Improving Students’ Assessment and Evaluation Experience in Higher Education: A Formative Peer Review Perspective

Krishneel Krishna Reddy

A thesis submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy at the University of Otago, Dunedin, New Zealand

2019
Abstract

This thesis is about student peer review in undergraduate education. The research uses a case study of the Ecology programme at the University of Otago, New Zealand, to gain insight into this phenomenon. Ecology at Otago provides a useful case study because students are taught to become peer reviewers over the three years of the programme. Students also get to experience peer review in five different formats, each building in complexity and challenge. As such, it provides an ideal context for studying the rich potential of peer review in undergraduate education.

It is presently accepted that peer review, as a specialised form of peer feedback, can improve students’ learning. Learning gains are reported to include the enhancement of generic transferable skills, critical thinking, self-assessment, self-regulation of learning, and self-reflection. However, the existing literature has a number of limitations. For example, much of the work is conceptual, while the empirical studies focuses on single events. What is not known is how the outcomes of these reported events would change through structured training and experience over time. In addition, the conclusions of the published studies are mixed, with reports that students like peer feedback, do not like it, find it beneficial or see no value in the exercises. These contradictory results are likely to be partly caused by the context and very brief encounters students have with each exercise. There are also theoretical concerns about the concepts that underpin peer review and other forms of feedback. For example, it has been claimed that peer review is ‘dialogic,’ the meaning of this term will be theorised in this thesis.

With respect to these challenges, this study sets out to answer the following questions in the context of the Ecology programme: 1) how do undergraduate students perceive their
peer review experiences?; 2) how do students respond to feedback in the review process?; and 3) can peer review skills gained in Ecology be transferred to other learning settings? In answering these questions, the thesis will provide new evidence and conceptual arguments about best practice and how to achieve the full benefits of student peer review and, in doing so, will make a contribution to the theories of this practice and to student feedback more generally.

To answer these questions, a longitudinal qualitative study was undertaken. Twelve students were recruited and interviewed in two successive years. The first interviews took place after the third peer review activity which was a month-long peer review exercise in the students’ second year of study in the Ecology programme, and the second round of interviews was conducted after the fifth peer review activity in the students’ third year of study. Semi-structured interviews were transcribed verbatim and analysed using a general inductive approach. From this, themes were developed in conjunction with the research questions. In addition, I adapted a theoretical feedback model to ascertain the quality and impact of feedback comments and to compare academic staff and student peer reviews in the second-year double-blinded exercise. This exercise included a rebuttal process in which students were forced to explain the rationale for accepting and rejecting comments. This rebuttal element appears to be unique and is not found in published accounts on peer review.

Findings suggest that while training and multiple experiences were beneficial, this was not merely a matter of ‘more is better.’ Rather, a series of different review exercise designs that increased in complexity, enhanced learning, contributed to normalising the activity, and created a shared identity and culture among the student cohort was found to be most useful. As students became more experienced, they reported being less
threatened by the pressure of commenting on their peers’ work. By the end of their second year, they had begun to realise the full value of peer review for their own learning. Peer review became a type of ‘research inquiry’ that lead to:

a) a deeper understanding of the disciplinary knowledge,

b) realisation of what being a peer reviewer could achieve,

c) new knowledge about self, and

d) new knowledge about others-as-learners.

All these outcomes were made possible because the exercises included written feedback and structured discussions, which I argue allows peer review to claim that it is truly dialogic. Consequently, some students were in a position to provide feedback of a similar quality to that of staff, and most were able to critically question the feedback they received. Being engaged in a culture of peer review allowed students to apply their skills and knowledge to contexts within and beyond the Ecology programme to improve their overall learning experience and help others. The peer review process eventually was seen as a shared responsibility for learning and a new student value that is unlikely to be attained with a one-off experience.

The outcomes of this thesis have much wider implications for higher education because they demonstrate that setting up student peer review as a progressive sequence of purely formative exercises over time, with opportunities for students to engage in dialogic feedback, can be very effective in enhancing higher-order learning skills, which are the foundation of an advanced education. While some of the earlier research suggests that students do not use peer feedback, or lack the motivation to do so, the findings from this
study demonstrate that, with experience, students start to expect and provide ‘quality’ feedback they can use to critically revise their work. Students came to see peer review as an integral part of learning through research and creating new knowledge. The findings also demonstrate that transferring peer review skills and knowledge to other situations is mediated by students’ long-term exposure and developing abilities to self-regulate learning, and results in a change in values centred on care for others and their learning.
For my Amma and Appa
Output from this research


Reddy, K. (2017b). *Feedback issues in undergraduate education – insights into how students construct and utilise peer feedback.* Verbal presentation at the Talanga Seminar Series, University of the South Pacific, Suva,
Acknowledgements

They say that a journey of a thousand miles begins with a single step. And how true it is! On reflection, I would have never imagined that a small boy who hated going to school – often faking toothaches and hiding in corn fields and sugar farms to avoid going to school - would one day be privileged enough to be a doctoral candidate at one of the finest universities in the world. As a social introvert with anxiety issues, being a doctoral candidate at the Higher Education Development Centre has been a life-changing experience. It was a journey that allowed me to grow to be a better person, to make critical life-changing decisions and also develop as a novice researcher; for this, I will forever be grateful.

This achievement would not have been possible without the support, guidance, care, love and blessings from a special group of people who have helped me to become a better person in life – both as a novice researcher and as a human being. First and foremost, I would like to sincerely thank my primary supervisor, Professor Tony Harland. Tony, you are the coolest guy I know, and I could not have asked for a better supervisor. You have been very patient, kind and generous with your time and ideas. I have the utmost respect for you as a scholar and as a person, and I am forever grateful to you because my PhD journey would not have been possible without you. To Dr. Rob Wass, my secondary supervisor, your guidance, care and support have been most valuable in my journey. Thank you so very much for being so friendly, kind and compassionate and for always pushing me to think of ideas in newer, better ways. Like for Tony, I have the utmost respect for you as a scholar and as an individual. Your friendliness and care had a very calming effect on my PhD journey, so thank you very much, Rob.

To the wonderful participants who volunteered to participate in my study, I appreciate your time and effort because without your insights, this thesis would not have been possible. To the University of Otago – thank you for the generous scholarship. Without it, it would have been impossible for me to study at the University of Otago. In terms of financial support, I also wish to acknowledge the support of the specific group of individuals who have over the number of years provided financial support towards my educational journey. Giving up full time work to
pursue further education was indeed a very challenging task. However the generosity of the following individuals made my life much easier. They include: Akka and Salen Jija, Papu and Hitesh Jija, Kamal and Nazia Bhabi, Vinod Anna and Anni, Dada and Badamma, David Jellings, Shobna and Mennu Jija, Vinal, Vanshika, Muni Aunty, Ravi, Sadhu Kaka and Kaki, Master Kaka, Radhika Akka, Pushpa Wati and my dear friend, Unaisi Caginivanua. I am eternally grateful. Without your support, this journey would have been impossible.

I also want to especially acknowledge my beautiful family. To my mother, Amma, thank you for all your love, care, support and sacrifices. You changed my life for the better and I cannot thank you enough for doing so. I cannot imagine my life without your presence in it, my dearest Amma. To my father, Appa, I know that we did not see eye-to-eye on many issues, but I know that you would have been the proudest of me. I still remember the beautiful January morning of 1990, when I first held your fingers and walked to the village primary school. Thank you so much for giving me the best of everything and allowing me to choose my own path. Thank you for not forcing me to go to school when I did not want to go and for letting me develop at my own rate. Both you and Amma have been a true blessing in my life and I would not have reached here without your blessings, love and support. To my siblings Akka, Papu and Kamal, their spouses and their children – thank you very much for supporting my studies right from primary school to university. You all are my bedrock and I am forever indebted to you all. To my aunts, uncles, cousins, their spouses and children – thank you all for your love, care, support and blessings as well. I am eternally grateful.

A special acknowledgement to David Jellings and Ridheesh Ahya. David, thank you for the free accommodation, meals, and road trips in Cardiff when my scholarship ran out. I am forever grateful for your generosity, and continued friendship. Dr. Ahya, thank you for the lovely jokes and professional advice provided on health related matters. One day in the near future, you, David and I will once again walk near the weir in Radyr followed by a few pints in the nearest pub around.
Professor Kerry Shepard, Associate Professor Ben Daniel, and Dr. Navé Wald – thank you all for your tough love. Speaking with you three was always an interesting affair. As with Tony and Rob, I have the utmost respect for each one of you as amazing scholars and beautiful individuals who took time out from your busy schedules to care about other students. I must also thank you for providing beautiful insights of your home countries – it truly has been a pleasure listening to you three.

To my beautiful HEDC family – my home away from home – it has been a true privilege to be associated with each and every one of you. Thank you so much for caring for me through all my health problems. You all made me feel so reassured that I had people who cared about my health and well-being and for this, I will forever be indebted to all of you. Candi and Joanne – you both have done so much for me – thank you, thank you so much for everything.

To my dearest friends who made it so much easier to live in a new city – Kenneth Harbour, Kenneth Buchanan, Bev, Veena Singh, Judith Dawn, Julia Higgins and Sophia – thank you for looking after me during the periods of my hospitalisation and surgeries. I do not know what I would have done without your support and friendship. Thank you also for carting me around for grocery shopping, dinner dates, looking after my family, weekend road trips as well as for all the shenanigans and the gossip. It really is a miracle that we did not stab each other with dining cutlery.

Finally, a special acknowledgement to my faithful, furry, four-legged children. Whenever I felt lonely and alone, photos, videos and memories of you all helped cheer me up. My beloved Monty, Dora, Teabow - the terror, Rani, Ricky, Buddy, Bingo, Maggy, Lilly and Mavis - you will never know how much you all have enriched my life.
Table of Contents

Abstract.....................................................................................................................i
Output from this research..........................................................................................vi
Acknowledgements .....................................................................................................vii
Table of Contents .......................................................................................................x
List of Figures .............................................................................................................xv
List of Tables .............................................................................................................xvi

Chapter 1 - Introduction .......................................................................................... 1
  1.1 Introduction ........................................................................................................ 1
  1.2 Purpose of this study .......................................................................................... 4
  1.3 Research questions .............................................................................................. 7
  1.4 The research context ........................................................................................... 8
  1.5 Thesis structure ................................................................................................... 9

Chapter 2 - Literature Review ................................................................................... 14
  2.1 Introduction ......................................................................................................... 15
  2.2 Theoretical background ..................................................................................... 16
  2.3 Definition of peer review ................................................................................... 20
  2.4 Students’ experiences of peer review ................................................................. 22
  2.5 Prior experience in peer review ......................................................................... 25
  2.6 Quality in feedback ............................................................................................ 29
  2.7 Dialogic feedback ............................................................................................... 33
  2.8 Revisions after feedback .................................................................................... 36
Chapter Three - Methodology ................................................................. 51

3.1 Introduction .................................................................................. 52

3.2 Ontological position .................................................................... 53

3.3 Epistemological position ............................................................... 57

3.4 Research paradigm ....................................................................... 59

3.5 Research context .......................................................................... 60

3.6 Selection of interview participants ............................................... 62

3.7 Data collection ............................................................................... 63

3.7.1 Semi-structured interviews ....................................................... 63

3.7.2 Feedback Analysis ................................................................... 65

3.8 Data analysis ................................................................................ 70

3.8.1 Semi-structured interviews ....................................................... 70

3.8.2 Feedback analysis ................................................................... 74

3.9 Ethical considerations .................................................................. 75

3.10 Trustworthiness ......................................................................... 75

3.10.1 Credibility ............................................................................. 76

3.10.2 Transferability ....................................................................... 77
Chapter 4 - Students’ cumulative peer review experience .................................................. 80

4.1 Introduction ........................................................................................................... 81

4.2 Findings and discussion ....................................................................................... 81

4.2.1 Multiple experiences in peer review develops expertise in giving and using feedback .................................................................................................................. 82

4.2.2 Cumulative peer review creates an environment of collaboration (reduced competition) .................................................................................................................. 89

4.2.3 Multiple experiences help to reduce stress associated with peer review .......... 90

4.2.4 Peer review helps create knowledge .................................................................. 93

4.3 Summary ................................................................................................................ 99

Chapter 5 - Responses to feedback: The case of the second-year peer review exercise ...................................................................................................................... 102

5.1 Introduction ........................................................................................................... 103

5.2 Findings and discussion ....................................................................................... 104

5.2.1 Quantity of feedback ......................................................................................... 105

5.2.2 Type of feedback provided by academic staff and peers ............................... 107

5.2.3 Students’ responses to feedback ....................................................................... 113

5.3 Summary ................................................................................................................ 122
Appendices ............................................................................................................. 184

Appendix A - Information Sheets................................................................. 184

Appendix B - Consent Forms ............................................................... 190

Appendix C - Ethics Application .............................................................. 192

Appendix D - Interview Protocols.............................................................. 195

Appendix E - Prompts and probes .............................................................. 197

Appendix F - Paper sent for review ............................................................. 198
# List of Figures

**Figure 1**: Structure of the thesis 9  
**Figure 2**: Example of how data were coded to find themes 71  
**Figure 3**: Example of grouping ideas from different participants into themes 72  
**Figure 4**: Example of highlighting key quotes to be used in the reporting of the theme ‘multiple experience’. 73  
**Figure 5**: Example of how students rejected feedback 87  
**Figure 6**: A comparison of the feedback types between academic staff and students 107  
**Figure 7**: Students justifying their decision to reject a feedback comment 116  
**Figure 8**: Examples of how students revise their work, despite claiming to reject feedback comments 118  
**Figure 9**: Example of how students revise their work using the rebuttal process 121
List of Tables

Table 1: Examples of different theories used to discuss peer review 18

Table 2: An example of competing terms used for peer review 21

Table 3: Factors promoting transfer 47

Table 4: Peer review activities done by students 61

Table 5: A modified version of Brown and Glover's (2006) feedback classification model 68

Table 6: Types of dialogue identified in the peer review 85

Table 7: The four domains and knowledge outcomes identified by students as they learned how to carry out peer reviews of research activities 94

Table 8: Number of comments provided by academic staff and students 105

Table 9: Students' rebuttal responses to the feedback 115

Table 10: Themes highlighting how students transferred their peer review experience 126

Table 11: Features of critical thinking skills based on Facione's (1990) consensus list of critical thinking 129

Table 12: High and low fidelity transfer of peer review knowledge 135
Chapter 1 - Introduction

1.1 Introduction

The history of higher education reveals that it has gone through significant changes from time to time (Altbach, 2004; Thelin, 2011; Trow, 2007). Arguably, one of the most significant changes that affected higher education in developed countries started at the end of the Second World War, which marked the end of fascism in Europe. The end of the war led to a number of distinct social and political changes, including changes within the higher education sector in Europe and America (Geiger, 2015). For instance, within the higher education sector, unlike the pre-war elitist nature of European and American universities, the end of the war saw a rise in egalitarian values and an increased demand for graduates with more than just a high school qualification (Trow, 2007).

As a result, the growing demand for university graduates created opportunities for ‘common people’ to have wider access to universities, leading to a significant increase in the number of students entering higher education (Trow, 2007). Paralleled with the rapid but uneven increasing higher education student population, there was also a gradual move towards neoliberal policy reforms in the late 1970s and early 1980s (Steger, 2017). Neoliberalism was marked by a shift from a focus on the public to the private sector, favouring free-market capitalisation, with the ultimate aim of reducing costs and maximising profits (Harland, 2017).

Public universities also caught up with neoliberal reforms were encouraged to promote academic capitalism, with governments having greater influence in universities through legislation and policy (Harland, 2017; Olssen & Peters, 2005). This
led to universities becoming more accountable to the government and society in general (Neave, 1988). In response, some universities moved away from degree programmes to a reliance on semesters, modules, and units (Harland, 2017).

The move towards structuring courses in chunks of modules meant that students could largely create a degree based on a selection of core and elective modules (Harland, 2017; Hounsell et al., 2008). However, as each module or unit was separate from each other, students had to undertake assessment more frequently, resulting in the consequential shift towards environments that promoted ‘traditional time efficient modes of assessment such as exams [that] have a greater potential to promote surface learning’ (Green et al., 2009 p.24), leading to learning in small chunks, “with much information learned, forgotten and never revisited again” (Harland, 2017 p.80). Consequently, increasing frequency in assessment is thought to have led to students becoming more competitive, individualistic and somewhat obsessed with grades (Wass et al., 2015).

The combination of the general increase in assessment activities and student numbers also posed additional problems. For example, Nicol (2010b), observes that “[i]n the past, when student numbers were smaller, written feedback was part of a larger coordinated system of teacher-student communication that also involved one-to-one discussions and drafting and redrafting of assignments” (p.501). However, having the curriculum space to engage with individual students on a face-to-face basis and allowing them to use the feedback to carry out multiple revisions on their work is generally considered a challenge, due to resource and time constraints (Liu & Carless, 2006; Sadler, 2010).
Even in cases where academic staff invest considerable time in constructing detailed feedback, their efforts go to waste because in some cases, students do not act on the feedback provided (Nicol, 2010b) and, in other cases, “feedback seems to have little or no impact [on students], despite the considerable time and effort put into its production” (Sadler, 2010 p.535). On the part of the students, research suggests that students are generally dissatisfied with their feedback experience. Reasons for dissatisfaction include students perceiving feedback from academic staff as lacking guidance on how they can improve their work (Hounsell et al., 2008), feedback being too brief (Orsmond et al., 2005), feedback being ambiguous (Price et al., 2010), and students only being interested in grades and not feedback (Weaver, 2006a).

A natural response to the problem faced by students in terms of their feedback experience was to introduce interventions aimed at enhancing the quality of feedback provided to students by “improving promptness (of feedback), level of detail, clarity, structure and relevance” (Nicol et al., 2014 p.102). However, given the resource constraint and increasing student numbers in higher education, such interventions did not help to improve students’ feedback experiences, but had a significant impact on increasing academic staff workload, (Nicol et al., 2014). Such a state of affairs called for a more sophisticated form of teaching and learning in which students take a more central role in the assessment and feedback process (Black & Wiliam, 1998; Juwah et al., 2004; Li & Steckelberg, 2004; Nicol et al., 2014; Wiliam, 2011).

The argument for giving more control over the assessment and feedback process to students was that if they are to learn from the feedback, then they should be able to “do something with transmitted information, analyse the message, ask questions about it, discuss it with others, connect it with prior understanding and use this to change
future action” (Nicol, 2010b p.503). However, large class sizes, reduced teaching times, and modular unit structures made it problematic to find curricula spaces that allowed students to take a central role in the assessment and feedback process (Harland, 2016). As a solution, it was suggested that one practice that could help students to take a more central role in the assessment and feedback process was through the use of formative student peer review (Falchikov, 2004; Liu & Carless, 2006; Nicol et al., 2014; Topping, 1998) and this is where the crux of this thesis is situated.

1.2 Purpose of this study

Formative student peer review is a process in which students make an evaluative judgement of their peers’ work and provide written feedback (Nicol et al., 2014). It is generally accepted that student peer review can be a useful formative assessment method that provides feedback to improve overall learning experiences (Mulder et al., 2014a; Topping, 2009). Furthermore, it is seen as an important academic and professional skill (Liu & Carless, 2006; Nicol et al., 2014). Formative peer review has a number of benefits. For example, Harland et al. (2017) showed that with good support and training, undergraduate Ecology students were able to provide a valuable contribution to their peers’ learning and to their own educational experiences. Similarly, in a paper describing how peer review was used as part of a major assessment for a third-year social studies unit, the majority of the students had a positive experience and felt it had helped to direct their learning (Moore & Teather, 2013).

However, not all research has been so positive. For example, when investigating how peer review was perceived by students in a Master’s-level programme, some complained bitterly about the exercise being a waste of time. In this case, students felt
that peers were unable to adequately identify errors in the submitted work (Brammer & Rees, 2007). Similarly, Evans (2015) showed that peer review did not provide equal benefit to all, as the quality of feedback varied between students. In one pre-post-test study, student expectations of what peer review could achieve were much higher before the experience (Mulder et al., 2014b), but in another it was reported that students who were not initially confident to assess their peers were more confident in their own assessing abilities after completing the review (Cheng & Warren, 1997).

These complex and sometimes contradictory research outcomes call for a better understanding of the potential of student peer review and more insight into its design, particularly with respect to how students develop an understanding of its requirements and potential for learning (Evans, 2015; Mulder et al., 2014b). As I will discuss in Chapter Two (Literature Review), one challenge for the field is that most of the reported studies on peer review in undergraduate education have examined students’ experiences of one-off events (Ashenafi, 2015). The problem here is that it is likely that novice reviewers may conceptualise the process differently when compared to those with experience, as illustrated in the professional academic journal review process (Callaham & Tercier, 2007a). Students who undertake peer review are unlikely to have the required knowledge and skills to provide the quality of feedback expected of an expert, and of course, it is doubtful if these can be developed through a single encounter. In a study that tracked Master’s students giving several rounds of feedback on a research proposal, the level of sophistication of comments gradually increased (Wen & Tsai, 2008). These data suggest that if the full benefits of peer review are to be realised, then students must be adequately prepared and provided with opportunities to practice (Boud, 2001; Strijbos et al., 2010; Vu & Dall’Alba, 2007), and there have been
calls to provide novice students with appropriate training (Liu & Li, 2014; Sluijsmans et al., 2004a).

A second challenge concerns the quality of student learning outcomes in relation to how review feedback is provided. Rather than ending the process with written comments on students’ work, Nicol (2010b) suggests that feedback quality will be improved through dialogue. This author contrasts feedback as a monologue with the dialogic approach proposed by Laurillard (2002). In her approach, to be effective, dialogue should be iterative, adaptive, discursive and interactive. Similarly, Carless et al. (2011) define dialogic feedback as “interactive exchange in which interpretations are shared, meanings negotiated, and expectations clarified” (397). However, apart from exchanging ideas, the difference between monologic (one-way) and dialogic feedback is not always clear and the boundaries between them tend to be fuzzy. Nicol (2010b) reasons that dialogic feedback is a two-way process, but also mentions “impoverished” and “fractured” dialogue (p. 503) which leaves the door open for interpreting what exercises can truly fit under either of these labels.

Presently, neither of these alternatives solves all the practical problems of how to work with feedback. For example, a comment can be either monologic or dialogic, depending on how it is written and how it is received. When feedback is on work that involves complex and subjective knowledge forms (e.g. an essay, a research project or a case study), interpretation is necessary, and in a Bakhtian sense (i.e., all communications occur specific social contexts), the reader is prompted to engage in active self-dialogue aimed at making sense of the comments. Furthermore, a teacher or peer can alter the form of their feedback to steer the recipient in different directions - either to acceptance of a comment or to further thinking. Feedback may also be more
effective when it includes both monologic and dialogic forms, and if this assertion is
correct, then it may not always be appropriate to privilege one above the other, as both
will have a place in learning. That said, the opportunity and space for dialogue,
especially when it involves speaking and listening in a social setting, clearly have a
major impact on student learning (Nicol, 2010b). Nevertheless, Zhu and Carless (2018,
p. 886) argue that we still know very little about the role of dialogue within the peer
feedback process.

Further, research also suggests that participating in peer review leads to the
development of transferable skills [discussed in detail in Chapter 2] such as critical
thinking, self-regulation of learning, self-assessment and communication skills (Adachi
et al., 2018; Topping, 1998). However, as I will show in Chapter 2, these claims are
rarely supported with evidence. Within this context, there are growing calls for
longitudinal research to investigate how students transfer their peer review skills to
different contexts (Yang, 2011). As such, by doing this study, I will be able to
contribute towards the scholarship of formative student peer review by providing a
detailed account of how students experience peer review process as a core assessment
feature in an undergraduate Ecology curriculum, their abilities to engage in the process,
as well as how they are able to transfer their skills to different contexts. It is envisaged
that such insights may help potential academic practitioners and curriculum designers
to consider the potential of using peer review within higher education as part of normal
course culture (Winstone & Boud, 2018).

1.3 Research questions

Having established the purpose of the current study, this section provides an insight
into the research questions that guide this study:
• What are students’ experiences of formative peer review?

• How do students respond to feedback in the review process?

• Do students utilise their peer review skills outside of the Ecology paper? If yes, then how do they do so? If not, then why not?

1.4 The research context

The focus of the research is the undergraduate Ecology degree programme at the University of Otago, a research-intensive university in New Zealand. The Ecology programme is designed in a manner whereby students are immersed in research training from the start of their first semester at university through a variety of long-term research projects (Wald & Harland, 2017). Formative peer review is embedded in each stage of the curriculum (Harland et al., 2017) and by the time students are in their third year, they have experienced five instances of this. In order to train the students, they are taught directly about peer review and supported in the first four exercises with a rubric containing marking criteria that describe the quality of the work. Each peer review experience builds in complexity and expectations change with respect to the quality and sophistication of feedback. All exercises have a dialogic component in that (1) written comments are always supported by discussion in some form and (2) students always have the opportunity to make changes to improve the quality of the assessed work (a detailed discussion on the research context is in Chapter 3 – Methodology).

As the study sought to gain insights from students who have experienced multiple instances of in-class peer review, the Ecology programme was selected as the research setting. Based on the three aims of the study, a qualitative methodology was deemed most appropriate, guided by an interpretive paradigm. To provide a detailed
analysis of students’ experiences of peer review, data were collected by a combination of two in-depth semi-structured interviews with individuals, as well as feedback analysis of academic staff and peer feedback. The knowledge generated in this research, therefore, adds to the existing discussions regarding how students’ experience peer review, how students provide and utilise feedback to revise work, and whether multiple instances of participation in peer review allow students to use skills in other papers, or even in contexts outside of the university.

1.5 Thesis structure

The thesis is divided into three main parts (Figure 1). In the first part of the thesis, I establish the need for the study, as well as the research methods used. In the second part, I address the three key research questions. This is then followed by the third section in which I present the summary of the main findings.

**Figure 1**: Structure of the thesis
Following the current chapter, which provides a background to the study and sets out the aim, the thesis has six other chapters organised in the following order. Chapter 2 explores the research that has been conducted in the field of peer review. The chapter starts by examining different theories that lend support to the scholarship of peer review. I then highlight the different definitions of peer review and discuss the definition of peer review used in this study. Given that I am interested in understanding students’ experience of peer review, after discussing the different terminologies for peer review, I make a case that most reports of students’ experiences of peer review are based on single episodes of peer review and that examining students’ experiences of multiple peer review episodes of peer review episodes may provide better insights into the practice of peer review. I then discuss the role of prior experience in peer review, particularly in terms of how peer review skills take time to develop. Considering that I am also interested in understanding how students respond to feedback in the review process, I discuss the issue of what constitutes quality in feedback. In discussing the issue of quality, I also draw on the notion of dialogic feedback because for students to use feedback, they need to be in a position to understand feedback. I use published literature to make a claim that dialogic feedback has the potential to help students improve their feedback experience. Following the discussion on dialogic feedback, I describe the process of revision, which is seen as a key part of the peer review process. I also provide a discussion on the role of training to help students develop different skills. I end the chapter by discussing the role of skills development and the issue of transferability of peer review skills.

Chapter 3 details the methodological approach of the study. The chapter begins by presenting the philosophical beliefs underlying the thesis by exploring my ontological and epistemological beliefs that underlie my interest as a researcher in the
broad area of student peer review and how my experience as a student has shaped my interest in the field. Doing so allows for the development of the research paradigm, which provides a justification for the research approach and data collection methods. Having established the research paradigm, the chapter then explores the data collection and analysis methods in line with the research aims, as highlighted in Chapter 1. The methodology chapter is broadly influenced by the aims and research questions outlined in Chapter 1 and also influenced by the findings of the literature review in Chapter 2. Issues of ethical considerations and trustworthiness, including credibility and transferability, are also discussed to reflect the rigour of research in this study.

Having established the background and aims of the current study (Chapter 1), provided a detailed critique of peer review (Chapter 2) and presented the methodological underpinnings of the current study (Chapter 3), Chapters 4, 5 and 6 provide the empirical findings of the study. These chapters are structured so that each chapter deals with one of the research aims as expounded by the research question.

Chapter 4 examines students’ experiences of their peer review process. In doing so, the chapter draws on students’ current and past experiences of peer review to provide a detailed account. Data from semi-structured interviews and text analysis are used to support discussion on how students experience the process and how they feel that participating in the multiple review processes influences their learning experiences. Based on the findings, Chapter 4 argues that multiple experiences in peer review have a positive effect on students.

To develop a better understanding of students’ experiences of peer review, it becomes prudent to see how students’ reflections on their peer review experiences
resonate with the type of feedback they provide and how they use feedback to revise their work. Thus, Chapter 5 builds on the discussion in Chapter 4 to discuss how students produce and utilise feedback in the review process. Doing so addresses the second aim of the study, which is to investigate how students respond to feedback in the review process. In order to gain insight into how students respond to feedback, I focused on the second-year, second-semester ECOL 212 peer review activity. The reason for doing so was that the peer review activity in ECOL 212 was the only one that mirrored a professional peer review process that required students to draft a rebuttal response addressing each feedback comment received. Considering that students received feedback from both staff and peers, data from student interviews and feedback analysis are used to investigate the type of feedback provided to peers and the difference between student and academic staff comments. The findings from the chapter provide a helpful narrative to document students’ expectations of feedback and how they use feedback in the revision process.

Having described students’ experiences of their peer review process (Chapter 4) and how students respond to feedback in the review process (Chapter 5), Chapter 6 addresses how students utilise their peer review experience outside of the Ecology paper. In doing so, the chapter fulfils the third and the final aim of the thesis, which is to determine if engaging in peer review on multiple occasions in a single course influenced students’ learning outcomes in other courses they took in conjunction with the Ecology course. Using data from semi-structured interviews, the chapter describes how students develop different skills as a result of participating in peer review activities. Following this, I explore how students transfer different types of skills to different contexts, both within and beyond the Ecology programme.
Having achieved the aims of the study in the empirical chapters (Chapters 4-6), in the last chapter, Chapter 7, the findings from the three empirical chapters are synthesised in order to discuss the implications in line with the aims of this study for both the theory and practice of student peer review. Discussion also focuses on the contributions of the study to the scholarship of student peer review. The chapter then discusses possible directions for future research before providing a final reflection on the research topic.
Chapter 2 - Literature Review

Part One

• Justifying the research
  - Introduction
  - Literature Review
  - Methodology

Part Two

Study findings

• Addressing the research questions
  - RQ1: experiences and reflections
  - RQ2: responses to feedback
  - RQ3: transfer of skills

Part Three

Concluding the study

• Summary of the main findings
  - Thesis contribution
2.1 Introduction

Assessment and feedback play a key role in the lives of students. While seen as the Achilles’ Heel (Knight, 2002), assessment (and invariably feedback) often serves multiple functions. In addition to validating standards and certifying credentials (Boud, 2000), it is also well-recognized that assessment and feedback play an important pedagogical role in shaping students’ learning (Black & Wiliam, 1998; Boud & Soler, 2016; Carless, 2017). For example, Carless (2017) notes that a well-implemented assessment process will provide a positive prospect for learning, and a flawed assessment design will lead to a risk of student disengagement. Given the significance of assessment and feedback to learning, it is not surprising to note that for well over three decades, conscientious efforts have been made by academics and researchers to shift how assessment is conceptualised in higher education.

While validating standards and certifying credentials remain the cornerstone of the process, at the same time, it is also now well recognised that if the assessment and feedback are to be beneficial, then telling students what is right or wrong in their work will not on its own improve their work (Black & Wiliam, 1998; Nicol & Macfarlane-Dick, 2006; Sadler, 2010). Rather, considering that assessment and feedback go ‘hand in hand’, the recognition that students need to play a greater role in the assessment process emerges against a body of literature that suggests that high-quality feedback and students’ use of feedback have a greater potential than any other factors to influence students’ learning (Boud, 2007; Hattie & Timperley, 2007; Winstone et al., 2017). Research has shown that for assessment, and in particular feedback, to be effective, then students should be in a position to “construct their own meaning from the received message: they must do something with it, analyse it, ask questions about it, discuss it with others and connect with prior knowledge” (Nicol et al., 2014 p.103).
Within such a context, as discussed in the last chapter (Chapter One), it is thought that one way students can be engaged in an assessment that gives them a greater role in the process, and at the same time provides high-quality feedback, is through formative peer review (Baker, 2016; Brammer & Rees, 2007; Cho & Macarthur, 2011; Dochy et al., 1999; Falchikov, 1995; Li et al., 2010; Liu & Carless, 2006; Pearce et al., 2009a; Topping, 1998).

A significant amount of research has been conducted on formative peer review since the turn of the century (Ashenafi, 2017). As identified in Chapter 1, the initial literature review highlighted three key challenges in the scholarship of formative peer review. To recapitulate, these three challenges were 1) most studies on peer review in undergraduate education have examined students’ experiences of one-off events, 2) little attention has been paid to how students respond to review feedback to revise work and 3) there is a lack of knowledge about how students transfer their peer review knowledge and skills to different contexts. As such, the purpose of this chapter is to situate these three challenges into the wider, general literature on peer review. In doing so, it is envisaged that the literature review will provide a unique insight into the potential of peer review for student learning. The key words peer review, peer assessment, peer feedback, peer response, peer interaction and peer evaluation were used to search for relevant literature. The search was carried out on Google Scholar. All studies based on summative peer review exercises and ones that did not focus on higher education students were excluded.

2.2 Theoretical background

Topping (1998) noted that given the many different types of peer assessment, establishing a single overarching theory of peer review is difficult. As such, to date,
there is no one particular theory for student peer review. Rather, peer review is supported by several theories including socio-constructivism, process writing, Vygotsky’s zone of proximal development, and communities of practice (Hansen & Liu, 2005; Lave & Wenger, 1991; Lin & Yang, 2011). Table 1 (p.18) depicts a selection of examples in which various researchers have used different theories to describe peer review.

What becomes evident from Table 1 (p.18) is that in nearly all cases, researchers draw on theoretical frameworks that focus on students playing an active part in knowledge creation and acquisition. For instance, the key ideas of socio-constructivism, communities of practice and collaborative learning theory are that they all emphasise learning is a social construct that takes place in groups and that the students take an active role in the learning process (Vygotsky, 1978; Wenger, 1999).

Vygotsky (1978) drew attention to the fact that students, with the assistance of a more capable peer, can be capable of completing tasks that they may not have been able to do on their own. Vygotsky also used the term ‘enculturation’ to refer to the process where people develop their identities within existing groups, which is closely related to the idea of communities of practice in which learning requires active participation and what people learn will be of relevance to them as participating members of that group (Wenger, 1999).
Table 1: Examples of different theories used to discuss peer review

<table>
<thead>
<tr>
<th>Type of theory</th>
<th>Key ideas</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socioc-constructivism</td>
<td>Students interact with peers by providing comments on others’ writing and</td>
<td>Lin and Yang (2011)</td>
</tr>
<tr>
<td></td>
<td>creating a social space for discussion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feedback is a social practice and membership of a community of practice</td>
<td>Price et al. (2011)</td>
</tr>
<tr>
<td></td>
<td>can shape engagement with feedback.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students actively construct their own understanding of feedback messages</td>
<td>Nicol and Macfarlane-Dick (2006)</td>
</tr>
<tr>
<td></td>
<td>derived from external sources.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Joint construction of knowledge through discourse and other interactivity.</td>
<td>Topping (1998)</td>
</tr>
<tr>
<td></td>
<td>Knowledge can be negotiated between participants about how to come to</td>
<td>Sadler (2013)</td>
</tr>
<tr>
<td></td>
<td>share a similar understanding of their practice and context.</td>
<td></td>
</tr>
<tr>
<td>Communities of practice</td>
<td>Learning occurs in social contexts that emerges and evolves when people</td>
<td>Taylor et al. (2015)</td>
</tr>
<tr>
<td></td>
<td>who have common goals interact to strive towards these objectives.</td>
<td></td>
</tr>
<tr>
<td>Cognitivist perspective</td>
<td>Closely associated with ‘a directive telling approach where feedback</td>
<td>Evans (2013)</td>
</tr>
<tr>
<td></td>
<td>is seen as corrective, with an expert providing information to a passive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>recipient’ p. 71.</td>
<td></td>
</tr>
<tr>
<td>Vygotsky’s Zone of Proximal</td>
<td>‘Weaker’ students can improve their knowledge and abilities by interacting</td>
<td>Ramon-Casas et al. (2018)</td>
</tr>
<tr>
<td>Development</td>
<td>with ‘above average students’.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘… learning is socially constructed, discovered and transformed among</td>
<td>Poverjuc et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>learners rather than between a person and artefacts’ p.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By providing feedback, students can help each other reach a level where</td>
<td>Lundstrom and Baker (2009)</td>
</tr>
<tr>
<td></td>
<td>they can perform certain tasks on their own.</td>
<td></td>
</tr>
<tr>
<td>Collaborative learning theory</td>
<td>Students use their abilities and complete tasks that they could not do</td>
<td>Hyland and Hyland (2006)</td>
</tr>
<tr>
<td></td>
<td>on their own and learn through dialogue and interaction with each other.</td>
<td></td>
</tr>
<tr>
<td>Process Writing</td>
<td>Reviewing provides student reviewers with opportunities to examine</td>
<td>Cho and Cho (2011)</td>
</tr>
<tr>
<td></td>
<td>writing from the perspective of the ‘assessee’.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>student focused on a topic’ p.77.</td>
<td></td>
</tr>
</tbody>
</table>

A likely reason for researchers to draw on theories that emphasise social constructivism and collaboration is that they are aligned with the growing idea that student learning in higher education is not a simple acquisition based on the
transmission of knowledge. Rather, as noted by Nicol and Macfarlane-Dick (2006), learning is now more commonly conceptualised as “a process whereby students actively construct their own knowledge and skills” (p.2) and as part of the dialogic process (discussed later in this chapter) through which students learn to understand and apply feedback (Nicol, 2010b; Price et al., 2011; Sutton, 2009).

Therefore, by drawing on the theories of social constructivism and collaborative learning, researchers emphasise the ‘active’ role that students play in the peer review process and its potential impact on their learning, i.e. as ‘active agents’ in the learning process, students are positioned to “negotiate meaning, learn together the conventions specific to their discipline, [and] extend their critical thinking and reasoning skills” (Poverjuc et al., 2012 p.465). Both Rust (2007) and Winstone and Boud (2018) consider students playing a central role in the assessment and feedback process as a new form of assessment culture. Results from earlier studies suggest that in most cases when students engage in formative peer review, most students are able to acquire distinctive learning gains such as: developing self-regulation of learning (Cho & Macarthur, 2010; Dochy et al., 1999; Nicol & Macfarlane-Dick, 2006); enhancement of critical thinking skills (Adachi et al., 2018; Nicol et al., 2014; Topping, 1998); and developing different elements of transferable skills such as teamwork and communication skills (Adachi et al., 2018; Lundstrom & Baker, 2009). Therefore, based on the above, in the present study, conceptualising peer review as a socio-construivist approach to learning will prove valuable in understanding how students perceive their peer review experience and how they learn from it.
2.3 Definition of peer review

Unlike scientific peer review in which, where in some cases, reviewers act as gatekeepers of science to recommend only the scientific research for publication (Bornmann, 2008), which subsequently influences decisions on career progressions and grant funding (Larochelle & Désautels, 2002), the purpose of student peer review is different. In the context of student peer review, the ‘emphasis is on standards and how peer interaction can lead to enhanced understanding and improved learnings’ (Liu & Carless, 2006 p.280), i.e, providing feedback in order to improve students’ work.

Such an outcome is particularly important in meeting the goal of students taking a central role in the assessment and feedback process within higher education (Nicol & Macfarlane-Dick, 2006). Additionally, while reviewers in the scientific peer review process are almost always professional peers who are working in the field and are generally considered as ‘experts’ to provide feedback (Spier, 2002), reviewers in the peer review process are almost always seen as novices. Published literature on the topic of student peer review reveals there are multiple terms used to refer to the idea of students reviewing work and providing feedback (Table 2, p.21).
Table 2: An example of competing terms used for peer review

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Type of assessment</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer review</td>
<td>“a reciprocal process whereby students produce feedback reviews on the work of peers and receive feedback reviews from peers on their own work” p. 102</td>
<td>Formative</td>
<td>Nicol et al. (2014)</td>
</tr>
<tr>
<td></td>
<td>“a process in which students constructively evaluate the work of other students” p.209</td>
<td>Formative</td>
<td>Crowe et al. (2015)</td>
</tr>
<tr>
<td>Peer assessment</td>
<td>“an arrangement in which individuals consider the amount, level, value, worth, quality, or success of a product or outcomes of learning of peers of similar status” p.250</td>
<td>Can be both summative or formative.</td>
<td>Topping (1998)</td>
</tr>
<tr>
<td></td>
<td>“is a process whereby groups of individuals rate their peers” p.175</td>
<td>Summative</td>
<td>Falchikov (1995)</td>
</tr>
<tr>
<td></td>
<td>“[an] assessment practice in which peers assess the achievements, learning outcomes or performances of their fellow students” p.221</td>
<td>Can be both summative or formative.</td>
<td>Lindblom-Ylanne (2006)</td>
</tr>
<tr>
<td></td>
<td>Following the idea of Dochy et al. (1999), van den Berg et al. (2006a) defines peer assessment as “an educational arrangement in which students can assess the quality of their fellow students’ work and provide one another with feedback” p.135</td>
<td>Can be both summative or feedback</td>
<td>van den Berg et al. (2006a)</td>
</tr>
<tr>
<td>Peer feedback</td>
<td>“a communication process through which learners enter dialogues related to performance and standards” p. 280</td>
<td>Formative</td>
<td>Liu and Carless (2006)</td>
</tr>
<tr>
<td></td>
<td>“is a dialogic process whereby students share knowledge and understandings with the intention of informing ongoing learning” p. 883</td>
<td>Formative</td>
<td>(Zhu &amp; Carless, 2018)</td>
</tr>
<tr>
<td>Peer response</td>
<td>“the use of learners as sources of information, and interactants for each other in such a way that learners assume roles and responsibilities normally taken on by a formally trained teacher, tutor, or editor in commenting on and critiquing each other’s drafts in both written and oral formats in the process of writing” p.1</td>
<td>Formative</td>
<td>Liu and Hansen (2002)</td>
</tr>
</tbody>
</table>

A general commonality between the terms in Table 2 is that almost all terms define peer review either as a process, or a practice in which students either evaluate or assess their peers’ work. The difference, however, becomes apparent when considering
the nature of assessment required on the part of students. What is evident from Table 2 is that there are two main forms of peer review — one is formative peer review which, as the name suggests, involves providing formative feedback to peers, while the second one is summative peer review, which involves grading or giving marks to peers’ work. Li et al. (2010) note that in most cases of formative peer review, students act as both reviewer and reviewee, i.e. they provide feedback to their peers (reviewer) as well as receive feedback from their peers (reviewee). However, in both cases, summative and formative peer review reflects the socio-constructivist role of students in the process.

For the purpose of this thesis, I use the term ‘student peer review’ and following the description of Nicol et al. (2014), my interpretation of peer review is that of a process in which students review each other’s work and provide formative feedback for the purposes of revision. A key reason for focusing on formative peer review is that formative peer review provides a scope to study the impact of feedback on students’ work through the revision process. Studying students’ experiences of summative peer review may not have provided such opportunities because in most cases students, would not have been in a position to make changes to their work after receiving summative feedback in the form of marks or grades.

2.4 Students’ experiences of peer review

Students’ experiences of peer review have been sought in a large majority of studies. In most cases, students’ experiences are normally measured as students’ overall satisfaction with the peer review activity (e.g.: Alqassab et al., 2018; Mulder et al., 2014b; Nicol et al., 2014; Strijbos et al., 2010; Wang, 2014). These studies generally show that students have a positive peer review experience. For example, Nicol et al. (2014) noted that participants in their study were generally positive about their
experience of engaging in peer review because they felt that “it was good to get feedback from each other” and that “showed me what others had done” (p. 108). Other studies also report that students generally see the process as a positive experience because it helps them to develop insights into their own work (Hanrahan & Isaacs, 2001; Mulder et al., 2014b; Wang, 2014).

Some studies have also explored students’ reflections on their willingness and competence to provide peer feedback. In these studies, it was found that some students doubted their own ability — and their peers’ abilities — to provide feedback (Brammer & Rees, 2007; van Gennip et al., 2010; Walker, 2001). After conducting a survey of 1740 students and 460 faculty members involved in peer assessment, Liu and Carless (2006) concluded that some students may believe that their peers are not qualified to provide feedback, while some may find it easier to accept feedback from peers. Similarly, Kaufman and Schunn (2011) also found that students thought the review process was unfair and believed that fellow students were not qualified to review and assess their work. Kaufman and Schunn (2011) noted students’ experience of the unfairness of the review process was associated with the extent to which feedback was useful and positive. In practice, it has been shown that in some instances in which staff and peers provide feedback, students use feedback that makes sense to them, irrespective of who provided it (Wald & Harland, 2018).

While the above studies provide a valuable contribution to how students experience the peer review process, a pragmatic challenge is that there is a rarity of studies that explore the experience of students who are engaged in multiple peer reviews. Given that the full benefits of peer review “may only be realised after serious effort is made to incorporate it into the everyday teaching practices in a way which is
positive, non-threatening and attractive to students” (Sluijsmans et al., 2002a p. 452), it becomes important to understand how students in such a context think of their experiences. This is because students’ epistemological beliefs (beliefs about knowledge and knowing) are predictive of their learning (Muis, 2004). In other words, students acquire learning gains from different assessment activities based on the way they experience them (Boud & Soler, 2016). It is likely that if students think they are becoming more capable in the peer review process, they are more likely to take part in the process and acquire the different learning gains from the process (Vanderhoven et al., 2015).

A study by Rotsaert et al. (2018) measured how students’ peer feedback skills changed over time in a peer assessment setting in which each student acted as a reviewer seven times and as a reviewee once in a class where they had eight peer feedback sessions per day. Students self-reported that the first two iterations of peer review resulted in significant improvement in their feedback skills, but subsequent participation in peer review activities did not result in much change (Rotsaert et al., 2018). However, in this particular case, it could be that students did not see significant changes in their peer review experience because of the nature of the assessment design (i.e., students assessed their peers’ work in a one-off context over an 8 week period). It is likely that if peer review is part of the assessment culture in a given context, then students may experience a different outcome from such a process.

Additionally, to my knowledge, it is rare for studies to have explored students’ experience of the review process in a context in which students are trained as researcher’s right from the start of their university journey. For instance, Harland et al. (2017) noted that “high-level skills that come from being involved in research activities
such as problem-solving, independent learning and critical thinking” (p. 809) will be transferable to other contexts. Such skills are also considered to be part of the learning gains in peer review (Adachi et al., 2018; Nicol, 2010a; Topping, 1998). Therefore, examining students’ experience of peer review in terms of the transferable skills developed through the process will allow insights into how engaging in the review process benefits students’ learning.

2.5 Prior experience in peer review

I made a case earlier in this chapter that most studies report on singular episodes of peer review; as such, in this section, I discuss the role of having prior experience in peer review. It is thought that the manner in which peer review is “prepared and implement[ed] in a course impacts upon the extent to which students engage in, and learn from, the assessment process” (Vu & Dall’Alba, 2007). Within the context of peer review design, it has been noted that peer review skills take longer than a semester to develop (Lundstrom & Baker, 2009). Similarly, Nulty (2011) argues that students in the first year of studies may lack the necessary skills in peer review compared to those students who are in their later years of studies, but at the same time, Nulty also notes that “first-year students are capable of engaging in peer and self-assessment, and that they should be given the opportunity to develop and practice the associated skills through engagement in such activit[ies]” (p. 497, emphasis in original). As a solution to the problem identified by Nulty (2011), there is a growing idea in published research that recommends creating a ‘course climate’ of peer feedback to improve students’ overall experience of the peer review process (Boud, 2000; Liu & Carless, 2006). According to Boud (2000), having the process of giving and receiving feedback as a normal part of the teaching and learning processes will lead to what he describes as
“worthwhile peer learning” (p. 157), which will help students develop confidence in the process.

Developing Boud’s (2000) idea of ‘course climate’ further, Liu and Carless (2006) note that “[c]ultivating an appropriate atmosphere for peer interacting is clearly a necessary condition for successful peer feedback processes” (p. 288). Normalising the peer review process as part of the assessment experience is important because, in some cases, when students transition to universities from high schools, the “newness of university assessments becomes a major cause of anxiety for students” (Beaumont et al., 2011 p.678). Therefore, embedding peer feedback within the course to create a climate for peer feedback will be beneficial because more regular involvement in the peer feedback process is likely to help students develop the required knowledge and skills of the processes, such as making judgements and constructing feedback (Liu & Carless, 2006). In a similar vein, Orsmond et al. (2000) argue that students need time and experience to develop an understanding of assessment in general and peer feedback specifically. In some cases, this may help reduce students’ initial difficulties with and reluctance about the process. Published research on peer review highlights that students sometimes cite the inexperience of fellow peer reviewers as a cause for dissatisfaction with the feedback process (e.g. Ballantyne et al., 2002; Cheng & Warren, 1997; Mostert & Snowball, 2013; Yucel et al., 2014). As such, having peer review as part of the assessment culture may help to normalise the process and possibly remove some of the initial difficulties faced by students.

In practice, research shows that in some cases, prior experience in peer review can have a positive effect on the review process. For example, Gielen and De Wever (2015) noted that the majority of first-year Bachelor of Educational Sciences
programme students reported they had prior experience of peer review through oral and written feedback in evaluations of presentations and group products. Following three iterations of four-phased peer review activities in which students sought specific feedback, provided comments to their peers, used feedback to revise work and finally, evaluated the quality of peer feedback, the researchers noted that the prior experience of peer review meant providing feedback was not perceived as a difficult task by students. At the same time, the quality of feedback provided by students improved after multiple activities (Gielen & De Wever, 2015).

In contrast, while examining the experiences of graduate students in a Master of Education Programme at a major UK University who had limited prior peer review experience, Poverjuc et al. (2012) found that participants expressed initial negativity towards peer feedback and were reluctant to take part in the process. The authors do not describe the peer review process used in the programme, yet over the course of the year, students’ experience of peer review changed from negative to positive as they participated in multiple peer review activities. However, most of the peer review was part of the informal peer feedback support interactions in which participants sought feedback on task clarification, subject knowledge, writing experiences, editing and proofreading written work, conducting micro-studies and exchanging opinions on each other’s topics (Poverjuc et al., 2012). Such an outcome suggests that having multiple experiences of peer review allowed students to gain an insight into the potential of peer review.

However, participating in multiple peer review activities itself is not enough to help students develop review skills. For example, in another case where peer review was embedded within a course and seven out of nine students had already used peer
review in a previous course, Vu and Dall’Alba (2007) noted that all but one student valued their experience because the process “helped to sharpen evaluation skills; … provided opportunities for assessing peers from their own perspective and learning from strengths and weakness; and … gave insights into how peers viewed and assessed each other’s work” (p. 546); one student reported disliking everything about the process without giving any reason. However, surprisingly, while students had an overall positive perception of the peer review experience, most students had concerns about the marking capabilities of themselves and their peers due to a lack of understanding of the marking criteria. Additionally, the course coordinator had not adequately prepared them to review their peers’ work because of limited class time (Vu & Dall’Alba, 2007).

Given that evaluating peers’ work forms the key part of the review process, it is suggested that students should be provided with training. In the case of the Vu and Dall’Alba (2007), while students had favourable conditions to take part in the process, such as familiarity with peer assessment practices and a level of trust between academic staff and students, the students received no form of training in how to assess their peers, resulting in most students reporting that “they were unclear about how to assess or what they were expected to do” (p. 576). Even in cases where students received training and they participated in multiple peer review activities, still, in some instances, students found it difficult to understand the full expectations of peer review (e.g. Harland et al., 2017).

Another criticism of studies investigating students’ experiences of peer review is that “the relationship between the peer feedback belief and perceptions and peer feedback content (type and accuracy) on performance is rarely examined” (Alqassab et al., 2018 p:3). A relatively recent study has shown that students’ experiences about the
helpfulness of feedback mediated their self-regulation skills (Brown et al., 2012), as well as the perceived accuracy in themselves as a reviewer and their peers as recipients (Rotsaert et al., 2018). Therefore, focusing on students’ experiences of the expectations of feedback in the review process and the subsequent use of feedback in the revision process can allow better insights into the practice of peer review.

It is generally accepted that practice arguably leads to improvement, yet the above mixed outcomes have led to calls for more research on students’ experiences of peer review, particularly in addressing the “scant evidence relating to the effects of repeating the [peer review] experience” (Falchikov, 2004 p.106). It is also thought that considering the long-term involvement of students in the peer review process may provide insights into how students can be helped to improve their own learning experiences (Sluijsmans et al., 2004b), as well as develop an understanding of how prior experience influences students’ subsequent involvement in the process (Topping, 2010).

2.6 Quality in feedback

Having considered the role of prior experience of peer review, I now discuss the issue of quality in peer feedback. In formative assessment practices such as peer review, assessment entail not only providing helpful feedback, but the process should also allow students to develop a conception of what counts as good quality work in a subject area (Hounsell et al., 2008). In order to discuss the issue of quality in feedback, it is imperative to define feedback which Price et al. (2010) suggested is a generic term that lacks clarity of meaning. For the purpose of this study, feedback is defined as “a process whereby learners obtain information about their work in order to appreciate the similarities and differences between the appropriate standards of any given work, and
the qualities of the work itself, in order to generate improved work” (Boud & Molloy, 2013b p.6). Within such a context, Nicol and Macfarlane-Dick (2006) suggested that good feedback theoretically performs the following functions:

- helps clarify what good performance is (goals, criteria, expected standards);
- facilitates the development of self-assessment (reflection) in learning;
- delivers high-quality information to students about their learning;
- encourages teacher and peer dialogue about learning;
- encourages positive motivational beliefs and self-esteem;
- provides opportunities to close the gap between current and desired performance;
- provides information to teachers that can be used to help shape the teaching.

A key argument of the authors is that “students are already assessing their own work and generating their own feedback, and that higher education should build on this ability” Nicol and Macfarlane-Dick (2006 p.2). Therefore, having the above outcomes in the feedback process will help students to become self-regulated learners, that is, they will be able to understand and judge by themselves what quality is and how they can achieve that level of quality in their work (Sadler, 1989). While much research has addressed the quality of quantitative peer review by measuring the validity and reliability indices of peer rating (e.g. Cho et al., 2006b; Falchikov & Goldfinch, 2000), Hovardas et al. (2014) note that there is not a single framework that suggests how the quality of peer feedback could be determined. In fact, there are three different, yet complementary approaches to what constitutes quality in the feedback process.
The first approach of characterising quality in feedback focuses on feedback design itself. For example, in published research, feedback quality is characterized by how feedback clarifies and reinforces task requirements (Nicol, 2010b); the clarity of language used to provide feedback (Bailey & Garner, 2010); the level of detail in feedback (Sopina & McNeill, 2015); the level of consistency between feedback providers (Carless, 2006); the time taken to deliver feedback (Ramsden, 2003); and the level of detail, clarity, structure and relevance of feedback (Nicol et al., 2014). In this approach of feedback design, emphasis is placed on making feedback easy for students to understand, suggesting that quality feedback is that which clearly conveys the feedback message to the students. Such an approach to feedback quality is likely to address the challenge of students misinterpreting and misunderstanding the feedback because it is delivered in complex and, oftentimes, specialised language (Higgins et al., 2002; Nicol, 2010b).

The second approach to quality in feedback is based on how feedback leads to revisions in students’ work. That is, quality is measured by the subsequent revisions made (e.g. Cho & Macarthur, 2010; Cho & Schunn, 2007; Li et al., 2010; Min, 2006; Patchan & Schunn, 2015; Sung et al., 2003). In most cases, it is thought that quality revision is where students alter the meaning of sentences and paragraphs as opposed to just revising language or grammar (Cho & Macarthur, 2010). In this approach, quality feedback is not only that which is easily understood by the students, but is feedback that can be used to revise their work. Such an outcome is particularly important in a context where it is becoming ever more important to understand where students are going, how they are doing and what can be done to make future progress (Hattie & Timperley, 2007).
The third approach to quality in feedback is based on students’ abilities to provide quality feedback. For example, Walker (2015) focused on quality by reporting that students were able to provide ‘quality’ feedback to their peers because the majority of the feedback was useable by their peers. Similarly, in a study by Harland et al. (2017), students did not “want their work to be reviewed by someone they don’t think has had proper training to give good feedback” (p. 806) suggesting that, in this case, quality feedback meant feedback could they could use. In this study, it was noted that in cases where students expressed dissatisfaction with the feedback received from academic staff, it was often articulated with concerns about the nature of the quality of feedback that students had problems using (e.g. Hounsell et al., 2008; Yang & Carless, 2013).

Based on the three different approaches above, I argue that there is no one single framework for judging ‘quality’ in students’ work. Therefore, to capture the notion of quality, a holistic account of the whole feedback process is important, rather than relying on any single factor, such as level of clarity or impact on revision (Nicol, 2010b; Wiliam, 2011). The argument is supported by the idea that feedback is an interactive process and that learning from feedback is not a matter of transmission of knowledge, but is constructed as a process of social interaction (Nicol et al., 2014). As such, if the ultimate aim of feedback is to support learning (Wiliam, 2011), then in judging the quality of feedback, one should focus not only on what is produced as feedback, but also pay attention to how students engage with it (Dunworth & Sanchez, 2016).

While the above provides a valuable insight into the different approaches of quality in feedback, to my knowledge, there is a distinct paucity of research when it comes to exploring how students’ expectations of feedback quality match the actual
feedback they receive, and in turn, how students use that feedback to revise work.
Comparing students’ expectations of feedback quality with the feedback they receive and the actual manner in which students use that feedback to revise work may provide what I consider as a holistic account of students’ feedback experience.

2.7 Dialogic feedback

The issue of feedback quality is supplemented by the idea of dialogic feedback. Providing feedback on students’ work is a central feature of learning in higher education; however, a criticism levelled against feedback practice is that telling students what is correct and incorrect in their work and how it might be improved does not lead to learning (Sadler, 2010). Central to this view is that feedback is not a product to be delivered to students (Carless, 2016). Rather, it is suggested that for students to learn from feedback, due consideration must be given to the role that students play in the process (Ajjawi & Boud, 2018; Hill & West, 2019; Nicol et al., 2014). Within the above context, most researchers agree that an active role in the feedback process means that students are provided with opportunities to ask questions about feedback, use it to revise work, clarify meanings and expectations, discuss it with others and connect with their prior experience (Carless et al., 2011; Nicol, 2010b; Price et al., 2011). Trust in such a context also plays an important role. Carless (2013) distinguishes between competency trust, i.e., in the capability of the peer and communication trust, i.e., confidence that the peer is providing the student with accurate information is important. To create such a climate, it is recommended that feedback should be conceptualised as a dialogue rather than a one-way transmission process (Nicol, 2010b).

Carless (2012p.90) defines dialogic feedback as “interactive exchanges in which interpretations are shared, meanings negotiated and expectations clarified” (p. 90).
Nicol (2010b), on the other hand, conceptualises his idea of dialogic feedback using Laurillard’s (2002) conversational framework theory in which she emphasises that learning results from the dialogue on a topic between students and teachers. For dialogue to be effective, it has to:

- be suitable for students’ needs (adaptive);
- have two-way communication exchange (discursive);
- be aimed at achieving specific goals related to students’ work (interactive); and
- help both academics and students to reflect on the overall feedback cycle (reflective), with the ultimate purpose of improving students’ understanding of learning tasks (Laurillard, 2002; Nicol, 2010b).

However, it must be noted that the idea of dialogue is just a metaphor for understanding the meaning and creation of meaning and not actual conversations between people (Bakhtin, 1981). In the Bakhtinian sense, a qualifying condition for dialogue is that “if an answer [does] not give rise to a new question from itself, it [falls] out of the dialogue” (Bakhtin, 1986 p.168) suggesting that all communication is dialogic. Of interest here is that within the context of education, and in particular higher education, O’Connor and Michaels (2007) note that classrooms are full of discourse and dialogue between teachers and students, and between students themselves, through formal talks and informal conversations and through written text to a particular audience, for example, a written assignment provided to the teacher for marking. In differentiating between monologic and dialogic forms of discourse, O’Connor and Michaels (2007) provide a helpful explanation that underpins the general argument for dialogic feedback within higher education:
… a formal lecture, with one person speaking and no direct questions, is interactionally and linguistically positioned at the monologic end of the continuum. However, ideologically, it may be couched within a setting in which groups of listeners may question, challenge, and eventually respond, rendering the lecture part of an activity system that is inherently [d]ialogic in its ideological stance. Conversely, it is easy to find examples of ‘dialogic,’ where a teacher asks a question, a student responds, and the teacher follows up (p. 277, emphasis mine).

In the above example, the nature of dialogue is evident in the ability to respond and this is where the crux of dialogic feedback is – the ability to engage in discussion (Nicol, 2010b; Steen-Utheim & Wittek, 2017; Sutton, 2009). Such a position suggests that teaching should develop students’ capacities to engage in dialogue through which “knowledge is constantly being constructed, deconstructed and reconstructed” (Wegerif, 2006 p.60).

Common to such a pedagogical approach is that dialogue serves to reduce misconceptions and differing perceptions about both assessment and feedback (Carless, 2006). While there are suggestions that peer review can help facilitate dialogic feedback (Filius et al., 2018; Nicol, 2010b), at the same time, Zhu and Carless (2018) assert that dialogue is not always present in peer feedback, and that design of the peer feedback activity is crucial in establishing dialogue. For example, in a study by Harland et al. (2017), two staff and a pair of students anonymously reviewed a research proposal written as a grant application. At the end of the review activity, each pair of students received four sets of reviews (two from staff and two from students). Once the reviews
were completed, they observed their work being discussed by two staff and two students (different from the reviewers) and made notes. After observing the review, students worked in pairs and wrote a rebuttal response to the feedback received. In the rebuttal, students provided a clear justification for accepting and rejecting feedback comments. The rebuttal and the grant proposal were then submitted for final summative assessment. What the above example demonstrates is that a complex level of dialogic feedback was possible through the design of the peer review activity. Given the importance of dialogue to helping students negotiate meaning, it becomes important to understand how students perceive dialogic exchanges within a formative peer review context.

2.8 Revisions after feedback

Given that one of the key features of quality in feedback is the process of revision, it is worthwhile to explore how the idea of revision manifests itself in peer feedback. It is suggested that revision as part of the peer review process is critical to improving students’ work (Cho & Macarthur, 2010). While a large majority of research has focused on second language learners providing valuable insight into the impact of revisions in students’ work (e.g. De Guerrero & Villamil, 2000; Lundstrom & Baker, 2009; Miao et al., 2006; Paulus, 1999; Tsui & Ng, 2000; Yang & Meng, 2013), there remains a dearth of studies exploring how students in other subjects engage in the revision process.

In terms of how students revise their work, by comparing the revision processes of student writers and experienced writers, Sommers (1980) found that that first-year student writers revised their draft as a process of “cleaning up the paper” (p. 381). In this process, students revised their work by making changes to words and phrases but
left the original meaning intact. In contrast, experienced writers such as journalists, editors and academics make substantial changes to the meaning of the text when revising their work. Such an outcome, according to Baker (2016), suggests that “undergraduate students receiving feedback from peers may use that feedback to make primarily polishing changes” (p. 182). Within the context of peer review, it is thought that feedback focused on content and structure in students’ work results in substantial revisions when compared to feedback on style and grammar, which may lead to simple revisions (Huisman et al., 2018).

The idea of simple versus substantial revisions is explained more fully in the work of Faigley and Witte (1981). Building on the work of Sommers (1980), Faigley and Witte (1981) found that revisions can be divided into two categories: surface-level (simple revisions) and meaning-level changes (substantial revisions). Surface level revisions are those changes that preserve the meaning of the text while changing aspects such as grammar and spelling, as well as adding, deleting and substituting words or phrases. In contrast, meaning level changes are revisions that alter the meaning of the text. Research has shown that in most cases, students engage in surface level revisions after feedback (e.g. Coit, 2004; Min, 2006; Paulus, 1999). However, there are also cases in which students are able to use feedback, including peer feedback, to make significant meaning level changes to their work (e.g. Cho & Macarthur, 2010; Cho et al., 2006a; Gielen et al., 2010). In cases where students are able make meaning level changes, most students are able to do so because they are in a position to interpret feedback and make changes to their work (e.g. Gielen et al., 2010). Such an outcome suggests that if students are helped to develop their skills in interpreting feedback, then it is likely that they will be in a better position to use feedback to make meaning level changes in their work.
It was noted from the literature that there are three important factors that influence students’ revisions: 1) the clarity of feedback provided, 2) the quantity of feedback provided, and 3) time. In most cases, students are able to engage in some form of revision if feedback is easily understood and contains specific suggestions for the student to act on. For example, Baker (2016) found that when students who were trained how to provide feedback, were able to provide comments that identified a problem and suggested how the problem could be resolved. As such, it resulted in feedback recipients making more meaning-level changes to their work. Similarly, Miao et al. (2006) noted that students found peer feedback useful because of the helpfulness of the comments that led them to make subsequent revisions in their work. Harland et al. (2017) note that in practice, students use whatever feedback that makes sense to them, irrespective of whether it is provided by a peer or an academic staff member. Such an outcome is not surprising because in order for students to make use of feedback, they should be in a position to understand it (Liu & Carless, 2006). For example, Carless (2006) noted that students found feedback such as “you need to elaborate more” (p. 226) useless because the students did not know how to address it in their revisions. Overall, there seems to be an increasing consensus amongst both academic staff and students that the ultimate purpose of feedback is improvement, with students expecting feedback that delivers detailed, quality feedback that can be used to revise work (Dawson et al., 2019).

Secondly, the quantity of feedback delivered to students also seems to have an effect on students’ abilities to revise their work, leading to the suggestion that feedback from multiple sources (peers and academic staff) can result in more significant revisions in students’ work (Kaufman & Schunn, 2011). For example, in their study, Cho and Schunn (2007) found that students who received feedback from multiple peers
made more revisions in their work when compared to those students who received feedback from only the subject experts. Such an outcome reflects the observations of Topping (1998), who explained that while “peer feedback might not be of the high quality expected from a professional staff members, its greater immediacy, frequency and volume compensate for this” (p. 255). Cho and Macarthur (2010) also suggest that it is possible that feedback from multiple peers may be easier to understand compared to feedback from academic staff members, hence leading to more revisions in students’ work.

According to Haaga (1993), timing also influences the quality of revision in students’ work following peer review. Haaga (1993) noted that revisions took time and reflected that it was difficult to discern any changes in the work of the students in his study when they had only two weeks to revise their work. However, giving students three weeks to revise their work and complete a cover letter explaining how they would use feedback to revise work (and counter-argue cases where they did not revise their work) helped in the revision process. Baker (2016) noted that the majority of studies scheduled peer review only one week ahead of the due date, leading to students just focusing their revision on cleaning up the draft, such as editing grammar, spelling and punctuation changes, without making substantial changes to the meaning of the text. It is possible that if students are provided with enough time, then they may be able to carefully consider the feedback before engaging in revisions (Haaga, 1993). Baker (2016) suggested that by understanding “how students engage in peer review and revise their paper afterwards [can] help identify the strategies that will produce the kinds of students we hope to create” (p. 190). Further, it is likely that opportunities for redrafting work multiple times may help students utilise feedback to make significant revisions in their work.
2.9 Training in peer review

Considering that the ability to evaluate peers’ work is a skill that is developed over time, many researchers agree that students should be provided with training before being engaging in the peer review process (e.g. Gielen et al., 2010; Hanrahan & Isaacs, 2001; Liu et al., 2018; Marty, 2010; Min, 2016; Sluijsmans et al., 2002a; Topping, 1998). A key reason provided for training students is that “[b]efore being put into the role of the assessor, students must understand which skills are involved in judging of themselves or a peer” (Sluijsmans et al., 2002b p.24); however, in most cases, students may not have the necessary skills to evaluate the work of their peers, especially in the first year of their studies (Liu & Li, 2014; Nulty, 2011; Svinicki, 2001). As such, the provision of initial training may help students gain awareness of the expected outcomes of the process and how they can achieve those outcomes (Pearce et al., 2009b). For example, Mulder et al. (2014b) studied students’ perceptions of the review process before and after a peer review activity. The sample of Mulder and his colleagues included a mixture of students from four different subjects and year levels: Engineering (postgraduate students), Environments (first-year students), Information Systems (third-year students) and Zoology (third-year students). A large majority of students from across the disciplines indicated they had some form of prior experience of peer review. While third-year Zoology students received training in the form of a two-hour workshop that included discussing the issues to consider when writing a review, and examples of helpful and unhelpful comments and questions about the review process, the first-year environmental science students did not receive training and reported confusion about the process prior to the activity. Results indicated that prior to the peer review activity, almost all students had a positive perception of the expected outcome of the process (Mulder et al., 2014b). However, after the activity, the expectations that
the peer review process would be useful decreased for the first-year environmental science students. Further, students’ confidence in the abilities of their peers to provide helpful feedback increased in the other three disciplines, while first-year environmental science students’ perceptions of their peers to provide helpful feedback decreased after the peer review activity. Students doubted the ability of their peers to provide feedback as shown in the comment, “[m]y peers might not be capable to provide objective comments” (p. 165). Based on such an outcome, Mulder et al. (2014b), also recommend training for students, particularly first-year students, to develop peer review skills.

While there is no one form of peer training model, and different researchers model the training experiences differently, Sluijsmans et al. (2004b) proposed an integrated peer review model in which the crucial component of training is developing students’ understanding of how to make judgments using assessment criteria and providing feedback. Similarly, the likes of (Topping, 2010) and (Kollar & Fischer, 2010) also suggested that peer review training should provide opportunities for students to understand how to use criteria to make evaluative judgements on their peers’ work. In practice, findings from specific studies investigating the impact of peer review training provide evidence that, in a large number of cases, training has a positive outcome on students’ performance in the review process (e.g. Min, 2006; Sluijsmans et al., 2002a; Sluijsmans et al., 2002b ; Sluijsmans et al., 2004b) . For example, after noting the perfunctory quality of peer feedback from students involved in a writing cycle programme to improve their expository essay skills, Min (2006) provided a two-stage training process for English language students involved in a writing cycle programme during the second and third stages of the programme, that is, students had no training in the initial peer review activity. The first part of the training consisted of
in-class modelling. In this phase, students were provided with an example of a former student’s essay. The instructor then engaged in demonstrating how to review the work by using the “think aloud method to demonstrate how to make comments by using a four-step procedure: Clarifying writers’ intentions, identifying the source of problems, explaining the nature of problems, and making specific suggestions” (p. 123). After demonstrating, students were required to use the same procedure to review two different drafts in class and provide written feedback to their partners for revision. Students then had one week to revise their work. In cases where they did not agree with feedback, they could disregard it, but at the same time they needed to explain in their revision why it had failed to work.

In the second phase of the feedback process, students were involved in a teacher-reviewer conference in which the instructor collected writers’ drafts, revisions and reviewers’ comments. The instructor then met with individual reviewers to discuss the review they had provided to their peers, with a particular focus on how reviewers could improve the quality of their feedback to make it more understandable (Min, 2006). Following the training, students engaged in reviewing their peers’ work, followed by making revisions in response to the review of their work. By comparing the pre-training versions of students’ draft work, peer review feedback and revisions with post-training peer feedback and revisions, the author concluded that peer review training was useful because it resulted in students providing more useful feedback, leading to more revisions in students’ work and, ultimately, better quality of work (Min, 2006).

Despite the suggestions that training positively impacts on improving students’ abilities in the review process, not all studies report such positive outcomes. For
example, Hanrahan and Isaacs (2001) noted that despite receiving training in the form of discussing the advantages and disadvantages of peer review, and examining the assessment criteria and practice in the process, some students changed their perception from an initially positive view of peer review to a negative view after participation in the process, citing reasons such as being unqualified to assess their peers’ work, seeing the review process as unfair, as well as feeling unprepared for the task, despite the training provided. Such an outcome suggests that the training may have been inadequate. However, overall, the above outcomes show that training in peer review holds the potential to develop students’ knowledge of the peer review process and can help to facilitate ‘effective’ peer review activities.

2.10 Skill development and transferability
Given that peer review involves students making evaluative judgments on their peers’ work and providing their peers with feedback, it is thought that by doing so, students are able to develop a wide range of skills, such as self-assessment, self-regulation, critical-thinking skills and teamwork (Adachi et al., 2018; Liu & Carless, 2006; Topping, 1998). For example, Sadler (2010) suggests that by engaging in peer review, students are able to develop objectivity in making decisions about their own work, as well as the work of others. The ability to make decisions about one’s own work is considered as self-assessment, which Boud (1991) defines as “the involvement of students identifying standards and/or criteria to apply to their work and making judgements about the extent to which they have met these criteria and standards” (p. 4).

Key to the idea of self-assessment is that the student makes the intrinsic judgment of what has been learnt without the external help of others (Boud, 1995). It is thought that the ability of students to make objective judgements on others, as well as
on themselves, is a highly desirable quality that is sought after by employers (Nicol, 2010a). In published research, it is seen that there are instances in which evaluating the work of their peers allows students to gain insights into their own work and make the necessary changes (Dochy et al., 1999). For example, Nicol et al. (2014) showed that after participating in a formative peer review activity, the majority of the participants reported that engaging in peer review allowed them to transfer ideas generated through the review process to their own work and subsequently improve their work. In a similar vein, Hanrahan and Isaacs (2001) showed that when students engaged in reviewing the work of others, some gained insights into their own work within the context of what aspects needed improvement.

Further, the findings of Hanrahan and Isaacs (2001) also depict that engaging in peer feedback helps students to develop critical thinking skills. The authors noted that peer review helped students gain an understanding of the standards required and of what might be achieved, which, in turn, may help students appreciate the difficulties academics face when marking assessments (Hanrahan & Isaacs, 2001). Similarly, in a survey of 90 undergraduate students who were introduced to peer assessment for the first time, Vickerman (2009) found that students agreed that participating in formative peer assessment had helped their critical writing and analytical skills. In his review of different peer assessment studies, Topping (1998) also noted that there were cases in which participation in different forms of peer review helped students to develop critical thinking skills. However, a concern here is that while the authors argue that students develop critical thinking skills, they do not explain the meaning of ‘critical thinking’. Having such a definition may have allowed for a better understanding of how peer review leads to the development of critical thinking skills. It has also been argued that peer review sessions can teach students important skills, such as seeing alternative ideas.
and views different from their own (Dochy et al., 1999; Paulus, 1999), as well as
develop negotiation and diplomacy skills (Topping, 1998) and they become
independent and self-directed learners (Vickerman, 2009).

Given the above potential effects of peer review on students’ learning, many
researchers claim that these skills are transferable (e.g. Adachi et al., 2018; Boud et al.,
1999; Dickson et al., 2018; Nicol & Macfarlane-Dick, 2006; Topping, 2009). In
identifying the potential benefits of peer review, Adachi et al. (2018) claim that because
peer review involves making judgements and giving feedback, it provides opportunities
for students to develop a range of ‘transferable skills’ such as communication, critical-
thinking and collaboration. Consequently, involvement in peer assessment at school can
develop transferable skills for life (Adachi et al., 2018). Gielen et al. (2010) also claim
that teaching students to focus on providing feedback aimed at content and style
characteristics can result in the development of generic skills that can be transferred to
other settings. However, a pragmatic problem with these claims is that none of them is
supported with empirical evidence, and there is also a distinct lack of knowledge about
how transfer takes place and when it does, what the impact is on student learning.

In saying that, I am not denying the idea that peer review skills can be
transferred. Rather, there is limited, yet highly valuable evidence that peer review skills
are transferred by students. For example, Harland et al. (2017) studied the same
Ecology programme as the one considered in the present study. These authors noted
that students were able to use their skills to review the work of their friends and
flatmates. This help was sought because it was known that the friend had peer review
skills. In another study, Cartney (2010), following a peer review exercise, reported that
students “started to seek feedback from each other on work for other modules which
did not have a formal peer assessment component” (p. 559). There was also the potential to seek help from peers who were good at reviewing skills: “I will hopefully take this experience with me throughout the next two years. I know that if I need a piece of advice on how to do something I can go to particular people who I know are good at picking up that sort of thing” (Cartney, 2010 p. 559). However, other than these two observations, we know very little about how students transfer their peer review knowledge and skills to improve their overall learning outcomes. Investigating the issue of transfer is a worthwhile activity because it remains unknown whether students do indeed transfer their peer review knowledge and skills, and if they do, what are they and whether they impact on learning.

In terms of understanding the meaning of transfer, then the notion of ‘transfer’ is described as using a set of knowledge and skills learnt in one situation and applying it to another (Pennington et al., 1995). The idea of transferring learning from one situation is widely considered to be one of the fundamental goals of education (Marini & Genereux, 1995). Research suggests that transfer may be promoted by different factors as highlighted in Table 3 (p.47).
Table 3: Factors promoting transfer

<table>
<thead>
<tr>
<th>Factor</th>
<th>Explanation</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>The similarity between learning contexts</td>
<td>The higher the proportion of similarity between tasks, the greater the</td>
<td>Anderson, 1982;</td>
</tr>
<tr>
<td></td>
<td>likelihood of transfer from one task to the next (high fidelity transfer)</td>
<td>Woodworth &amp; Thorndike, 1901</td>
</tr>
<tr>
<td>Newer learning contexts</td>
<td>Increasing the similarity between the cognitive processing requirements of</td>
<td>Bransford et al., 1979</td>
</tr>
<tr>
<td></td>
<td>the tasks in each situation (low fidelity transfer)</td>
<td></td>
</tr>
<tr>
<td>Perceived similarity and understanding of</td>
<td>Key determinant of transfer from one task to another is not the actual</td>
<td>Gick &amp; Holyoak, 1987</td>
</tr>
<tr>
<td>the process</td>
<td>similarity of the tasks but rather the perceived similarity of the task from</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the viewpoint of the learner.</td>
<td></td>
</tr>
<tr>
<td>Transfer through social interaction</td>
<td>Transfer takes places through social interaction.</td>
<td>Rogoff, 1990</td>
</tr>
</tbody>
</table>

At the heart of the idea of transfer lies the debate focused on the issue of fidelity, that is, “the extent to which tasks in the learning domain are similar to those in the real-life situation” (Burke et al., 2005 p.134). While Burke et al. (2005) do not fully explain the idea of ‘real-life situation’, it is assumed that it refers to the notion of authenticity. Wald and Harland (2017) suggest that an authentic learner “gains knowledge about his or her values and actions and [understands] how these impact on self and others” (p. 11). As such, a real-life situation is contextualised as one where the student is in a position to be able to transfer his or her knowledge to newer tasks. The issue of fidelity has been considered from two perspectives: high fidelity and low fidelity.

It is thought that for learning to be transferred from one domain (context) to another, the task in the learning domain must bear close resemblance to the original domain (Table 3); that is, the greater the similarity between two tasks, the greater the chance of transfer from one task to another (Anderson, 1982; Woodworth & Thorndike,
1901). Transfer of knowledge between similar tasks is classified as high fidelity knowledge transfer. High fidelity transfer is thought to be governed by production rules (Burke et al., 2005). Production rules are described as “condition-action” (p. 487) rules in which students use their prior experience and apply it to newer problems (Billing, 2007). An example of high fidelity knowledge transfer is a student majoring in English Language using his or her essay writing skills from the English courses and applying them to draft an essay in a Geography course.

In contrast, Bransford et al. (1979) suggest that low fidelity is needed for transfer (Table 3). The idea of low fidelity of transfer involves “increasing the similarity between the cognitive processing requirements of the tasks in each situation” (Burke et al., 2005 p.135). The reason for needing low fidelity transfer is that students grasp underlying principles of concepts learnt in one context and then apply them to new situations and contexts. An example of low fidelity transfer might be the same English language student from the example above using his or her essay writing skills and command of the English language to clearly articulate complex Geography problems in an oral presentation in his or her Geography course.

In addition, theorists such as Katona (1940) have also considered the role of the learner in the transfer process. For example, it is argued that for transfer to occur, it is not the actual similarity between tasks that matters. Instead, it is thought that the students’ perceived similarity of the task (Table 3) and their understanding of the task is what promotes transfer to occur (Gick & Holyoak, 1987). Alternative views also include the claim that rather than relating to individual learners or to the similarity between tasks, it is the social context which is a key determinant in learning transfer. Basing their ideas on the seminal work of Vygotsky (1978) and focusing on children, both Pea (1987) and
Rogoff (1990) suggest that transfer takes place through social interaction with parents, siblings and peers and, as such, the sociocultural contexts of formal education need to be taken into account to see how transfer occurs. The potential socio-constructivist nature of transfer implies that within the context of higher education, learning transfer can be facilitated by creating a suitable environment in which learners can interact with each other (Macaulay & Cree, 1999).

2.11 Summary
The purpose of this chapter was to develop insights into the key challenges identified in Chapter 1 – multiple experiences, quality in feedback and the issue of the transfer of peer review skills and knowledge. Based on the literature review, it becomes evident that student-centred learning theories such as collaborative learning, communities of practice, socio-constructivism and Vygotsky’s Zone of Proximal Development lend themselves to the core idea of peer review, namely, students being given a central role in the feedback process. At the same time, it is noted that merely engaging students in the peer review process will not automatically lead to learning gains for students. Rather, students’ experiences of the process play an important role in determining what they learn from the process. Both training and participation in the peer review process seem critical for students to develop their peer review skills and learn from the overall process. The ability to revise work following peer review is also a critical output of the peer review process, especially in terms of students’ abilities to understand feedback and apply it to their work. There is a consensus that students and staff alike expect feedback to be useful to help students to improve their learning.

While overall the published research provides a positive view, again, an overarching problem is that, with the exception of a few studies, almost all the studies
have reported a singular episode of peer review. There is a pronounced lack of studies in contexts where students engage in multiple episodes of peer review. Therefore, this thesis aims to address this lack of knowledge by investigating how students for whom peer review forms a core part of the assessment experience the process.
Chapter 3 - Methodology

Part One
Asking the questions
- Justifying the research
  - Introduction
  - Literature Review
  - Methodology

Part Two
Study findings
- Addressing the research questions
  - RQ1: experiences and reflections
  - RQ2: responses to feedback
  - RQ3: transfer of skills

Part Three
Concluding the study
- Summary of the main findings
  - Thesis contribution
3.1 Introduction

It has been reported that creating a course climate in which giving and receiving peer feedback as a normal part of the course culture is a necessary condition for a successful peer review process (Boud, 2000; Liu & Carless, 2006). However, as discussed in Chapter 1 (Introduction) and Chapter 2 (Literature Review), a pragmatic problem is that past research has generally focused on singular episodes of peer review (Falchikov, 2004) and there are calls for a better understanding of the potential of peer review, and how experience and training in peer review influences student learning outcomes (Falchikov, 2004; Sluijsmans et al., 2004b; Topping, 2010).

As such, this study was designed to acquire insight into the theory and practice by seeking to understand how training and participation in systematic peer review influence students’ experience of the process and their learning. The guiding questions for the research are as follows:

- What are students’ experiences of formative peer review?
- How do students respond to feedback in the review process?
- Do students utilise their peer review skills outside of the Ecology course? If yes, if yes, then how do they do so? If no, then why not?

As a starting point for any research, it becomes important to not only discuss the methods used to gather and interpret data, but also to discuss the philosophical underpinnings of the study because it is the ontological and epistemological beliefs that inherently influence all phases of the research (Grix, 2002). Therefore, the chapter starts with a discussion of how my ontological and epistemological position influenced my research approach and methods. The chapter also provides a detailed account of the research context, followed by a discussion on data gathering tools and an explanation of
the manner in which data were analysed to report the findings and conclusion of the study.

3.2 Ontological position

According to Grix (2002), ontology refers to what a person knows about the world, which is the starting point for all research as it explores the nature and characteristics of knowledge. Although there are different ontological perspectives, Grix (2002) identified two main ones in research: objectivism and constructivism. The ontological position of objectivism asserts that “social phenomena and their meanings have an existence that is independent of social actors” (Grix, 2002 p.177), while the ontological position of constructivism implies that “social phenomena and categories are not only produced through social interaction but they are in a constant state of revision” (Bryman, 2012 p.33).

Using the distinction between objectivism and constructivism, I argue that my ontological position is influenced by my constructivist position, that is, my experiences as an individual and my interactions with others over time have shaped what I know about the world and, as such, different contexts will have different realities for me. For example, after a month-long undergraduate student exchange programme in Japan, I learnt that slurping while having meals – especially noodles – is a sign of appreciation for the food. However, when in Cardiff as a graduate student, slurping while having noodles (a staple for the budget-conscious student) or any meal was considered rude behaviour. In relating my experience to my constructivist, ontological position – especially my higher education journey and that of my peers– I realise that different individuals will have different experiences based on their social interaction and, with time and experience, individuals’ perceptions change. This makes the nature of reality
subjective and multiple (Creswell, 2007). Understanding reality then means that one must describe and interpret the experiences of an individual over a period of time.

Within the context of this research, my ontological position is that peer feedback in universities holds immense potential in enhancing students’ learning experiences. This belief system stems from my own personal experience. Most learners need support in their learning journey through university. Most universities in New Zealand have the necessary systems in place to provide support and guidance to both undergraduate and postgraduate students. For example, the University of Otago’s Higher Education Development Centre with Student Learning Development provides support for students in their academic assignments and runs a peer-facilitated mentoring programme, as well as providing drop-in and appointment services for students to see qualified staff to seek academic support. Additionally, at Otago, the relationship between lecturers and students is different from my past tertiary study experience in that students are free to have different views from their lecturers and engage in healthy debates without fear of reprisal. Compared to this, my undergraduate experience in Fiji was completely different, which, in turn, had a significant impact on how I viewed teaching and learning in higher education.

I come from a very beautiful, rural sugarcane farming background and a large extended family. Life at home was idyllic as a child and as a teenager, with days spent swimming in creeks and rivers, playing hide and seek in the curry leaf hedgerows, organising (very competitive) Hopscotch matches under the century-old tamarind tree, climbing mango trees, and foraging for wild yams and berries in the forest behind the homestead, however, there was constant pressure from my parents, uncles and aunties for all the children to do well academically. This demand was not unique to my
siblings, my cousins or me. Rather, it was a common occurrence for my peers in the sugarcane belt because education was (and still is) seen as a way out of poverty and an uncertain future wrought by political turmoil and forceful eviction from leased land (Lodhia, 2003; Prasad, 2006; Tedeschi, 2005).

However, while on the one hand there was a constant demand for us to do well academically in school, on the other hand, owing to the cultural background, at the same time we were encouraged not to question elders and teachers as it would be considered a sign of disrespect (Matthewson & Thaman, 1998). This type of mentality resulted in a ‘spoon-feeding’ style of learning in which I accepted whatever my teachers told me. Added to this was a crippling fear of corporal punishment. It was not uncommon to be slapped on the face, belted on the legs, struck on the arms with a hosepipe or a piece of timber or simply struck on the knuckles of one’s hand with the end of a wooden duster for the mere ‘crime’ of giving the ‘wrong answer’ in response to a teacher’s question or not following the teacher’s instructions. Informing adults of the abuse at that time in life was no use at all – almost everyone (even some till today) had/have this barbarian, immensely cruel, archaic, uncouth, primitive belief that corporal punishment is the most effective form of disciplining the child. Physical abuse was also accompanied by constant daily verbal abuse. Being labelled as an idiotic moron who would never amount to anything in life was a common occurrence. The abuse was so rife and persistent that I dreaded going to school and would often fake medical ailments to stay at home. Failing that, I would often hide in the sugarcane, or peanut and cornfield’s. Such was the fear. My dear mother — out of sheer frustration and determination to ensure her child was ‘educated’ — would often resort to using the baryara chapki (branch of a shrub) to smack me and drag me to school. No amount of bawling and sobbing on my part would appease her. Anxiety to the point of speech
loss in social settings set in quite early. A ruptured eardrum in Year 3 as a result of corporal punishment at school finally convinced my late father to change my school but, unfortunately by then, I had already been conditioned to permanent physical and psychological damage.

Having been conditioned, my transition to higher education as an undergraduate student was very difficult. The expatriate lecturers expected students to be independent learners and to be in a position to make judgements on the quality of work, and this was difficult for me. Owing to my upbringing, I feared going to lectures to ask questions, and in clarifying doubts and personal anecdotes with friends, it appeared that it was the same for most of them. While part of the fear was caused by my cultural background and my primary and secondary school experience, the other part was due to language barriers. English is the official language for all three universities in Fiji, but for a large majority of the students, English is a second language. While some of my peers were very proficient in the command of the English language, most of my friends and I faced difficulties, so that added another element of fear, a fear of embarrassing myself in front of expatriate lecturers. As such, it was very difficult to approach a lecturer or tutor for help.

In the context described above, I would often turn to my peers to seek their help to improve my assignments, and they would do the same. With each other’s help, we were able to progress, slowly but steadily, in our undergraduate degree programme. On reflection, I sometimes wonder what would have happened if there was a lack of collaboration on the part of my peers. It is likely that my experience would have been a completely different one, with the remote possibility that I might have exited the undergraduate programme without a qualification. Further insights into the positive
aspect of the peer feedback were developed when I went to Cardiff, Wales, for postgraduate study. As the programme was a mixture of taught research papers and a dissertation component, workload and expectations were high, and we were encouraged to form groups to support each other. Therefore, for the duration of my study, the international students in the programme formed an informal peer support group, as most of us were living in the same university accommodation. This group was used to share our work – ranging from a paragraph to a complete chapter – and getting written feedback. This experience was valuable because it meant that feedback from peers offered multiple perspectives and if points were unclear, they were at hand to clarify matters further. The overall experience of the informal peer feedback group was very beneficial as it allowed us to successfully complete our postgraduate studies.

Hence, this is the main reason I highly value peer interactions as a process that can enhance the student learning experience. Realising and acknowledging my experience as a student has given rise to my ontological position. While my experience was informal in structure (i.e., not part of an academic programme), I can now see that formalised interactions between peers can help to not only foster bonds between peers for care and consideration for each other, but they can also be mutually beneficial in achieving academic success.

3.3 Epistemological position
If ontology is “what is out there to know about” (Grix, 2002 p.175), then epistemology is concerned with how “one comes to know it” (Daniel & Harland, 2018 p.22). In discussing my ontological viewpoint, I subscribed to a constructivist position in that my experience in life has shaped the way I view the world in different contexts. Based on this, I ascribe to the view that reality is subjective, and that it is likely that individuals
may experience a common phenomenon differently from each other over a period of
time. Therefore, to understand the nature of knowledge and how it can be acquired, I align my epistemological perspective to that of ‘interpretivism,’ in which I acknowledge that reality is created by an individual and that knowledge is unique to the individual (Daniel & Harland, 2018).

My realisation that truth has multiple realities, and the subsequent interpretivist epistemological position that knowledge is unique to an individual, has significant implications for how data were gathered and analysed in this study. Creswell (2007) suggests that the combined worldviews of constructivism and interpretivism lead to the idea that meanings of experiences and ideas are varied and multiple, which allows the researcher to develop complex ideas, rather than just narrowing them into categories. Knowledge production from this perspective can be seen as engaging in close examination and interpretation of individual students’ experiences – in the case of this study, their cumulative peer review experiences – to provide an overarching understanding of how the group of students perceives their experiences over a period of time.

Therefore, to uncover a reality, I need to adopt an interpretive framework that will not only allow me to describe the experience of students, but also provide me with opportunities to interpret participants’ accounts of their experiences to prepare an accurate representation as I see it. Acknowledging my ontological and epistemological position has been a significant step in shaping the methodological design of this study.
### 3.4 Research paradigm

It is thought that research is “a matter for ‘horses for courses’ where [research] approaches are selected because they are appropriate for specific types of investigation and specific kinds of problems” (Denscombe, 2014 p.3). As determined in the earlier section in the current chapter, because of my ontological and epistemological position, the nature of truth is multiple and subjective, which I feel can be best understood by an interpretivist epistemological position. As such, a phenomenological approach was deemed the most appropriate approach because it reflected the position to uncover multiple meanings given to a particular context by the research participants. Such an approach, therefore, allows for a rich opportunity to understand the meanings that these experiences hold for the individual in order to present reality as I see and understand it through the eyes of the participant. As such, my role as a researcher is to get close to the participants and then, based on my experience and background, make interpretations of the meanings they have about the world. In doing so, the understanding that develops is not viewed as objective, but rather co-constructed with the participants (Denzin & Lincoln, 2003).

Daniel and Harland (2018) define phenomenology as a research approach that “focuses on people’s subjective experiences and interpretations of the world” (p. 38). The authors further suggest that by analysing participants’ experiences and perceptions of a phenomenon, the researcher can capture unique insights into how “individuals comprehend an event through how they feel about, relate to or understand [a particular experience]” (p. 38). A key feature of a phenomenological approach is ‘bracketing’ (Creswell, 2007). Bracketing is important because it allows the researcher to set aside their experiences as much as possible to take a fresh perspective on the experience that is being investigated (Creswell, 2007). I bracketed my experience of peer review with
my discussion of my ontological positioning. I liken this perspective to that of ‘being-with’ as described by Moustakas (1995). Moustakas’ idea of ‘being-with’ suggests that a researcher brings knowledge and experience into the relationship and uses this to facilitate discussions. In doing so, the research space becomes separated from other parts of life and the researcher, along with the research participants, work together to unravel the particular phenomenon under study.

All research approaches have limitations. According to Shenton (2004), there are “many critics [who] are reluctant to accept the trustworthiness of qualitative research because their concepts of validity and reliability cannot be addressed in the same way in naturalistic work” (p. 63). In justifying the trustworthiness of this thesis, I referred to Lincoln and Guba’s (1985) criteria for judging qualitative research. They proposed four criteria to validate trust, and they are discussed in detail at the end of this chapter.

3.5 Research context

The focus of the research reported in this study is the undergraduate Ecology degree programme at the University of Otago, New Zealand. In the programme, students are immersed in research training from the start of their first semester at university through a variety of long-term research projects (Wald & Harland, 2017). Formative peer review is embedded in each year of the curriculum (Harland et al., 2017) and by the time students are in their third year, they have experienced five instances of peer review activities (Table 4).
Table 4: Peer review activities done by students

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Formative Assessment Type</th>
<th>Type of Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ECOL111</td>
<td>Draft project write-ups</td>
<td>Written reciprocal peer review</td>
</tr>
<tr>
<td>2</td>
<td>ECOL211</td>
<td>Draft research proposal</td>
<td>Written reciprocal peer review</td>
</tr>
<tr>
<td></td>
<td>ECOL212</td>
<td>Draft authentic research proposal</td>
<td>Written peer review with staff feedback and rebuttal</td>
</tr>
<tr>
<td>3</td>
<td>ECOL313</td>
<td>Research presentation</td>
<td>Oral peer review</td>
</tr>
<tr>
<td></td>
<td>ECOL314</td>
<td>Research design and presentation</td>
<td>Reciprocal written peer review and oral peer review</td>
</tr>
</tbody>
</table>

As depicted in the table above, each peer review experience builds in complexity, and expectations change with respect to the quality and sophistication of feedback. As depicted in the table above, each peer review experience builds in complexity, and expectations change with respect to the quality and sophistication of feedback. In ECOL11 and ECOL 211 course, students provided anonymous written feedback to their peers which was then used to revise work. The ECOL 212 peer review required students to work in pairs as review partners. The student review partners designed a research proposal for a project that was to be carried out in the third year. Each proposal was sent to two peers and two lecturers for double-blind review. After receiving the four reviews, each review partner discussed the outcome amongst themselves and then wrote a rebuttal letter to justify their acceptance or rejection of all comments. Then, after making amendments to the original, the revised research proposal and the rebuttal and were submitted for formal assessment. In the ECOL 313 peer review, students did an oral presentation of their research proposal. During the presentation, student audience constructed written feedback for their peers. After the presentation, a verbal discussion of the presentation ensues following a question and answer session. Similarly, in the ECOL 314 presentation, students receive written and verbal feedback for their projects and oral presentations.”

61
During training students are taught directly about peer review and supported in the first four exercises with a rubric containing the marking criteria that describe the quality of work. Initial training in the first year also includes students doing mock peer reviews in groups to discuss potential challenges and ways of overcoming such challenges. Subsequent peer review activities became a form of training in itself.

3.6 Selection of interview participants

A purposive sample approach was used for data collection. Daniel and Harland (2018) noted that in purposive sampling, samples are selected with a particular purpose in mind and that the sampling approach includes absolute exclusion and inclusion criteria. For the purpose of this study, the inclusion criteria were only students who had taken Ecology courses during the first year and from them, only those who were willing to participate in two rounds of interviews — one in Year 2 and the other in Year 3. Those students who were taking an Ecology course as an elective and who did not take the first-year core Ecology course were excluded. Such a sampling approach allowed me to develop insights into how students’ experiences of peer review changed over time.

Participants were obtained by posting a notice in the laboratory for the second-year Ecology (212) course. In this announcement, details of the study were posted, as well as what the students’ commitments would be, and how they might benefit from the experience. Potential participants were asked to contact me directly via email or telephone if they were interested in the study. Once students got in touch, I presented and explained the ethics consent form (Appendix B) and more information about the project (Appendix A). From this process, a total of 12 students — 7 females and 5 males — were recruited and took part in two rounds of interviews.
3.7 Data collection

Considering the present study aimed to understand how training and participation in systematic peer review influenced students’ learning perceptions of the process and their learning, two rounds of semi-structured interviews and a textual analysis were used. The first round of interviews took place in the second year after the ECOL212 peer review activity, and this was aimed at getting data on students’ experience of peer review. To present a detailed account of the issue of transfer of skills, a second round of interviews was after the ECOL314. The second interview was aimed at gaining data on peer review skill development and transfer. It was envisaged that students at this point will have a unique vantage point to reflect on the issue of skill transfer.

3.7.1 Semi-structured interviews

Longhurst (2010) defines semi-structured interview as “a verbal interchange where one person, the interviewer, attempts to elicit information from another person by asking questions” (p. 103). Given my ontological and epistemological position that knowledge is socially constructed and that different individuals may experience the same phenomenon differently, and considering the fact that I am interested in providing a detailed discussion about how students perceived their peer review experience, I opted to use the semi-structured interview method to gain data from students. A key feature of a semi-structured interview is that it “unfolds in a conversational manner offering participants the chance to explore issues that are important” (Longhurst, 2010 p.103), thereby, possibly reducing the idea of the interviewer as an ‘objective outsider’ (Gibson & Brown, 2009). The conversational flow of semi-structured interviews is also thought to allow interviewees to develop ideas and speak more widely on issues raised by the interviewer (Denscombe, 2014). Additionally, Gibson and Brown (2009) point out that an important benefit of the semi-structured interview is that it provides opportunities
for the interviewer to examine interviews immediately after they have been conducted and then use that analysis to explore other issues that may have emerged in subsequent interviews.

Twelve students participated in the first round of semi-structured interviews in their second year of study. The second round of semi-structured interviews was conducted with the same 12 students in their third year of study to ascertain their perception of the skills developed in the peer review process and how they were able to transfer those skills to different contexts to improve their learning. In order to explore students’ experiences of peer review, semi-structured interview questions (Appendix D) were aligned with the research questions and focused on:

- their experience of repeated engagement with peer review;
- their experiences of quality feedback in peer review; and
- their perceptions of the skills developed in the review process and how they transferred those skills to different contexts (in the second round of interviews).

Prior to the interviews, a brief email was sent to the participants detailing the framework for the student, along with a description of the key themes that would be discussed during the interviews. This was done so that participants had ample time to reflect upon their experiences prior to the interview so they could be at ease with the process and, at the same time, provide a deeper reflection during the interview process. Prior to the interview, participants were reminded about the ethical considerations, in particular, issues surrounding anonymity, as well as their right to withdraw from the interview (and study) at any time without any repercussions.
Interviews lasted between 45 minutes and 1 hour. All interviews were audio-recorded and sent for verbatim transcription with an independent, external transcriber. On receiving the completed transcriptions, I checked them against the audio-recording to ensure accuracy. After this, transcribed copies of the audio-recordings were sent to individual participants so they could verify that the transcription was an accurate representation of their viewpoints. All participants responded that they were happy with the accuracy of their transcribed file.

3.7.1.1 Piloting the interview
In order to check for feasibility of the semi-structured questions, I piloted the semi-structured interview with two colleagues from my department. One of the colleagues pointed out that one of the lead-in questions in the first set of interview questions was not clear enough for him to understand so that question was revised and ‘repiloted’ with the same colleague who, in the second round, found that the question was understandable.

3.7.2 Feedback Analysis
For the purpose of understanding how students used feedback to revise their work, it is important to analyse the type of feedback they receive and what they do with it (Steen-Utheim & Hopfenbeck, 2018). While all peer review activities required students to revise their work after receiving feedback, it was only the ECOL212 review activity that required students to respond to feedback comments through the rebuttal component in which they had to explain how they used feedback comments to revise their work. In cases where students rejected feedback comments, then they had to provide a detailed justification for doing so. The ability of students to respond to feedback through a rebuttal helped in the ‘uptake’ of feedback (Baker, 2016), that is, how they used feedback to revise work. Further, while students receive feedback from staff in all their
assessment after the reviews, the peer review activity in ECOL212 was the only one that also included simultaneous staff review as well, i.e. students received feedback from peer reviewers as well as staff reviewers. Given that students are generally considered novices, focusing on the second year peer review activity provided a unique opportunity to compare academic staff and peer feedback and their influence on the revision of students’ work.

In the ECOL212 peer review activity, second-year student pairs designed a research project and wrote a research grant proposal for a project that was to be carried out in the third year. Each proposal was sent to two peers and two lecturers for a double-blind review. Students worked with their research partners and applied a set of criteria to help them make judgements about their peers’ work. After receiving the four reviews, the pair partners discussed the outcome with each other and then wrote a rebuttal letter to justify their acceptance or rejection of all comments. Then, after making amendments to the original, the revised grant proposal and the rebuttal were submitted for formal assessment. In June 2016, this activity took just over one month to complete and saw the production of 19 draft research proposals, 76 peer reviews, 19 rebuttal letters, and 19 revised proposals.

In 2017, the students, then in their third year, carried out the proposed research in the field and during this period used peer review in five hour-long small group tutorial discussions. Later, they presented their preliminary research findings at a symposium. Each project was discussed, and presenters were provided with written feedback from two peers and two staff members. The symposium review helped students revise a draft research report, which was then handed in for grading.
In order to analyse the feedback, an appropriate means of classifying feedback was sought. The literature offered a number of potential choices (e.g. Brown & Glover, 2006; Dudley-Evans, 2002; Hyatt, 2005; Hyland, 2001; Ivanic et al., 2000; Kumar & Stracke, 2007; Mutch, 2003; Stracke & Kumar, 2010), all of which presented unique ways of thinking about analysing feedback data. Considering that the present study was analysing feedback comments on science assignments, Brown and Glover’s (2006) model was deemed the most appropriate model to use because it was primarily designed for classifying feedback on science assignments. Brown and Glover’s (2006) feedback classification system contained five main categories of feedback comments:

i. Comments on the content of the students’ responses
ii. Comments designed to help students develop particular skills
iii. Comments that encouraged further learning
iv. Comments providing feedback that may motivate students to ‘do well’.
v. Comments providing feedback that may demotivate students

The above categories are in line with the idea that feedback provides information about a performance, explains the expected standards and possibly enables self-regulation of learning (Elbra-Ramsay, 2011). However, for the purposes of the current study, a challenge was that the feedback sub-categories of the model were rather narrow and focused. While most categories were clear, such as ‘comments on content of students’ response’ and ‘motivational comments’, the demarcation in the category of ‘encourage further learning’ (p.84) was hard to establish. For example, one of the codes for the category ‘comments that encourage further learning’ included a sub-code of ‘dialogue with students encouraged’ (Brown & Glover, 2006 p.84). However, there was a lack of explanation as to what constituted ‘dialogue with students
encouraged.’ Further, another category, ‘comments designed to improve students’ skills’ contained codes of ‘mathematical,’ ‘presentation,’ ‘communication,’ and ‘English usage.’ These categories are very content-specific and some codes, such as ‘mathematical,’ were not relevant for the purpose of the present study. As such, while keeping in mind the core categories and codes of Brown and Glover’s (2006) model, a modified model was created based on the needs of the present study (Table 5).

**Table 5:** A modified version of Brown and Glover's (2006) feedback classification model

<table>
<thead>
<tr>
<th>Feedback Category</th>
<th>Feedback sub-category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recapitulation and summary (RnS)</td>
<td>Suggesting Improvements (SI)</td>
</tr>
<tr>
<td>Highlighting Strengths (HS)</td>
<td>Highlighting Weakness (HW)</td>
</tr>
<tr>
<td>Organisation of Ideas (OI)</td>
<td>Error (Er)</td>
</tr>
<tr>
<td>Praise and Encouragement (PnE)</td>
<td>Emoticons (E)</td>
</tr>
<tr>
<td>Demotivation (D)</td>
<td>Direct Questions (DQ)</td>
</tr>
<tr>
<td>Clarification of Ideas (CoI)</td>
<td>Reflection (R)</td>
</tr>
<tr>
<td>Spelling and Grammar (SnG)</td>
<td>Presentation and Layout (PnL)</td>
</tr>
</tbody>
</table>

While the core category of content was maintained, the feedback codes for it were modified. During the interviews, some students reported that in providing
feedback, they started with a general overview of the project. Therefore to capture that, the feedback code of recapitulation and summary was added. In addition, while all feedback can be seen as suggesting improvement, sometimes, the meaning conveyed by feedback is not explicit. For example, the feedback, “Your work lacks clarity” has a different meaning to, “Your work lacks clarity. Please name the variables you will measure.” Therefore, to account for the comments given explicitly to improve work, the feedback code of ‘suggesting improvements’ was also included. The feedback code of ‘error’ from Brown and Glover’s model was reclassified in the current model as ‘error’ and ‘feedback highlighting weaknesses in students’ work. This is to draw distinctions between a feedback code of ‘error’, which points out incorrect work, and a feedback code of ‘highlighting weakness’, which highlights general weaknesses in students’ work that can be revised to strengthen the overall work.

Further, the ‘motivation’ and ‘demotivation categories’ are combined into one category with different codes because students in the present study had been trained and instructed to not give demotivational comments. The category of ‘comments to encourage further learning’ was renamed ‘Dialogue’ as it focused on dialogic interactions with students, and the sub-categories were modified to include the codes of ‘direct questions’, ‘reflections’ and ‘clarification of ideas’. This was done to establish a clear demarcation to identify how feedback leads to dialogue as it was noted that feedback phrased as questions was more likely to stimulate students’ reflections (Dekker et al., 2013). Codes for reflection and clarification of ideas were to capture comments that provided feedback that students could consider changing, rather than demanding change. The category of ‘comments designed to develop students’ skills’ was recategorised as ‘language’ and ‘organisation’ as in the model of Brown and
Glover, it focused on ‘communication,’ ‘English usage,’ ‘diagrams,’ ‘mathematical’ and ‘presentation.’

3.8 Data analysis

As discussed in the earlier section within this chapter, two main data collection techniques were used: semi-structured interviews and feedback analysis.

3.8.1 Semi-structured interviews

For both rounds of semi-structured interviews, I used Thomas’s (2006) general inductive framework. The reason for using the general inductive approach was that it provided a straightforward approach for deriving themes from the data through multiple detailed readings of the texts. The process of general inductive analysis as described by Thomas (2006), and as used in this thesis, is as follows:

1. Preparation of raw data files (data cleaning)

   The verbatim record of the semi-structured interviews was imported into Microsoft OneNote. OneNote was used purely as a data management tool. At this stage, I ensured all transcripts were uploaded correctly and that each had a reference alphabetical code that I could refer to during the write up, for example, Participant A, B, C and so forth. I also checked for clarity to ensure that the transcriber did not indicate any parts that she could not hear from the audio files and subsequently could not transcribe.

2. Close reading of the texts

   In this stage, I read through the transcript multiple times to get an idea of the content covered and the potential themes that could emerge from the text. Since I was using OneNote as a data management tool, I was able to electronically
highlight different concepts in the transcripts using different colours, make notes and identify general themes emerging from the data as I read and re-read the text (Figure 2). The example provided in Figure 2 (p.66) was taken from the first round of semi-structured interview analysis.

Figure 2: Example of how data were coded to find themes

3. Creation of categories

In this step, the broad, emerging themes identified from the initial reading of the text were grouped into different categories, with a specific focus on how these
categories could be used to answer my research question. I did this by getting all
the quotations associated with the different themes from individual transcripts
and compiling them under one section for individual themes to get an overall
account of students’ views (Figure 3).

Figure 3: Example of grouping ideas from different participants into themes

4. Overlapping coding and uncoded texts
In this step, I finalised all the themes and quotations that would be used in this thesis to report various themes aligned to the research questions of this study. In doing so, I was able to reduce the number of broad themes into key themes and quotes that I would use in the thesis (Figure 4). I also checked all the quotations under different themes for repetitions. I then did another reading of the uncoded texts in stages 2 and 3 to ensure that I did not miss out anything important.

Figure 4: Example of highlighting key quotes to be used in reporting of the theme ‘multiple experience’.
5. Continuing revision and refinement of categories

In the final stage of the process, continued revisions and rechecks of the themes were done by reading both coded and uncoded text. This process was useful in thinking about the structure to report the findings, that is, how to structure themes to address the research questions.

Given that I conducted two rounds of semi-structured interviews with the same students, the above process was repeated for the second set of semi-structured interviews. Considering that the first interview was used to address students’ experiences of peer review and their participation in feedback, therefore, data from the first round was used to report the findings for Chapters 4 and 5. The second set of interviews, which focused on skill development and transfer of skills was used to report the findings of Chapter 6.

3.8.2 Feedback analysis

The written feedback provided to students was coded against the sub-categories adapted from Brown and Glover’s (2006) feedback classification model. A total of 1051 comments were provided as feedback and, since a single comment can address multiple categories, a total of 2067 comments were coded. Coding was done in NVivo purely as a categorisation activity as opposed to making any form of analysis (Table 8, p.98).

Rebuttal comments were analysed by assigning data to the following seven categories: feedback not addressed, feedback accepted, feedback rejected, feedback accepted but changes not made in the final project, feedback rejected but changes made in the final project, feedback partially addressed, and no clear action.
3.9 Ethical considerations

Prior to conducting this study, an ethics application was approved by the University of Otago, Human Ethics Committee. Once my ethics application was approved, participants were recruited and documents (second-year research proposals, review feedback and rebuttal documents) collected. As discussed earlier in this chapter, in keeping with ethical guidelines, participants were made aware that participation in the interview process was voluntary, that their identities would be kept anonymous, and that they were free to withdraw from the study at any point. Consent was also sought from all ECOL212 students to analyse their feedback and rebuttal. All participants were given information sheets and consent forms prior to data collection. All interviews were audio-recorded. Copies of the verbatim interview transcripts were returned to the students to ensure they were happy that the transcripts represented an accurate view of what they had said.

3.10 Trustworthiness

According to Shenton (2004), there are many critics who are reluctant to accept the trustworthiness of qualitative research because the “concepts of validity and reliability [in qualitative studies] cannot be addressed in the same way in naturalistic work” (p. 63). Therefore, in justifying the trustworthiness of this thesis, I draw on Lincoln and Guba’s (1985) work to justify qualitative research. Guba (1990) proposed four criteria that should be considered in justifying the trustworthiness of a qualitative study: credibility, transferability, dependability and confirmability. Each is addressed in turn below.
3.10.1 Credibility

The idea of credibility requires establishing that findings are credible, relevant and congruent (Daniel & Harland, 2018). I ensured credibility by triangulating my data sources, that is, I used two different forms of well-recognised forms of data sources to report the findings of this study. Daniel and Harland (2018) note that triangulation allows the researcher to “substantiate partial findings from one type of data through another” (p. 117). Given that I was interested in exploring students’ experiences of peer review, comparing students’ views expressed in the semi-structured interviews to the feedback analysis allowed me, as a researcher, to provide a ‘holistic insight’ into students’ peer review experiences.

An important point noted by Creswell (2007), and subsequently reinforced by Daniel and Harland (2018), is that if a researcher is trying to achieve credibility through triangulation, then the researcher needs to return the final report to participants for verification purposes. However, given that a thesis is a substantial piece of work spanning multiple years, it is not always possible to achieve this; in some cases, participants, especially students, may have left the university (as in the case of the present study). However, as a researcher, I returned each student’s transcript to them before use in the data reporting to ensure that they agreed that it was an accurate representation of their viewpoint. Shenton (2004) points out that another way of ensuring credibility is through opportunities for scrutiny of the research projects. Therefore, in order to meet this criterion, I have presented my work at a number of conferences over the duration of my research. In addition, I also have a paper currently under review with the journal Studies in Higher Education.
3.10.2 Transferability
Shenton (2004) asserts that the notion of transferability reflects how findings from one study can be applied to the wider population; at the same time, he adds that sometimes, owing to the nature of qualitative studies, it becomes “impossible to demonstrate that the findings and conclusions are applicable to other situations and populations” (p. 69). However, while discussing the potential for case studies to contribute towards knowledge, theory and practice, Harland (2014) notes that “any interpretations and their significance will be nevertheless be conditional and transitory until understandings change again” (p. 1120). I draw on this notion and, in doing so, I ensure the transferability of this study by presenting detailed information on the research methodology, including the sampling technique, participant description, and context of the study, as well as a detailed description of the research participants’ viewpoints using verbatim-transcribed quotations. It is envisaged that such information will allow readers to make inferences about transferability of this thesis to other contexts.

3.10.3 Dependability
The notion of dependability for the positivists refers to the idea that if “research were to be repeated, in the same contexts, with the same methods and with the same participants, [will] similar results be obtained[?]” (Shenton, 2004 p.71). However, Harland (2014) notes that “neither the researcher nor [the] reader can truly replicate the study, they can only learn from it” (p. 1116) and as such, Harland’s (2014) idea strikes a chord when thinking about the notion of dependability in this study. Reflecting on my ontological position, I concur with Harland’s view that, because knowledge is based on multiple realities and interpreted based on one’s own experience, the dependability of qualitative studies cannot be replicated. However, the general features of what was learned, how was it learned and what facilitated the learning remain valid and,
therefore, can be repeated in other contexts. As such, I have ensured the dependability of this study by providing a detailed discussion of the research philosophy guiding this research, including detailed information on data collection and data analysis steps.

3.10.4 Confirmability
The criteria of confirmability is reflected by the representation of the participant’s ideas and experiences and not the researcher’s (Shenton, 2004). As such, in order to ensure confirmability, participants in this study were provided with verbatim copies of the interview transcripts so they could check that I correctly represented their views in this thesis. I have also used two different data sources, which allowed me, as a researcher, to link participants’ interview reflections to actual peer review practice (feedback and rebuttal analysis).

3.11 Summary
This chapter has provided a detailed justification for the different components of my research methods. Key to the discussion is recalling my journey from the farming hinterlands of a remote rural community of Ra, Fiji, to the world of academia and research in higher education. My ontological experiences led to the choice of topic, while my epistemological position helped me develop a qualitative, interpretivist way of doing research. More importantly, I was able to reflect on my experiences as a student and the role of ‘informal peer review’ in my undergraduate and postgraduate studies, which initially sparked my interest in this field. Using my understanding of how knowledge is created and interpreted, I was able to align my research methodology and data collection in order to answer my research questions. I have also included a discussion on data analysis approach used for this study, including my justification for ensuring the credibility of this study. The next three chapters – Chapters 4, 5 and 6 –
address the three key research questions for this study. I begin with Chapter 4 in which I discuss students’ perceptions of the peer review experience.
Chapter 4- Students’ cumulative peer review experience

Part One

- Asking the questions
  - Justifying the research
    - Introduction
    - Literature Review
    - Methodology

Part Two

- Study findings
  - Addressing the research questions
    - RQ1: experiences and reflections
    - RQ2: responses to feedback
    - RQ3: transfer of skills

Part Three

- Concluding the study
  - Summary of the main findings
    - Thesis contribution
4.1 Introduction

Understanding students’ experiences of the peer review is important because it shapes their expectations of the process, their subsequent involvement in it, and their approach to learning and motivation (Kaufman & Schunn, 2011; Mulder et al., 2014b; Rodriguez, 2009). However, as discussed in Chapter 1 (Introduction) and Chapter 2 (Literature Review), qualitative studies exploring students’ experiences have provided mixed results, leading to calls for a better understanding of the potential of formative peer review (Evans, 2015; Mulder et al., 2014b). A key challenge in understanding the true potential of the peer review process is that most of the findings are reported largely based on students’ participating in singular instances of peer review.

Therefore, the purpose of the current chapter is to address the above challenge by examining how training and experience in systematic peer review influence students’ experience of the processes and their learning. To acquire insight into practice, I asked students who had experienced multiple reviews for their reflections on the processes and outcomes. By focusing on the structure of the peer review (Baker, 2016), and the experiences of students in giving and receiving feedback, I provide the learner’s perspective. The ultimate aim of this chapter is to contribute to knowledge on peer review by providing insights into students’ experiences of multiple peer review activities. In doing so, I address the first research question of the present study: “What are students’ experience of formative peer review”?

4.2 Findings and discussion

Students were clear that having multiple peer review activities within a single programme spread over the duration of their studies helped them realise that the process was more than just reviewing the work of their peers and providing feedback. Rather,
most students were of the view that cumulative peer review exercises are highly valuable in improving their overall learning experience. Investigating students’ reflections of their cumulative peer review experiences resulted in four key themes that are discussed in the following sub-sections.

4.2.1 Multiple experiences in peer review develops expertise in giving and using feedback

All participants perceived that multiple participation in the peer review process helped them to develop their feedback skills. When asked to describe what they meant by feedback skills, students reported that feedback skills for them meant the ability to provide useful feedback to their peers, as well as the ability to be in a position to use feedback provided by academic staff and peers. Such an experience is not surprising because, as noted by Orsmond et al. (2000), students do need “*time, experience,* and *support* in working through assessment processes” (p. 35, emphasis in original) because in some cases, first-year students may not have the skills needed to successfully engage in the peer review process (Mulder et al., 2014b; Nulty, 2011). In the present study, students were mindful they were being trained as peer reviewers and were undergoing a lengthy process with expectations that skills would improve and become more advanced over time (Topping, 2010; van Zundert et al., 2010).

However, for some students, formal training was not enough in itself to develop sufficient understanding of the peer review process: “He (academic staff) ran through an example (of how to do peer review) but that’s not training, I’d say” (Participant D). Instead, most students were of the view that developing insights into giving feedback to peers and using feedback from peers was a slow process that took time and multiple instances of participation in the review process: “it took a few rounds of it (peer review
activities) for me to realise that I did have the ability to give feedback and criticise things in a helpful way” (Participant A). This outcome suggests that either training alone, or participating in single peer review experience, is not enough for students to engage meaningfully in the review or to provide the quality of feedback that students are capable of. Rather, it seems likely that a combination of training and participation in a number of peer review activities is an effective way of helping students develop feedback skills.

Further, participants were clear that their experiences of feedback in the Ecology programme were different from the other subjects and courses they had studied. Comments from students indicated that the ability to revise and resubmit work for summative assessment was unique to the Ecology courses: “In all my other [courses], I just submit my assignments and that’s it. I just get a mark at the end” (Participant L). In the Ecology programme, students are expected to resubmit their assessments for final summative assessment following revision after peer reviews. Boud (2000) points out that “[u]nless students are able to use feedback to produce improved work, through for example redoing the same assignment, neither they nor those giving feedback will know that it has been effective” (p. 158). In the present study, it was noted that the ability to resubmit work was a mediating factor in students’ utility of comments: “I have always made sure to use it (feedback) to revise my work” (Participant E). When questioned how students used it, a common response was that in most cases students knew how to use peer and academic staff feedback when feedback was clear and understandable. (I discuss in detail how students use feedback to make revisions in the next chapter.) Price et al. (2010) noted that “clear, unambiguous, instructional and directive feedback is generally welcomed by students [as] they know how to interpret it and apply it” (p. 285).
However, in cases when they did not understand aspects of what was provided, students sought both verbal and written clarification from others. Such an outcome reflects the idea that effective student feedback includes interaction between students in oral communication (van den Berg et al., 2006b) as this may clarify the meaning of written comments (Blair & McGinty, 2013; Orsmond & Merry, 2011). I understand this type of peer review as ‘dialogic’ and follow O’Connor and Michaels’ (2007) argument that the dialogic construct is one of more equal social relationships, an openness to new ideas, critique and creative thought in the peer review process. If these constructs are contrasted with the double-blind academic peer review typical of the journal process, this tends to be less dialogic because it is associated with the transmission of ideas and with status inequalities (Nicol, 2010b). In a study of approaches to feedback, Carless et al. (2011) clearly demonstrated the benefits of an interactive process over one-way communication. These authors defined dialogic as “interactive exchange in which interpretations are shared, meanings negotiated and expectations clarified” (p. 397). Similarly, in a study on feedback effectiveness, Orsmond, Merry and Reiling (2005, p. 370) found that “what students really seek is a dialogue with tutors about their work rather than written feedback” (p. 370).

4.2.1.1 How dialogue led to students understanding feedback

It was noted that dialogue played an important role in the cumulative peer review experience to help students develop an understanding of how to provide, as well as utilise, feedback. From my analysis, I was able to identify five different kinds of dialogue related to feedback (Table 6). The design of the different peer review activities influenced the manner in which students engaged in dialogue with reviewers, for example, students could respond to reviewer feedback only through the rebuttal process.
in the second year peer review activity, yet for the most part, students reported that they had access to either a peer, an academic staff member or a fellow review partner to discuss feedback.

Table 6: Types of dialogue identified in the peer review

<table>
<thead>
<tr>
<th>Type of student dialogue</th>
<th>Mode of communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>With self</td>
<td>Inner thoughts</td>
</tr>
<tr>
<td>With peers</td>
<td>Verbal</td>
</tr>
<tr>
<td>With staff</td>
<td>Verbal and written communication</td>
</tr>
<tr>
<td>With review partner</td>
<td>Verbal</td>
</tr>
<tr>
<td>With reviewers</td>
<td>Verbal and written</td>
</tr>
</tbody>
</table>

Students reported that verbal dialogue with peers, academic staff members and review partners was effective in understanding how to use the feedback given by reviewers, as well as understanding how to construct feedback for peers. While dialogue with reviewers, as well as with peers and academic staff members was important, most students reflected that the ability to think for themselves was the most important aspect of all:

One thing I have learnt from this is that at the end of the day, they will be gone, and I will have to think really hard for myself. I think that has helped me the most in trying to understand feedback. Even if I talk with friends and stuff, I still have to make that decision about what needs to be done.

(Participant E)

The findings above, supported by those of a previous study (Harland et al., 2017), offer two critical lessons. First, a dialogue between reviewer and reviewee is not
the only possible option; other students or teachers can fulfil this role. There was much discussion between research partners about feedback received and about the reviews they were doing:

I found that talking with my partner helped us to decide how we could use feedback. Like sometimes, it was quite difficult to use feedback but in this situation, having a partner was helpful.

(Participant A)

I understand that the above example resonates with a broader conceptualisation of dialogue as a “two-way process that involves coordinated … interaction as well as active learner engagement” (Nicol, 2010b, p. 503). Nicol extends the idea of dialogue to include Bakhtinian view, emphasising the “inner dialogue in students’ minds” (p.504), in which case it need not involve two people. If accepted, such a position would render all exchanges as dialogic and is less helpful when trying to understand student discussion about written feedback. The benefit of dialogue can be more fully realised if distinctions are made between the different forms of dialogue and its impact on students. In the present study, students reported that discussion was empowering as it gave them greater ownership for their learning, enabled them to think for themselves and helped with the uptake of the written comments. Findings also revealed that students talked to their peers when acting as reviewers, even when they were expected to review something on their own. These discussions were seen as a necessary part of the review itself and also considered essential for the development of peer review skills. This reliance on others strongly suggests that students benefited from such dialogic exchanges.

Students also valued non-verbal forms of dialogue, the most notable example being the rebuttal letter in the second-year review activity. After receiving feedback,
they had to respond to all feedback comments by explaining how they either rejected or incorporated comments in their revised drafts (a more detailed discussion is in Chapter 3). In cases where feedback was rejected, a written justification had to be provided:

A staff reviewer provided the following written comment to a pair of students:

It should be considered that you are only observing the bee behaviour in the morning, and behaviour may be influenced by time of day therefore, you may not get a true and random representation of their behaviour.

Students rejected the feedback comment and provided the following justification:

We disagree. Despite the change in methodology, we are still observing bee behaviour. However, in this research we are only focusing on bee choice in relation to pollination; therefore, we want to be observing bee activity while they are likely to be pollinating. As the research focus is more from a plant perspective, we are not concerned about what the bees do during the rest of the day, thus are not concerned with getting a true representation of their behaviour. Studies used for templates in the methodology (Campbell et al., 2010; Campbell et al. 2010) recommend what is stated in the new methods: ‘Observations of the arrays will be performed during calm sunny weather (if practical) between 10:00 and 17:00 daily.’ (Lines 161-162). From other studies viewed in research, it appears to be very common practice.

**Figure 5**: Example of how students rejected feedback

In the above example, students are able to provide a reasonable justification for rejecting the feedback comment. Students reported that they valued the ability to defend their work in the feedback process.

I valued the rebuttal process because it gave a sense of ownership of our work which you would not otherwise get because if you go back to the point about humans being argumentative, it is then quite unnatural to do a piece of work, get reviewed and that is what most essays and assignments are, whereas in this procedure
(the rebuttal activity), we were able to state an argument, get feedback and then use the rebuttal to justify what we originally said, based on the review, and I think that was quite empowering

(Participant A)

The notions of ‘defending’ and ‘ownership’ of one’s work are interesting. Students always have a choice when it comes to adopting feedback, but the rebuttal forced them to take responsibility for their decisions and, most importantly, to think about them carefully. Students saw the benefit in this exercise and it has been demonstrated that when they are able to respond to written feedback by providing an opinion, they also gain greater metacognitive awareness, resulting in enhanced performance (Kim, 2009). The rebuttals also clearly demonstrated that students were capable of addressing deep issues relating to subject knowledge, and not just surface matters of language or structure (see Zhu & Carless, 2018).

The cumulative effect of peer review experiences with the different kinds of dialogue meant students worked closely with peers and academic staff to generate reviews and revise work. This partnership was instrumental for the establishment of a culture where students not only felt safe but also had an obligation to engage in dialogue to give and receive feedback.

… I guess it is our initiative to make it helpful as you also get feedback. I mean it was quite amazing when really helpful suggestions were given … They went out of their way to provide alternative references, and it seemed like they had gone and looked into it … It was immediately helpful, and it was nice to be helped that way.

(Participant B)

Through repeated review exercises and training, students experienced what is required for effective feedback, in terms of knowledge, the type of feedback necessary
and a commitment to the process. In turn, this required an appreciation of the positive impacts that feedback can have one’s own work. This understanding of peer review, especially when practised as part of an authentic research curriculum (Wald & Harland, 2017), resulted in students having a strong sense of being able to help others, with gratitude for the feedback they received in return.

### 4.2.2 Cumulative peer review creates an environment of collaboration (reduced competition)

Not only did the cumulative peer review process help students develop capabilities in giving and receiving feedback but a few students also perceived it as a process of creating an environment of collaboration. In their seminal work, Lave and Wenger (1991) noted that learning is not “merely situated in practice – as if it were some independently reifiable process that just happened to be located somewhere; [rather], learning is an integral part of generative social practice in the lived-in world” (p. 35). Put another way, such an approach conveys the idea that learning is an ongoing social process that is done through mutual engagement with each other. Such an idea highlights the socio-constructivist nature of peer review, i.e., learning takes place through social interaction (Nicol & Macfarlane-Dick, 2006; Sadler, 2013).

In the present study, students recognised a degree of altruism in the class and value in “helping [their] peers improve their learning” (Participant D) as well as the ethos of working together with each other:

I think now there is a general feeling in the class that everyone benefits from these activities. It’s like we know that everyone will do the best to give helpful feedback.

Participant D
I am doing a [course] in [a particular subject] and it’s so competitive but [in Ecology courses] it’s different because they are trying to promote teamwork by making us do these things (peer review). Like [lab staff] always encouraged us to see each other as learning partners and I can see the benefits of it now. It feels good to be able to help each other and learn.

Participant G

I have learnt to trust my peers because I couldn’t have improved my work without the input from them.

Participant A

The above examples suggest that students’ multiple experiences of peer review allowed them to see the ‘collaborative’ nature of the process. Students seemed to appreciate that the process reduced competition amongst students and led to closer and more equal relationships between learners, as well as academic staff, which helped in the formation of what could be regarded as a community of practice (Wenger, 1998). In her study, Evans (2015) found that students perceived that peer review did not provide equal benefits to all students because, in some cases, peers were unable to relate to the feedback provided. However, in the case of the present study, participation in multiple experiences provided opportunities for students to gradually come to trust each other and realise that collaboration through peer review activities brings about positive benefits for everyone associated in the process.

4.2.3 Multiple experiences help to reduce stress associated with peer review

Another key commonality between research participants, closely aligned to the idea of developing expertise in feedback, is that the cumulative peer review experience helped reduce the initial stress associated with peer review. The idea that students are stressed by their initial experience of peer review is not uncommon. For example, Pope (2005)
noted that the requirement for students to assess either themselves or their peers can stress a student. Such an outcome has been evidenced by Hanrahan and Isaacs (2001), who found that students display a degree of discomfort when their work is reviewed by their peers. For example, students reflected that, “I felt uncomfortable about another peer reading my work and even though it was anonymously marked, I still felt pressured and awkward while writing my assignments” (p. 61). Topping (2009) also suggested that “both assessors and assesses can experience initial anxiety about the peer assessment process” (p. 24).

Similar to these reports, in the present study, most students said they were stressed during the initial rounds of the peer review exercise in the first year because of the feeling that they lacked confidence in their abilities to provide feedback. However, the stress eventually dissipated as they participated in further peer review activities.

Yes, if I go back to the first experience, I was stressed. I felt it was not my role to do it [the review] because I was not qualified enough. Now, I can see the benefits of it and do not feel as stressed as before.

(Participant E)

Sluijsmans et al. (2002b) also showed that, as students progress through multiple peer review activities, they become less intimidated by the process. Topping (2009) suggests that one way of reducing reviewee’s anxiety is by providing positive feedback, yet, the above outcome suggests that having multiple experiences in the peer review process may be a more effective way of reducing stress, without the need to focus feedback on positive aspects of work. A reason for such a suggestion is that, while multiple experiences reduced stress on part of the the students, at the same time, it also helped them develop familiarity with the process and develop awareness of what teachers expected the outcomes to be. For example, Evans (2015) found that a lack of familiarity
with peer feedback led some students to question the potential of it for their learning. In
the present study, familiarity was not something associated with one-off review events:

I became more confident in my decisions based on my experience and practice. I was able to make better judgements because I knew how to make use of the marking criteria.

(Participant B)

I think being part of the process last year and this year has helped me to become more confident in giving feedback. It almost feels like that it is something which I developed over time.

(Participant H)

Such an outcome is not surprising because, even for academic staff who provide feedback to students, the necessary expertise is developed over time (Falchikov, 2004). Students’ confidence in their own review abilities was clearly demonstrated in the second-year exercise in which they examined research proposals on subjects within Ecology, but on topics about which they had little or no prior subject knowledge. As an example, note the differences in the titles for the following three research projects:

I. Protecting biodiversity in the intertidal, a trophic cascade from a reduction in kelp forests due to climate change, to barnacle domination on the rocky shores in the Catlins, New Zealand.

II. Parasitism in Potamopyrgus antipodarum under Biological Stress; How could infection impact the snail and could parasitism be beneficial?

III. The importance of downed woody material as habitats for saproxylic invertebrates and as catalysts for forest floor process in an indigenous New Zealand forest.

The titles indicate different research fields for each pair of students. Given that peer reviewers had little or no knowledge of the content of each proposal, the novelty
initially evoked concern, yet all reported that they were able to draw on their prior experience of peer review in order to complete the task at hand:

It was a bit intimidating, but overall, it was a good experience because I was able to use my past knowledge and experience of the review process to do the review.

(Participant C)

After the exercise, there was a positive shift in attitude towards peer review largely attributed to students becoming more self-assured, especially in relation to how they structured their feedback, as well as becoming confident that they could provide good feedback. When asked what they understood by good feedback, students responded by suggesting that it was something that improved the quality of their draft work, much in line with expectations from a good peer review in a journal setting (Ware, 2011). Such an outcome supports Ware’s claim that “students need a period of adjustment in coming to terms with the requirements of the peer feedback process” (p. 121).

4.2.4 Peer review helps create knowledge

Regardless of other outcomes, students recognised that cumulative experience helped them realise that new knowledge was fundamental to peer review. At times, this was articulated explicitly, but mostly it was implicit in the interview responses. Overall, knowledge creation was a key motivator for students and four categories were identified. These were knowledge of the subject, knowledge of peer review, knowledge of self and knowledge of others (Table 7). All domains were regarded as important and together they can help in understanding the epistemological potential of student peer review.
Table 7: The four domains and knowledge outcomes identified by students as they learned how to carry out peer reviews of research activities

<table>
<thead>
<tr>
<th>Knowledge of:</th>
<th>Key knowledge outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>Ecological knowledge</td>
</tr>
<tr>
<td>Peer Review</td>
<td>The skills and attributes of a reviewer. The potential of peer review</td>
</tr>
<tr>
<td>Self</td>
<td>Confidence in one’s own abilities to provide and receive feedback</td>
</tr>
<tr>
<td>Others</td>
<td>Recognising and respecting other’s abilities in a learning community</td>
</tr>
</tbody>
</table>

4.2.4.1 Knowledge of the subject
All review exercises were aimed at creating new knowledge as an integral part of training students as researchers. However, since they worked on a range of ecological inquiries and asked authentic research questions (for which there were no known answers), it was recognised that students would likely have limited subject knowledge when it came to the peer review exercises. It is thought that to make appropriate evaluative judgements, students need background subject knowledge (Sadler, 2010) and, as discussed earlier, since most of the students lacked this, they had to learn about the subject before providing feedback:

I read three articles and [the research partner] read three key articles. We then discussed what we understood about the topic. I mean it wasn’t full-on in-depth knowledge or anything, but we wanted to make sure that we had a bit of background knowledge before we reviewed their work.

(Participant A)
The care and time required to do this background work showed that reviewers took the task seriously and accepted a measure of personal accountability for their work. The additional research was not initially part of peer review training, nor had there been any staff expectation for students to engage in additional reading in order to provide feedback. A likely reason for students to engage in additional reading to provide feedback could be that because students were steeped in a culture of research, they had the skills and ability to inquire into new areas and valued their peers’ learning. Although students can provide valuable feedback without training and with very limited subject knowledge (Cho & Macarthur, 2010; Cho et al., 2006a), such practice is unlikely to realise the full potential of a review that requires subject expertise. The importance of turning to the literature for ensuring knowledgeable reviews was also echoed from the position of feedback recipients. Students reported that the review comments needed to be convincing and supported with evidence, both of which were associated with the quality and accuracy of the review:

When it comes to judging the accuracy of the feedback, I guess it really depends on the level of feedback they are giving me. I mean, if I think it is wrong, then I would go and research the reasons provided.

(Participant B)

The above quote shows a second cycle where the reviewee returns to the literature to check on comments. One student said, “we are taught not to take things at face value. Everything has to be evidenced” (Participant F). The practice of conducting further research was certainly encouraged by the inclusion of the rebuttal at the end of the second-year peer review exercise, but students must have developed it in other ways. One student said, “being the reviewer and getting feedback was handy. It made me realise what it means to assess work” (Participant C). Their double role as both
providers and receivers of feedback was important for them to realise the impact of the whole peer review process. However, reciprocity alone cannot fully explain why it was common for reviewers to dedicate so much time and effort to constructing their feedback. One student said that he would not have taken the extra initiative to read papers had it not been for positive past experiences of peer review that had helped him realise the value of the process. Importantly, reviewers did not see their role as quality assurers or gatekeepers but, instead, saw themselves as contributing to knowledge creation by helping improve the research of their peers. Overall, the students’ motivation mirrors the formative responsibilities of academic researchers, namely, an obligation to a community, an expectation of reciprocity, and being able to improve research (Ware, 2011).

4.2.4.2 Knowledge of peer review
As I have discussed earlier in this chapter, participating in the peer review process led students to gain a deep understanding of the process as they developed relevant skills. A key expectation was for students to use assessment criteria and attendant standards as a guide to crafting feedback but, like all complex criteria, these were open to interpretation. At the same time, they were developing an understanding of how feedback can help revise work. Both processes – using criteria to review and providing feedback - involved explicit and tacit knowledge that was difficult to articulate (Rust et al., 2003). However, first understanding and then transferring knowledge was important:

I found the process quite challenging because it seemed a step beyond proofreading and we really had to put in an effort. You can proofread in five minutes but trying to understand a work before providing feedback is time-consuming.

(Participant J)
As already discussed, most students initially had reservations about taking part in peer review and had doubts about their abilities. They were partially helped by the training. For example, one student learned early on “how to provide feedback without being too negative” (Participant B). However, for students to realise the full value of peer review they needed to appreciate its potential and this was something that had to be learned for themselves over time. Importantly, all used their experiences of receiving feedback to understand the difficulties faced by peers, which then helped them to model good practice. Some students also reflected that the review activities also exposed them to a range of judgements and some found diversity of opinion useful. Given these conditions for learning about being a peer reviewer, it was clear that students had used a similar dialogical process to that of learning about a subject.

4.2.4.3 Knowledge of self
Participants reported that engaging in peer review provided rich opportunities for them to learn about their own learning and values. In constructing feedback for their peers, they were able to develop insights into their own work:

I think it’s easier to spot mistakes or things that could be improved in other people’s work and then when you can see it in other people’s work, you can see it in your work more easily. In other words, you try your best and you think this is as good as I can do when you write something, and then when you see other people’s work and that’s the best they’ve done but you can see things that could be improved, then you can transfer that to your own work too.

(Participant C)

The opportunity to compare their work with that of their peers helped develop an understanding of what good quality work entails. Being able to stand back from one’s own work, evaluate it and re-draft is an advanced skill. Students must be in a position
to make judgements about their knowledge claims, writing abilities, how meaning is conveyed and their own learning process, and then use these to make changes (Liu & Carless, 2006). Identifying weaknesses in other’s work invariably led to a revision in their own, and an improvement in quality:

I have learnt to open myself to feedback. I do a bit of art and it has been a huge thing for me to learn because quite often, I am worried about sharing that or things like that because some part of me doesn’t want people to criticise it in any way. But now I have become more accepting of other people’s feedback because I can see how I can use it to improve my work.

(Participant E)

Students may not welcome negative criticism, which can dominate feedback practice (Weaver, 2006b), and the emotional impact can affect motivation, self-confidence, understanding and therefore, the potential for improvement. The long-term peer review culture was seen as one that supported the learner, and this space enabled students to gain insight into their learning processes and become more accepting of the idea of feedback. After experiencing peer review, some reported they felt less threatened, even when comments seemed negatively critical. Some discussed the peer review process itself with others and it is likely that this dialogic practice changed their understanding of giving and receiving feedback.

4.2.4.4 Knowledge of others

Peer review allowed students to generate knowledge about others through different aspects of the review process, including informal discussion and dialogic feedback. Being exposed to a wide range of topics showed what others were interested in and how they approached the task at hand:
it was interesting to see what they (peers) were researching on. We were reviewing seaweeds and how they are important in the ecological system. I used to perceive seaweed as gross, but seeing how they are important for invertebrate species in the tidal system changed my feeling towards it.

(Participant C)

Providing helpful feedback signifies both a degree of professionalism and care towards others (Sutton, 2012), but how this feedback is received also requires an understanding of who is providing it. In the case of Ecology, reviews were from students or staff who were usually anonymous, depending on the exercise. Students reached the point where they started considering peers as a reliable source of feedback whose comments could be just as valuable as those from academic staff. They learned to value and trust their peers’ ability to make a positive impact and improve the quality of their work:

I no longer find it scary if I have [to hand] my work to my peers. It doesn’t mean that they are just going to tear it up or the opposite, where they just say everything’s okay. I feel quite comfortable giving this to classmates, knowing that I will be getting a reasonable response which will strengthen my work. I think that is something valuable that I and others have taken from this.

(Participant A)

4.3 Summary

Students saw peer review as part of being a research apprentice and understood that the process also entailed new layers of research inquiry focused on subject knowledge. These new inquiries were necessary for understanding the content of the work they were reviewing, and also to interpret the comments they received about their own work. Students, therefore, worked with peers and academics in order to learn content and how to review. These are sophisticated processes that required both dialogic feedback and
multiple experiences of peer review. Both were instrumental in shaping students’ experiences, attitudes and skills. As students became more experienced, they became less threatened by the required tasks and began to realise the value of peer review for their own learning. While multiple experiences were beneficial, this was not merely a matter of ‘more is better.’ Rather, a series of different review exercise designs and experiences that built in complexity seemed to enhance learning, contribute to normalising the activity, and create a shared identity and culture. Embedding a rebuttal in one exercise had a major impact on learning and helped students to understand the value of dialogue and critically question feedback before revising work.

Multiple experiences and systematic training saw this formative process as primarily about developing knowledge in different domains. In this context, peer review became part of a wider knowledge project but, while it included quality improvement, it did not have the gatekeeping function required for articles submitted to journals for academic peer review. Students also gained knowledge about themselves as learners and these insights were formed in relation to how they viewed the work of their peers. Most importantly, the dialogic processes of both written and oral communication allowed students to gain much insight into their own work and develop abilities in self-review, a skill that is difficult to master in higher education (Higgins et al., 2001; Sadler, 2013).

The outcomes from this chapter have much wider implications across the sector because they demonstrate that effective dialogue in feedback can be achieved through student peer review and that with sufficient systematic training and experience, it can be very effective in enhancing higher-order learning. Of course, more curriculum time and space are required than for the more typical one-off exercises, but the design and
training necessary to achieve this should be relatively easy for academics as all regularly experience peer review in their own research and will be reasonably experienced in the process. The key difference here is in setting up student peer review as a progressive sequence of purely formative exercises.
Chapter 5- Responses to feedback: The case of the second-year peer review exercise

Part One
Asking the questions

- Justifying the research
  - Introduction
  - Literature Review
  - Methodology

Part Two
Study findings

- Addressing the research questions
  - RQ1: experiences and reflections
  - RQ2: responses to feedback
  - RQ3: transfer of skills

Part Three
Concluding the study

- Summary of the main findings
  - Thesis contribution
5.1 Introduction

As discussed in the previous chapter, students reported that peer review was a positive experience for them because they were able to receive and provide helpful feedback in the process. The notion of feedback on student performance is largely recognised to be one of the most important learning paradigms (Hattie & Timperley, 2007; Poulos & Mahony, 2008; Price et al., 2010), yet it is also recognised that feedback provision on its own does not necessarily lead to improvements in students’ work (Crisp, 2007).

Sadler (2010) observes that the research related to the desirable properties of feedback generally recommends that feedback should inform “students about the strengths of their works; telling them (gently) about the deficiencies, where they occurred, and their nature; telling students what would have improved their works and pointing them to what could be done next time they complete a related type of response” (p. 538). However, a pragmatic problem with such an observation is that it reinforces the transmission approach of feedback in which students are passive receivers of information. Given the centrality of feedback ‘uptake’ to student learning (Carless & Boud, 2018; Sadler, 2010), there is increasing consensus that rather than focusing on students as passive receivers of information, assessment and feedback practices should emphasise on students’ actions following feedback (Carless et al., 2011; Higgins et al., 2001; Nicol, 2010b; Nicol & Macfarlane-Dick, 2006; Price et al., 2011; Steen-Utheim & Hopfenbeck, 2018; Winstone & Boud, 2018).

It is thought that for feedback to be effective, students should be in a position to use feedback to revise their work (Boud & Molloy, 2013a; Gibbs & Simpson, 2005; Sadler, 1989). Within the context of peer review, the case of students using peer feedback to revise work has been seen as challenging because, in most cases, undergraduate students are not considered subject matter experts (Cho & Macarthur,
As such, there is a possibility that the accuracy of peer feedback will vary (Gielen et al., 2010), congruent with the abilities of the students, which may impact students’ use of feedback to revise work (Baker, 2016). While in some cases, students are able to use feedback to carry out relatively detailed revisions in their work (see: Cho & Macarthur, 2010), it has been suggested that in most cases they are unable to use it for in-depth revisions of their work (Coit, 2004; Hyland, 2003; McGarrell & Verbeem, 2007). These contradictory outcomes call for a better understanding of how students engage with feedback, particularly of “what students do with the feedback they receive” (Steen-Utheim & Hopfenbeck, 2018 p.2). However, as noted by Ajjawi and Boud (2017), research that examines the effect of feedback in terms of how it is received and acted upon is still limited.

Therefore, the purpose of the present chapter – Chapter 5 – is to address the above challenge by identifying the type of feedback provided to students and examining how they respond and revise their work. To provide a detailed analysis, I focus on the second-year peer review exercise, which mirrored a professional double-blind journal setting. The reason for using this exercise as a case study is that it provided a unique opportunity to compare academic staff and peer feedback and it included a rebuttal phase as well in which students were required to address each feedback received from reviewers.

5.2 Findings and discussion
All students recognised that peers and academic staff provided valuable feedback that helped them gain insight into their work and subsequently influenced how they revised their work. These outcomes are discussed below. The first section (5.2.1) provides an overview of the quantity of feedback provided by staff and students. The second section
(5.2.2) provides a comparison between staff and peer feedback and the third section (5.2.3) examines students’ response to the feedback.

5.2.1 Quantity of feedback
A total of 1051 comments were provided as feedback. Since a single feedback comment can address multiple categories, a total of 2067 comments were coded (Table 8).

Table 8: Number of comments provided by academic staff and students

<table>
<thead>
<tr>
<th>Feedback Category</th>
<th>Feedback sub-category</th>
<th>Feedback Provider</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td>Recapitulation and Summary (RnS)</td>
<td>Lecturer (L)</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students (S)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Suggesting Improvements (SI)</td>
<td>L</td>
<td>247</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>232</td>
</tr>
<tr>
<td></td>
<td>Highlighting Strengths (HS)</td>
<td>L</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Highlighting Weakness (HW)</td>
<td>L</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>Organisation of Ideas (OI)</td>
<td>L</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>Error (Er)</td>
<td>L</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>2</td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
<td>Praise and Encouragement (PnE)</td>
<td>L</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Emoticon (E)</td>
<td>L</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Demotivation (D)</td>
<td>L</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>1</td>
</tr>
<tr>
<td><strong>Dialogue</strong></td>
<td>Direct Question (DQ)</td>
<td>L</td>
<td>193</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>Clarification of Ideas (CoI)</td>
<td>L</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Reflection (R)</td>
<td>L</td>
<td>123</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>119</td>
</tr>
<tr>
<td><strong>Language</strong></td>
<td>Spelling and Grammar (SnG)</td>
<td>L</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>30</td>
</tr>
<tr>
<td><strong>Organisation</strong></td>
<td>Presentation and Layout (PnL)</td>
<td>L</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>59</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>2067</td>
</tr>
</tbody>
</table>

As might be expected, academic staff members provided a marginally greater number of comments (1082) than students (985). This was not surprising, as earlier studies comparing peer and academic staff feedback also highlighted that it is generally
the academic staff members who provide a greater quantity of feedback (Cho et al., 2006a; Hamer et al., 2015; Harland et al., 2017; Miao et al., 2006). Students were mindful that providing feedback was a challenge for them, considering they had less knowledge than academic staff members, who they considered as much more experienced. All five Ecology academic staff members had taught in the course for a number of years, one of whom, a professor, was one of the key architects in redesigning the Ecology curriculum in 2002 (Spronken-Smith et al., 2011).

Students’ beliefs in the role experience plays in providing feedback reinforces the narrative that students are novices in their discipline and may not have the sophisticated subject matter knowledge and skills to provide a greater quantity of feedback (Cho & Macarthur, 2010; Gielen et al., 2010), at least in terms of the feedback quantity. Lunsford (1997) recommends that, in the case of essays, three well-crafted feedback comments are optimal. In contrast, other studies have shown that both students and academic staff perceive effective feedback to be detailed (Mulliner & Tucker, 2017; Weaver, 2006a). In the present study, students valued the large number of comments as they were deemed helpful: “I don’t mind if there is a lot of feedback because it provides more information on what we can do to improve our work” (Participant K). Such an outcome suggests that a large quantity and diversity of feedback (Pearce et al., 2009b) helped students engage with their work. However, it is difficult to know what the optimal levels would be.

However, a pragmatic problem with a greater quantity was that, because feedback comments were very similar in structure, variations in ideas expressed in comments were deemed problematic by students: “It’s hard to judge between [academic staff] and peer feedback when there are differences. You really have to think about how
to tackle it” (Participant A). Most participants were of the view that they valued both peer and academic staff feedback, yet, for two participants, similarity between comments from different sources was important because it added a degree of legitimacy to feedback, especially in cases where feedback comments “correlated” (Participant D). Such an outcome broadly resonates with the idea that reviewer variation (i.e., difference in feedback comments) can be considered as vital to help encourage students to “develop means of assessing organizing and rationalizing their response to such variation” (Mulder et al., 2014b p.167).

5.2.2 Type of feedback provided by academic staff and peers
Analysis of feedback comments revealed most of the feedback from academic staff and peer reviewers focused on similar areas in students’ work (Figure 6).

![Figure 6: A comparison of the feedback types between academic staff and students](image)

In the case of the present study, both academic staff and students’ comments were coded in the categories of ‘suggesting improvements’, ‘direct question’, ‘reflections’, ‘seeking clarification of ideas’, ‘highlighting weakness’, followed by ‘organisation of
ideas’, ‘praise and encouragement’ and ‘presentation and layout’ (Figure 6). The ability of students to focus their feedback on areas similar to the focus of academic staff is attributed to their peer review experiences. Nicol (2011) notes that constructing feedback is a cognitively highly demanding task that can help students internalise assessment criteria and standards. As discussed in the last chapter (Chapter 4), most of the students in the present study claimed that experience in training and multiple peer review activities had allowed them to develop a familiarity with the peer review process and they were aware of what academic staff expected the outcomes to be. In other words, having such experiences may have resulted in students becoming better at detecting problems and suggesting revisions in their peers’ work (Huisman et al., 2018).

In terms of feedback preference, students emphasised that they valued and expected feedback that provided explicit comments to help them improve their work. While feedback itself is a contested term that lacks clarity (Carless, 2018), the ability of these students to articulate their expectation of feedback suggests they have a clear idea of what feedback should be. In conceptualising feedback, Sadler (1989) noted that feedback should ‘bridge the gap’ between what is understood by students and what is demonstrated by their work. Fundamental to this is the extent to which feedback is aligned to students’ needs and expectations (Orsmond & Merry, 2011). The interview data supported the feedback analysis because, in the current study, a large majority of feedback comments were in the sub-category of suggesting improvements (Figure 6), which matched students’ expectations of their feedback:

I like to be given specific feedback that I can use to improve my work. Like for this project, at least for us, [reviewers] seemed to
have gone out of their way to suggest ways in which we could improve our work and it was good to be helped this way.

(Participant F)

The above outcome broadly resonates with the idea that useful feedback “helps students understand their subject area and gives them clear guidance on how to improve their learning” (Orsmond et al., 2013 p.240). Students emphasised that comments that included the steps they needed to take to improve their work were the most helpful for revising their work. A large number of comments provided to students were coded in the sub-categories of direct questions (Figure 6). A likely reason for both staff and students crafting feedback as direct questions is explained by the following comment:

In other [course]s, [academic staff] already know the answer to the research questions and they are just trying to take us through the process to find out the predetermined answers and have their expectations fulfilled, whereas [Ecology 212] staff had no idea about the questions that all of our teams asked and they were just as excited as we were about finding the answers to them. It was like almost that there are so many possible questions out there, so why bother trying to answer ones that we have already answered? Let us work together to find some new ones together.

(Participant D)

The experience of Participant D above suggests that if the research is original, then more questioning is required than when feedback is given for a pre-determined outcome. Chin (2007) noted that the way teachers used questions influenced how students constructed knowledge in a science curriculum. In the present study, most of the questions asked by peers and academic staff members were open questions, which, according to Kawalkar and Vijapurkar (2013), require a more extended response and place more cognitive demand on the learners. In the case of the present study, students reported that having feedback crafted as questions was crucial in helping them in their work:
My partner and I were looking at the homing behaviour in limpets but our draft was a bit underdeveloped. The feedback we got was like a lot of questions. [Feedback in the form of questions] was really handy because it just felt like you can approach it from many different angles and come up with pretty neat insights.

(Participant K)

Price and O’Donovan (2007) noted that written feedback can, at times, be unidirectional and limited in its scope for communication of meaningful knowledge. However, in the present study, the above comment suggests that the use of questions by academic staff and peers was useful in eliciting students’ thinking processes and helping them gain insight into their own work. The use of questioning, in general, is thought to encourage students in critical thinking of their work (Golding, 2011), and this is evident from the above example, as questioning allowed Participant K to approach his work from different viewpoints and in the process, gain “neat insights.”

In addition to feedback in the sub-category of ‘questions,’ it was noted that there was also a large number of comments in the sub-category of ‘Reflection’ (Figure 6). Nicol and Macfarlane-Dick (2006) recommends that part of good feedback practice is providing feedback that helps students to reflect on their learning. It is thought that “the ability to reflect on and analyse material in order to form reasoned judgements is central to critical thinking and deeper learning” (Quinton & Smallbone, 2010 p.126).

Arguably, all feedback involves a degree of ‘reflection,’ yet, in the case of the present study, within comments coded as ‘reflection’ there were specific ‘maybe comments’ type feedback that had no definite answer. For example, “We think it may be difficult to identify any significant correlation between environmental variables and the abundance of bumblebees with so few traps” (feedback from a student reviewer to a
Participants recognised the importance of such comments as adding another layer of usefulness as it prompted them to think about the impact of revisions:

Some of the stuff required a lot of thinking. It wasn’t like a quick fix, here do this, do that and you are good to go. I think we spent a lot of time reflecting on it (feedback), like talking about it and trying to connect the dots because it directly impacts our work for next year and quite frankly, it was challenging but it was good to be nudged like that.

(Participant B)

The idea of students reflecting on the impact of feedback (and revisions) on future tasks is interesting as it amplifies the idea that, if assessment tasks are sequentially linked and the connections between them are made explicit, then students are in a better position to engage with feedback (Zimbardi et al., 2017). Such an outcome broadly resonates with the idea of “feedforward” – which in Hattie and Timperley’s (2007) seminal review of feedback literature, is an integral component of helping students understand the essential question “where to next?” (p. 86). It is thought that the question of ‘where to next?’ is addressed when learning gains from one task is applied in subsequent tasks (Carless, 2018). Participant B’s comments above recognised that the manner in which feedback was used would directly influence the research output in the third year. As such, it required both inner dialogue with self – “we spent a lot of time reflecting on it” – as well as verbal dialogue with her research partner – ”talking about it” – to carefully consider how best to use feedback. Nicol (2010b) describes such forms of dialogue as crucial for students to form meanings out of feedback interactions and ultimately make improvements in both current and future work. Students also reported that comments that sought further clarification complemented their overall feedback experience as they were forced to address clarifications raised by the reviewers.
Further, it was noted that the frequency of feedback highlighting weakness was higher than that of feedback highlighting strengths (Figure 6). There were cases in which reviewers highlighted weaknesses in students’ work without providing explicit instructions on what action needed to be taken. This may have possibly skewed the data because, overall, there was minimal feedback on issues such as spelling, grammar, sentence structure, and error (Figure 6) compared to feedback in other sub-categories. Such an outcome suggests that work submitted for review may have been of a high quality and did not warrant much attention on the part of the reviewers.

In some cases, reviewers — mainly peers — used emoticons to aid feedback, especially when pointing out weaknesses in students’ work. It is likely that the use of emoticons reflects the challenges of written communication. A problem with written communication is that it cannot transmit much of the information that creates and sustains verbal interactions, such as non-verbal cues, including facial expression and tone of voice (Garrison et al., 1999). Therefore, while the use of emoticons may not have influenced revisions in students’ work, it is likely that it may have softened or reinforced feedback provided and at the same time made communication more personal.

It was interesting to note that only a few reviewers provided a recapitulation or summary of comments, suggesting that such an outcome may have been due to the personal choice of certain reviewers. In interviews, participants reported they appreciated being praised for their work, yet, an analysis of feedback revealed there was limited praise or motivational comments from reviewers. However, other researchers have suggested that other than motivating students, praise as a form of
feedback does not lead to direct revisions in students’ work (Ferris, 1997; Hattie & Timperley, 2007).

5.2.3 Students’ responses to feedback

Given participants’ expectations of helpful feedback and their claims of valuing feedback from both academic staff and peers, it came as no surprise when all claimed to have used feedback to make significant revisions in their work. Key to students’ experiences was the rebuttal phase of the peer review activity:

I valued the opportunity to defend my work [through the rebuttal]. […] for instance, you could find shortfalls in your text, strengthen it but also keep the parts that were quite necessary, even if the reviewers thought otherwise, as long as you could justify your arguments.

(Participant C)

Such an outcome supports Baker’s (2016) recommendation that if students were asked to write a letter in which they described how they used feedback, that process may help in its uptake. The recommendation of Baker (2016) is aligned with the idea that a necessary condition for using feedback is making sense of it (Gibbs & Simpson, 2005; Higgins et al., 2001). Unlike the findings of Price et al. (2010), who, when investigating students’ engagement with feedback from staff and students, found that students were generally critical of the feedback received and expressed a level of confusion over its purpose, students in the present study could see its value and were in a position to explain how they would use it to make changes in their work. Students’ uptake was not only influenced by the rebuttal experience, but also by their expectation of quality final proposal: “I think their feedback always helps. Like the last one really improved my work, so we wanted that same experience again” (Participant L). Not only does such an outcome reinforce the idea that peer feedback leads to enhancements in the overall
improvements in students’ work (Li et al., 2010; Lundstrom & Baker, 2009; Topping, 2009), but it also goes to show that for some motivated students, the desire for improved work facilitates the update of feedback.

From the initial 2067 coded comments, a large majority of the comments were addressed in students’ rebuttals, while 390 comments were ignored (Table 9, p.115). With the exception of Recapitulation and Summary (RnS) comments which were not addressed by any students, it was difficult to ascertain a specific reason as to why students ignored 390 comments. From the 1677 comments that were addressed, a total of 1569 comments were accepted, and 40 comments were rejected. A previous study in Ecology also showed that when students and academic staff provide feedback, students generally addressed a large proportion of the feedback comments in their rebuttals (Harland et al., 2017).

Given students’ expectations of helpful feedback and the desire to use it to improve their work, the smaller number of comments rejected possibly reflects the fact that students found the feedback of high quality and useful. Price et al. (2011) note that students’ rejection of feedback advice “may be due to lack of understanding, or [be] based on identity or self-efficacy issues [that prevent] the student [from] taking action” (p. 892).
Table 9: Students’ rebuttal responses to the feedback

<table>
<thead>
<tr>
<th>Feedback Provided</th>
<th>Students’ responses to feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback Category</td>
<td>Feedback not addressed</td>
</tr>
<tr>
<td>RnS</td>
<td>L 32</td>
</tr>
<tr>
<td></td>
<td>S 33</td>
</tr>
<tr>
<td>SI</td>
<td>L 247</td>
</tr>
<tr>
<td></td>
<td>S 232</td>
</tr>
<tr>
<td>HS</td>
<td>L 15</td>
</tr>
<tr>
<td></td>
<td>S 30</td>
</tr>
<tr>
<td>HW</td>
<td>L 111</td>
</tr>
<tr>
<td></td>
<td>S 118</td>
</tr>
<tr>
<td>OI</td>
<td>L 99</td>
</tr>
<tr>
<td></td>
<td>S 77</td>
</tr>
<tr>
<td>Er</td>
<td>L 5</td>
</tr>
<tr>
<td></td>
<td>S 2</td>
</tr>
<tr>
<td>PnE</td>
<td>L 57</td>
</tr>
<tr>
<td></td>
<td>S 67</td>
</tr>
<tr>
<td>Motivation</td>
<td>E 5</td>
</tr>
<tr>
<td></td>
<td>S 10</td>
</tr>
<tr>
<td>D</td>
<td>L 0</td>
</tr>
<tr>
<td></td>
<td>S 1</td>
</tr>
<tr>
<td>DQ</td>
<td>L 193</td>
</tr>
<tr>
<td></td>
<td>S 116</td>
</tr>
<tr>
<td>Col</td>
<td>L 127</td>
</tr>
<tr>
<td></td>
<td>S 91</td>
</tr>
<tr>
<td>R</td>
<td>L 123</td>
</tr>
<tr>
<td></td>
<td>S 119</td>
</tr>
<tr>
<td>Language</td>
<td>SnG</td>
</tr>
<tr>
<td></td>
<td>S 30</td>
</tr>
<tr>
<td>Organisation</td>
<td>PnL</td>
</tr>
<tr>
<td></td>
<td>S 59</td>
</tr>
<tr>
<td>Total</td>
<td>2067</td>
</tr>
</tbody>
</table>

However, in the present study, students seemed to have an explicit understanding of what the feedback message was trying to convey because, in cases where they explicitly rejected feedback, they were able to clearly evaluate feedback and text analysis which showed they could provide a detailed explanation for rejecting feedback comments:
A student reviewer provided the following comment:

Why are the initial 40 mayflies collected from the lowest salinity site? Perhaps, instead they should be collected from randomised sites of varying levels of salinity.

Students rejected that particular feedback and justified their choice as follows:

We appreciate the comment and see where you are coming from but we disagree. We believe that for this experiment, it is best to take the mayfly from the lowest salinity site. This is because we want to test the tolerance of mayflies to salinity changes. Therefore[, ] taking them from freshwater source means that we can test their response to conditions that they are not used to. The ones that live in more salty habitats will not likely be inundated with fresh water.

Figure 7: Students justifying their decision to reject a feedback comment

As noted by Weaver (2006a), academic staff and students have different perceptions of what constitutes subject knowledge and, hence, they may interpret comments differently from each other. Most participants reported that cases of rejecting feedback required a degree of confidence and a firm grasp of ecological knowledge:

“We could not just say no, we reject this or that. We really had to know our stuff before rejecting feedback” (Participant H). In such cases, the ability of students to justify the decision to reject feedback with reasoned arguments, demonstrates students’ critical engagement (Price et al., 2011). Such an outcome reinforces the idea that “students can learn not only from peer [and academic staff] feedback itself, but [also] through reflecting on and justifying what they have done” (Liu & Carless, 2006 p.289).

In terms of rejecting feedback, there were 53 instances in which students rejected the comments (Table 9), but still revised their work with respect to partially addressing the comments they had rejected. A similar observation was also made by Harland et al. (2017), who noted there were instances in which students rejected
feedback but revised their work nonetheless. In the present study, considering that peer review had a direct impact on students’ research projects in the third year, some students reported they wanted “ownership” of their work and because of that, using feedback was not just dependent on accepting or rejecting feedback. Participant H continued:

It’s hard to explain but it’s like what [Ecology staff] was saying about taking ownership of work. We had to think about contradictory stuff (feedback) because we didn’t want our ideas drowned out by [the reviewers] so we rejected some feedback but did small changes here and there to strengthen our argument.

(Participant H)

It is thought that, if students are to achieve a learning goal, then they should be in a position to assume some ownership of their work and be in a position to assess their progress towards it (Black & Wiliam, 1998; Sadler, 1989). In the present case, the idea of assuming ownership required students to carefully consider the feedback and then “develop a repertoire of strategies for acting on feedback” (Carless, 2018 p.5). For example, as shown in Figure 8, students pointed out that they disagreed with the feedback but, at the same time realised that they could make their work better and, as such, they engaged in revisions:
A staff reviewer provided the following feedback:

The title [What is the impact of invasive plant species and microclimates on bumblebee composition and behaviour in coastal temperate forest in the Catlins, New Zealand?] conveys the main aspects of the research; however, it is somewhat complicated and confusing for the audience to interpret. Please change the title.

The following was crafted as a response in the rebuttal:

Disagree. We feel the level of detail was appropriate in the original title; however we concede that it may have been a little daunting. We will attempt to simplify the title, but do not want to lose too much detail. The title has now changed to ‘The effect of the invasive Lupinus arboreus on the pollination of native Pimela lyalli in a coastal dune ecosystem in the Catlins, New Zealand.

Figure 8: Examples of how students revise their work despite claiming to reject feedback comments

What they seem to have done is completely re-think the title to better reflect the study, but have still ended up with something complicated. They might have used ‘How invasive lupins affect sand dunes in coastal New Zealand.’ The ability of students to partially address the feedback comments reinforces students’ perceptions presented in Chapter 4 that the rebuttal process was a non-verbal dialogic activity. Price et al. (2010) found that written feedback without options for dialogue created frustration and disengagement in the process. In the current study, by partially addressing comments, students arguably engaged in a figurative conversation of the nature ‘I disagree with what you are saying but I am going to do this to ….’ in order to reduce misconceptions between themselves and the reviewers. In this way, students voices (and ideas) are not ‘drowned out’ and they are able to develop their own capacity to form judgements (Carless & Boud, 2018).
Further, as noted by Boud (2000), “unless students are able to use the feedback to produce improved work, through for example, re-doing the same assignment, neither they nor those giving the feedback will know that it has been effective” (p. 158). As discussed earlier, in the present study, from the 1677 comments that they addressed, students accepted a large majority of the comments – a total of 1569 feedback comments – to revise work (Table 9). Students accepting a large majority of feedback was not surprising, given that students perceived that both peers and academic staff members had provided them with helpful feedback. In comparing how students revised their work using peer and expert reviewing, Cho and Macarthur (2010) found that novice writers in language classes were better at using peer feedback to revise work than using comments from subject matter experts. However, in the present study, students addressed most comments without bias towards either academic staff or peer feedback. This could be because students a) valued both academic staff and student feedback, and b) they could not differentiate between academic staff and peer feedback. This finding is consistent with the findings of an earlier study by Harland et al. (2017), which found that students used feedback irrespective of who provided it, as long as it made sense to them.

Analysis of students’ rebuttal responses showed that similar to how students were able to justify their positions for not accepting feedback, they were also able to provide detailed justification for accepting feedback comments. Baker (2016) suggested that having students explain how they used feedback may help students engage with feedback. The process of explaining why students accepted feedback was instrumental in facilitating what Sadler (1989) perceived as ‘closing the gap,’ that is, “engage[ing] in appropriate action which leads to some closure of the gap” (p. 121). Students reported that justifying their acceptance of comments helped them to develop a connection to
carry out actual revisions in their work. In other words, they gained awareness of what parts of their work needed revision, as well as insights into the steps they needed to take to revise their work:

We spent a lot of time thinking about how to respond [to feedback] but it was helpful because we then knew what to revise and how to revise, like things were much clearer and we could see connections.

( Participant J)

Being in a position to understand “what to revise and how to revise” work allowed students to engage in what Faigley and Witte (1981) and later Baker (2016) describe as making meaning-level changes, that is, those changes that “alter the meaning of the text in substantial ways” (p. 182). Unlike the findings of Baker (2016), who noted that students made meaning-level changes in the form of added texts at the end of the sentence, in this study, by comparing students’ individual responses to the feedback comments with students’ draft projects and the final projects, it was noted that students were able to make meaning-level changes by redeveloping their drafts by moving around text, adding new information and, generally, improving their overall arguments in their research proposal. For example, in Figure 9, the feedback provided, and the response to feedback on the part of the students, resulted in significant content change of the initial argument. Such an approach meant that the end result of the peer review activity resulted in a large majority of students making significant changes to their work and can be summed up by the following comment: “Yeah, I think we were happy with the final outcome, like we would not have made those changes without their input” (Participant C).
The proposal contained the following claim:

Miro berries are an important food source for the native New Zealand wood pigeon when no other native species are able to consume Miro seeds.

In response to the above claim, a student reviewer provided a following feedback:

Clear significance is shown; however, wood pigeons are not the only native birds that feed on Miro. Kaka [a type of bird] has also been known to feed on them.

On receiving the feedback, students accepted the feedback and responded to it as follows:

You are correct. It is true that NZ wood pigeons are not the only consumers of Miro berries and we have looked at further research to confirm this. [From the research] we have found that the Tui (Prosthemadera Novaseelandiae), North Island Kokako (Callaea Cinerea Wilsoni), NZ Bellbird (Anthornis Melanura), North Island Brown Kiwi (Apteryx Mantelli), and Weka (Gallirallus Australis) also consume Miro berries. As a result of this, we have edited lines 82-85 to include this new information.

Comparing the students’ rebuttal response and draft research proposal to the revised research proposal showed a significant change. The initial claim was modified using the rebuttal response, and the revised version was as follows:

Knowledge of the ecological significance of Miro is far from complete, but as a significant component of the podocarp forests, Miro fruit is known to be consumed by the Wood Pigeon (Hemiphaga novaeseelandiae), Tui (Prosthemadera Novaseelandiae), North Island Kokako (Callaea Cinerea Wilsoni), NZ Bellbird (Anthornis Melanura), North Island Brown Kiwi (Apteryx Mantelli), and Weka (Gallirallus Australis) (Moon and Cobb, 1992). These birds all hold notable cultural significance in New Zealand.

Figure 9: Example of how students revise their work using the rebuttal process
5.3 Summary

The purpose of the current chapter was to investigate how students use feedback in the review process. Most students expected both peers and academic staff to provide them with comprehensive feedback focused on specific directions on how to improve their work. Expectations were largely met through specific advice on how to improve work, including the provision of feedback comments posed as direct questions that required students to rethink their work. Central to students’ responses to feedback, in this case, was the rebuttal letter in which they not only justified rejecting feedback comments, but also provided in-depth discussion on how they would use feedback to revise work. In most cases, students accepted most of the feedback provided to them by staff and students. Having the opportunity to explain how they would use feedback to revise their work seems to be an effective approach in the revision process for these students, as it requires careful thought and consideration, and most students were able to make substantial changes to their work. Dialogue was also critical in helping students engage with the feedback as they spent time with their partners discussing ways in which they could revise their work. The outcome from the findings has wide implications for research on feedback use because it demonstrates that effective curriculum design – such as the use of a rebuttal letter – can facilitate students to actively engage with feedback comments and apply new understanding to revise their work.
Chapter 6- Transfer of peer review skills within and beyond the Ecology programme
6.1 Introduction

The previous chapters have established how students perceived the peer review process (Chapter 4) and described how students produced and utilised comments to revise work (Chapter 5). The current chapter examines how students use their peer review training and experience to improve learning, both within and beyond the Ecology programme. As noted by Mulder et al. (2014b), there are distinct theoretical learning advantages of student peer review. When conducted in a non-threatening environment, the process can allow students to engage in active learning as peer feedback production is a cognitively demanding task that places students in the same context as their teachers when providing feedback (Nicol, 2011). To be truly effective, it has been suggested that students should be able to transfer skills beyond the current task to develop new knowledge and skills with respect to future work (Boud et al., 2013; Knight & Yorke, 2003; Nicol et al., 2014; Sadler, 2010). Within such a context, I ask the question: if peer review has the potential to teach students such skills, then how do students use these skills to improve their overall learning experience in higher education and how might this impact on others?

Within the context of peer feedback, the impetus for developing an understanding of the nexus between the gains of peer review knowledge and skills and its transfer to different contexts is situated in the possibility that having such an understanding will lead to better insights into peer review design (Taylor, 2011; Yang, 2011). However, a problematic aspect of researching knowledge transfer is that it is difficult to prove transfer, leading at least one researcher to claim that “the idea that transfer just ‘happens’ has been so powerful an assumption as to be deemed beyond discussion” (Griffin, 1994p. 134). Within the field of peer review – as discussed in Chapter 2 (Literature Review) – one challenge in terms of peer review skill transfer is
that claims of transfer generally lack evidence. For example, some assert that skills of peer review, such as critical thinking and self-regulation of learning, are generally transferrable (Adachi et al., 2018; Boud et al., 1999; Burke et al., 2005; Topping, 2009), yet these claims lack evidence of how transfer takes place and what the outcomes are. For instance, Topping (2009) argues that involvement in peer review in schools can develop transferable skills for life. In his argument there is no evidence of what forms of transferable skills will be developed or how students will be able to ‘transfer’ them to different contexts. In contrast, there is some evidence that students transfer their peer review experience (see: Cartney, 2010; Harland et al., 2017), but even in these limited cases, the impact of transfer is not fully elucidated.

A second challenge in understanding the concept of transfer within peer review deals with the design of the peer review activity. Investigating how students transfer the knowledge and skills of peer review is made difficult, given the often stand-alone design of the peer review processes (Price et al., 2010). As already discussed in Chapter 2, a key criticism levelled against peer review theory is that virtually all studies review the merits of peer review over a short period (Topping, 2010). It might be questioned if a student will be in a position to transfer their knowledge and skills after a single experience. To develop better insight, Yang (2011) recommended that studies must be carried out over a longer period of time to observe how student transfer operates. It is likely that students will be in better position to transfer their knowledge after cumulative peer review experiences.

Therefore, the purpose of this chapter is to provide a fine-grained account of how students who have been systematically trained in peer review over three years transfer their knowledge and skills, both within and beyond the Ecology programme. To do this,
I first discuss the skills that students perceived were developed as a result of the cumulative peer review experience. In the second part, I use the theory of low and high fidelity transfer to discuss how students transfer their peer review knowledge. The present chapter provides new evidence that students do indeed transfer their peer review knowledge and skills to improve their overall learning experience. It is envisaged that such an understanding may help curriculum developers see the potential of peer review activities as a useful teaching pedagogy.

6.2 Findings and Discussion

This section is structured around the third research question, which asked how students transferred their skills from their Ecology peer review experience, both within and beyond the programme. Two significant themes emerged (Table 10). The first broadly relates to how participation in peer review enhanced a range of students’ skills. The second is concerned with how students then transferred those peer review skills to contexts both within and beyond the programme, and how they improved their overall learning experiences.

Table 10: Themes highlighting how students transferred their peer review experience

<table>
<thead>
<tr>
<th>Themes</th>
<th>Sub-themes</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enhanced skills for Ecology study</td>
<td>Skills development</td>
<td>· Critical thinking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Self-assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Use of marking rubrics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Value of peer review</td>
</tr>
<tr>
<td>2. Transfer of skills</td>
<td>Wider application of skills</td>
<td>· Within Ecology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Outside of Ecology</td>
</tr>
</tbody>
</table>
6.3 Enhanced skills for Ecology study

Consistent with previous research (Boud, 2001; Liu & Carless, 2006; Moore & Teather, 2013), students in the current study emphasised that the peer review experience had a transformative effect on their learning. Students recognised that being engaged in a curriculum in which all core Ecology assessments were embedded with peer review activities was fundamental in helping them re-examine the manner in which they approached their learning. Providing a curriculum space in which students can think and act on choices, for example, carefully thinking about using feedback to revise work and then revising their work, is considered a necessary condition for helping students gain insight into their learning practice (Harland, 2016). It is likely that the cumulative peer review experience afforded opportunities for students to reflect on their learning outcomes:

I think it [cumulative peer review experience] has been an incredibly useful experience because it made me realise what I can do to improve my learning.

(Participant A)

Carless (2018) notes that learner development, that is, helping students develop an awareness of their learning process, is largely dependent on how students make sense of their assessment experience and, more importantly, how they use that understanding to improve their academic performance. When asked if the assessment experience in other courses had a similar effect on their learning, participants reported in the negative and reflected that most assessments were summative in nature. Those summative assessments did not allow students to use feedback to revise work – a stark contrast to the long-term formative, peer-review-led experiences in Ecology assessments. It is understood that students with well-developed insight into their learning practice are
“continuously developing capacities in making sound judgements about academic work, and manage [change] in positive ways” (Carless & Boud, 2018 p.4). This is perhaps why students in the current study were in a position to identify specific skills they perceived were essential in enhancing their learning experience, and which they were also able to transfer to different contexts.

6.3.1 Skill development
Participants reported that the cumulative peer review experience enhanced skills that were essential for them to gain insight into their own learning practice and later transfer to different learning contexts. These skills were included critical thinking, self-assessment, understanding how to apply marking criteria to assess work and the value of peer review for their learning. Of the skills identified, the majority of the students perceived that critical thinking skills were most important for them because it transformed the way they approached their learning:

It (critical thinking) is not about criticising things, but more like thinking things through. Like now I sort of take a moment to think what I am doing and how best I can do it.

(Participant A)

This example resonates with the broader conceptualisation of critical thinking, which is defined as a “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (Facione, 1990 p.2). In simpler terms, this definition suggests that critical thinking is reflective judgement on the ways of believing and doing things (Facione et al., 2000).
In defining critical thinking, Facione (1990) identified a list of skills and sub-skills of an ideal critical thinker (Table 11). This list closely mirrors the student peer review process in which students are, for example, required to “evaluate and make judgements about the work of their peers and construct a written feedback commentary” (Nicol et al., 2014 p.103). As such, I was in a position to ask students to reflect if peer review over the course of three years had helped them to become better at ‘interpreting’, ‘analysing’, ‘evaluating’, ‘inferring’, ‘explaining’ and ‘self-regulating’, and then link the interview data reflections of how they developed as critical thinkers to Facione’s (1990) conceptualisation of critical thinking (Table 11).

Table 11: Features of critical thinking skills based on Facione’s (1990) consensus list of critical thinking

<table>
<thead>
<tr>
<th>Critical thinking characteristics</th>
<th>Critical thinking outcomes</th>
<th>Student reflections (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpretation</td>
<td>· Clarify meaning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>· Ask questions</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>· Decode significance</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>· Examine ideas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>· Analyse arguments</td>
<td>11</td>
</tr>
<tr>
<td>Evaluation</td>
<td>· Assess claims</td>
<td></td>
</tr>
<tr>
<td></td>
<td>· Assess arguments</td>
<td>10</td>
</tr>
<tr>
<td>Inference</td>
<td>· Drawing conclusions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>· Querying evidence</td>
<td>8</td>
</tr>
<tr>
<td>Explanation</td>
<td>· Presenting arguments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>· Justifying procedure</td>
<td>10</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td>· Self-examination</td>
<td>12</td>
</tr>
</tbody>
</table>
From the table above, it is evident that a large majority of the students perceived that their cumulative peer review experience allowed them to become better at interpreting, analysing, evaluating, drawing inferences, explaining ideas and self-regulating their learning. Such an outcome suggests that the cumulative peer review experience allowed students to examine and evaluate their own reasoning process by thinking objectively and logically, which is fundamental to developing critical thinking skills (Facione, 1990). Some students recognised that peer review activities taught them to be critical by changing their attitudes towards how they approached their learning: “I think it (cumulative peer review experience) has made things clearer, like it has made me more conscious of my learning” (Participant D). Similarly, another student reflected that participating in peer review allowed him to rethink the ways in which he approached his assessment task:

Thinking constructively about someone else’s work gave me a better idea of how I needed to construct my report. I saw problems in their work that I found in my work. I often find reading through my own work very difficult, but the review experience was different. It made you think how you might help improve their (peers’) work.

(Participant C)

Both Participants C and D appear to have gained metacognitive awareness of their learning processes, that is, they are able to reflect on their experiences, analyse their actions to draw inferences about their learning, and then use that understanding to engage in self-regulation. Carless and Boud (2018) note that the ability to look at one’s own work in a removed or more objective fashion is a difficult-to-master higher-order skill and requires stepping back from the work and developing a degree of self-reflection skills, which the peer review activities provided. In stepping back and re-examining their own work, students take significant responsibility for their own
learning because they are making a conscious decision about setting specific goals in relation to a task, and then evaluating their progress in reaching that goal (Nicol, 2010a).

In developing as critical thinkers, participants also gained insights into self-assessment skills by developing an understanding of the marking rubric. Research suggests that sometimes there is a misunderstanding of the marking criteria between academic staff and students (Bloxham & West, 2004; Handley & Williams, 2011; Orsmund et al., 1996). In the present study, participants were clear that using marking rubrics in different peer review activities was helpful in developing an understanding of the marking criteria:

In other [courses], we don’t use a rubric. I mean it’s there, but we don’t do anything with it, but in the last [Ecology course] we used it to review the proposals. I think it was helpful because you become aware of how they [academics] mark your work.

(Participant G)

The above example supports the claim that developing an understanding of a marking rubric is a form of tacit knowledge that is sometimes difficult for students to master (O'Donovan et al., 2004). Developing such skills is considered quite complex (Bloxham & West, 2004; Miller, 2003; Orsmund et al., 1996; Sadler, 2010) because it requires the ability to compare actual performance with a standard and then take actions to improve outcomes (Sadler, 2013). By using I rubrics to guide the evaluation of work, students were able to gain insights into how staff used these in assessment.

Further, the combination of the highly structured, but self-directed nature of the peer review process, intertwined with a growing awareness of the impact on learning, led to participants valuing the peer review process as working together for the greater
good of everyone involved. Cartney (2010 p.558) describes such a situation as an example of “academic altruism” (p. 558). Similar to the discussion in Chapter 4, the element of interdependence and, to a certain extent, the altruistic value associated with peer review, were influential factors in how students understood the process. Comments suggest that despite being anonymous, peer review reduced competition amongst students and prompted a feeling of community in which students helped each other for the greater good of everyone:

I feel like it [peer review experience] made me feel a closer connection to my classmates. Even though it [peer review] was anonymous, it just felt good to be working together with others to improve our learning. Like most [courses] are very competitive but here we were working for the common good for everyone [peers].

(Participant C)

… it is not like this is someone’s paper. You don’t know who it is. Critique it and we will mark your critique. It’s more, there was value in our critique where the person who did write it got our feedback and they had to take into account what we said and it was reciprocal as well. It was like there was a kind of community respect in it and I think that was really cool because we were helping each other.

(Participant A)

The above examples reflect a degree of altruism with students caring about each other’s learning (Harland et al., 2017). From the above, it is evident students had a clear understanding that peer review was a learning process for everyone involved in it. This understanding is distinctively different from situations such as students not willing to take on the role of assessors and being distrustful of their peers’ feedback (Cartney, 2010; Liu & Carless, 2006; McConlogue, 2015). Having a cumulative peer review experience was useful in creating a positive environment, but this was a long-term endeavour. Some participants likened the nature of Ecology assessments to peer review...
and understood the logic of this curriculum which required space for the review process:

In Ecology we do fewer assignments but they are quite big. Ecology doesn’t really do small, little things, which I think is different from other [courses]. The focus of the assignments is a lot more on imitating or replicating real life situations and if I go back to peer review, like, we can use skills like critical thinking in these big assignments. I think other courses sometimes focus more on smaller routine assignments that complement lecture material, making it very mundane.

(Participant C)

6.4 Transfer of skills

Having described the skills developed, students then provided insights into how they transferred those skills to different contexts. With respect to how students transferred their peer review skills and knowledge, as discussed earlier in this chapter, the idea of knowledge transfer is a contentious issue, especially considering the competing conceptualisations of transfer. Here, I use the theory of high and low fidelity transfer to provide insight into how transfer of peer review knowledge and skills takes place. To recapitulate, high fidelity transfer includes transfer of knowledge between two tasks that are similar to each other (Anderson, 1982; Woodworth & Thorndike, 1901). In contrast, low fidelity knowledge transfer is said to take place when students use knowledge from one task and apply that knowledge to newer tasks that do not share similarities to the task from which the students initially picked up the knowledge (Bransford et al., 1979; Burke et al., 2005). A key reason for using high and low fidelity was to gain insight into how similarities and differences between tasks influenced transfer. In terms of transfer, students were mindful that they did not receive any specific training about this idea:
It (transfer) is hard to pin down. I mean it’s not like we were trained to do it. I don’t know if it makes sense, but my main motivation for it was to improve work. Like, if I can [improve] my work here, then why not [transfer skills] to stats[istics]?

(Participant D)

Such an example suggests that the motivation for transferring peer review knowledge and skills was an outcome of the cumulative peer review experience, motivated by a sense of responsibility for one’s own learning and a desire for improved work. Being responsible for one’s own learning has been suggested as a necessary condition for learning transfer to take place (Ngeow, 1998; Perkins & Salomon, 2012). It is thought that, if students are able to take responsibility for their learning, then they are in a position to identify their own learning needs and take steps to fulfill those needs (Duchatelet & Donche, 2019). The ability to monitor one’s own learning activities and the results achieved is also broadly consistent with the core skills of critical thinking (Facione, 1990), which may, in turn, lead to both high and low fidelity transfer of peer review skills.

However, being responsible for one’s own learning alone cannot fully explain the motivation for transfer. Some of the participants reported that developing an awareness of the positive outcomes of the peer review experience, including developing their skills of critical thinking and self-assessment, were also mediating factors that led to the transfer of peer review skills:

Looking back, it (peer review) was kind of a drag sometimes, kind of just another thing you have to do for the university. But now I feel the whole thing has been very helpful. I liked the fact that you can kind of apply peer review skills to anything, not necessarily just Ecology, but any sort of research, essays, or writing or things like that, so I guess anyone can use it.

(Participant F)
In the above example, Participant F’s understanding of peer review as a “drag” changed over time as he realised the helpfulness of the process. Prawat (1989) suggests that transfer becomes easier when students are able to recognise opportunities for this. While the Ecology peer review activities did not explicitly teach students about knowledge transfer, the practice of reviewing peers’ work and using the knowledge gained to improve one’s own outcome was certainly explicit.

6.4.1 Wider application of skills
When students were at the beginning of the third year of studies, they were at a vantage point to reflect on how they had transferred their peer review skills and knowledge to contexts within and beyond the Ecology programme (Table 12).

<table>
<thead>
<tr>
<th>Table 12: High and low fidelity transfer of peer review knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transfer</strong></td>
</tr>
<tr>
<td>Within Ecology</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Beyond Ecology</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

From Table 12, it is evident that the predominant form of transfer described was high fidelity transfer of peer review skills. It is likely that high fidelity transfer was
easier to talk about than low fidelity because of the close match between the task in which the student gained the knowledge and a repeat of this experience (Anderson, 1982; Burke et al., 2005). What is implicitly evident from the table above is that all instances of transfer required students to engage in varying degrees of critical thinking characteristics. For example, it can be argued that for a student to use peer review skills to self-regulate work would require the student to be in a position to a) interpret the task at hand, b) analyse his or her past experience, and then c) use that understanding to engage in self-regulation.

6.4.2 High fidelity transfer within Ecology

High fidelity transfer of peer review knowledge within Ecology allowed students to improve their abilities in providing peer feedback. Liu and Li (2014) observed that the success of peer review depends on whether students have the necessary skills to provide valid judgement of their peers’ work, and training is important in helping students understand what is required of them in the review process (Liu & Li, 2014; Min, 2006; Sluijsmans et al., 2002b). At the same time, engaging in multiple peer reviews was a valuable approach as the students were in a position to transfer their peer review knowledge and skills to subsequent peer review activities:

Each student was given a bit of paper and for each person we wrote some feedback. I provided feedback on a couple of books he [peer] could read that were relevant to his study. I realised how valuable such suggestions were, based on my last peer review experience.

(Participant D)

Such an example represents what Carless (2018) described as “closing the feedback loop” (p. 705), that is, using knowledge gained from one task – in this case, peer feedback knowledge – and using it to improve a subsequent task. Closing the
feedback loop is particularly important because students’ experiences of feedback are often disjointed; therefore, helping students develop as ‘effective learners’ becomes largely dependent on students reflecting on a large range of assessment experiences and taking action to improve performance (Carless & Boud, 2018). In the present study, students valued being in a position to provide helpful feedback to their peers, because they felt they had received helpful feedback from their peers in the past peer review activities and felt guilty if they could not provide helpful feedback in return:

Initially, I was always nervous and felt guilty because I wasn’t sure of what to do. I mean we got some really good feedback and I felt bad because I think our feedback wasn’t as good. But I think I am more confident now.

(Participant E)

Having the opportunity to receive quality peer reviews allowed students to develop an understanding of the potential of the review process and learn to provide better feedback.

Further, high fidelity transfer also allowed students to engage in self-regulation of their learning. The ability to engage in self-regulation is one of the key characteristics of critical thinking as it requires students to monitor their thinking by “applying skills in analysis and evaluation [to make] inferential judgments” (Facione, 1990 p.10). It is thought that an effective way of self-regulation is engaging in self-assessment (Nicol & Macfarlane-Dick, 2006). High fidelity of transfer was evident by students who reported that reviewing their peers’ work allowed them insights into what constituted quality, which they were then able to transfer to their own work. Students’ experiences of using insights from their peers’ work and applying it to their own work is not uncommon (Harris & Brown, 2013; Moore & Teather, 2013; Nicol, 2010a). In
the case of the present study, students were able to transfer their skill of self-assessing their work to activities within Ecology, such as writing reports and projects, which students felt greatly improved their work:

I think it [self-assessment] is something I learnt over time. I don’t think I made an effort to check my work in the first year. Most times I think I submitted it as it was. But now I sort of make an effort to check my work before submitting and it has helped a lot to improve my grades.

(Participant F)

Such an example resonates with the broader conceptualisation of double-loop learning as learning that “involves the re-examination of the principles for tackling a task and the subsequent adjustment of values and practices” (Carless, 2018 p.708). This position suggests that, for learning to take place, students must be able to make sense of a wide range of assessment experiences, reflect on these experiences and then use that understanding not only to improve future performance, but also to modify the ways of thinking and acting (Carless & Boud, 2018). In Participant F’s example above, it is clear that the ability of students to change their action (of not checking final assessment pieces before submitting work) was a gradual process developed over time. High fidelity transfer of self-regulation of learning skills, in this case, allowed students to improve academic performance through improved grades.

6.4.3 **High fidelity transfer beyond Ecology**

By being able to reflect on their learning, participants were able to transfer their peer review skills and knowledge to contexts outside of the Ecology courses. The ability to reflect and form reasoned judgements is thought to be central to critical thinking (Quinton & Smallbone, 2010). Reflection allowed students to transfer their peer review knowledge to different contexts. Some reported that being able to reflect on their peer
review experience proved effective in improving their assessment outcomes in non-Ecology courses. For instance, consider the following example:

I try not to take things at face value like what [Ecology academic staff] said. Like, we were doing something on cation exchange process in a soil [course] and I couldn’t understand what was happening. … I went back and did a bit more reading and it helped me grasp the concept. It takes a bit of time, but it makes it easier to understand things.

(Participant A)

It is thought that for successful knowledge transfer, students should be in a position to recognise appropriate transfer situations and then have the motivation to transfer knowledge to different tasks (Marini & Genereux, 1995; Pea, 1987). In the case above, recognising the importance of not taking things at face value in the Ecology peer review experience and then applying that understanding to a course outside of Ecology courses allowed students to develop an understanding of concepts in non-Ecology courses. Importantly, such an outcome suggests that the Ecology peer review experience had given students enough confidence to take ownership of their learning, that is, they were in a position to seek knowledge for themselves. The ability to foster confidence in students about their capacity to take ownership of their learning is a necessary condition to help promote learning (Boud & Falchikov, 2007).

Because some students gained confidence in their own learning abilities, they reported they were able to use their peer review knowledge of marking rubrics and transfer it to non-Ecology courses to improve their assessment experience. As discussed earlier in this chapter, interpreting complex criteria can sometimes be a distinct challenge for students because they may not have the same understanding of the criteria as their tutors (Carless et al., 2006), and developing such capability requires repeated
practise on a range of tasks (Sadler, 2013). In the context of the current study, formative marking criteria were used to determine what constituted quality in peers’ work, as well as students applying that understanding to their own work. This still was then transferred to other contexts:

I had to write an essay for in my philosophy [course] based on an argument presented. The intent of the essay was to create your own argument based on that. Using my reviewing experience, I created a criteria for my essay as no criteria were provided. When reading the draft, I was able to see a couple of points where there were gaps in my argument because I was not meeting the criteria that I created. I remember I had similar issues in my Ecology report, and they [the reviewers] suggested what I could do to improve it so I used it to improve my argument.

(Participant C)

In the above example, peer review had a transformative effect on the student because it changed the manner in which he viewed his learning. In other words, the student was in a position to adapt and transfer his peer review knowledge of criteria to identify deficiencies in his work and then apply his peer review skills and knowledge to rectify deficiencies. A part of transfer of knowledge in this context may have been motivated by what Liu and Carless (2006) described as the salient link between peer review and self-assessment. When questioned about how he created the criteria, given that none were provided, Participant C said that it had been helpful having Ecology academic staff discuss review criteria during peer review training and he was able to connect that knowledge to come up with a new set of criteria.

High fidelity transfer also occurred with friends outside of Ecology. Students reported they did participate in informal peer review activities and that the cumulative experience had transformed the manner in which they did this:
I think I have become more serious when we discuss assignments in the flat. My flatmates think that I am more critical now. Like we were talking about a philosophy essay assignment last week and I was focusing more on connecting ideas, while Tom was talking about structure. It’s a good feeling when your flatmates come to you for ideas.

(Participant C)

My flatmates think I am the go-to girl in the flat for them to check their work. Before I checked grammar and stuff, but now sometimes, I try to help with the content too. They think it is supercool. I think the review experience has been helpful in showing me what I can do. But I have to admit, it is a time-consuming process.

(Participant D)

Knowledge transfer within the above contexts might suggest that some of the Ecology students are aware of their central role in others’ learning. From the above, it is evident that expertise has also allowed the student to focus on content feedback rather than just grammar. The ability of students to be aware of their central role in understanding and transferring their knowledge (in this case, peer review knowledge and skills), as well as having the competency to analyse and explain problems to their peers, are examples of fostering communities of practice (Campione et al., 1995; Lave & Wenger, 1991; Wenger, 1999). These authors argue that knowledge and behaviour in such communities tend to be quite situation-specific, an observation that somewhat aligns with the Ecology students’ views that they take part in informal peer review with friends because “the social aspect of it makes [them] feel good. It’s good to help someone out” (Participant D). This is a similar observation to that made by Harland et al. (2017), who found that students were willing to work for the benefit of their peers without expecting anything in return. A likely reason for students enjoying the social
aspect of it could be they realise that peer review improves learning for everyone involved in the process.

6.4.4 **Low fidelity transfer within Ecology**

Low fidelity transfer within the Ecology courses manifested itself by students developing conceptual knowledge about learning. For example, in order to provide feedback, most of the students claimed to have engaged in additional reading to develop an understanding of the content being reviewed. When describing how they used Ecology peer review skills in different contexts, participants reflected that they realised how helpful reading additional literature material was in developing insights into ecological concepts. Some participants reported making an effort to seek additional literature in different Ecology courses to develop their knowledge:

> One valuable thing I have taken away from it (peer review experience) is I have started to read a bit of papers. [It's] nothing major, just some stuff related to my [course] to boost my knowledge. I am on a scholarship and I have a B+ grade to maintain, so I need to do well.

(Participant E)

This student was aware of the goals he or she needed to achieve and the strategies required to achieve these goals (Sadler, 2010). Such an outcome also exemplifies the idea that if learners want to learn, they need to “become aware of themselves as learners and [should] be able to take responsibility for their own learning trajectories whether in or out of school and over a lifespan” (Deakin Crick, 2007 p.137). Being able to better understand their learning requirements may have made it easier for students to use peer review knowledge in a different context. I argue that low fidelity transfer is what educators should be aiming for in higher education. As discussed in Chapter 1, university courses are designed in modular systems. Gaining valuable skills such as
critical thinking, and applying it to different situations is likely to help students after university, i.e. it may be that students become more critical of how they approach different tasks post-university.

6.4.5 Low fidelity transfer beyond Ecology
Students were able to transfer and adapt their peer review skills and knowledge to improve their assessment experience in other courses they took in addition to the Ecology courses. This finding was not surprising as it is thought that transfer depends on “how the knowledge and skills were acquired, and on how we manage and learn from the adaptation of our strategies and skills to the conflict, between our existing skills and constructs and a new task or situation” (Billing, 2007 p.500). However, the finding provided valuable empirical evidence that students do transfer their peer review skills to different contexts. In the case of the current study, students overcame assignment challenges in other courses by transferring their peer review skills. For example, one participant reflected as follows:

I was very stressed in [another course] because we had weekly reports. I think we have had about seven of them, whereas in Ecology, we had one report the whole semester. Each report was 200 words. We also had to read ten articles for each report. I sought inspiration from my peer review activities so I set up a group in [the other course] with a few students. We all read the papers and then discussed the ideas. Just like the peer review activities, we were able to challenge each other, and it proved very effective in understanding the different concepts to write quality reports.

(Participant A)

It is evident from the above that some students transferred their peer review experience from the Ecology course by modifying it to suit their assessment needs in another course. Such forms of transfer show that learning does not take place in
isolation from students’ other learning activities (Perkins & Salomon, 2012) and that, despite assessments being different in nature, there is potential for learning gains from one task to be transferred to the next. Within this context, assessment activities provide students with prior exposure and practice in order to develop a clear sense of expectations and standards (Sadler, 2002). It is likely in Participant A’s situation that transfer would not have taken place had the student not encountered a challenge in their assessment experience in another course.

Further, low fidelity transfer was also evident in being able to accept criticism in group work activities in other courses. A few participants reflected they had feared criticism and did not like it. Arguably, this is human nature, but participation in the reviews may have allowed students to be more accepting of constructive criticism. Acceptance of criticism from peers is likely to have a greater impact on learning than the assessment task itself (Rust, 2009) and feedback has a powerful effect on what students do (Hattie & Timperley, 2007). For some, it builds their confidence, while for others, it may show their inadequacies. However, in the present study, peer review experiences allowed them to better understand how criticism could be positive:

I learnt that when other people do that for you (criticise), is it helpful and it is a good thing because there is always a temptation to take things personally. You are going to have to open up to feedback and not learn to place your identity in things you have created. Like, I do a bit of art and that has been a huge thing for me to learn because quite often, I will be worried about sharing that, or things like that, because it feels like such a part of me that if people criticise it in any way, it just feels like I am being attacked by someone. So like it [peer review experience] has helped me to open up to others’ critique.

(Participant C)
Students may not be used to being criticised (Higgins et al., 2001) and when they have to give criticism to peers, they have their own past experience at the forefront of their minds. In such a context, Participant C’s experience shows the impact of peer review and the changes this brought about; she was able to transfer her positive attitude towards criticism and connect it to a completely new experience of face-to-face group work:

I think this year has been really interesting because I think I have been more active in my group work in Geology. Before, I sort of struggled a lot because I was shy of criticism, but now I just find it easier to interact with others in the group without the fear of criticism. I think it [review experience] has allowed me to remove my prejudices to provide and receive criticism.

(Participant C)

This finding lends support to the idea that designing a supportive peer review regime may instil confidence in students’ abilities to give and accept criticism (Handley & Williams, 2011; Nicol et al., 2014; Price et al., 2010) and that it has potential to improve students’ overall learning outcomes if they are able to transfer their positive perception of criticism to different learning contexts. Therefore, such an outcome reinforces the idea that low fidelity transfer of learning is motivated by students’ experiences and understanding, and that teaching can be organised to achieve this.

6.5 Summary

This chapter set out to identify how students transferred their peer review knowledge, both within and beyond the Ecology programme. These findings have distinct implications towards the scholarship of peer review, in particular, how the transfer of skills and knowledge takes place. Using the theories of low and high fidelity transfer, it was found that the cumulative peer review experience allowed students to be in a
position to identify different skills, which they had developed as a result of participating in five peer review processes. Students were able to engage in both low and high-fidelity transfer of their peer review skills and knowledge. However, it is important to note that students had a clear understanding of the learning benefits of peer review, as well as a clear understanding of how to apply skills from peer review to improve their learning. While students did not receive any specific training to transfer their peer review skills to different contexts, the motivation to ‘do well’ was influential in promoting the transfer of knowledge and skills.

While different theorists argue that transfer occurs because of factors such as the nature of similarity and differences between tasks (Anderson, 1982; Bransford et al., 1979; Woodworth & Thorndike, 1901), including a perceived similarity and understanding of tasks (Gick & Holyoak, 1987; Katona, 1940), or that transfer is motivated by social contexts (Pea, 1987; Rogoff, 1990), the findings from this study suggest that there are multiple determinants in a complex transfer process. In stark contrast to the claims that transfer of learning “must be cued, primed and guided [as] it seldom occurs spontaneously” (Perkin & Salomon, 1989, p. 20), the findings from the current study highlight that the key determinant of transfer of the peer review skills was the ability of students to self-regulate their own learning and build on all the knowledge or skills of peer review gained over the three years. This form of learning occurs spontaneously in the sense that it was not directly taught.
Chapter 7 - Conclusion

Part One
Asking the questions
- Justifying the research
  - Introduction
  - Literature Review
  - Methodology

Part Two
Study findings
- Addressing the research questions
  - RQ1: experiences and reflections
  - RQ2: responses to feedback
  - RQ3: transfer of skills

Part Three
Concluding the study
- Summary of the main findings
  - Thesis contribution
7.1 Introduction

This case study of Ecology students, who were systematically trained over three years in peer review, has given unique insights into the potential of this educational strategy. The work is in stark contrast to the vast majority of studies that have looked at single experiences of peer review. Just like professional scientific journal article reviewers, novices may conceptualise the process differently compared to experienced reviewers. It may be argued that the more one practises a particular skill, the better one becomes at it; however, equally, there is no guarantee of progress, and mistakes can be repeated. The present study provides a valuable insight because peer review training over the three years gradually took students to an advanced level of skills and abilities. Therefore, the study aimed to address the knowledge gap by providing a fine-grained account of how trained students experienced peer review and used their skills to support their learning, both within and outside the Ecology programme. This study was done by exploring the following research questions:

1. What are students’ experiences of formative peer review?
2. How do students respond to feedback in the review process?
3. Do students utilise their peer review skills outside of the Ecology course? If yes, then how do they do so? If no, then why not?

With the above in mind, I now discuss the summary and conclusions which is then followed by a discussion on the contribution to knowledge made by my thesis. Lastly, I discuss the recommendations for future research. I also provide a final reflection in the epilogue.
7.2 Summary of conclusions

The creation of a course climate, in which giving and receiving peer feedback on specialised knowledge was a normal part of the course culture, greatly improved students’ experiences of the review process. Engaging in repeated review experiences over the course of three years in a single programme allowed students to overcome issues such as anxiety and stress, leading to them becoming more confident in their abilities to provide and utilise feedback. Since they were taught by Ecology academic staff to not take knowledge at face value, and considering that they were reviewing work in a relatively new area, a large majority of the students started to think of peer review as a process of knowledge creation. This perception was due to the fact the providing feedback in different review activities was not a straightforward process.

Unlike a gate-keeping mechanism, peer review in the current study operated like a learning process in which students usually had to develop knowledge of content before providing feedback. While this was not expected by academic staff, the nature of the work being reviewed by the students over the course of three years inculcated this habit. Students recognised that this experience (i.e., engaging in further reading and research to provide feedback) was a time-consuming process, yet they were able to recognise the impact of this effort. Such conditions seemed to help them realise that the review process was fundamental to knowledge creation in which they learnt about the subject of Ecology, gained knowledge of the skills of peer reviewing and gained knowledge of self and others.
Dialogue also played a critical role in helping students construct, understand and utilise feedback. It was noted that students engaged in a range of complex dialogical feedback activities. This included verbal communication with staff and peers to understand task requirements, best practice measures to use feedback to revise work, as well as on one occasion, engaging in written dialogic feedback through written responses indicating how feedback would be used to revise work. In doing so, students not only clarified meaning and assessment expectations, but they also developed Ecological content knowledge. Based on this, a key argument from Chapter 4 is that developing a culture of peer review in a course can have positive benefits for the students. It is recommended that within this culture, students should be engaged in different forms of peer review, as well as multiple types of dialogic feedback. Participating in different forms of peer review and dialogic feedback activities bolstered students’ confidence in their own abilities and, at the same time, helped them realise the benefits of the process. One might question the overall impact of the peer review component on the three-year Ecology programme, but it was clearly a powerful learning experience for these students.

Students learned about reciprocity and co-dependency and began to experience the benefits of effective feedback. It is often said that when a lecturer provides feedback on work, it may not be engaged with by students. However, because peer review was done as a whole class exercise as part of research training, students learned to take it more seriously and engage. Soon the benefits of doing high-quality work became a key rationale for students putting in effort to provide the best feedback possible while engaging carefully with peers’ comments on their own work. Textual analysis clearly showed that students could learn to provide feedback that could be just as valuable as their lecturers’.
The experience of giving and receiving feedback and the rebuttal exercise helped students accept comments based on merit. These abilities were seen as part of the critical side of higher education. Students, in general, expected specific feedback that provided suggestions for improving their work. At the same time, they valued feedback structured in the form of questions and comments seeking further clarification because they claimed it helped them to engage in a process of self-reflection to determine the best way to use feedback to revise work. It may be argued that in addition to the desirable qualities of feedback, such as telling students about the strengths of their work, their deficiencies and suggesting improvements, it should include the use of questions and comments seeking further clarification to encourage a re-evaluation of work. Although the textual analysis was from a single peer review activity, the findings in Chapter 5 demonstrated that students were able to provide quality feedback to their peers.

An important course design aspect that facilitated students’ utilisation of feedback was the inclusion of revising and resubmitting work for final assessment. Such opportunities were considered highly valuable. Considering that most university courses are now modular and semesterised in structure, it is acknowledged that having the curriculum space to revise and resubmit work can be difficult to accommodate with respect to time constraints. However, as evident within the context of the current study, with careful use of space in curriculum planning, such forms of slow scholarship benefitted students’ overall learning by helping them to better understand how to give and receive feedback that resulted in higher quality work.

Given that students participated in five different peer review activities over the course of three years, such an experience provided them with a unique vantage point in
which they could reflect on different skills developed over time. As discussed in Chapter 6, in terms of applying skills within the Ecology course, students claimed that having prior experience was critical in providing quality feedback in subsequent peer review activities. For example, some reflected that they used their earlier experiences to provide feedback to their peers in a third-year oral presentation. In terms of applying skills outside the Ecology course, it was noted that they were able to use these to improve the manner in which they engaged in informal peer review sessions with their friends outside of the Ecology course. Students also used elements of their experiences in other courses, for example, the skill of using a marking rubric to evaluate work. One student even designed a marking rubric in a situation where none was provided.

However, it was evident through the reflections of students that using peer review experience within and beyond the Ecology course was not a straightforward process. The ability to identify and use their experience of peer review to improve their learning outcomes in different contexts was developed over time, indicating that students who experience peer review in a single episode may not have similar viewpoints as those expressed by the participants in the current study. Based on this, a key argument is that developing a culture of peer review and normalising this activity is not only immediately valuable for the student in the course in which peer review is practised, but it also transfers to different contexts outside of the course. Knowledge and skills transfer outside of the context in which it has been learned can be considered crucial to higher-order learning and critical thinking skills. Ecology students (and those from other disciplines) mostly do not graduate and become ecologists. They go onto various occupations and so subject specific knowledge can be seen as less important than the ability to learn, think critically and work cooperatively.
7.3 Limitations of the study

Like all research, my study has limitations. These limitations include the small number of participants, as well as not interviewing academic staff members to explore their experiences of using peer review in core Ecology courses.

The participant numbers were small and determined by who volunteered. However, because of the qualitative nature of this research study, this group of students was able to provide unique, rich, and vibrant insights into peer review. Their experiences allowed this study to make contributions to the literature on peer review, especially in documenting how students with prior experience of peer review experience the review process. The participants represented a range of views but it was not clear if these were representative of the cohort.

The study, like all qualitative research, was shaped by my interpretations and choice of what to emphasise with respect to the research questions. Thus, in this process, ideas that may have been highly valuable to the participant may have been excluded. It is also likely that because these participants volunteered to take part in the study, they might have been particularly proactive and engaged individuals who were more likely to see the value of the peer review activities. One might question if other students (perhaps less motivated to take part) also experienced the same level of skill developed by those who were interviewed. As such, the study could represent only the potential of long-term peer review training.

Students’ descriptions of their experiences may have been better supported with academic staff reflections of their own experience of reviewing student work in the Ecology programme as part of the assessment process.
7.4 Contributions to knowledge

There is currently a lack of research that examines students who are engaged in a culture of peer review. The majority of research is aimed at one-off episodes and so cross-year participation in peer review is very rare. Single episodes make it difficult to gain insight into how engaging in peer review practice improves students’ long-term learning and the potential of this educational strategy. Therefore, the present study addressed this gap by examining the experiences of undergraduate students who engaged in peer review (in a single programme) across all three years of their university education. As such, the study makes three distinct contributions to the scholarship of student peer review.

Firstly, the study adds to the theory by showing how a culture of peer review normalises the practice and influences students’ experience of the process. A key contribution is that it demonstrates how engaging in sequential review activities leads to familiarity, thus reducing issues such as anxiety and stress that are normally associated with initial peer review experiences. In addition, findings suggest that regular participation enables students to develop confidence in making evaluative judgments and in providing useful feedback, thus demonstrating the effectiveness of prior experience and reinforcing the idea that regular participation may help students consider it as a normal part of their education.

The above substantiates the scholarly debate on what constitutes effective peer review design (e.g. Pearce et al., 2009b; Topping, 2010; van Zundert et al., 2010; Wanner & Palmer, 2018) and also addresses concerns about students’ abilities to provide meaningful feedback. Rather than seeing the process as a chore, most students in the current study believed that peer review was a beneficial process of collaboration.
As discussed in detail in Chapter 4, students engaged in additional reading and research, as well as dialogic feedback, to provide and utilise feedback on specialised knowledge. These tasks, when structured as a research activity, led them to believe that their contribution would influence the overall quality of their peers’ work. These perceptions provide a useful insight into students’ feedback experiences, given the importance of all assessment types to students’ overall learning experiences. Students in the current study were able to recognise the usefulness of the peer review (e.g., leading to the development of evaluation skills, deeper knowledge of the subject content and research skills), but it was clearly a gradual process and not straightforward. The finding supports the idea that formative peer review can also be used to ‘demystify’ some of the assessment processes in higher education.

The second contribution of this thesis is that it adds to the scholarly debate on how subject matter and teaching experts compare with students. A common belief is that students and academic staff provide different types of feedback because, unlike experts, students are considered novices in their disciplines and novices in feedback. It has also been suggested that sometimes students are unable to use feedback because they find it difficult to interpret. This thesis adds to the theory by reaffirming the idea that staff and students provide different types of feedback. However, the thesis also demonstrates that, with student experiences of peer review, differences in the impact on learning between staff and student feedback can be minimised. There were instances in which receivers of feedback could not differentiate between academic staff and students, and so used comments based on merit.

Based on their own experiences of reviewing their peers’ work, students were aware of the time and effort it took to produce ‘quality’ feedback. Having such a
realisation was important because it then meant all students in class respected the feedback process. Further, the use of the rebuttal process was also effective in helping students make sense of the feedback and subsequent revisions. The rebuttal allowed them to feel empowered and responsible for themselves and others. Therefore, this particular finding suggests that to make feedback itself a learning experience for students, academics should provide curriculum space in which students can explain their decisions as they revise and resubmit their assignments. Doing so is undoubtedly time-consuming and, as such, will require careful curriculum planning, but as demonstrated by the current study, it is not an impossible feat.

The third contribution of this study is that the findings substantiate the idea that students used their peer review experience to improve their overall learning outcomes both within and outside of the programme. As noted in Chapter 6, students felt it taught them to be responsible for their own learning, to reflect on how they learnt and strategies to improve their learning. Students reported that they used their peer review experience in other courses they took in conjunction with Ecology and also outside of formal study, showing a crucial low-fidelity transfer of learning.
7.5 Recommendations for future research

While the findings of this study extend our knowledge of the potential of student peer review, the study also raises further research questions. Firstly, this thesis indicates that students’ experiences of participation in peer reviews are strongly mediated by their past experiences (or lack thereof). Therefore, the first recommendation for future research is to identify how different types of review training and design can influence student learning. In addition, teachers’ perceptions of these different activities could also be explored, in particular, the effectiveness of longitudinal forms of training.

Second, future research can ask questions about how students use low-fidelity learning to improve outcomes outside of the course in which peer review is initially experienced. One way to do this might be with the use of reflective journal entries over the course of a year in which students can be asked to document their peer review experience and describe situations in which they felt they used specific peer review skills in different contexts, the motivation to do so and the outcomes. It is envisaged that this approach would allow for a nuanced understanding of the transfer of particular knowledge and skills and how these impact on learning.

Third, it would be useful to investigate what factors motivate students to use and to reject feedback. It is envisaged that doing so would provide an understanding of how students bridge the gap between what was provided (i.e., the feedback) and how it is interpreted (i.e., students using or choosing not to use feedback to revise work). Developing an understanding of the different types of feedback that students use and do not use might allow for the creation of better theoretical feedback models that can guide teaching practice.
This study also demonstrated that dialogue played a key role in helping students interpret feedback. New research could look at different dialogic models – verbal, written and reflective – that promote dialogic interaction. This interaction can be between peers, and between peers and staff, as well as dialogue with oneself.

7.6 Epilogue

Working with the same students over the course of multiple semesters forms a degree of familiarity and a relationship of sorts. At the end of 2018, I ‘ran into’ two participants at the University Staff Club. We recognised each other and over coffee, they updated me about their progress. The participants had travelled to Costa Rica to do an independent field trip, had both done a summer internship with local city councils, and had since moved to postgraduate studies (Master’s degrees). Both remained adamant that the feedback experience in the Ecology course had been the best experience they had, and said it was so different from their other courses. They also informed me that some of the students from their cohort had embarked on postgraduate studies, which they felt was a testament to their quest for knowledge.

Now as I sit here, mulling over my (warmish) pint of Emerson’s London Porter and watching the sea fog creep into Carey’s Bay, I wonder if, had it not been for the Ecology course feedback experience as a whole, would the participants in my study have thought about themselves and their learning as they do now? Probably not. Such reflections reaffirm my view that feedback has a powerful impact on learning and that universities and teachers need to value it more. The mainstream feedback theories are reasonably in agreement with this, but it seems to have become a marginalised practice in mass higher education. Restoring it will require space in the curriculum and a
commitment from the academic workforce. I hope my thesis has contributed to a better understanding of this.
References


Boud, D., & Molloy, E. (2013b). What is the problem with feedback? In D. Boud & E. Molloy (Eds.), *Feedback in higher and professional education: understanding it and doing it well* (pp. 1-10). New York: Routledge.


Campione, J., Shapiro, J., & Brown, A. (1995). Forms of Transfer in a Community of Learners: Flexible Learning and Understanding. In A. McKeough, J. Lupart, & A. Marini (Eds.), *Teaching for Transfer: Fostering Generalization in Learning* (pp. 81-149). New Jersey: Routledge.


Ivanic, R., Clark, R., & Rimmershaw, R. (2000). What am I supposed to make of this? The messages conveyed to students by tutors' written comments. In M. Lea & B. Stierer (Eds.), *Student writing in higher education: new contexts* (pp. 47-65). Buckingham: University Press.


Sadler, D. R. (2013). Opening up feedback: Teaching learners to see. In S. Merry, M. Price, D. Carless, & M. Taras (Eds.), *Reconceptualising feedback in higher education: Developing dialogue with students* (pp. 54-63). Oxfordshire: Routledge.


180


Appendices

Appendix A - Information Sheets

Information Sheet for Participants

Improving Students’ Feedback Experience in Higher Education: A Formative Peer Review Perspective

Thank you for showing an interest in this particular project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, I thank you. If you decide not to take part, there will be no disadvantage to you, and I would like to thank you for considering my request.

What is the aim of the project?

Formative peer review plays an important role in helping students enhance their learning experience in higher education. The aim of this project is to develop a better understanding of how peer review is used in higher education, especially in a context when students get to experience peer review over an extended period of time and in your context – the entire duration of your undergraduate ecology courses. Published research in the field of peer review has largely reported of students’ experiences from singular episodes of peer review. Therefore, the key aim of my project is to understand how students’ perceptions of multiple experiences of peer review.

What type of participants are being sought?

I am looking for participants who currently taking ECOL 212 and those who will take ECOL 313 in the third year. Considering that the project is focused on students’ experiences in multiple episodes of peer review, I am looking for those students who
can avail themselves to take part in two semi-structured interviews – one after the ECOL 212 peer review activity and the other one after the ECOLO 313 peer review activity in the third year.

**What will participants be asked to do?**

Should you agree to take part in the interview phase of the project, you will be asked to be involved in two semi-structured interviews during September 2017 and May 201. Each round of interview will last approximately 45 minutes to an hour. Please be aware that you may decide not to take part in the project without any disadvantage to yourself.

**What data will be collected and what use be made of it?**

Interview data will be securely stored in such a way that only those mentioned below will be able to gain access to it. Data will be retained for at least 5 years in secure storage. Any personal information held on the participants may be destroyed at the completion of the research even though the data derived from the research will, in most cases, be kept for much longer or possibly indefinitely. The results of the project may be published and will be available in the University of Otago Library, but every attempt will be made to preserve your anonymity. You will be given opportunity to view the data or information that relates to them after the completion of the research and before any public dissemination of the findings (including conferences and/or publications).

**Can participants change their mind and withdraw from the project?**

You may withdraw from participation in the project at any time without any disadvantage to yourself.
What if participants have any questions?

If you have any questions about the project, either now or in future, please feel free to contact either:

Krishneel Krishna Reddy
Higher Education Development Centre
03 479 6360
krishneel.reddy@postgrad.otago.ac.nz

Prof. Tony Harland
Higher Education Development Centre
03 479 8136
tony.harland@otago.ac.nz

This study has been approved by the Higher Education Development Centre. However, if you have any concerns about the ethical conduct of the research, you may contact the University of Otago Human Ethics Committee through the Human Ethics Committee Administrator (03 479 8256). Any issues raised will be treated with confidence, investigated and you will be informed of the outcome.
Improving Students’ Feedback Experience in Higher Education: A Formative Peer Review Perspective

Thank you for showing an interest in this particular project. Please read this information sheet carefully before deciding whether or not to allow for your work to be used as part of my research. If you decide not to allow for your work to be used in my research, there will be no disadvantage to you, and I would like to thank you for considering my request.

What is the aim of the project?

Formative peer review plays an important role in helping students enhance their learning experience in higher education. The aim of this project is to develop a better understanding of how peer review is used in higher education, especially in a context when students get to experience peer review over an extended period of time and in your context – the entire duration of your undergraduate ecology courses. Published research in the field of peer review has largely reported of students’ experiences from singular episodes of peer review. Therefore, the key aim of my project is to understand how students’ perceptions of multiple experiences of peer review.

What am I collecting?

I am interested in collecting your ECOL212 draft research proposals, your rebuttal response, and your revised proposal. I am also seeking to collect your review feedback that you provided to your peers.
What will participants be asked to do?

Should you agree to let me use the documents identified above, I will make arrangements with the ECOL212 coordinator to collect the required documents.

How will data be used?

I will analyse the data using a feedback coding system to determine the type of feedback provided to students and how students responded to that feedback to revise work. All names and identifiers will be removed.

Can students change their mind and withdraw their approval for me to use their documents?

You may withdraw your any time without any disadvantage to yourself.

What if participants have any questions?

If you have any questions about the project, either now or in future, please feel free to contact either:

Krishneel Krishna Reddy
Higher Education Development Centre
03 479 6360
krishneel.reddy@postgrad.otago.ac.nz

Prof. Tony Harland
Higher Education Development Centre
03 479 8136
tony.harland@otago.ac.nz

This study has been approved by the Higher Education Development Centre. However, if you have any concerns about the ethical conduct of the research, you may contact the University of Otago Human Ethics Committee through the Human Ethics Committee.
Administrator (03 479 8256). Any issues raised will be treated with confidence, investigated and you will be informed of the outcome.
Appendix B - Consent Forms

Consent Form - Interview

*Improving Students’ Assessment Experience in Higher Education: A Formative Peer Review Perspective*

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:

1. My participation in the project is entirely voluntary;
2. I am free to withdraw from the project at any time without any disadvantage;
3. Personal identifying information will be removed after collection and destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in a secure storage facility for at least five years;
4. This project involves semi-structured interviews. The general line of questioning involves exploring students’ experiences of multiple peer review activities, its impact on how students use feedback to revise their work and finally, on how students use transfer their peer review skills to improve their overall learning experience. The precise nature of the questions which will be asked has not been determined in advance, but will depend on the way in which the interviews develop and that in the event if a line of questioning develops in such a way that I feel hesitant or uncomfortable, I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind.
5. The results of the project may be published and will be available in the University of Otago Library, but every attempt will be made to preserve my anonymity.

I agree/disagree to take part in this project. (Tick to indicate your choice)

<table>
<thead>
<tr>
<th>Signature of Participant</th>
<th>Name of Participant</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>..................................</td>
<td>..........................</td>
<td>......</td>
</tr>
</tbody>
</table>
I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:

1. My participation in the project is entirely voluntary;
2. I am free to withdraw my approval from the project at any time without any disadvantage;
3. Personal identifying information will be removed after collection and destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in a secure storage facility for at least five years;
4. The results of the project may be published and will be available in the University of Otago Library, but every attempt will be made to preserve my anonymity.

I allow/disallow for my ECOL212 work to be used in this project. (Tick to indicate your choice)

Signature of Participant   Name of Participant   Date

……………………….   ………………………   ……
Appendix C - Ethics Application

University of Otago Human Ethics Committee
Application Form: Category B
(Departmental Approval)

1. University of Otago staff member responsible for the project
   
   Surname   First Name   Title
   
   Harland   Tony   Professor

2. Department/School:
   Higher Education Development Centre

3. Contact details for the staff member responsible:
   tony.harland@otago.ac.nz

4. Title of the project:
   Improving Students’ Feedback Experience in Higher Education: A Formative Peer Review Perspective

5. Indicate type of project and names of other investigators and students:
   Staff Researcher: Dr. Rob Wass (Secondary Supervisor)
   Student Research: Krishneel Reddy (Doctoral Candidate)
   Level of Studies: PhD

6. When will recruitment and data collection commence?
   - Participant recruitment will commence from 6th September 2016. Once participants have been recruited, data collection will commence. During the month of September and October 2016, first rounds of interviews will be conducted. Then after a lapse of 5 months, the second round of interviews will be conducted in March 2017.
   - Peer reviews, rebuttal responses, draft and final research project of ECOL212 students will also be collected after the end of ECOL212 paper.

7. Brief description in lay terms of the aim of the project, and outcome of the research questions that will be answered (approx. 200 words)
   Formative peer review plays an important role in helping students enhance their learning experience in higher education. The aim of this project is to develop a better understanding of how peer review is used in higher education, especially in a context when students get to experience peer review over an extended period of time and in
your context – the entire duration of your undergraduate ecology courses. Published research in the field of peer review has largely reported of students’ experiences from singular episodes of peer review. Therefore, the key aim of my project is to understand how students’ perceptions of multiple experiences of peer review by answering the following research questions:

i. What are students’ experiences of student peer review?
ii. How do students engage with feedback in the review process?
iii. Do students utilise their peer review skills outside of the Ecology paper? If yes, how so? If not, then why not?

8. Brief description of the method:

This research is embedded in a qualitative framework that attempts to understand how students experience multiple episodes of peer review. Data collection will be through semi-structured interviews and document analysis. The University of Otago has an established programme in Ecology that uses formative student peer review over the course of three years. Participants will be recruited from the programme and interviewed after three experiences of peer review in 1st and 2nd year followed by a second round of interviews after the fifth peer review experience in the 3rd year.

9. Disclose and discuss any potential problems:

The main supervisor, Prof. Tony Harland is a lecturer in the Ecology programme. During a lecture, Tony will announce the project and students will be invited to volunteer by using a form (Appendix A) in the notice board. Student will be informed that in no way will Tony be able to identify any student from their consent forms and interview transcripts and that they will no way disadvantage themselves by not taking part in the interviews.

Applicant’s Signature: …………………………………..

Name: ……………………………………………

Date: ………...

The signatory should be the staff member detailed at Question 1

Action Taken

☐ Approved by HOD

☐ Approved by departmental Ethics Committee
☐ Refered to UO Human Ethics Committee

Signature of **Head of Department:  ……………………………………….

Name of HOD (please print):  ……………………………………….

Date:  ………

**Where the Head of Department is also the Applicant, then an appropriate senior staff member must sign on behalf of the Department or School.

Departmental approval: I have read this application and believe it to be valid research and ethically sound. I approve the research design. The research proposed in this application is compatible with the University of Otago policies and I give my approval and consent for the application to be forwarded to the University of Otago Human Ethics Committee (to be reported to the next meeting).

IMPORTANT NOTE: As soon as this proposal has been considered and approved at departmental level, the completed form, together with copies of any Information Sheet, Consent Form, recruitment advertisement for participants, and survey or questionnaire should be forwarded to the Manager, Academic Committees or the Academic Committees Administrator, Academic Committees, Rooms G22, or G26, Ground Floor, Clocktower Building, or scanned and emailed to either gary.witte@otago.ac.nz or jane.hinkley@otago.ac.nz

194
Appendix D - Interview Protocols

Interview Protocol

Interview One

1. What do you understand by term ‘student peer review’?

2. How has your experience been like in the review process over the last two years?

3. What type of training did you receive prior to taking part in peer review activities?

4. What are some of the challenges you faced when taking part in the peer review process?

5. What are your feedback expectations from peers and staff?

6. How did you engage in constructing feedback for your peers?

7. What did you do to use the feedback provided by your peers and staff?

8. What effect do you think that feedback had on your work?

9. What kind of feedback did you find more useful?

Interview Two

1. What type of skills do you think you developed as a result of participating in the review process during these three years?

2. Do you think that peer review helped you develop any of the following skills: ‘interpreting’, ‘analysing’, ‘evaluating’, ‘inferring’, ‘explaining’ and ‘self-regulation’ (If yes, then how so)?

3. Did you transfer the skills learnt from the review experience to other contexts?
4. What impact did the cumulative peer review experience have on your learning journey?
Appendix E - Prompts and probes

- Can you provide an example, please?

- What do you mean by ….?

- You stated that …. – can you describe it further please?

- Why is that so?

- That is interesting – can you elaborate a little more please?
Appendix F- Paper sent for review

Student peer review as a process of knowledge creation through dialogue

Abstract

This study contributes to a better understanding of the potential of student peer review in higher education by examining how repeated practice influences student learning. The study investigated the experiences of undergraduate science students who were systematically trained in peer review over three years. Twelve were interviewed at the end of their second year and then again in the middle of the third year. It was found that multiple experiences had a positive influence in shaping and embedding a culture of peer review in the programme. The reviews used both formal and informal dialogic processes, and through these, students developed an advanced skill set that enabled them to provide and utilise quality feedback. Students saw peer review as a type of research inquiry that led to a deeper understanding of a) disciplinary knowledge, b) being a peer reviewer, c) knowledge about self and d) knowledge of others. These results have implications for the theories of peer review and feedback, and for specific teaching approaches across higher education.

Krishneel Reddy*, Tony Harland, Rob Wass and Návé Wald
Higher Education Development Centre, University of Otago, Dunedin, New Zealand.
*krishneel.reddy@postgrad.otago.ac.nz

Keywords: peer review, curriculum design, feedback, dialogue, undergraduate students

Introduction

It is generally accepted that student peer review can be a useful formative assessment method that provides feedback to improve the overall learning experiences (Mulder et al., 2014a; Topping, 2009). Furthermore, it is seen as an important academic and professional skill (Liu and Carless, 2006; Nicol et al., 2014). Formative peer review has a number of benefits. For example, Harland et al. (2017) showed that with good support and training, undergraduate ecology students were able to provide a valuable contribution to their peers’ learning and to their own educational experiences. Similarly, in a paper describing how peer review was used as part of a major assessment for a third-year social studies unit, the majority of the students had a positive experience and felt it had helped to direct their learning (Moore and Teather, 2013). However, not all research has been so positive. For example, when investigating how peer review was perceived by students in a master’s-level programme, some complained bitterly about the exercise being a waste of time. In this case, students felt that peers were unable to adequately identify errors in the submitted work (Brammer and Rees, 2007). Similarly, Evans (2015) showed that peer review did not provide equal benefit to all as the quality of feedback varied between students. In one pre-post-
test study, student expectations of what peer review could achieve were much higher before the experience (Mulder et al., 2014b), but in another it was reported that students who were not initially confident were more positive after completing the review (Cheng and Warren, 1997).

These complex and sometimes contradictory research outcomes call for a better understanding of the potential of student peer review and more insight into its design, particularly with respect to how students develop an understanding of its requirements and potential for learning (Evans, 2015; Mulder et al., 2014b). One challenge for the field is that most of the reported studies on peer review in undergraduate education have examined students’ perceptions and experiences of one-off events (Ashenafi, 2015). The problem here is that novice reviewers may conceptualise the process differently when compared to those with experience, as illustrated in the professional academic journal review process (Callaham and Tercier, 2007). Students who undertake peer review are unlikely to have the required knowledge and skills to provide the quality of feedback expected of an expert, and of course it is doubtful if these can be developed through a single encounter. In a study that tracked master’s students giving several rounds of feedback on a research proposal, the level of sophistication of comments gradually increased (Wen and Tsai, 2008). These data suggest that if the full benefits of peer review are to be realised, then students must be adequately prepared and provided with opportunities to practice (Vu and Dall’Alba, 2007; Boud, 2001; Strijbos et al., 2010), and there have been calls to provide novice students with appropriate training (Sluijsmans et al., 2004; Liu and Li, 2014).

A second challenge concerns the quality of student learning outcomes in relation to how review feedback is provided. Rather than end the process with written comments on student’s work, Nicol (2010) suggests that feedback quality will be improved through dialogue. This author contrasts feedback as a monologue with the dialogic approach proposed by Laurillard (2002). In her approach, to be effective, dialogue should be iterative, adaptive, discursive and interactive. Similarly, Carless et al. (2011) define dialogic as ‘interactive exchange in which interpretations are shared, meanings negotiated, and expectations clarified’ (397). However, apart from exchanging ideas, the difference between monologic (one-way) and dialogic feedback is not always clear and the boundaries between them tend to be fuzzy. Nicol (2010) reasons that dialogic feedback is a two-way process but also mentions ‘impoverished’ and ‘fractured’ dialogue (503) which leaves the door open for interpreting what exercises can truly fit under either of these labels.

Presently, neither of these alternatives solve all the practical problems of how to work with feedback. For example, a comment can be either monologic or dialogic, depending on how it is written and how it is received. When feedback is on work that involves complex and subjective knowledge forms (e.g. an essay, a research project or a case study), interpretation is necessary, and in a Bakhtian sense, the reader is prompted to engage in active self-dialogue aimed at making sense of the comments. Furthermore, a teacher or peer can alter the form of their feedback to steer the recipient in different directions; either to acceptance of a comment or to further thinking. Feedback may also be more effective when it includes both monologic and dialogic forms, and if this assertion is correct, then it may not always be appropriate to privilege one above the other, as both will have a place in learning. That said, the opportunity
and space for dialogue, especially when it involves speaking and listening in a social setting, clearly has a major impact on student learning (Nicol, 2010). Nevertheless, Zhu and Carless (2018: 886) argue that we still know very little about the role of dialogue within the peer feedback process.

Given such complexity, students who undertake peer review will not have the required knowledge and skills to provide the quality of feedback expected of an expert and, of course, it is doubtful that these can be developed through a single experience. Consequently, this case study aims to address these challenges by examining how training and experience in systematic peer review influence students’ perceptions of the process and their learning. To acquire new insight into theory and practice, and to address the issue of providing quality feedback, we asked students who had experienced multiple peer reviews for their reflections on the process and outcomes, and on the role that dialogue played. By focusing on the structure of peer review (Baker, 2016) and the experiences of students in giving and receiving feedback, we provide the learner’s perspective. Our aim is to contribute to knowledge that will help in the design and incorporation of student peer review into teaching and curriculum.

The study

The focus of the research is the undergraduate ecology degree programme at the University of Otago, a research-intensive university in New Zealand. In the ecology programme students are immersed in research training from the start of their first semester at university through a variety of long-term research projects (Wald and Harland, 2017). Formative peer review is embedded in each year of the curriculum (Harland et al., 2017) and by the time students are in their third year, they have experienced five instances of this. In order to train students, they are taught directly about peer review and supported in the first four exercises with a rubric containing the marking criteria that describe the quality of work. Each peer review experience builds in complexity, and expectations change with respect to the quality and sophistication of feedback. All exercises have a dialogic component in that (1) written comments are always supported by discussion in some form, and (2) students always have the opportunity to make changes to improve the quality of the assessed piece.

The main focus of the research reported here is on peer review in the second and third year. At the end of second-year, student pairs designed a research project and wrote a research grant proposal for a project that was to be carried out in the third year. Each proposal was sent to two peers and two lecturers for double-blind review. Students worked with their research partners and applied a set of criteria to help them make formative judgements about their peers’ work. After receiving the four reviews, each pair discussed the outcome with each other and then wrote a rebuttal letter to justify their acceptance or rejection of all comments. Then, after making amendments to the original, the revised grant proposal and the rebuttal and were submitted for formal assessment. In June 2016, this activity took just over one month to complete and saw the production of 19 draft research proposals, 76 peer reviews, 19 rebuttal letters, and 19 revised proposals. In 2017, students, now in third year, carried out the research in the field and during this period used peer review in five hour-long small group tutorial discussions. Later, they presented their preliminary research findings at a symposium. Each project was discussed and presenters were provided with written feedback from two peers and two staff members. The symposium review helped students revise a draft research report which was then handed in for grading.
The findings reported here are based on two rounds of interview data with the same 12 students. The first was after the month-long review activity, and the second after the symposium feedback in the third year. The interviews were semi-structured and designed to elicit experiences of peer review and how it had influenced their learning. There were two main research questions. The first asked students about their experiences of repeated engagement with peer review, and the second about their reflections on role of dialogue in feedback. Each interview lasted approximately an hour and all were audio recorded and transcribed verbatim. A systematic analysis of the transcripts was carried out using a general inductive approach (Thomas, 2006). Patterns and trends helped to develop insights that were manually coded. Repeated reading of transcripts led to saturation of ideas. The emergent themes and sub-themes were then refined in relation to the main research questions and aims. The analysis showed very little difference between each set of twelve interviews and so we have combined the data from the two rounds to present a qualitative account that represents a group of students who experienced a rich culture of peer review. It is worth noting here that there were three conditions that were key to both conducting the study and interpreting the data. These were:

1. Teachers set out to create a culture of peer review

2. Students understood they were being systematically trained in peer review and the rationale behind it

3. Student reflections were based on cumulative experience from a number of peer review exercises

With regard to the broader context, peer review in the ecology programme is part of the ethos of training students as researchers (Wald and Harland, 2017). Research training helps to internalise the value of peer review, not as a gatekeeping mechanism, but as a practice within a community of researchers that seeks to improve the quality of knowledge (Eisenhart, 2002). Boud (2000) made a similar recommendation to normalise the practise of peers giving and receiving feedback as part of the educational process. Under examination here is an expansion of this idea to a whole degree programme that sets out to educate students as collaborative learners and researchers. Putting all these conditions together gave participants a distinct vantage point that allowed them to judge whether the theoretical or anticipated benefits associated with peer review materialised in practice.

Findings and discussion

All students recognised the importance of multiple experiences of peer review and the crucial nature of dialogue in developing quality learning. These outcomes are discussed below in sections 1 and 2, followed by a third section on ‘knowledge creation’, a theme identified as critical for understanding the potential of peer review.

1 Valuing peer review
Students clearly valued their peer review experiences and this was a critical component in helping them to develop feedback expertise and understand the value of peer review. Starting peer review in their first year had given students enough time for incrementally acquiring a high level of skill that could be used throughout and beyond the degree programme in other novel situations. Participating in multiple review activities is known to help students make better judgements and overcome initial difficulties or reluctance associated with giving feedback (Wen and Tsai, 2008). Orsmond and colleagues noted that in order to develop the level of skills and attitudes required in peer assessment that: ‘Students need time, experience and support [ ] Time to reflect and develop skills and understanding, experience to be able to make qualitative judgements and support to reassure the student during the learning process’ (Orsmond et al., 2000: 35, emphasis in original). In ecology, students reported that having peer review as an integral part of the curriculum and as a formative assessment process helped them understand its value because the feedback led directly to improved learning and, importantly, improved grades. Being integral led to the development of a culture of peer review and it has been suggested that an appropriate atmosphere for peer interaction is a necessary condition for all forms of peer feedback (Liu and Carless, 2006; Boud, 2000).

Students were mindful they were being trained as peer reviewers and undergoing a lengthy process with expectations that skills would improve and become more advanced over time (Topping, 2010; van Zundert et al., 2010). For some, however, formal training was not enough in itself to develop sufficient depth of understanding: ‘He (academic staff) ran through an example (of how to do peer review) but that’s not training, I’d say’ (Participant D). Students’ skills were improved mainly through cumulative experience: ‘it took a few rounds of it (peer review) for me to realise that I did have the ability to give feedback and criticise things in a helpful way’ (Participant A). This outcome suggests that training alone, or participating in single peer review experience, may not be enough for students to engage meaningfully with the review or provide the quality of feedback that students are capable of. Rather, a combination of training within a number of peer review activities seemed to be very effective. There were other advantages reported from repeated exercises, for example, as skills developed the initial stress experienced by students was alleviated:

Yes, if I go back to the first experience, I was stressed. I felt it was not my role to do it [the review] because I was not qualified enough. Now, I can see the benefits of it and do not feel as stressed as before.

(Participant E)

Multiple experiences also allowed students to develop familiarity with the process and there was developing awareness of what teachers expected the outcomes to be. Familiarity is not something associated with one-off review events.

I became more confident in my decisions based on my experience and practice. I was able to make better judgements because I knew how to make use of the marking criteria.
Students’ confidence in their own review abilities was clearly demonstrated in the large second-year review exercise in which they examined peers’ research proposals on subjects within ecology but on topics that they had little or no prior subject knowledge. While the novelty of the proposal initially evoked concern, all students who took part in the study were able to draw on prior experience for this task:

It was a bit intimidating, but overall, it was a good experience because I was able to use my past knowledge and experience of the review process to do the review.  

After the exercise, there was a positive shift in attitude towards peer review that was largely attributed to students becoming even more self-assured, especially in relation to how they structured their feedback and the confidence that they could recommend meaningful changes. Students saw value in ‘helping [their] peers improve their learning’ (Participant D) and recognised a degree of altruism in the class. High value was placed on receiving feedback on drafts while at the same time working for the benefit of others. When asked what they understood by good feedback, students responded by suggesting that it was something that improved the quality of their draft work, much in line with expectations from a good peer review in a journal setting (Ware, 2011).

The diversity of feedback that students usually received was also valued and this has been recognised as one of the benefits of using multiple reviewers (Pearce et al., 2009). One student reported feedback was of quality when comments made by staff and students were similar, an important observation since all feedback was anonymous. Previous research in ecology peer review found that while students claimed they could identify who provided the feedback and that they would prioritise advice from lecturers, they actually took ‘whichever comment made sense to them, regardless of who had made it’ (Harland et al., 2017: 806). This outcome showed that by the end of their second year, students were able to judge comments for their value, rather than according to who might have made them. Such a level of appreciation of feedback and of confidence to accept or reject advice, even when provided by subject experts, may at least in part be attributed to experience.

2 Dialogue in peer review

Participants were clear that their experiences of giving and receiving feedback in the ecology programme were different from those in the other subjects and courses they studied. This difference was mainly attributed to the repeated exercises, but also to the circumstance that reviews involved both written communication and verbal discourse. One of the key factors in effective student feedback is oral communication between students (van den Berg et al., 2006) that clarifies meaning in written comments (Blair and McGinty, 2013; Orsmond and Merry, 2011). We understood this type of peer review as ‘dialogic’ and follow O’Connor and Michaels (2007) who also argue for equal social relationships, an openness to new ideas, critique and creative thought in the peer review process. If these constructs are contrasted with the double-blind academic
peer review typical of the journal process, this tends to be less dialogic because it is
associated with the transmission of ideas and with status inequalities (Nicol, 2010).

In a study of dialogic approaches to feedback, Carless et al. (2011) clearly
demonstrated the benefits of this interactive process over one-way communication.
Orsmond et al. (2005: 370) found that ‘what students really seek is a dialogue with
tutors about their work rather than written feedback.’ In the present study, students
received written feedback and then the opportunity to discuss this before revising their
work. It was reported that engagement helped to clarify doubts, negotiate other’s
expectations and enhance revisions. Students were able to identify a number of
different kinds of dialogue related to feedback. For example, in the fourth exercise
feedback was through face-to-face discussion:

> It (verbal feedback) was pretty scary but it was a good
> challenge. It was good to ask them as well, like it wasn’t one
> way. You can ask them to explain if you did not understand
> what they were saying.
>
> (Participant B)

In this case the review was not anonymous, however, the major exercise at the end of
the second year mirrored the professional double-blind journal setting. Our findings,
supported by those of a previous study (Harland et al., 2017), offer two critical lessons.
First, a dialogue between reviewer and reviewee is not the only possible option and
other students and teachers can fulfil this role. The data showed that there was much
discussion between research partners about feedback received and about the reviews
they were doing:

> I found that talking with my partner helped us to decide how we
could use feedback. Like sometimes, it was quite difficult to use
feedback but in this situation, having a partner was helpful.
>
> (Participant A)

This example resonates with a broader conceptualisation of dialogue as a ‘two-way
process that involves coordinated … interaction as well as active learner engagement’
(Nicol, 2010: 503). Nicol extends the idea of dialogue to include a Bakhtin ‘inner
dialogue in students’ minds’ (2010: 504), in which case it need not involve two people.
If accepted, such a position would render all exchanges as dialogic and is less helpful
when trying to understand student discussion about written feedback. In the present
study, students reported that discussion with others was empowering as it gave them
greater ownership and responsibility for their learning and helped with the uptake of the
written feedback. Findings also revealed that students talked to their peers when acting
as reviewers, even when they were expected to review something on their own. The
discussion was not only seen as a necessary part of the review itself but was also
essential to the development of peer review skills. This reliance on others strongly
suggests that students benefited from collaborations.

Students also valued non-verbal forms of dialogue, the most notable example
being the rebuttal letter in the second-year peer review activity. After receiving
feedback, they had to respond to all feedback comments by explaining how they either
rejected or incorporated these in their revised drafts. In cases where feedback was
rejected, a written justification had to be provided.
I valued the opportunity to defend my work [through the rebuttal]. I valued it in a way because, for instance, you could find shortfalls in your text, strengthen it but also keep the parts that were quite necessary, even if the reviewers thought otherwise.

(Participant C)

The notion of ‘defending’ one’s work is interesting. Students always have a choice when it comes to adopting feedback, but the rebuttal forced them to take responsibility for their decisions and, most importantly, to think about them carefully. Students saw the benefit in this exercise and it has been demonstrated that when they are able to respond to written feedback by providing an opinion, they also gain greater metacognitive awareness, resulting in enhanced performance (Kim, 2009). The rebuttals also clearly demonstrated that students were capable of addressing deep issues relating to subject knowledge, and not just surface matters of language or structure (see Zhu and Carless, 2018).

The cumulative effect of peer review experiences with the different kinds of dialogue meant students worked closely with peers and academic staff to generate reviews and revise work. Ultimately, this resulted in closer and more equal relationships between learners and helped in the formation of what we would regard as a community of practice (Wenger, 1998). This community was instrumental for the establishment of a culture where students would not only feel safe but have an obligation to engage in dialogue for giving and receiving feedback.

I guess it is our initiative to make it helpful as you also get feedback. I mean it was quite amazing when really helpful suggestions were given [ ] They went out of their way to provide alternative references, and it seemed like they had gone and looked into it [ ] It was immediately helpful, and it was nice to be helped that way.

(Participant B)

Through repeated review exercises and training, students experienced what is required for effective feedback, in terms of knowledge, the type of feedback necessary and a commitment to the process. In turn, this required an appreciation of the positive impacts that feedback can have one’s own work. This understanding of peer review, especially when practised as part of an authentic research curriculum (Wald and Harland, 2017), resulted in students having a strong sense of being able to help others, with gratitude for the feedback they received in return.

3 Knowledge creation

Regardless of other outcomes, students recognised that new knowledge was fundamental to peer review. At times this was articulated explicitly but mostly it was implicit in the interview responses. Overall, knowledge creation was a key motivator for students and four categories were identified. These were knowledge of the subject, knowledge of peer review, knowledge of self and knowledge of others (Table 1). All
domains were regarded as important and together they can help in understanding the epistemological potential of student peer review.

Insert table 1

**Knowledge of the subject**

All review exercises were aimed at creating new knowledge as an integral part of training students as researchers. However, since they worked on a range of ecological inquiries and asked authentic research questions (for which there were no known answers), it was recognised that students would likely have limited subject knowledge when it came to the peer review exercises. To make appropriate evaluative judgements students need background subject knowledge (Sadler, 2010) and since most lacked this, they had to learn about the subject before providing feedback:

I read three articles and [the research partner] read three key articles. We then discussed what we understood about the topic. I mean it wasn’t full-on in-depth knowledge or anything, but we wanted to make sure that we had a bit of background knowledge before we reviewed their work.

(Participant A)

The care and time required to do this background work showed that reviewers took the task seriously and accepted a measure of personal responsibility for their work. The additional research was not initially part of peer review training nor had there been any staff expectation for this. It happened because students were steeped in a culture of research, had the skills and ability to inquire into new areas and valued their peer’s learning. Although students can provide valuable feedback without training and with very limited subject knowledge (Cho et al., 2006; Cho and Macarthur, 2010), such practice is unlikely to realise the full potential of a review that requires subject expertise. The importance of turning to the literature for ensuring knowledgeable reviews was also echoed from the position of feedback recipients. Review comments needed to be convincing and supported with evidence, both of which were associated with the quality and accuracy of the review:

When it comes to judging the accuracy of the feedback, I guess it really depends on the level of feedback they are giving me. I mean, if I think it is wrong, then I would go and research the reasons provided.

(Participant B)

This quote shows a second cycle where the reviewee returns to the literature to check on comments. One student said ‘we are taught not to take things at face value. Everything has to be evidenced’ (Participant F). The practise of conducting further research was certainly encouraged by the inclusion of the rebuttal at the end of the
second-year peer review exercise, but students must have developed it in other ways. Their double role as both providers and receivers of feedback was important. However, reciprocity alone cannot fully explain why it was common for reviewers to dedicate so much time and effort to constructing their feedback. One student said that he would not have taken the extra initiative to read papers had it not been for positive past experiences of peer review that had helped him realise the value of the process. Importantly, reviewers did not see their role as quality assurers or gatekeepers but instead saw themselves as contributing to knowledge creation by helping improve the research of their peers. Overall, the students’ motivation mirrors the formative responsibilities of academic researchers; namely, an obligation to a community, an expectation of reciprocity, and being able to improve research (Ware, 2011).

Knowledge of peer review

Participating in the peer review process led students to gain a deep understanding of the process as they developed relevant skills. A key expectation was for students to use assessment criteria and attendant standards as a guide to crafting feedback but, like all complex criteria, these were open to interpretation. At the same time, they were developing an understanding of how feedback can help revise work. Both processes involve explicit and tacit knowledge that was difficult to articulate (Rust et al., 2003). However, first understanding and then transferring knowledge was important:

I found the process quite challenging because it seemed a step beyond proofreading and we really had to put in an effort. You can proofread in five minutes but trying to understand a work before providing feedback is time-consuming. (Participant J)

Most students initially had reservations about taking part in peer review and had doubts about their abilities. They were partially helped by the training. For example, one student learned early on ‘… how to provide feedback without being too negative’ (Participant B). However, for students to realise the full value of peer review they needed to appreciate its potential and this was something that had to be learned for themselves over time. Importantly, all used their experiences of receiving feedback to understand the difficulties faced by peers, which then helped them to model good practice. Peer review also exposed students to a range of judgements and some found diversity of opinion useful.

Given these conditions for learning about being peer reviewer, it was clear that students had used a similar dialogical process to that of learning about a subject.

Knowledge of self

Engaging in peer review provided rich opportunities for students to learn about their own learning and values. In constructing feedback for their peers, they were able to develop insights into their own work:
I think it’s easier to spot mistakes or things that could be improved in other people’s work and then when you can see it in other people’s work, you can see it in your work more easily. In other words, you try your best and you think this is as good as I can do when you write something and then when you see other people’s work and that’s the best they’ve done but you can see things that could be improved, then you can transfer that to your own work too.

(Participant C)

The opportunity to compare their work with that of their peers helped develop an understanding of what good quality work entails. Being able to stand back from one’s own work, evaluate it and re-draft is an advanced skill. Students must be in a position to make judgements about their knowledge claims, writing abilities, how meaning is conveyed and their own learning process, and then use these to make changes (Liu and Carless, 2006). Identifying weaknesses in other’s work invariably led to a revision in their own, and an improvement in quality:

I have learnt to open myself to feedback. I do a bit of art and it has been a huge thing for me to learn because quite often, I am worried about sharing that or things like that because some part of me doesn’t want people to criticise it in any way. But now I have become more accepting of other people’s feedback because I can see how I can use it to improve my work.

(Participant E)

Students may not welcome negative criticism, which can dominate feedback practice (Weaver, 2006) and the emotional impact can affect motivation, self-confidence, understanding and so the potential for improvement. The long-term peer review culture was seen as one that supported the learner and this space enabled students to gain insight into their learning processes and become more accepting of the idea of feedback. After experiencing peer review, some reported they felt less threatened, even when comments seemed negatively critical. Some discussed the peer review process itself with others and it is likely that this dialogic practice changed their understanding of giving and receiving feedback.

Knowledge of others

Peer review allowed students to generate knowledge about others through different aspects of the review process, including informal discussion and dialogic feedback. Being exposed to a wide range of topics showed what others were interested in and how they approached the task at hand:

… it was interesting to see what they (peers) were researching on. We were reviewing seaweeds and how they are important in
the ecological system. I used to perceive seaweed as gross but seeing how they are important for invertebrate species in the tidal system changed my feeling towards it.

(Participant C)

Providing helpful feedback signifies both a degree of professionalism and care towards others (Sutton, 2012) but how this feedback is received also requires an understanding of who is providing it. In the case of ecology, reviews were from students or staff who were usually anonymous, depending on the exercise. Students reached the point where they started considering peers as a reliable source of feedback whose comments could be just as valuable as those from academic staff. They learned to value and trust their peer’s ability to make a positive impact and improve the quality of work:

I no longer find it scary if I have [to hand] my work to my peers. It doesn’t mean that they are just going to tear it up or the opposite, where they just say everything’s okay. I feel quite comfortable giving this to classmates, knowing that I will be getting a reasonable response which will strengthen my work. I think that is something valuable that I and others have taken from this.

(Participant A)

Conclusion

Students saw peer review as part of being a research apprentice and understood that the process also entailed new layers of research inquiry focused on subject knowledge. These new inquiries were necessary for understanding the content of the work they were reviewing, and also to interpret the comments they received about their own work. Students, therefore, collaborated with peers and academics in order to learn content and how to review. These are sophisticated processes that required both dialogic feedback and multiple experiences of peer review. Both were instrumental in shaping students’ perceptions, attitudes and skills. As students became more experienced, they became less threatened by the required tasks and soon began to realise the value of peer review for their own learning. While multiple experiences were beneficial, this was not merely a matter of ‘more is better’. Rather, a series of different review exercise designs and experiences that built-in complexity seemed to enhance learning, contribute to normalising the activity, and create a shared identity and culture. Embedding a rebuttal in one exercise had a major impact on learning and helped students to understand the value of dialogue and critically question feedback before revising work.

Multiple experiences and systematic training saw this formative process as primarily about developing knowledge in different domains (Table 1). In this context, peer review became part of a wider knowledge project, but while it included quality
improvement it did not have the gatekeeping function required for articles submitted to journals for academic peer review. Students also gained knowledge about themselves as learners and these insights were formed in relation to how they viewed the work of their peers. Most importantly, the dialogic processes of both written and oral communication allowed students to gain much insight into their own work and develop abilities in self-review, a skill that is difficult to master in higher education. In future research on peer review, it will be necessary to seek clarity about the meaning of ‘dialogic’ and ‘monologic’ feedback in order to clarify what it consists of and what is excluded (Zhu and Carless, 2018).

The outcomes from this case study have much wider implications across the sector because they demonstrate that effective dialogue in feedback can be achieved through student peer review and that with sufficient systematic training and experience, it can be very effective in enhancing higher-order learning. Of course, more curriculum time and space are required than the more typical one-off exercises, but the design and training necessary to achieve this should be relatively easy for academics as all regularly experience peer review in their own research and will be reasonably expert in the process. The key difference here is in setting up student peer review as a progressive sequence of purely formative exercises.
References
practices, challenges and the way forward. Assessment & Evaluation in Higher
Baker KM. (2016) Peer review as a strategy for improving students’ writing process.
Active Learning in Higher Education 17: 179-192.
Assessment & Evaluation in Higher Education 38: 466-476.
and Sampson J (eds) Peer Learning in Higher Education: Learning From and With
Brammer C and Rees M. (2007) Peer review from the students' perspective: Invaluable
or invalid? Composition Studies 35: 71-85.
Callaham ML and Tercier J. (2007) The relationship of previous training and
experience of journal peer reviewers to subsequent review quality. PLOS Medicine
4: e40.
Learning and Instruction 20: 328-338.
perceived helpfulness of comments from novice peer reviewers and subject matter
Eisenhart M. (2002) The Paradox of Peer Review: Admitting too Much or Allowing too
feedback with a rebuttal. Assessment & Evaluation in Higher Education 42: 801-
811.
Assessment & Evaluation in Higher Education 34: 105-114.
the effective use of learning technologies, London: Routledge.
Liu X and Li L. (2014) Assessment training effects on student assessment skills and
task performance in a technology-facilitated peer assessment. Assessment &
perceptions, engagement and academic outcomes? A case study. Assessment &


**Declaration of Conflicting Interests**
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Funding**
The author(s) received no financial support for the research, authorship and/or publication of this article.

**List of Table**

Table 1: The four knowledge domains and knowledge outcomes identified by students as they learned to carry out peer reviews of research activities

<table>
<thead>
<tr>
<th>Knowledge of:</th>
<th>Key knowledge outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>Ecological knowledge</td>
</tr>
<tr>
<td>Peer Review</td>
<td>The skills and attributes of a reviewer. The potential of peer review</td>
</tr>
<tr>
<td>Self</td>
<td>Confidence in one’s own abilities to provide and receive feedback</td>
</tr>
<tr>
<td>Others</td>
<td>Recognising and respecting other’s abilities in a learning community</td>
</tr>
</tbody>
</table>

**Author biographies**

Krishneel Reddy is a doctoral candidate with the Higher Education Development Centre at the University of Otago. His research focuses on the application of formative peer review to improve student’s feedback experience.
Tony Harland, PhD, is a Professor of Higher Education. He studies the purposes of a university education. Recent projects have looked at the concept of Powerful Knowledge, students’ peer review, how research and compliance affect teacher development and how students learn through doing research.

Rob Wass, PhD, is a lecturer in higher education and works on project-based research with staff and students. His research interests are focused around improving student experiences of learning, particularly through examining assessment practices and supporting sessional teachers.

Navé Wald, PhD, is a geographer with a particular interest in development studies. He brings his critical social science skills and perspectives to the field of higher education, researching themes such as academic freedom, authenticity, students’ peer review and assessment.