. We then run out of time. It was taking basically two weeks to go through the whole cycle. They handed in a week later it takes a week for the TAs to mark and provide it back to them. And after you have done that there were only a couple of weeks left, three more section and give them enough time and almost into exam time. So we stopped at the methods' and we said we tried to give them as much information or information to take the rest of the..... stepping back we....after the methods prac they did a field trip they collected the data. From there thus where we did, Mary did kinda of is actually

APPENDIX F: Example of Lecturer interview transcript and coding

a model lecture rather than a hands-on interactive kinda of a thingbut teaching them what goes into the results section what goes into the discussion section and having them go ahead and do the rest, so they incorporated feedback from the first two parts and for the last results and discussions and putting it all together they did that for the first time. Ehh we got them work on the final product. The goal originally was to do that for every section.

P 1: J transcript.rtf - 1:36 [what are your views about the ..] (86:87) (Super)

Codes: [research readiness - Families (2): Approaches used to assess, What is assessed] [Views]
No memos

what are your views about the current assessment practices within the school and how they feed into,...the school talks about trying to preparing research ready students. What are your view about practices and how we trying to achieve that?

42J: Ahmm... For just in my course? I think I am trying to think of how in terms of judging research readiness, in terms of what the honours group is like every year. And is always such a mix across the years. We get some students who just barely made it through to honours and who definitely will never be ready to be researchers. And others who that could probably have started their master's degree right out of their third year. So across that broad range of variation there are students coming out of their undergraduate who are capable of going into a postgraduate programme and able to be successful at that. So if thus the goal then I think we doing okay. I actually, and I know M has mentioned this at various meetings in the past that we shouldn't be pushing research readiness

P 1: J transcript.rtf - 1:37 [researcher from North America I..] (87:87) (Super)

Codes: [Generic skills - Family: What is assessed] [Professional development - Families (2): Factors influencing practices, Issues] [Views]
No memos

researcher from North America I mentioned earlier say critical thinking skills lifelong learning (whatever the other one is) skills that will work anywhere not necessarily in research but definitely in research but whether they go off and work in governments or industry or whatever. So I guess I feel like I go on pushing and pushing broader abilities I think I have talked about building capacity I think is around those three things I referred to that we do that so that they get out and they critically assess a problem, they can use their imagination to find a way to solve that, they can reflect on what they have done and think of better ways of doing it next time. They can look at or be confronted with something that they haven't be trained specifically to do and still be able to try to solve the problem try to probably figure ways to do that.

Code Family: Factors influencing practices and conceptions

HU: Case J
File: [C:\Users\00000604\Documents\Scientific Software\ATLAS\TextBank\Case J.hpr6]
Edited by: Super
Date/Time: 2012-07-12 14:32:59

Created: 2012-07-12 14:10:03 (Super)

Codes (8): [Accountability] [Assessment Policy] [Assessment preferences] [Freedom] [Justification generic skills] [Professional development] [Purpose of course] [Purpose of feedback]

Quotation(s): 19

APPENDIX F: Example of Lecturer interview transcript and coding

P 1: J transcript.rtf - 1:1 [I treat the course as a genera..] (5:5) (Super)

Codes: [Purpose of course - Family: Factors influencing practices]

No memos

I treat the course as a general introduction to ecology. So the field of ecology and all the basic information that a student will need to know if they were going to take more specialised courses in ecology in third year. So I treat it as a prerequisite sort of course.

P 1: J transcript.rtf - 1:10 [Mainly because we can't teach ..] (15:15) (Super)

Codes: [Justification generic skills - Family: Factors influencing practices]

No memos

Mainly because we can't teach students all the facts that they need to know, that stuff changes. Science changes, ecology changes, the skill sets that they will leave here with change, but what.....they need to do or what we need I guess to accommodate that change is to do is to teach them to adapt to it

P 1: J transcript.rtf - 1:14 [Then what will you see the rol..] (22:23) (Super)

Codes: [Accountability - Family: Factors influencing practices]

No memos

Then what will you see the role of assessment then in this course to be?

10J: How well did they master the material we taught them.

P 1: J transcript.rtf - 1:15 [focus was mainly on mastery of..] (24:25) (Super)

Codes: [Accountability - Family: Factors influencing practices]

No memos

focus was mainly on mastery of concepts and principles.

11J: Yes, I think thus pretty what I ended focusing on.

P 1: J transcript.rtf - 1:16 [I suppose I thought more abou..] (27:27) (Super)

Codes: [Justification generic skills - Family: Factors influencing practices]

No memos

.I suppose I thought more about.... what specific tools they will need when they go into third year. In terms of facts, not in terms ofreasoning skills.....be able to solve scientific problems.

P 1: J transcript.rtf - 1:18 [To judge how well they were le..] (31:31) (Super)

Codes: [Justification generic skills - Family: Factors influencing practices]

No memos

To judge how well they were learning the material.

P 1: J transcript.rtf - 1:21 [guess my own experience with l..] (41:41) (Super)

Codes: [Assessment preferences - Family: Factors influencing practices] [Feedback - Family: Approaches used to assess] [Justification generic skills - Family: Factors influencing practices] [Professional development - Families (2): Factors influencing practices, Issues] [Views]

No memos

APPENDIX F: Example of Lecturer interview transcript and coding

I guess my own experience with learning to write, is that is not something that can be taught in a lecture or sitting in a one place in a theatre being told this is what to do. It doesn't even really work giving them this APES writing thing and I gave them parts of it not the whole thing because is a little big and daunting. Because my feeling is that don't they will read it but they will not understand what they reading and be able to implement it the way we think they should just because they don't have the experience with it. So having them doing it once and pointing out ok where they did not what the guide said, or what we told you in the prac or whatever. This is how to fix it gives them a chance to try it and get some feedback and try it again. I guess what I am trying to say is that much of my own experience with writing was a lot like that. My father taught me to write. He was a real master about it. He gave me papers to write and he scribbled all over them on it gave it back to me. But I learned how to write is something that they turn out not to learn at secondary school as much as they should. Ahh I think that was somewhat confirmed when these guys from North Carolina came and said we got evidence that this works the scientists that study how students learn say this works, they tend to learn best if they practice get feedback and practice again. So thus why I did it that way, I thought that will be the most effective way for them to learn how to write.

P 1: J transcript.rtf - 1:22 [I guess is to sort of to direc..] (43:43) (Super)

Codes: [Feedback - Family: Approaches used to assess] [Purpose of feedback - Family: Factors influencing practices] [Quality of feedback]

No memos

I guess is to sort of to direct them towards what we think they should be doing and to help them to understand why they doing it that way. Because doing it once you know, doing it and getting feedback tells them what they doing wrong. But for them to take that into a better product next time requires them seeing what to look out for. So I...the TAs I worked with did most of this. I tried to emphasise was constructive feedback. Eh.....

P 1: J transcript.rtf - 1:25 [re you familiar with the unive..] (52:53) (Super)

Codes: [Assessment Policy - Family: Factors influencing practices]

No memos

re you familiar with the university assessment policy?

25J: Properly not.

P 1: J transcript.rtf - 1:28 [Because I guess I wanted how m..] (69:69) (Super)

Codes: [Justification generic skills - Family: Factors influencing practices]

No memos

Because I guess I wanted how much different members of the group contributed to the overall total. I wanted the students to feel like they were; the ones who were doing their fair share of work were getting some form of recognition for that.

P 1: J transcript.rtf - 1:31 [To ... because the university ..] (73:73) (Super)

Codes: [Justification generic skills - Family: Factors influencing practices] [Measurement]

No memos

To ... because the university requires us to do the final exam. What will be the ideal purpose of the final exam? Ehh....trying to see if I forgot things I wanted to do. So what's the purpose of the final exam? So we can measure how well they did in the course, so we can measure what they learned. Is a tool for measuring their performance. I am not sure what else there is to that.

APPENDIX F: Example of Lecturer interview transcript and coding

P 1: J transcript.rtf - 1:32 [I don't like tests and exams v..] (77:77) (Super)

Codes: [Assessment preferences - Family: Factors influencing practices]

No memos

I don't like tests and exams very much. I would probably do a lot fewer of those if there will be way I would get away with that.

P 1: J transcript.rtf - 1:34 [I was surprised when I got her..] (83:83) (Super)

Codes: [Assessment Policy - Family: Factors influencing practices] [Freedom - Family: Factors influencing practices] [Justification generic skills - Family: Factors influencing practices]

No memos

I was surprised when I got here to find in these, my understanding of how the process works here evolves since I arrived at Wits. That the 60%, at first I thought is the final exam had to be 60% of the total mark but that evolved into 60% material that got to be seen by the external examiners. I think a lot of lecturers certainly my predecessor yes I think for this course as well and certainly for my third year course that turned into one final exam worth 60% which I thought that was horrible. There are so many other things that might influence how well a student does on an exam and that might not be fair to make whether they pass the course or not dependant on a 2hr or a 3hr single episode of assessing. So I did something like take a 60% single final exam and cut it into two or three pieces, so having a class test, (they did have a class test for savanna before that I can't remember that), but cutting that big chunk into two or three chunks or more chunks even giving the students a bit of a fair but for me is a I think is a better fair shot at doing well. So getting to the lecturers' questions and style of examining, practising a high stress situation and having more than one of these things I feel I am likeable to get a more honest measurement of their performance and not whether they were stuck in traffic or got a snatch and grab or their boyfriend dumped them or whatever else influences what goes on upstairs. So I guess I felt or learned eventually that I can sort of work within that sort of constraint, I guess the only cost is in terms of what the externals ending seeing and so far no one has complained.

P 1: J transcript.rtf - 1:35 [So doing the writing feedback ..] (85:85) (Super)

Codes: [Freedom - Family: Factors influencing practices] [Practice]

No memos

So doing the writing feedback incorporating feedback thing with the pracs I ...except in terms of trying to make it fit into the other courses and what is needed else in the school I didn't feel like there was a problem in trying to start that.

P 1: J transcript.rtf - 1:37 [researcher from North America I..] (87:87) (Super)

Codes: [Generic skills - Family: What is assessed] [Professional development - Families (2): Factors influencing practices, Issues] [Views]

No memos

researcher from North America I mentioned earlier say critical thinking skills lifelong learning (whatever the other one is) skills that will work anywhere not necessarily in research but definitely in research but whether they go off and work in governments or industry or whatever. So I guess I feel like I go on pushing and pushing broader abilities I think I have talked about building capacity I think is around those three things I referred to that we do that so that they get out and they critically assess a problem, they can use their imagination to find a way to solve that, they can reflect on what they have done and think of better ways of doing it next time. They can look at or be confronted with something that they haven't be trained specifically to do and still be able to try to solve the problem try to probably figure ways to do

APPENDIX F: Example of Lecturer interview transcript and coding

that.

P 1: J transcript.rtf - 1:38 [I don't see testing as a good ..] (89:89) (Super)

Codes: [Accountability - Family: Factors influencing practices] [Assessment preferences - Family: Factors influencing practices]
[Authenticity] [Measurement]
No memos

I don't see testing as a good way of doing that. I mean if you look at where student end up once they graduate. They don't write tests. Theyif what we want to do is to assess them of how well they do in the real world then the assessment should somehow mimic the real world. I have no idea of how to do that. But certainly since I started doing undergraduate university I have not as a student done one exam and I am so happy about that. So I guess in terms assessing them for preparing them for the world we need to think some more on that. In terms of whether exams or tests are reasonable way or what is the goal of them or that method is purely is just a measurement. Somehow they have to come out of this system and have a number next to their name to say this how well they did. So how else do we assess who to give bursaries to, or let them into the school or let them into the next level or whatever if we don't have that number next to their name. Yhhh I don't know

P 1: J transcript.rtf - 1:39 [guess part of that is developi..] (91:91) (Super)

Codes: [Challenges - Family: Issues] [Professional development - Families (2): Factors influencing practices, Issues] [Teaching skills - Family: Issues]
No memos

guess part of that is developing teaching skills needed in the school that foster that sort of stuff. I am certain that we all tell ourselves that we wanna teach in way that prepares students for the world when they leave without really knowing how to do that. The effective teaching workshop does that a bit... does a pretty good job of that I think. I suppose there are places where staff can go to make changes whatever, to learn teaching abilities to learn teaching tools to incorporate that sort of thing ahmm...

P 1: J transcript.rtf - 1:40 [I think part of the time we so..] (93:93) (Super)

Codes: [Assessment preferences - Family: Factors influencing practices] [Challenges - Family: Issues] [Professional development - Families (2): Factors influencing practices, Issues]
No memos

I think part of the time we sort of not just not aware ofI think it just involves having the knowledge to know what achieves certain objectives and not all of us have that. I came out of a college and did research and not that I don't enjoy teaching but as M is fond of saying we all amateurs in this field. And not that we not willing to try to do better but we I think for most part we teach the way were taught. We think about what worked for us and try to do that. Some works some it doesn't. But probably for most of us, like I said before about not having had the time to sit down and look at what the students have given me I think reflecting on our teaching practices and just thinking about them or taking half the day the binder down from the shelf and re-reading what (Felder & Brent) gave us three years ago. You just don't have the time to do that.

P 1: J transcript.rtf - 1:42 [I guess I like.....at a bas..] (99:99) (Super)

Codes: [Accountability - Family: Factors influencing practices] [Views]
No memos

I guess I like.....at a basic level I want to see that they are competent with the information that I have taught them. And also I would like to be able to see that they can apply somehow that comes back to the problem solving and the critical thinking types of...so if . So doing problem solving somehow giving

APPENDIX F: Example of Lecturer interview transcript and coding

them something that pushes them not I don't think the exam is a good place to push them beyond their limits but to judge how far beyond their limits I might have pushed them in class is a safer way to put that.

Code Family: Issues and challenges with assessment

HU: Case J
File: [C:\Users\00000604\Documents\Scientific Software\ATLAS\TextBank\Case J.hpr6]
Edited by: Super
Date/Time: 2012-07-12 14:35:36

Created: 2012-07-12 14:15:20 (Super)
Codes (3): [Challenges] [Professional development] [Teaching skills]
Quotation(s): 7

P 1: J transcript.rtf - 1:20 [he challenges you mentioned ti..] (36:37) (Super)

Codes: [Challenges - Family: Issues]
No memos

he challenges you mentioned time constraints...

17J: Yes...part of the reason for that was that the block was shorter than usual. So with the third block so I have already started planning this for next year. Is a seven week block, there will be plenty time with an extra week at the end to do the whole thing without nearly as much struggle we had this year. So thus nothing I can do about but it affects so things I think and affects so much time and feedback students get

P 1: J transcript.rtf - 1:21 [guess my own experience with l..] (41:41) (Super)

Codes: [Assessment preferences - Family: Factors influencing practices] [Feedback - Family: Approaches used to assess] [Justification generic skills - Family: Factors influencing practices] [Professional development - Families (2): Factors influencing practices, Issues] [Views]
No memos

guess my own experience with learning to write, is that is not something that can be taught in a lecture or sitting in a one place in a theatre being told this is what to do. It doesn't even really work giving them this APES writing thing and I gave them parts of it not the whole thing because is a little big and daunting. Because my feeling is that don't they will read it but they will not understand what they reading and be able to implement it the way we think they should just because they don't have the experience with it. So having them doing it once and pointing out ok where they did not what the guide said, or what we told you in the prac or whatever. This is how to fix it gives them a chance to try it and get some feedback and try it again. I guess what I am trying to say is that much of my own experience with writing was a lot like that. My father taught me to write. He was a real master about it. He gave me papers to write and he scribbled all over them on it gave it back to me. But I learned how to write is something that they turn out not to learn at secondary school as much as they should. Ahh I think that was somewhat confirmed when these guys from North Carolina came and said we got evidence that this works the scientists that study how students learn say this works, they tend to learn best if they practice get feedback and practice again. So thus why I did it that way, I thought that will be the most effective way for them to learn how to write.

APPENDIX F: Example of Lecturer interview transcript and coding

P 1: J transcript.rtf - 1:37 [researcher from North America I..] (87:87) (Super)

Codes: [Generic skills - Family: What is assessed] [Professional development - Families (2): Factors influencing practices, Issues] [Views]

No memos

J42 researcher from North America I mentioned earlier say critical thinking skills lifelong learning (whatever the other one is) skills that will work anywhere not necessarily in research but definitely in research but whether they go off and work in governments or industry or whatever. So I guess I feel like I go on pushing and pushing broader abilities I think I have talked about building capacity I think is around those three things I referred to that we do that so that they get out and they critically assess a problem, they can use their imagination to find a way to solve that, they can reflect on what they have done and think of better ways of doing it next time. They can look at or be confronted with something that they haven't be trained specifically to do and still be able to try to solve the problem try to probably figure ways to do that.

P 1: J transcript.rtf - 1:39 [guess part of that is developi..] (91:91) (Super)

Codes: [Challenges - Family: Issues] [Professional development - Families (2): Factors influencing practices, Issues] [Teaching skills - Family: Issues]

No memos

J44 guess part of that is developing teaching skills needed in the school that foster that sort of stuff. I am certain that we all tell ourselves that we wanna teach in way that prepares students for the world when they leave without really knowing how to do that. The effective teaching workshop does that a bit... does a pretty good job of that I think. I suppose there are places where staff can go to make changes whatever, to learn teaching abilities to learn teaching tools to incorporate that sort of thing ahmm...

P 1: J transcript.rtf - 1:40 [I think part of the time we so..] (93:93) (Super)

Codes: [Assessment preferences - Family: Factors influencing practices] [Challenges - Family: Issues] [Professional development - Families (2): Factors influencing practices, Issues]

No memos

J45 I think part of the time we sort of not just not aware ofI think it just involves having the knowledge to know what achieves certain objectives and not all of us have that. I came out of a college and did research and not that I don't enjoy teaching but as M is fond of saying we all amateurs in this field. And not that we not willing to try to do better but we I think for most part we teach the way were taught. We think about what worked for us and try to do that. Some works some it doesn't. But probably for most of us, like I said before about not having had the time to sit down and look at what the students have given me I think reflecting on our teaching practices and just thinking about them or taking half the day the binder down from the shelf and re-reading what (Felder & Brent) gave us three years ago. You just don't have the time to do that.

P 1: J transcript.rtf - 1:41 [Well, when teach I do nothing ..] (97:97) (Super)

Codes: [Challenges - Family: Issues]

No memos

Well, when teach I do nothing else. I since the fourth block began I have not read one scientific paper I do bear minimum I have to do the exams, so bear minimum administration, not very well to be honest. I don't have a good answer for that, I work all days a week on teaching something I have to work on.

P 1: J transcript.rtf - 1:43 [Exactly how to do that is what..] (15:15) (Super)

Codes: [Challenges - Family: Issues] [Views]

APPENDIX F: Example of Lecturer interview transcript and coding

No memos

J6: Exactly how to do that is what I am struggling with that still now. I have my own ideas I guess but exactly how to bridge the gap between filling their minds with stuff and giving them capacity...is something I am struggling with I guess.

Appendix G: Example of student interview and coding

Date: 2013/01/29

P 3: 03 05 2012.docx

Page: 1/17

001 A Maybe just tell me briefly about, you know, what the three courses were like for you? Okay? Whether they met the expectation that you were thinking about when you initially did your second year?

002 B Mm mm. Okay. I think the first ... the Biotic Diversity I did because it was It was very diverse for me. So it was... and like ... I didn't do Bio previously ... like at high school, so it was ... I got like a lot of understanding from there . And ... um... Evolution, (pauses and draws in her breath) I don't know, ... I found Evolution very difficult. I don't know why. I don't know why (repeats) but Savannah Ecology was also fine.

✖ Prior learning #1 (2:2)

✖ challenge #2 (2:2)

✖ view on course #2 (2:2)

003 A Okay. In terms of how they fit into what you want to do and in terms of the degree that you ultimately want to get ... do you think they are meeting your expectations.

B Mm. Mm. Yes, Biotic Diversity and Biotic Ecology did.

004 A Okay. Evolution, you don't see it clicking?

005 B No, not really (embarrassed ? laughing) Not really.

006 A Okay. Did you ... I mean how confident were you when you started the courses? Did you think you can make it through the courses?

008 B Yes. I did. I did. I did. But Evolution, I failed it... So,(embarrassed laugh) ... Yeah, but I did. But I ... I honestly thought I was gonna pass. And I passed all of them. Like I passed Savannah Ecology very well. Yes, I think that's what brought my mark up.

✖ Performance #3 (8:8)

A Okay. I mean ... your confidence, did it start... when you started was it high or did it increase as you went through the courses?

009 B Tch! Ummm (pauses) Eh! after Evolution ,(embarrassed laugh) it was like Eish! Jah! But then with Savannah, final block, I shot up, because even with the other course ... it's not a core...

010

011 A Jah ...

012 B But it's also a good course when... you know it motivated me.
you know I got good marks there... jah.

✖ Motivation #4 (12:12)
✖ Performance #4 (12:12)

A Mm

013 Jah. And I did well for Savannah... so ...

014 A Okay. I mean, did you know what is expected of you in those
015 courses? Maybe let's start with Biotic Diversity. Did.

you know exactly what was expected of you?

016 B Not really.

017 A Okay

018 B. I'm not gonna lie. Not really. I just saw what was expected of
me where they give us stuff and... jah

019 A; Like when they gave you the course outline and how the
course is going to run did you know exactly what was ...

✖ Clarity of course aims #5 (19:19)
✖ Expectations #5 (19:19)

020 B Jah, I had an idea.

A; For all three of them?

021 B (Said while thinking) (softly) Not for Evolution really. Not for
022 Evolution. But with the others, jah. Jah.

✖ Contradiction #6 (21:23)

023 A Okay.

B Jah

024 A Okay. um, the teaching part.

025 B Mm

026 A Can you comment a bit about... you know, I know you have ...
027 for example in Biotic Diversity you have what... about two or
three people?

028 B lecturers..?

029

030 A per course?

031 B Jah

032 A How did that fit into your expectations on how the course ran?

033 B, No, I think that was... I think that was fine because like every Lecturer was specialising in something and you knew, like, you knew with the flowers... I knew Gladys was the person to go to. she knew everything . I... so for me, it was very convenient cos you know exactly who to go to and they'll always give you an answer. and jah, even with Evolution ... cos, we also had like different lecturers, I think it was three, if I'm not mistaken. and they also gave us, um ... Jah it was proper. I think it was fine - with the different people lecturing the different aspects of the course.

✖ Team teaching #7 (33:33)

034 A Um, trying to tie, you know, the teaching style to how, you guys were assessed...

B. Mm

035 A I mean, in terms of tests, exams, whatever

036 B Mm

037 A ... projects that you did. Do you think the two were aligned? I mean what the lecturers were saying and were emphasizing...
038 was that what they assessed you guys on?

039 B (longish pause) Hmmm. Do I still remember? No, but for Biotic Diversity, yes it was. Because it was an open book. And they... you know, with the questions it was not like "Okay, what's this? I've never seen it before." It was something you've come across before. So, Jah. Ummm with Evolution, we wrote the test right? but when the feedback came I realised that they wanted us to approach the answering the question in a different way than in what we did. Because, I think that's why so many people failed our first test. And with Savannah ... jah, it was... it was what we expected. Like what... like what was taught in class though. It was fine.

✖ Alignment teaching and asses

✖ Assessment methods #9 (39:33)

✖ Feedback used to clarify TLA g

A So what do you think the purpose of assessment was all about?

In the three courses really.

- 041 B Wasn't it to get our understanding in how well... I think it's understanding and interpretation and um, ... ag, what's this word... ag, ... and applying, jah, applying like applying... like what we've learnt... Can we use it in another... especially for Evolution... Can we use it in another sense. Because you know, They always tell you ... give you this example.. and that's another example, you kind of don't know how to apply it and so I think that was the major thing was with Evolution it was application? In any of the three course? and relating it to something else... to something more vast ... so jah...

✖ Perception #11 (41:41)

✖ Purpose of assessment #11 (41

A do you think you were over assessed

- 042 B Overassessed?

- 043 A: Di you have too many tests? Or things that you needed to
044 submit...

B Nooooooooo...

- 045 A That you think were in excess?

- 046 B No. No, no. No. Compared to now. No (laughs wryly)

- 047 A Okay. Were there in any way where you had to do some form
048 of assessment task that didn't contribute to marks. Which you think were just for you guys to nail and get feedback on?

B (Silence)

- 049 A: I know that in Biotic Diversity there were some pracs that they didn't...

- 050 B Oh jah, that didn't count for marks. Oh yeah...

A Do you think they helped you in terms of learning?

- 051 B Jah. Jah. Jah, I think they did because you know, you can use...
052 even if it's not for marks we handed it in , rights... and they marked it... but they didn't record it. And it's stuff that you use
053 for the test... for the open book test... so definitely it did help

✖ Formative assessment #12 (51:41)

you. Jah, it did help.

054 A And with the other courses?

055 B Jah... But Jah... (I forgot - said very softly)

056 A Okay in terms of the assessment do you think that any of the assessment kind of helped in your learning or the kind of hindered your learning?

057 B No it helped. It definitely helped. Because with the... with tests and whatever, you... you constantly up to scratch with your work because if it's just an exam in June, you kinda laid back and you're like ... "Ah well, I'll start when ..." But if it's like... I like the tests. It makes you more... (giggles) more motivated to study on a daily basis, jah.

✖ Benefits of assessments #13 (57:57)
✖ Continuous assessment #13 (57:57)
✖ Motivation #13 (57:57)
✖ preference #13 (57:57)

058 A So, in terms of the teaching and in terms of what you are given as the aims of the course, do you think those were matched to the assessments, really?

B (Slight pause) Jah. Jah.

059 A Okay. so...

060 B Because I know with Savannah, like in the beginning we were given the aims and in the end Jason gave us ... we... so That was our aim. And this is what we did and didn't... so it was like. I ... it's clear. It's very clear.

✖ Clarity of course aims #14 (61:6)

A And for the other courses?

062 B Um. I don't quite remember the other courses. It's just that I remember Savannah more because Jason just took us now for ??? now in January... I mean first block, so ...

063 A Jah, Jah.

B And he did the same thing...

064 A Mm. Mm.

065 B Um, Biotic Diversity... (pauses) Oh, I can't remember the...

066 A Were you just given topics... that, this is what we are going to

067

068

cover? or were you given, kind of, the aims of the course... I mean, at the end you need to be able to do blah, blah, blah?

069 B Jah, it was something like that. That ... we... will... do... this... and...by ... the... time... you've... done ...that... you ...will... be... able... to... do... (speaking in a paced voice for emphasis?) dah,dah,dah ... Jah.

070 A Okay, so that was given. Um, You mentioned briefly about the feedback ...

B Mm.

071 A So, what kind of feedback did you get in the three courses?

072 B Um... (Pause) Okay, with... with Evolution (said slowly) we had to submit a report. and it was sort of like a draft the first time...

073 A Jah.

074 B ... and then we resubmit. I think that really helped because, you know, you can see ... like even the silly mistakes that you do and the major mistakes that you do, and they tell you, like look at another person's work... or whatever, maybe a person who did well... like check what they did... it's more... appropriate... whatever. I like that. The feedback was good. And Jah, the feedback was good overall, I think. because even for Biotic Diversity I thingeys... our TA's wrote stuff on it... and for Savannah... what did we do for Savannah again?

A You did the weekly reports? Where it was broken down into the...

B Oh, Oh! The different sections... Jah... jah...

076 A Was it just purely written, um, feedback? Or comments that you got? Did you get any verbal feedback? I mean..

077 B No. Er... verbal? (Asking herself) Not that I... I got a...

078 A I mean a...

079

080

✖ Clarity of course aims #15 (69:6)
✖ learning outcomes #15 (69:69)

✖ Draft reports #16 (73:75)
✖ Experience of feedback #16
✖ Purpose of feedback #16 (73)

✖ written comments #17 (75:75)

081 B On a one-to-one basis ? Like?

082 A Or in a group

083 B(long pause) Oh, for... for Sa... for... For Evolution, we did because they gave us our thingeys and Glynnis was just telling us, um ... so these are the common mistakes that people made. So, jah... and jah... just the comment they made and the most mistakes that we made I think in general, as a class.

A Do you think that was very beneficial to you guys?

084 B Jah! Very!

085 A Jah, I sat in one of those ??? for the evaluation...

086 B Mm.

087 A And I think, when I recall, Glynnis did call upon some students
088 to read aloud?

B Mm... what they did. Mm

089 A Jah. And you thought that was ... what was your feeling about that really? In terms of...?

090 B I think it was... well, personally, if she had called me I don't think I would have been able to... but it was good for us, who
091 didn't really do well ... to hear what other people wrote... and you're going to be like "Hmph! So I was on the wrong track, dude. Totally!" So, I think jah, it was good for us.

A: In terms of the quality of feedback, I mean... I mean, the written comments in terms of the type of language that was used, were you... I mean, do you have any comments about
092 that?

B (Slight pause) Jah, well, some of the stuff that was written, you couldn't see because it's like cursive... and some terms, so you needed to go back and you know, and just clarify it. So ...

093 A Clarify with whom?

094

Experience of feedback #18 (83)
Group verbal feedback #18 (83)
Perception #18 (83:83)

Experience of feedback #19 (91)
Peer group feedback #19 (91:9)
Social identity~ #19 (91:91)

eligibility of written comments +
Experience of feedback #20 (93)
nature of comments #20 (93:93)

095 B With the TA who marked your paper... because usually you
start with your TA. Then you go to the lecturer. So, jah and see...
and they're probably going to explain more in detail. You like...
Okay... jah... so it's fine.

A Okay, so in terms of the fairness of the comments... I mean,
096 you really didn't deserve some of the comments, for example?

B (Longish pause) No, (said slowly) I think the comments were
097 fine. Some people had ridiculous comments but my comments
were fine.

A I mean. it happened that I did analyse some of the comments
that were coming through from some of the... especially from
098 Evolution.,...

B Mm...

A I mean, some of the terms that were used, for example, were
099 things like "cliché"... Would you be familiar with ...

B(murmurs) the word cliché...?
100

A If somebody said cliché on... as one of the comments, for
example... cliché with regards to substance...

B Jah, I know some people got like... "What does that mean?"
102 but I personally didn't get those weird comments that I didn't
understand.

A And it terms of criticism?
103

B I think it was constructive.

A Constructive...

B Even though it was... you know... we were like "Oh! My gosh!"
104 but its... it make you...

A So how did that affect your motivation in terms of...
105

B I think it motivates you to do we... to do... um, to do better
107

108

109

✖ nature of comments #21 (97:97)

✖ nature of comments #22 (103:1)

✖ nature of comments #23 (105:1)

✖ Purpose of feedback #26 (

✖ nature of comments #24 (

next time...

110 A Mm

111 B Cos... jah, you see... then you see someone else's paper, and then you like " No, I can do this!" but it's... It motivates you.

A; Were there any, I mean, areas of confusion in terms of the
112 feedback that you got?

B Confusion? How... like... with the ...

113 A The written comments that you got?

114 B (Slight pause) Like... if it's not clear... jah, cos you know,
115 sometimes they use like... scientific terms... and like you know proper stuff... and you're not really sure what that means. You've seen the word before ... but you... so, jah... jah, I guess.

A And do you think they should comment on... on the use of language? Especially, because, I mean you're doing a biological
116 course but it's written in English and you're writing scientific reports, do you think it's very critical for them to comment on the grammar, for example?

B (said slowly) Jah I think it is. Because when you... when you graduate and go to work, don't you... do... doesn't that count? Like... your... is it proper English? Because I mean English is
117 known world-wide, so I think they should comment on the grammar, jah.

A I mean ... one of the things that they school is trying to achieve really is for people to be research-ready...

B Mm
118

A In a way, by the end of their degrees. and pone of the ways that they are doing it is for is for people to get practice in terms of writing scientific reports.

119 B (echoing) scientific reports. Mm.
120

A What do you think is very critical to get feedback on, in terms

121

122



✖ Motivation #27 (111:111)
✖ Social identity~ #27 (111:111)

✖ Comments grammar or language

of writing the report? Is it the language? Or the structure of the report? Or whether there is some coherence in what you're writing? Whether you're citing correctly? What do you think is really important?

123 B What I feel is really, really important ...? I think they style of writing, the format is really important, But I'm sure now we kinda of have that. And I think the proper terms to use is ... because I know like there's scientific language and then there's normal language. So you always need to know who you are writing it for. So, I think that also... because you know, sometimes you're not really too sure on who exactly am I writing this for... and you kinda of use simple English when you're supposed to use ;like scientific terms and whatever. So, I think the language is also important.

✖ Experience of feedback #29 (123:123)
✖ preference #29 (123:123)

124 A Were you ever surprised by the match between the marks that you get and the feedback that you get?

B (Pauses) Ehhh... Jah!

125 A In terms of the correlation

126 B Jah... Because sometimes you see a whole lot of comments (said animatedly) and then your mark is quite good... you like...

127 A Jah. Jah.

✖ Alignment teaching and assessment
✖ Experience of feedback #30 (127:127)
✖ Performance #30 (127:127)

B Oh! Okay! It's not that bad! (animatedly)

128 A Okay. I mean, in terms of the comments... will they in essence, match the marks? I mean, will they be saying "Well done! you could have improved this ... even this is..." ?

130 B Jah. I know with Evolution... I got that... Like... jah. Jah.

131 A Mm. How much time do you spend...I mean, even currently... reading the comments, really? Or when you get your script do you just look at your mark and...?

132 B (Laughs shortly) Okay... for me... it depends. It... like... now with ECBC... I look at my comments because I know that I have another big report to write. So I want to see where I made my

133

✖ Use of feedback #31 (133:133)

mistakes and I want to get those marks next time. Um, unless it's something like I'm never going to do again... if it's like that one big report... or whatever... Jah, I think it was the Savannah Ecology one... the last one... I didn't even check the comments on the final, final one.

A Jah.

134 B Cos, it's like... But jah, with these regular ones... kinda you need
135 to keep [up] to date with whatever...

A But with Savannah, I think you did, first the Introduction... and then you went into...

136 B And then you put it together... Mmm...

A Did you use the feedback from those little sections?

137 B Mm. Mm.
138

A To write your final report?

139 B Jah. I did. I did.
140

A And were they helpful?

141 B They were. They were. Because I remember, there was my
142 Methods... I didn't really put many citations because I didn't
143 think I'd need to (said slower) but like the TA wrote comments,
like "You need your co-ordinates", "You need your study sites"
You know? And I used that. And I think... jah... and my last
report, it was fine.

A In essence, did they give meaning to the assignment that you were supposed to do, in terms of final report?

144 B Mm.

A Okay. Um... (Short pause) In terms of assessment, do you think the assessment, the feedback is helpful to your future career?

145 B Jah I think it is. (Said without conviction) Jah.
146

147

148 A Mm

149 B Cos it's all stuff that you're constantly doing, over and over again, so I think it will help. Especially, with the reports. It will help. (Said very softly)

A Are you using any of the comments that you got from last year to ... this year.

B (echoing) this year? Jah. Jah. Definitely. I am.

151 A Why is that so?

152 B Especially with my Methods. Like I was telling you now... Like...
153 Cos this year I'm also doing Savannah Diversity, because I didn't do it last year, and you know, when you talk to second years, they haven't done Savannah Ecology and so they don't know, the stuff that we know now, and for me, it's like general knowledge kind of thing now, (small laugh) Oh... in a way, I know it's only been last year but it's kind of like general knowledge now, and for them saying "Ha, Why? Is it?" So, you know, I'm definitely using all of that... now. So, I think that's why you kind of improve. Because I personally think I have improved from second year to third year. Like my marks are even improving... so... Jah.

A Ideally what do you think, I mean in some courses you write closed book exams, closed book tests...

154 B Mm

A What do you think the ideal way of assessing students would be really?

156 B (laughing) Open book.

A Open book?

157 B (Laughing) I'm joking. I'm joking. Um... (pausing for a while) Ideal?

158 A Mm

159 B But I am sure we would all want open books, I guess. But I

160

161

 Learning experience #33 (153:1)

 preference #35 (157:157)

don't know.

162 A People... Some people don't do well in open books.

163 B It's because... I think, they miss ... they abuse that Open book... where it's like "I shouldn't study". But that is wrong. You should study just as much. But you know at open book you always know, you see, I have it at my fingertips, like I could just ??? it, if I forget... Because you know like in exams, especially if you are under pressure, you just can't remember that one word and you're like "Oh my gosh..." And I... you can kind of see it but you can't remember it. So, I don't know... I know open books are kind of ridiculous...

A They are nonsensical...

164 B No exams at all. I think there should be tests though. Because
165 with ECBC right now, I'm not happy. There's no test. I'm not happy.

A Jah...

166 B Cos you don't even know how the lecturer is going to set the
167 questions. Jah, we do have past papers and... but, you know, it's always the feedback that you get from your tests that you use for your exam... so if it's just one boom big exam...

A So, what's going to happen in ECB?

168 B We... we submitting, like, reports... weekly reports. Then at the end... exam.

169 A Oh, there will be an exam?

B There's going to be an exam.

170 A Will it be open or closed?

171 B (Pause) I... I'm not sure... I'm not sure (said softly)

172 A You're not sure. Okay. So what do you feel that you have learnt
173 really from the three courses and how they fit into your plans
174 really? Beyond... beyond your degree?

✖ Assessment methods #34 (163:
✖ Exam stress or pressure #34 (163:164)

✖ Assessment methods #36 (165:
✖ preference #36 (165:165)

✖ Assessment methods #37 (167:
✖ Justification for preference #37
✖ Purpose of assessment #37 (167:168)

175 B Mm. (Longish pause) Okay with, with Evolution, I thought it
was... It's quite good general knowledge to know... It's like "Oh
okay." It's stuff that people wouldn't know... like on a daily
basis... Um I think it was... with Biotic Diversity... you just more
knowledgeable in general... like... you walk around... you know
stuff... you see around. You don't just see buildings and
machines. You see more than that. Jah, I think it... it just
broadens your knowledge. I don't know how you can explain it.
But jah, it's...

A Mm

176 B You just not that, you know, narrow minded person. You are
177 more aware of everything basically.

A Mm. I mean, In Biotic Diversity you deal with the... the
collections...

178

B Mm. Mm.

A Which I mean... do you get feedback on... as you were doing
179 the collections themselves... or did you just have to do it on your
180 own and make submissions?

B Uh... we went... we went to a camp, right?

A Jah...

181 B For like two days or something. And you collected there and
182 you tried to identify as many things there, because you know you
183 had the lecturers to help you. You know, you had TA's to help
you. But whatever you couldn't identify, then you were on your
own. You just had to come to the lab... when you had time,... or
borrow books from the library and you were basically on your
own. But you didn't get feedback on that. So... Jah, we didn't
really... Did we get our marks back? (Asking herself) Hmmm?

A You should... because it counted towards your final

B Jah it counts.... (Still musing) Oh, jah we actually did. But like
you didn't get your actual project back to see...

184

185

✖ Clarity of course aims #38 (175:

✖ Clarity of course aims #39 (177:

186 A Oh Okay. But you had an assessment rubric with it, didn't they
give you that? I mean, criteria how your project will be marked?

B (echoing) will be marked... jah... Jah, we did.

187 A And was that helpful?

188 B Jah, it's always helpful to see where I should focus on more.

189 Because you know, you focus on like something else and it's like
two marks. Which is... useless.

A Were you given that for all the courses. I know that in
Savannah, Ecology...?

190 B Jah we had one.

A For Evolution, in terms of the report that you did, did you have
191 it?

192 B Uhhhhh (long sigh) I forgot! (Said very softly) I honestly forgot.
I'm not sure...

A For Evolution, I understand that after the report that was
193 handed in, people were given the chance to...

B (completing the sentence...) to resubmit it!

194 A Jah. Did you do... resubmit yours?

B Jah. Cos... Um... my... my may... Like I... my mark was good but
195 I still wanted to resub... because she gave me feedback on my
results. Um, she's like... she wrote that my... I didn't report as
196 much as I should have. So I just put more stuff and I put more
197 references. And my mark went up... so, jah, that was good. I did
resubmit it.

A So, that opportunity was really good in terms of rec...

B I always, if I have that resubmission thing. I always do. Because
I... I mean... if they say your mark is not going to go down. Then,
why not?

198

199

assessment criteria #40 (189:18)

preference #41 (197:197)

Resubmit #41 (197:197)

200 A Jah,.

201 B Then you can do ... well.

202 A Is there any other thing that you want to comment in terms of,
I mean... the three courses... I mean, the teaching part, how you
learned, how the assessment and the feedback went...

B Uhhhh... jah...

203 A I mean somebody who was supposed to do second year and
204 came to you and said... Just briefly how was your experience?
What was the WOW moment for you in any of the three courses
and what was not really, really good in any of the three courses?
What would you say to that student?

B Oh... I don't know but I LOVED Savannah Ecology. I just...
205 Maybe it's because it's what I really want to do, you know... you
just got more information... Like especially the soils part... I was
just like Wow this is so interesting... because you have no idea
what soil is until... until Mary comes and she explains and it's
like... Wow! Um, jah and it's all very interesting... even Biotic
Diversity... you open up a flower... It's like really interesting... It's
interesting. Hmmm Jah... I found it... It's for... for Evolution, I
didn't really understand the pracs hundred percent... you know
we had the simulation models... I didn't really get them hundred
percent... like I wouldn't be able to explain it to a second year
right now. But I did it... and I passed some of them so... Jah...

A I mean now you're doing you're kinda doing... your final year in
a way... eish, jah... And the main aim of the three courses was
206 to... to act as the ??? cord, because they feel that they are
foundations for the rest of the courses. Do you feel they are
foundations for what you are currently doing in terms of your
third year courses?

B Mm. Mm. Jah. Jah... I think, definitely Biotic Diversity and
Savannah Ecology, they are because... I'm trying to think...
Evolution...

207

208

APPENDIX H Samples of marked student work

H1: Course A Test Scripts

Question 1
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With different beliefs and religious background that people are brought up, ideas and thinking is different and separated into groups.

Some people think that vaccinating the child will cause autism, a disease that affects the ~~body~~, they are scared to input a disease, which is in very small amounts into the child which they think they will not get small pox in the future, and that is going against the natural state or way of life, to prevent this occurrence. **Mixing ideas here!**

People might be afraid of it and just think of the long term issues if their child is infected with autism. The extra care, expenses and responsibility will increase if the child is sick with autism, which will last a life time. People always think of the worst for everything. **Not true**

Complete contradiction

Therefore, people ^{just} tend to believe what is for the best and just live life without knowing what could happen, so rather, they take chance with sickness than having a child with autism after vaccination. ~~We always have to challenge what we are meant to do or~~ There's a pattern of life in which we ~~often~~ follow because of certain ideas that make us think it is true based on some facts and observations, theories. And because ~~it~~ some have not been disproved, we believe it is real.

95
ideas
Not god
Question
13
ideas
you have grasped about
are half of the ideas
you write down

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Question 2
Write on both sides of the paper

9) HIV attacks the immune system, mainly the white blood cells that fight off pathogens. HIV does not kill or cause death, it just reduces the ^{strength} of the immune system greatly and a secondary illness ~~lets you~~ causes the death. It is difficult to treat as it is hard to trace as it has ^{many} (a long) genes, mutations occur rapidly ✓ and the reverse transcriptase [✓] it contains with the ^{many} long genes, and with rapid mutations occurring, it is hard for the ^{drug} science to develop it. It is difficult to treat, also because, the reverse transcriptase is error prone, [✓] mutations occur as then AZT is slowly rejected with no effect. This is because of natural selection, the viruses that is stopped by AZT stops, but due to an error-prone reaction, mutations of genetic make-up changes, and ~~variant~~ variations occur, the viruses with the best characteristics remain survive ✓ because ^{they are} it is not affected by AZT, and these ^{various} (genes) remain and ^{their genes} get passed on to offspring and a new population resistant to AZT continues to grow. ✓

6/10

b) HIV origins ~~might be~~ ^{are} from SIV from primates, this could be due to ~~the~~ ^{which ones?} eating the primates and blood infected with SIV gets into circulatory system and gradual evolution occurs and infects human population, vaccines are being studied back to how ^{it} started in the SIV phase in primates. So starting from route and identifying the evolutionary route of the HIV.

Does not really answer the Q.

1/2

6 1/2 / 12

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Question
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It is "low ^{fitness} cost" to believe that the
vaccines are harmful when they are not.
This is a type 1 error and can be explained
by patternicity (find meaning in meaningless
things). → How?

People also follow what others do. ^{curious #3}???

most people are also [?]ineducated about
science and the extent of its knowledge
or how it works. They need to be taught. What?

largely a unconnected paragraphs
with pictures and little of
substance.

⑧

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Question 1
Write on both sides of the paper

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Humans are complex creatures. They find patterns and need to believe things based on their ideas - Very imprecise statement

Science needs to support their beliefs. It is easier to ignite a fire than to stop it. This is the case with the vaccine scenario. Once parents thought there might be a correlation between vaccines and autism nothing can change their mind.

They don't understand that science is not about wrong or right. It is continuously attenuating as new data is found. Good

Most people believe in science as a general but differ when it comes to certain aspects or findings.

Humans are scared. They believe that the chance of them their children developing autism is greater than their need to protect them from measles, mumps or rubella or other kinds of diseases.

Why?
Answer - make an evolutionary argument for this
These illnesses that require vaccinations for infants are less disastrous than the diseases that they believe can occur if their children were vaccinated. Let there

Question 1
Write on both sides of the paper

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People who are not in the science field do not fully understand the mechanics of science. ~~For exam~~ Since the science field is based on theories hence meaning that the hypotheses always undergo constant change as soon as new influential information arises. This then makes people uncertain of scientific theories as they observe that there is constant modification. People do not understand that when a modification is made it will be more correct than the previous one (Wronger than Wrong). The mistake that the public makes may be taken as a type 2 error because the cost of not vaccinating your child is a higher cost (resulting in death). As humans, it is also easier to believe that something is wrong although it is later proven to be right. There will always be some doubts as to why a doctor said that vaccinations cause autism.

?

Good

Good

Not-logical

Mixed answer.

Pattens? → make us happy

11

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a) The ^{retro}virus works on reverse transcriptase which is more susceptible to errors. The virus enters the host cell by binding to the CD4 and co-receptor where after the HIV RNA enters the host cell. If the RNA then undergoes reverse transcriptase where it is ^{transcribed} turned to DNA. In the host cell's nucleus DNA is transcribed to mRNA which is then released out of the nucleus where the mRNA is then translated to proteins. These then leave the host cell and multiply rapidly.

HIV is hard to treat because it undergoes many mutations which causes variation, it is extremely quick, it has 9 genes (unlike other viruses) and it can hide itself well. Treatment with AZT becomes ineffective after a while when the virus has undergone mutation which may result in resistance to AZT.

5/10

Natural selection occurs in the virus's time span where the virus can detect that it survives longer if it produces other viruses that resist AZT, so treatment must be based on reversing such a process.

No!! ☹

A virus cannot choose which viruses survive - No is due to natural selection

How?

b) Knowing whether the individual has HIV 1 or HIV 2 is important as these strains have different virulence levels. So knowing the origins of the HIV strain will assist ^{in what?} because there will be other individuals (monkeys) that have adapted to the virus and this can be further investigated on. ✓ or

1/2

6/12

Question 4
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Negative FDS favours the rare form whilst
positive FDS favours the common form. ✓

An example of negative FDS could be of a
flight view where a predator will feed on
prey that is more abundant in that area and
leave the one that looks different from the rest ✓

Yes -
but with
only really
weak pos-
ive FDS.

(in fear of getting toxicated by the different
looking prey. However there has to be enough ^{such individuals} species
of this prey) for the predator to draw such conclusions. ✓

Positive FDS is when a predator preys on
a species that is ~~is~~ rare and hence this
species will decrease or even go extinct. An
example is of the right-hand-mouthed and
left-hand-mouthed fish that feed on their
mothers. If the conditions favour the right-
hand-mouthed, there will be a sharp increase
of this type ~~with~~ while the left-hand-mouthed
decreases gradually.

No -
this is
-ve FDS
& due to
competition
not
predation

3/6

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Q1) We persist in supporting false ideas ^{pose} because they generally come as a lower risk than what? when believing them. Evolutionary we are programmed to respond to when something may directly affect our lives and because often at the time we do not know if the treat or ideas are false it is in a person's best interest to believe because the cost of believing and realising it is false is less cost than in they didn't not believe and this problem ~~turned out to possibly~~ cost us our lives.

Not
logical

So in people not choosing to vaccinate their children they believed that it may cause autism thought that autism was far worse for their children to endure than to ~~be~~ become sick. And this is a logically decision as autism can not be cure where as most illnesses can. Their decision was one that has large evolutionary significance as those who do not react to ~~f. seem~~ seemingly false ideas face the risk of it actually being true. So ~~a~~ if the vaccine case

Not
English

u
u
correct

Question 4
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Contradictory } Positive frequency dependent selection - is where by the
the rare form of species is not favoured ^{preferred} and the
common form is not the potential prey, predation is
high and most organisms survive by having or being
aposematismers - having brighter colours indicating that
they are toxic or venomous. Example - the peppered
moth after the black smoke industry event, ~~was~~
the black moth was favoured by the condition
and white ~~the~~ moth was typical so it was the
potential prey.

Negative frequency dependent selection - this is when
the rare form is favoured and common form is
targeted as potential prey. The rare form survive
or is being favoured by having predator images,
having resources (unique resources) to use and also
mate choice. Example - the cichlid fish has a
mouth on the right or left side of the head, it
feeds on scales of the fish - so it goes behind
other cichlid (bigger ones) or other fishes and grab
the scales and eat it and it survives X

3 1/2
/ 6

This example
is based
on
competitive
advantage

Time & Space

Question1.....
Write on both sides of the paper

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Report of questions

Human persist in supporting ~~the~~ frightening but false ideas, such as the movement to not vaccinate children in the USA for fear of causing autism, even though not vaccinating puts all children at real risk of serious illness because ~~the~~ humans (it terms of vaccination causes autism) it is best

to believe that it so, ~~so~~ because
the risk will be less if that assumption
was correct - type I error; which is
believing that something is so when it
actually isn't. Because if the assumption
was to be correct more children will
have autism. However, the other error that
human beings tend to make, and is
mostly likely so for this case (~~that~~ ^{vacc} ~~autism~~ ^{is}
~~doesn't cause~~ (that vaccinations do not
cause cancer) is type II error; one that
we human make when something is
actually correct we believe it actually it
isn't correct.

Half an answer

9

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Question 2
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a) HIV ~~is virus that attacks it host by~~
~~attaching~~
~~attacking it~~

a) HIV enters host cell by attaching itself
using the gp120 and gp41 proteins. When
it has entered the host it release ^{RNA} genome,
reverse transcriptase and the rest of
its contents inside the host cell. It then
make HIV DNA from the RNA using
the reverse transcriptase. It also after that
make HIV mRNA from the HIV DNA.

RNA $\rightarrow$ DNA $\rightarrow$ mRNA $\rightarrow$ protein.

Then once the process is done the HIV
virus destroy the host cell and then moves
on to another cell. This virus is so hard
to treat because it mutates very quickly,
the reverse transcriptase disturbs the host cell
and it has more genes. ^{than?}

Natural selection - favourable heritable traits
are successively passed on to the next generation
and unfavourable heritable traits slowly
disappear because they are not passed on.

Therefore the understanding of natural selection
will help in the treatment of HIV. Natural
selection helps an organism (HIV virus) to
adapt, therefore being able to survive and
reproduce, thus the treatment for HIV will
need to be able to "kill" all the viruses
so that none can adapt to the treatment
and therefore reproduce offspring that

such
as?

How?

what do you
mean by "kill"?

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Question 5
Write on both sides of the paper

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Good genes Theory and the Fisher theory. Where in the good genes theory female choose males on the bases on the genetic make ~~uses~~ using the phenotype. This theory enable the female to produce an offspring that ~~are~~ have good genotypes such as the that help with resistance towards a disease. The Fisher Theory is on the bases of material resources ~~where~~ ~~so~~ that females choose males for material resources that will help them survive and be able to reproduce such as food, protection etc.

Answer the
question.

①

Question 1
Write on both sides of the paper

Human beings although was born to be happy, it is not meant to last, like for instance if one tends to get everlasting happiness from eating / having sex, that particular organism would only eat once or have sex once in their lifetimes more than what people believe in scientists, they are afraid of not believing what some false newspapers tends to say. Humans normally have the idea that what they say should be correct. They have the desire to be more correct than the fact assuming what they believe is actually the fact. Infact people are afraid of believing what the scientists say like they are afraid, that even though scientists say vaccination prevents their children from getting a serious illness, they are afraid and think that vaccination itself could be more dangerous ~~than~~ ^{than} the disease it might prevent. People are afraid that not following what ~~they~~ they themselves believe and trusting scientists could be dangerous. and they also believe in type I error which would be of lower cost than type II ^(believing what not believe) error which will be of higher cost (of ^{not} believing what is there to be true)

Whole is what in this example?

Your English is not good.

You have not given an answer
When incorporates evolution?
Natural selection.

10

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Question
Write on both sides of the paper

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Humans have evolved to be happy such that we have evolved to perform certain functions in order to make us happy such as eating and sex. In certain cases people will believe in false ideas and such a case as seen in the case to not vaccinate children is known as false positive reasoning, being that people will take something positive and make it out to be wrong, as opposed to false negative in which you believe something isn't true when in fact it isn't. People will observe something in the negative light and believe that it is wrong. Yes, it may be slightly possible that vaccines can cause autism however not vaccinating puts the children at more of a risk to infectious diseases making the person or the decision maker "wonger than wrong". ~~But~~ Wise People have been brought up to believe danger is near when it is in fact not in order to improve chances of survival as this is better than believing something is not there when in fact it is.

NR!
correct

cannot

(11)

Question 2
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a) The HIV virus is a virus that attacks the body's white blood cells or macrophages which are necessary in fighting diseases and infections. HIV is what is known as a retrovirus as the enzyme reverse transcriptase transcribes the genome. Most proteins found in the body have 4 or 5 genes, however the protein of the HIV virus has 9 genes making it a complex structure to treat. Many of the treatments affect the host cells as well. The enzyme reverse transcriptase is used to convert HIV RNA into HIV DNA within the host cell; the addition of ²ART (treatment) aids in slowing down the effects of HIV however does not destroy the HIV virus and this is due to natural selection. The reverse transcriptase is error-prone and either may not pick up the ART which ultimately destroys the coded HIV DNA, but very often mutations occur; these mutations develop and are able to withstand ART. Natural selection will favour these mutations and produce offspring creating a whole lot of ART resistant HIV and thus destroying the body's immune system. Thus natural selection is important in designing treatment for HIV.

sense?

Thymidine analogue

How?

6/10

b) There are 2 strains of HIV; namely HIV-1 which developed from SIV from a chimpanzee as well as HIV-2 which developed from a different strain of SIV and was found in a monkey species. The two different strains and different origins makes it difficult for vaccines to be developed. HIV-1 is a lot more dangerous than HIV-2 and destroys cells faster than HIV-2 adding to the implications.

1 1/2 / 2

Why?
Explain
clearly.

7 1/2 / 12

Question 3

Write on both sides of the paper

an alternative form of a gene

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a) An allele is a code (found on a gene) which codes for a particular characteristic or trait.

$\frac{1}{2}$

b) Alleles arise from gametes which are exchanged during sexual reproduction. The alleles are found in the genes obtained from both parents and code for a particular phenotype.

0

b) MM: $\frac{187}{320} = 0.584$

MN: $\frac{114}{320} = 0.356$

NN: $\frac{19}{320} = 0.059$

✓ } ✓

→ 1

c) M: $(187 \times 2) + 114 = 488$ → frequencies?

N: $(19 \times 2) + 114 = 152$ ✓ OK

d) $\frac{488}{640} = 0.76$
 $\frac{152}{640} = 0.24$

$p^2 + 2pq + q^2 = 1$

$\therefore 0.76^2 + 2(0.76)(0.24) + 0.24^2 = 1$ Yes.

3/3

where $p^2 = (0.76)^2 = 0.58$

and $q^2 = (0.24)^2 = 0.06$

$2pq = 2(0.76)(0.24) = 0.36$

e) Genotype	Observed number	Expected number	(O-E)	(O-E) ² /E
MM	187	187	0	0
MN	114	114	0	0
NN	19	19	0	0
Total	320	320		$\chi^2 =$

$\frac{1}{2/4}$

f) d.f. = 3 - 1 = 2

$p = 0.05$

$\chi^2 > p$ and therefore (accept) the null hypothesis
= fail to reject

0/2

$\frac{6}{12}$

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Question 1
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Even if people have evolved to happy, doubt is present in many individuals of the human race. Doubt has evolved in humans and may actually have beneficial consequences. People sometimes avoid harmful situations that can endanger their life by being doubtful. It would then ~~seem~~ ^{seem} that doubt, ~~if~~ in some degree, has helped us survive and evolve from generation to generation. We doubt, we think and we reason. Some people doubt a great deal more than others. To degree to which they do this may render their thoughts unreasonable. For ~~eg~~ example, if sufficient evidence exists to show that the risks of contracting serious illnesses ^{by not vaccinating children} highly outweigh the risk of causing ~~an infection~~ then there should be no ~~question~~ reason to not get vaccinated. After all, vaccinations will increase survival ~~if~~ and fitness and place us higher on the list of natural selection. Many people however doubt too much and are afraid that the less likely outcome will occur. If people choose not to vaccinate, and many children die from sickness as a result, many people evolved to be happy will in fact be ~~very~~ ^{if it is a very rare outcome} very unhappy. People would then realise the fault that they have made, and will ~~likely~~ ^{likely} not likely make the correct decision, resulting in the further evolution of happiness. If the opposite occurred, (vaccines were given and some children developed autism) ~~some~~ ^{some} people would still be unhappy. But it is important to remember that the larger proportions of success are the proportions that are ^{evolutionary} successful.

But
Good thinking - Did you read the
articles? Rationality is that?

APPENDIX H Samples of marked student work

H2: Course B Test Scripts

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Question 2
Write on both sides of the paper

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(a) 1a, 9a, 11a, 12a, 13, Labiatae

6/6

(b) - Anatomy of crystals

- Polynology (pollen morphology)

- Chemosystematics (essential oils) & scent or smell

⇒ Are all taxonomic data that can be used
to separate one family from another.

4/4

(c) Three legume subfamilies: Diversity within Fabaceae family

The question says describe, not list. I have just reproduced the table that you gave.

	Caesalpiniodeae	Mimosoidae	Papilionoideae
Floral arrangement & size	Flowers large	Small regular flowers, in flower heads or spikes	Pea flowers
Floral symmetry	zygomorphic	actinomorphic	very zygomorphic
Corolla aestivation	Petals imbricate in bud	Petals valvate in bud.	Petals imbricate in bud.
Petal arrangement	Median petal overlapped by others (when present)	Median petal not overlapped by others, similar shape & size	median petal (standard, banner) overlaps others.
Calyx fusion	Sepals generally free.	Sepals & petals generally united at base	Sepals united at base into a calyx tube.
Stamen # & Heteromorphy	stamens (1-) 10 (-many) sometimes dimorphic or heteromorphic	stamens (3-) 10-many (sometimes over 100); all the same	stamens (9-) 10-many (sometimes dimorphic)
Showy part of flower	Petals	stamens	petals.
Habitat	Trees, shrubs, woody climbers	Trees, shrubs, climbers.	Herbs, shrubs, trees, climbers, twiners.

2/10

* Root nodules present in all 3 sub-families of Fabaceae

Question Write on both sides of the paper

a) Monocotyledonous - parallel venation on the leaves

- flower parts in 3's

- Corona is present 1 True - 1

- Inflorescence = indeterminate

o) 1, 2, 3, 4, ✓ - Liliaceae sensu lato ✓

c) * (3) (3) (3) (3) (2) (2) capsule 1/2

d) Primitive(x)

- Bisexual ✓

- Symmetry is radial
- Ovary is superior

- Number of parts (many) x No. of advanced features present?

2) The capitulum remains closed with outer bracts

being dry and woody until the next fire comes. It will then open up and release the seeds. ^{at the time} They have

Ants also aid in protecting the buds during the fire, and protect the buds from the fire, and

the seeds by consuming the fleshy eluosome and leaving the seed underground which protects it from damage. They

have underground woody stems that protect the roots from the fire; there are many species that grow in

These units or deep underground in order to be protected

once the fire has occurred the seeds are released into a nutrient rich ^{little} environment with no competition and

are able to grow efficiently

Speeds per minute after 24 hrs - 1000 (approx)

[illegible]

50
481

2E

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Question
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floral diversity specifically

d) The varied floral arrangements are important to attract different pollinators to aid in seed dispersion. The sweet pea may attract insects or beetles which in turn eat the fleshy sutures and disperse the seeds. Legumes have a very important association with bacteria which are present on the roots (nodules) this allows legumes to thrive because they can use the Nitrogen in the atmosphere to help them grow. The fruits are very useful, they provide a huge food source for the economy; legumes are also very important in soil improvement - natural fertilizer - and in industry for medicinal purposes and thus are widely cultivated. Their habit varies to a great extent and thus are very common and successful.

The success ^{have} ^{related to}
should be ^{diversity}
floral

2½

5

18½

25

Question: 1
Write on both sides of the paper

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e) ~~Monocot~~

a) 'A' is a monocotyledonous ✓

- The sepals and petals are fused to form tepals ✓
- Parallel venation of leaves ✓
- floral parts in multiples of 3 ✓
- Is herbaceous ✓
- Bisexual ✗

4/5

b) Specimen A: 1, 2, 3, 4, 11. Liliaceae sensu lato ✓

5/5

c) X; 6; 1; capsule ✓

2/5

d) Advanced ✓

- superior ovary is primitive ✓
- Bisexual is primitive ✓
- fusion of parts is Advanced ✗ type of fusion + parts?
- Bilateral symmetry is Advanced ✗
- few parts is advanced ✓

4/5

e) Some species of the Proteaceae by means of serotiny, some species have large ^{involucral} bracts (after germination takes place) the large bracts close around the seeds and protect them during a fire, after the fire the bracts break open and release the seeds. In other species ants eat the fleshy ^{around capitulum} lycone of the plant, in which seeds are found, and then take the seeds under ground. Protecting the seeds from fire after a fire the ants leave their nest and there is a pH change and the seeds germinate.

1/5

No, this is not serotiny but myrmecochory

16/25

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Question
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Question 1

a. Specimen A is a monocotyledonous plant. This is because the leaves on this specimen have parallel veins and the leaves are oblong/linear in shape and the leaves are sheath at the base of the plant. ^(not really visible here)

2 1/2 / 5

b. 1, 2, 3, 4, Liliaceae sensu lato

5 / 5

c. $\bar{x}$, $\bar{6}$, $\bar{6}$, $\bar{6}$, $\frac{2x}{2}$, capsule

2 1/2 / 5

d. I would expect specimen A to be relatively advanced, because a few of the parts are fused which shows an advanced feature. The flower is also bilaterally symmetrical which is characteristic of an advanced plant. ^{Not enough reasons}

1 1/2 / 5

e. Some proteas that occur in a biome where fires frequently occur have adapted so that they have a closed capitulum that can remain closed for years until a fire occurs. These proteas then open their capitula and release their pollen ^{seeds} and are then (germinated) via wind dispersal or by (pollinators).

2 / 5

+ Advantage of germinating after a fire?

13 1/2 / 25

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Question
2
Write on both sides of the paper

of legumes
The significant characteristic given
that also improves their success

is their ability to fix nitrogen in
the atmosphere through nodules on
their roots which is a big boost
as nitrogen is very important in
producing proteins.

The seeds of legumes (some) have
also got an important role in

helping make this family successful.
So have "wings" attached so
that when they fall the move
a further distance from the

parent plant ~~giving~~ giving it a
wider dispersal.

does not really address
the question.

19
25

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Question 1 ~~2~~
Write on both sides of the paper

a). Specimen A is a monocotyledonous plant. ✓

- Its leaves are parallel-veined and linear in shape.
- Stipules are absent on leaves) Not all dicots have stipules
- Flower parts are in a multiple of three.
- The growth form is herbaceous.

4/5

b) → 1. (Monocotyledonae), 2, 3, 4 (Liliaceae sl.) *Sord*

5/5

c) * 6, 6, 6, 3, dry capsule

$$4\frac{1}{2} \times 5$$

d) More advanced because it has more advanced features than primitive ones. For example, there are ^{fixed} ~~tepal~~ ^{petals}, the stamens are adnate to the petals, the carpels are ^(connate) fused and there are many ^{to}. Adnation is also considered to be advanced. - Yes.

 $\frac{3}{5}$

e). Protea repens is known for serotiny. This Protea's ^{flower} head closes and may be so for ~~about~~ up to 20 years. ✓ This seals the seedlings inside and protects them. After a fire, the head of the flower falls off and seeds are released onto the ground. This is positive because after a fire there are nutrients in the ground (i.e. Nitrogen), and there is less competition for space when the seeds begin to grow because other plants are killed after a fire.

$$\frac{4\frac{1}{2}}{5}$$

V. Well done!

2
25

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Question
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The Mimosoideae have small, regular flowers arranged into heads or spikes and they are actinomorphic and radially symmetrical. The median petal is not overlapped by others, all are similar in size and shape. The sepals and petals are generally united at the base, while the stamens (3-) 10-many are all the same. Here, the showy part of the flower is the stamens.

10
10

~~The characteristics of the different 3 subfamilies~~

d). This family is economically important. They act as food sources, improve soil by fixing Nitrogen and industrially they have uses in making plastics, oils, dyes and fuel. They are also used in medicines.

0
5

Due to their diversity they have many uses and are found all over the world in many habitats. You did not actually address this question. How has floral diversity contributed to the success of the legumes?

13
25

Ans:

- brightly coloured petals to attract pollinators e.g. Caesalpinidae and papilion
- production of large no. of stamens e.g. mimosoideae to ensure pollination
- Variation in flower size and architecture ensures different types of pollinators can be employed.
- etc.

Question
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showy part of the flower is the petals, and in others it is the stamen. Some of the flowers may be either heteromorphic or dimorphic. The inflorescence ~~are~~ also have different arrangements.

9
10

d. This variety in floral ~~diversity~~ structure has made it possible for many different pollinators to pollinate the flowers. This diversity in floral structure also increases the efficiency of pollination for each of the sub-families as it has the structure that complements the type maximises the efficiency of the pollinator to pollinate the flower. The increase in pollination efficiency means an increase of reproductive efficiency.

4
5

23
25

N. Wood Fractional
Keep it up!

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Question
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The seeds are kept stored in a fire safe - environment.
~~Then~~ The capitulum can then be opened, to
release the seeds, by a following fire. This means
that the seeds can now germinate in a better
suited environment for their growth. The fire
will have removed competition from other plants as
well as allowed lots of nutrients, and nitrogen release
from the decomposition of other plants, both of
which will allow the new seeds to germinate effectively.
Good!

5/5

Very well done,
Steph! 😊

21 1/2
25

APPENDIX H Samples of marked student work

H3: Course C Research reports

Course C.....Student :

Assessment of Practical 1 – Introduction and References

Section	Comments	Marks
Title (10%)	A good title. Make sure you know what 'soil composition' means, whether it includes structure, nutrients, particle type and distribution etc.	8
Introduction elements (60%) • Research Question • Problem • Background and Rationale • Objectives	- I would like to see a better hook in the first paragraph relating to your study. - Good background information to build on for your next submission - what is the most limiting nutrient and how it is linked to soil type? - you have mention the affect of the catena, but not the vegetation patterns observed. - Include your approach – are you going to use soil and vegetation maps, or will you be taking samples, or will you be reviewing the literature?	50
Presentation (10%) • Correct formatting • Writing style • Organization • Spelling • Typos	- Has followed APES formatting guidelines - fluent and well-written - topics are well organised - a polished report, no typos or spelling mistakes	10
References (20%) • Five peer-reviewed articles? • Cited correctly in text? • References formatted correctly?	- A good number of references, and a selection of good articles. - et al. could be in italics. - references formatted consistently and correctly according to APES guidelines	19
Total		87%

A first, well done!

If you take note of my comments you will have a very finessed final product.

Course C**Assessment of Practical 1 – Introduction and References**

Section	Comments	Marks
Title (10%)	Try to improve the fluency of your title. Make it more specific to your study area.	6
Introduction elements (60%) • Research Question • Problem • Background and Rationale • Objectives	- Vague and broad, and only apparent from your title. Has the field trip expanded or changed what you will look at? - I want a bigger hook in the first paragraph. - More detail is needed for a new reader. What do different in soil particles do to fertility/water availability etc.? What type of soils do you get in African savannas? What about broad/fine leaf vegetation? - None given. What happened to all your ideas from Prac 1?	30
Presentation (10%) • Correct formatting • Writing style • Organization • Spelling • Typos	- Good title page, followed most APES guidelines. No page numbers. - Some strong sentences. Repetition between paragraphs which can be condensed. Ask yourself what the point of the paragraph is, and how it links to the preceding and following paragraphs. - Few.	7
References (20%) • Five peer-reviewed articles? • Cited correctly in text? • References formatted correctly?	- Yes. Good use of literature. - Mostly. Inconsistent formatting on '<i>et al.</i>'. Some citations appear to be missing? - Consistent. Two mistakes and not in alphabetical order.	17
Total		60

Course C PLEASE TELL ME WHAT MARK YOU THINK YOU SHOULD HAVE

Aspect	What mark do you think you deserve?	Why do you think you deserve it?	Total mark allocation
Content			
Abstract (new)	4	I included all the required detail	/5
Introduction (revised)	4	I followed the advice given by our TA	/5
Methods (revised)	5	I included the fine detail of the procedures	/5
Results (new)	9	I combined all the data and reported it in detail in a logical sequence	/10
Discussion (new)	9	Included all the reported material and gave more detail on the findings using the chemistry approach.	/10
Written effort			
Formatting & neatness	3	It may be improved	/5
References	4	Arranged in the appropriate manner	/5
Articulation			
Appeal to scientific review audience	4	Used scientific language but difficult terms explained	/5
Sequence and coherence of ideas	4	Follow the expected sequence	/5
WRITTEN REPORT TOTAL			/50

APES2005 – Savanna Ecology – MARKING GUIDE FOR FINAL SCIENTIFIC REPORT

Aspect	Considered criteria	Level of criteria matching	Total mark allocation
Content			
Abstract (new)	Provides a summary of the facts of a piece of scientific work A coherent argument in no more than 300 words	0. No abstract 1. Clear that a study occurred, but not clear why, what was found, or what it means. 2. Clear question or objective missing; methods and results with no clear connection to question; importance not clear. 3. More than one of the elements in (5) missing; question or objective clear, but methods, results, or importance vague 4. Most aspects necessary to understand entire project present; no more than one of the elements in (5) missing. 5. Explains what happened, why and where (two sentences each); methods most strongly relevant to question; most important result (i.e., data); answer to "so what?"	3/5
Title page + Introduction (revised)	Develop idea of interacting factors that determine characteristics of savanna environments	0. No Introduction 1. All three of the following problems: overall importance or problem not apparent; insufficient background to set context/prepare reader; question/objective not clear or not logically developed 2. Two of the problems under (1) 3. One of the problems under (1)	3.5/5

	Establish point of the report and importance of question	4. Overall problem stated; sufficient background and rationale to understand question/ importance; reasonable objective/ question given the problem, background and rationale 5. Overall problem clear and compelling; comprehensive background and rationale to understand question/ importance; objective/ question clear, logical and intuitive given the problem, background and rationale	
Methods (revised)	Site description with maps or figure Description of field, laboratory, and analysis methods	0. No Methods, or copies from prac hand-out 1. No site description; field activities neither clear nor repeatable; soil analyses copied as in prac hand-out 2. Site description insufficient to relocate sites; field activity description not detailed enough to repeat; soil analyses copied as in prac hand-out 3. Site description insufficient to relocate sites; field activity description not detailed enough to repeat; soil analyses listed. 4. Detailed written description of sites with no supporting material; concise description of field activities; soil analyses listed and summarized concisely 5. Maps, aerial images, used with detailed written description of sites; concise description of field activities; lab analyses listed and summarized	3.5/5
Results (new)	Description of findings from broad-scale to fine-scale. Compare vegetation and soil characteristics among sites. Present results relevant to question.	0. No Results, or raw/compiled data only 1. Insufficient (~50%) results presented and interpreted in tables or figures; no text to explain results 2. Few (~40%) results presented and interpreted in tables or figures; no reference to appropriate figures, tables or statistics; results are briefly commented on in text 3. Most (~80%) results presented and interpreted in tables or figures; no reference to appropriate figures, tables or statistics 4. Most (~80%) results presented and interpreted in tables or figures; patterns are concisely explained in text and refer to appropriate figures, tables or statistics 5. Complete presentation and interpretation of field and lab analyses; patterns and differences concisely explained and refer to appropriate figures, tables or statistics	7/10
Discussion (new)	Explanation of findings, fine- to broad-scale Answer questions Reconcile findings within the context of theory developed in the Intro and list reasons for possible inconsistencies.	0. No Discussion 1. Reiteration of Results; no discussion in relation to the objectives of the project and questions; no use of literature 2. Few (<40%) results are discussed in relation to the objectives of the project and questions; no use of literature 3. Some (~60%) results are discussed in relation to the objectives of the project and questions; little use of literature to substantiate findings 4. Most (~80%) results are discussed in relation to the objectives of the project and questions; some use of literature to substantiate findings 5. Findings are discussed in relation to the literature and the key questions	4.5/10
Written effort			
Formatting & neatness	Use of headings, paragraph structure, line spacing General neatness and organization of report	0. Formatting & neatness? What's that? 1. General lack of formatting; untidy presentation distracting and makes comprehension difficult 2. Inconsistent use of paragraphs, headings, and formatting 3. Good structure with headings and headings in some parts of the report; still relatively easy to read because of line spacing 4. Paragraphs well-constructed including appropriate line spacing; section headings do not detract from structure of report 5. Makes use of paragraphs and headings to facilitate access to information; uses appropriate line spacing for easy reading; pages numbered	4.5/5
References	Use of in-text citations and a References list	0. Internet web pages as only source of scientific information (okay for Study Area), or no citations or references at all 1. Inconsistent use of citations in text; reference list with inconsistent style; Internet web pages as sources of scientific information (okay for Study Area) 2. Inconsistent use of citations in text; reference list with inconsistent style; no peer-reviewed journal articles (books only) 3. Inconsistent use of citations in text; reference list with inconsistent style; few peer-reviewed journal articles; mostly scientific books 4. Accurate use of citations in the text; reference list with inconsistent style; roughly equal use of peer-reviewed journal articles and other sources of printed scientific material (books) 5. Referencing style flawless in both text citations and reference list; ample use of peer-reviewed journal articles	3.5/5
Articulation			
Appeal to scientific	Use of scientific English, including	0. Entirely colloquial with no specialist terms used 1. Few specialist terms used; scientific audience not considered	3.5/5

review audience	specialist terms	2. Generally colloquial style with little attention to the scientific terms used in the literature 3. Use of specialist terms limited to <50% of report 4. Appropriate use of specialist terms in 80% of report 5. Scientific audience considered with adept use of specialist terms	
Sequence and coherence of ideas	Construction of report from coherent sequence of ideas	0. Bulleted list of unrelated ideas 1. Report lacks coherence and progression of ideas 2. Progression of ideas lacking, coherence unclear caused by irrelevant information 3. Ideas presented in logical order but tend to lack coherence and progression of ideas 4. Evidence of sequence of ideas with tangential/unrelated diversions accounting for <10% of report 5. Clear sequential structure, logically coherent progression of ideas	3.5/5
WRITTEN REPORT TOTAL			36.5/55

Peer- and Self-assessment

Field (/4)	Did their part on vegetation sampling and soil pit, including digging and the profile description	4
	Contributed to mostly one activity (either soil or vegetation); actively involved in soil description	3
	Focussed on one aspect of the field activities (either soil or vegetation); did not participate in the soil profile description	2
	Sun-tanned and chased butterflies (real or imaginary); stood vigilant for menacing cattle	1
	Absent from the field trip	0
Lab (/3)	Actively participated in all aspects of all tasks	3
	Participated in only some of the lab tasks or superficially in all tasks	2
	Weighed the samples only	1
	Did little more than Blackberry	0
Data (/3)	Active in organizing and processing data, including working on calculations	3
	Contributed to some aspects of data and calculations	2
	Involved primarily in only one aspect of the data	1
	Played no part in organizing data or doing calculations	0
PEER-/SELF-ASSESSMENT TOTAL		/10

SCIENTIFIC REPORT TOTAL (/65) = WRITTEN REPORT (/55) + ASSESSMENT (/10)

Soil composition and its effect on the vegetation found in Combretum Park, a savanna landscape.

Student:

Method and Materials

Study Site

The study was conducted in Combretum Park, situated 15km from Modimolle, in the Limpopo Province, South Africa (Combretum Park Website, Accessed 04 October 2011). Three different sites were sampled within the campsite area, the broad-leaf savanna (with approximate GPS coordinates of S 24.78009°; E 28.51187°), the fine-leaf savanna (approximate GPS coordinates were S 24.78042°; E 28.50904°) and the sodic site (with approximate GPS coordinates of S 24.78264°; E 28.50773). Since a typical savanna displays co-dominance between grass and trees (Scholes and Archer 1997), it was expected that Combretum Park would display this specific structure.

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The vegetation in the sodic site, was sparse, and grew in clumps. The soil was hard and compact, and therefore only very small holes were dug. The fine-leaf savanna had many small, thorny, trees, and the holes dug were close to the expected dimensions, but the hard soil still made it difficult to dig to the exact dimensions. The broad-leaf savanna had many large trees, and the holes that were dug matched the expected dimensions.

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Sampling protocol

The Park was separated into three main areas, namely, fine-leaf savanna, sodic site and broad-leaf savanna. Each area was further separated into a number of smaller sites (4 in the broad-leaf savanna, 3 in the sodic site and 3 in the fine-leaf savanna), resulting in a total of 10 sample sites. At each site, a hole was dug as close as possible to the dimensions of one metre wide, two metres long and 1,2 metres deep. The vegetation and topsoil layer was removed using garden forks, a spade and a pickaxe. The hole was then dug deeper with the use of a spade and hand trowels. One side of each pit was dug into a vertically straight plane in order to view the different soil layers, also known as horizons. The horizon pattern was diagnosed in the field, using the field book, "Soil Classification: A Binomial System for South Africa" (MacVicker *et al* 1977). Each soil horizon was analysed for its physical properties using a number of tests. The finger test was performed to determine the texture of the soil. The soil was moistened, kneaded and then shaped, to establish the soil texture. Colour was

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determined by comparing samples against the Munsell Colour charts. The structure of the soil was then determined with use of various tests. The degree of development was determined by assessing the ped formation, shape and size. Consistency (cohesion) was also assessed, by attempting to crush any of the peds, if present. Presence of inclusions was also established and recorded. The transition from one layer to the next was determined and recorded. About one kilogram of soil from each horizon was collected for analysis in the laboratory. Each hole was then refilled, to leave the environment as undisturbed as possible.

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Chemical Analysis

Various tests were performed for each horizon, to determine the chemical properties and composition. To determine the particle size distribution, the hydrometer method was used. The particles were separated by dispersion, using 40.0g sodium hexametaphosphate ($(\text{NaPO}_3)_6$), buffered with 10.0g sodium carbonate (Na_2CO_3). Once the soil was dispersed, the temperature of the solution was measured 40 seconds, four minutes and two hour after dispersion. Gravimetric soil content was determined by drying out a previously weighed portion of the sampled soil, and then reweighing the dry mass of the soil. The soil pH and electrical conductivity were determined using 1M KCl extract solution and distilled water. Once mixed, the soil-solvent solution was allowed to settle and then the pH and electrical conductivity were measured. Additional tests to determine bulk density, porosity and field capacity will also be conducted.

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Statistical analysis

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To determine whether there was any similarity between the soil and vegetation in the three sites, a two-sided t-test was conducted.

References

MacVicar, C. N., R. F. Loxton, J. M. De Villiers, E. Verster, J. J. N. Lambrechts, F. R. Merryweather, J. Le Roux, T. H. van Rooyen and H. J. Von M Harmse. 1977. *Soil Classification: A Binomial System for South Africa*. The Department of Agricultural Technical Services, Pretoria, South Africa.

Scholes, R. J. and S. R. Archer. 1997. Tree-Grass Interactions in Savannas. *Annual Review of Ecology and Systematics*. 28:517-544.

Deleted: Anonymous. 2006. Combretum Park Nature Reserve. (<http://www.combretumpark.com/index.html>). Accessed 04 October 2011.¶
 Anonymous (1). 2011. *Savanna Biology: Soils*. Savanna Ecology (APES2005) Course Pack. School of Animal, Plant and Environmental Sciences. University of the Witwatersrand. Johannesburg. South Africa.¶
 Anonymous (2). 2011. *Savanna Ecology: Soils. Practicals 2011*. Savanna Ecology (APES2005) Course Pack. School of Animal, Plant and Environmental Sciences. University of the Witwatersrand, Johannesburg. South Africa.¶

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APES2

Assessment of Practical 2 – Materials and methods

Section	Comments	Marks
Objectives and methods (10%)		<u>6</u>
Materials and Methods elements (70%)	See comments in manuscript	<u>55</u>
• Study area • Detail sufficient to repeat the work? • Consideration of scale? • Literature citations for sources of methods?		
Presentation (10%)	See comments in manuscript	<u>6</u>
• Correct formatting • Writing style • Organization • Spelling • Typos		
References (10%)	See comments in manuscript	<u>5</u>
• Cited correctly in text? • References formatted correctly?		
Total		<u>72</u>

Course : Course C

Practical 2_Materials and Methods

Student Name :

Student number :

Materials and Methods

Study area

We conducted our study in Combretum Park Nature Reserve, which is situated on a farm known as the Haakdoringpoort (Ehost 2011). This location is situated about 15km south of Modimolle (Ehost 2011) which is a town of the Waterburg District. Modimolle was previously known as Nylstroom. The study was carried out in one day on the 1st October 2011 between 8H00 and 14H00. The study areas of interest were located on the camping area which covers approximately 400 hectares of the total 1300 hectare property of Combretum Park.

The location can be classified overall as a broadleaf dystrophic savanna but still consists of the broadleaf ridge top section, the terminalea frange in the mid slope section, the fine leaf in the lower slope section and the sodic sites on the bottom slope section. The area has different types of vegetation occurring on the catena ranging from the *Burkea* on the ridge top, to the hydromorphic grassland along the mid slope, to the *Acacia* along the lower slope and *Euclea divinorum* occurring at the bottom of the slope. Different soil types are also evident across the catena. Sandy soils with horizons B and C are found on the ridge top, the emergence of clay is seen around the midslope region, vertic sodic soils are present along the lower foot slope and sodic sites dominate in the bottom slope region. The presence of some herbivory is present around the sodic sites. This is seen by the upturned top soil along the bare ground and the droppings of animals which may be wildebeest, zebra, kudu etc.

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Experimental design and protocol

Groups of approximately eight students were randomly scattered along three different locations on the catena. Four groups were allocated the broadleaf site on the ridge top, three groups were allocated the midslope site and another three groups were allocated the footslope site. The groups were put in different areas in each site and each group had to produce soil samples of the different horizons present in their pit. We dug a pit using spades, a pick and a garden fork. The dimensions of the soil pit

were as follows: 2m long, 1m wide and approximately 1.2m deep (depending on your allocated site it may be shallower). Therefore in total each group produced a minimum of two soil samples.

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In each pit, we cleaned and smoothed a vertical strip that we used to identify the horizons. The strip had to be facing the sun in order to identify the horizons more clearly. We then did a profile description of each horizon and carried out tests for texture, colour, structure, consistence, inclusions and transitions. [The detailed test procedures may be obtained from the Savanna Biology: Soils handout.]

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We collected a sample of the visible horizons by placing a spade at the bottom of that horizon and using a hand trowel, we scraped approximately 1kg of the horizon and that soil was then placed in a paper bag. The different soil horizons are needed so that chemical tests may be done on each example to observe the changes that may occur (nutrition content, moisture content etc.).

Soil analyses

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The data analyses were carried out in the University of the Witwatersrand 2nd year laboratory. Four different tests were done on each soil sample.

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In task 1 we determined the particle size distribution (texture) using a hydrometer method. This test is carried out so as to measure the different size distributions in a particular soil sample. The task distinguished the different sizes of the soil particles by viewing either their dispersion or destruction rates. Sodium hexametaphosphate is used to separate the soil particles. The dispersion method is done by adding 100ml of dispersing agent to 50g soil. The proportional amounts of fractions are calculated.

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In task 2 the water content was estimated since this determines how much water the roots get. Approximately 15g of soil sample is heated in an oven for ~ 48 hours until no mass loss is detected upon weighing. The dry mass content is then calculated.

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In task 3 bulk density, porosity and field capacity are tested. The bulk density is tested by weighing 100g of dry soil sample. The porosity is then obtained by adding water (of known volume)

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to the bulk density sample, the porosity may then be calculated thereafter using the saturated soil water content. The field capacity is measured by draining the porosity sample with 50 ml added water and taking readings 10 min intervals for 40 minutes and 20 minutes for 2 hours.

Task 4 is carried out to determine the soil pH with 1M KCl extract and to determine the electrical conductivity of the soil. These tests are essential because the nutrient availability, the cation exchange capacity and the aluminium toxicity are controlled by the pH. Two samples of 5g soil content are treated with 50ml KCl and 50ml distilled water where the pH is measured in the KCL solution and the EC measured in the water sample.

Commenter [M10]: Again some more detail is required, I don't think someone could redo the work based on these methods.

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References

Ehost. 2011. Encounter South Africa. *Combretum Park Nature Reserve*, South Africa.

(<http://www.encounter.co.za/combretum-park-nature-reserve.html>) . Accessed 1 October 2011.

S A Places. 2011. Southern African Places CC. *Modimolle*, Limpopo, South Africa

(<http://www.places.co.za/html/nylstroom.html>). Accessed 2 October 2011

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Assessment of Practical 2 – Materials and methods

Section	Comments	Marks
Objectives and methods (10%)		<u>7</u>
Materials and Methods elements (70%) • Study area • Detail sufficient to repeat the work? • Consideration of scale? • Literature citations for sources of methods?	See comments in manuscript	<u>52</u>
Presentation (10%) • Correct formatting • Writing style • Organization • Spelling • Typos	See comments in manuscript	<u>6</u>
References (10%) • Cited correctly in text? • References formatted correctly?	See comments in manuscript	<u>3</u>
Total		<u>68</u>

