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An Investigation of How Written Feedback

Influences

Applied Level Mathematics Students'

Perceptions of Assessment

by

Rina Hyland

A Thesis

Submitted to the Faculty of Graduate Studies
through the Faculty of Education and Academic Development
in Partial Fulfillment of the Requirements for
the Degree of Master of Education
at the University of Windsor

Windsor, Ontario, Canada

2015

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DECLARATION OF ORIGINALITY

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ABSTRACT

Providing written feedback is common practice in education. This study explores how feedback practices influence applied level mathematics students' perceptions of assessment. The study was conducted in a grade 9 applied mathematics class using mixed methods. An adaptation of the Instructional Feedback Orientation Scale (IFOS) (King et al., 2009) was used to measure changes in students' orientations towards feedback during the course of a semester in a classroom where research-based feedback practices were implemented. Statistical analysis did not reveal significant changes of student perceptions of assessments. One-on-one interviews revealed that recommended feedback practices, while perceived as useful by students, did not always produce desired effects. Anecdotal records suggested that the type of assessments employed determined the effectiveness of written feedback. Formative assessment tasks that focused on one or two learning goals, were low risk, required minimal feedback and allowed for immediate response elicited favourable responses and promoted a classroom atmosphere that encouraged student learning.

DEDICATION

*To my students,
past, present and future,
who have been, and continue to be,
a constant source of
joy and wonderment.*

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I would like to extend my gratitude to the faculty, staff, and students at the University of Windsor who have indulged me in participating in numerous thoughtful discussions about the topic of feedback. I owe particular thanks to Dr. George Zhou, whose lessons have inspired me to become a better researcher and whose clarity of thought has helped me to refocus and organize when the myriad of ideas in my head became jumbled. Thank you also to Dr. Dragana Martinovic, whose meticulous editing of my proposal and thesis provided meaningful feedback to build upon. Thank you also to Dr. Sung Hyun Yun for serving as the external reader.

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TABLE OF CONTENTS

DECLARATION OF ORIGINALITY	iii
ABSTRACT	iv
DEDICATION	v
ACKNOWLEDGEMENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF APPENDICES	x
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 LITERATURE REVIEW	6
CHAPTER 3 RESEARCH DESIGN	18
CHAPTER 4 FINDINGS	30
Quantitative Results	30
Qualitative Results	44
CHAPTER 5 DISCUSSION AND CONCLUSIONS	62
REFERENCES	77
APPENDICES	82
Appendix A: Student Feedback Orientation Scale	82
Appendix B: Interview Protocol	87
Appendix C: Letter of Information for Consent to Participate in Research	89
Appendix D: Letter of Consent for Audio Taping in an Interview	91
VITA AUCTORIS	92

LIST OF TABLES

Table 1: Background of Interview Participants	21
Table 2: Group Mean Scores of IFOS Sub-scales for Each Time Measured	31
Table 3: Feedback Utility - Frequencies.....	34
Table 4: Sensitivity - Frequencies.....	35
Table 5: Confidentiality - Frequencies	36
Table 6: Comprehension - Frequencies	36
Table 7: Overall Frequencies for Each Sub-scale.....	37
Table 8: Gender Comparison for Each Sub-scale (Time 3).....	38
Table 9: Correlations between Paired IFOS Scores (Time 1).....	39
Table 10: Correlations between Paired IFOS Scores (Time 2).....	40
Table 11: Correlations between Paired IFOS Scores (Time 3).....	41
Table 12: Correlation between Actual versus Reported Midterm Marks	42
Table 13: Correlations Between Report Card Marks and IFOS Scores.....	43

LIST OF FIGURES

Figure 1	Concept Map of Findings.....	61
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LIST OF APPENDICES

Appendix A	Student Feedback Orientation Scale.....	82
Appendix B	Interview Protocol.....	87
Appendix C	Letter of Information for Consent to Participate in Research.....	89
Appendix D	Letter of Consent for Audio Taping in an Interview.....	91

CHAPTER 1

INTRODUCTION

A major portion of a teacher's workload involves assessment. In addition to determining a mark for an assignment or test, a diligent teacher may spend a considerable amount of time providing his or her students with detailed written feedback to correct errors in student thinking and, presumably, to improve student learning. In my own experience, it seems that, despite my good intentions, those students who would most benefit from the written feedback that I provide for them often give the least regard to it, choosing to focus, instead, on the evaluative aspects of the assessment such as the numerical mark, a letter grade, or a qualitative ranking (e.g., good, satisfactory, poor). Sensitivity to marks and de-sensitivity to feedback seems to be amplified in classrooms populated with lower achievers. Students will often display an emotional response to the mark and show little concern for how to improve it. "I got a Level 3!" one might proclaim while filing the assignment in his or her notebook, paying no heed to the comments which may give him insight on how to improve. Or I might hear, "Well, I failed this math test!" simultaneously with the sound of crumpling paper. Thus, I often find myself questioning the value of providing written feedback to students in applied level mathematics courses.

In recent years, an increasing amount of attention has been given to formative assessment in educational research (Assessment Reform Group [ARG], 2002; Black & Wiliam, 1998a, 1998b, 2009; Shepard, 2000, 2006; Wiliam, 2011). Thus, in many

countries, including England, Australia, US, and Canada, education reform has focussed on enhancing formative assessment practices. The Ontario Ministry of Education and Training [OMET] has recently released the *Growing Success* (2011) document, which devotes an entire chapter to formative assessment practices. In this document, formative assessment is discussed using terminology popularized by the Assessment Reform Group (2002): assessment *for* learning and assessment *as* learning. Some suggest that these terms better reflect the continuous nature of assessment. Richard Stiggins, founder of the Assessment Training Institute in Portland, Oregon, is a strong proponent of training teachers in both assessment *of* learning and assessment *for* learning, arguing that while schools have established solid measurement practices for assessment *of* learning, assessment *for* learning has been neglected in teacher training; both need to be given due attention in the classroom if student achievement is to be maximized in US schools (2002). The current direction in many school improvement plans in Ontario is to increase the amount of time devoted to assessment *for* learning.

Not surprisingly, timely descriptive feedback is listed as one of the essential steps in assessment *for* and *as* learning in the *Growing Success* document (OMET, 2011). Accordingly, the Windsor-Essex Catholic District School Board [WECDSB] document, *Assessment, Evaluation and Reporting: A Guide for Educators* (2010) provides detailed guidelines for descriptive feedback for teachers. Thus, the practice of providing descriptive written feedback is reinforced not only by research, but also by provincial and district policies. A concern from practitioners in the applied level, however, is that they are putting significant effort into providing descriptive feedback to students even when

there is palpable evidence that it may not be serving the function it is intended to serve.

Considering the complexity of factors that affect student learning, it is difficult to determine why feedback practices do not appear to motivate some students, particularly low achievers, to improve learning. While there is an extensive amount of research substantiating that formative assessment strategies, including descriptive feedback practices, are essential to support learning (Black & Wiliam, 1998a, 1998b, 2009; Hattie, 2009; Hattie & Timperley, 2007; Sadler, 2010; Shepard, 2000, 2006; Wiliam, 2011), other studies reveal that teachers do not fully understand formative assessment and what is expected of them (Boyle & Charles, 2010; Hargreaves, 2011; Taras, 2008). Furthermore, studies in student motivation and self-regulation processes suggest that it is not enough to simply give feedback; it is imperative to consider that student responses to feedback vary, and, in some cases, feedback can negatively affect learning (Boekaerts & Corno, 2005; Kluger & DeNisi, 1996; Kohn, 2011). It appears that we cannot apply a “one size fits all” approach to feedback practices.

Ultimately, the goal of feedback should be to foster students who are owners of their own learning (Wiliam, 2011). Boekaerts (as cited in Wiliam, 2011, p. 147) calls a self-regulated learner one who is able to coordinate cognitive resources, emotions, and actions in the service of a learning goal. In the classroom, it is apparent that lower achievers typically lack this ability to self-regulate. In Ontario, lower achievers are accommodated in a streamed system – students are channeled into the “applied” level (rather than “academic” level) based upon previous performance and teacher recommendations in grade school. There is limited research on the interaction between

the feedback that is delivered by teachers and how it is received and utilised by lower achievers. The current study seeks to gain a deeper understanding of this interaction and to gain insight into applied level students' perceptions of the purpose of assessment and potential inefficiencies of current feedback practices.

Some studies suggest that extrinsic motivators such as grades may have a role in diminishing the value of feedback (Black & Wiliam, 1998b; Deci, 1971; Kohn, 2011). In current practice, a mark almost always accompanies any type of assessment – formative or summative - while written feedback may or may not be given, despite policies suggesting that teachers should be providing it. This may perhaps be because teachers today are data driven due to accountability issues – they more often find themselves in a situation where they are asked to defend the grades they assign students. Thus, they assume, based on statistics, that the more measurement data they collect, the more reliable and valid a final grade may be. The tendency to assign a grade may also stem from teachers' perceptions that if students feel an assessment does not “count,” they may be less inclined to exert extra effort on it. In fact, Black and Wiliam (1998b) report that written feedback without an accompanying grade was found to be more effective in improving student learning than written feedback that included a grade. There is also some evidence that suggests that progressively elaborate feedback (including both comments and a grade) had positive effects on self-regulation in older students (Moylan, 2009). The current study seeks to investigate these relationships further, with a focus on how differing written feedback practices may influence changes in applied students' perceptions of formative assessment.

While studies can be found in the literature that investigate the effects of assessment practices on (a) student achievement (Smith & Gorard, 2005), (b) student perceptions of classroom assessment environment and achievement goal orientations (i.e., what students feel is the purpose of assessment) (Kharusi, 2007), and (c) self-regulated learning (Elawar & Corno, 1985; Moylan, 2009), empirical studies are required to determine how evidence-based, ministry-driven formative assessment strategies and feedback practices influence applied students' perceptions of assessment. In the current study, a set of criteria for written feedback was established using research in the areas of formative assessment, teacher feedback, student motivation and self-regulation. Written feedback following these criteria was provided to a grade 9 applied level mathematics class to determine whether or not positive changes in perceptions of assessment would occur.

CHAPTER 2

LITERATURE REVIEW

Formative Assessment

Arguably, one of the most thoughtful and comprehensive definitions of formative assessment to date is the one currently proposed by Wiliam (2011) who is careful to emphasize that it is the *function* of the assessment that determines its formative nature:

An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have made in the absence of that evidence.(p. 43)

This definition takes into account that an assessment is not intrinsically formative by design. Whether an assessment is formative or not depends on how the assessment is used. For example, teachers can use summative tests formatively if they decide to use the evidence obtained from the test to redirect their instruction to improve student learning.

A study conducted by Ricky Lam (2012) also found that using summative tests formatively in test preparation could enhance student performance and promote “modest” self-regulated learning. The ARG (2002) proposed that assessment designed to improve student learning be referred to as “assessment *for* learning” and “assessment *as* learning.”

This terminology better reflects how formative assessment operates in the classroom: it may be premeditated (this includes diagnostic tasks that assess student readiness), but it may also occur spontaneously during a lesson. The results of a formative assessment

may, for example, require a teacher to redirect a lesson based on informal gathering of evidence through a class discussion. Or it may lead to a brief one-to-one discussion with a student about his or her homework. Furthermore, according to this definition, formative assessment may be used by the teacher or the learner to improve learning; that is, a formative assessment may inform teachers on how to improve their teaching strategies or it may inform students on how to improve their understanding of concepts. The *Growing Success* document outlines that information gathered from assessment for learning is to be used “so teachers can plan instruction and assessment that are differentiated and personalized and work with students to set appropriate learning goals” (OMET, 2010, p. 31). Assessment as learning is to be used “by students to provide feedback to other students (peer assessment), monitor their own progress towards achieving their learning goals (self-assessment), make adjustments in their learning approaches, reflect on their learning, and set individual goals for learning” (OMET, 2010, p. 31). Assessment for learning entails that teachers provide students with descriptive feedback and coaching for improvement (OMET, 2010). In recent years, there has been a paradigm shift in ideology when it comes to assessment practices. Under the Harris regime in Ontario, with the introduction of achievement charts, knowledge and skills categories, and the new report card and standardized testing, there was an emphasis on using assessment practices that measured performance and achievement with more consistency and reliability; teachers perceived that summative-type assessments were a priority from an accountability perspective. While summative-type assessments still have a place in the classroom, educational researchers today advocate for teachers to become more proficient at

formatively assessing students with the aim of improving student self-regulation and learning (Black & Wiliam, 1998a, 1998b, 2009; Hattie, 2009; Hattie & Timperley, 2007; Shepard, 2000, 2006; Wiliam, 2011).

Intricately connected with effective formative assessment practices is the need to establish clear learning goals. Research on goal-setting suggests that students need to be made aware of the learning goals and success criteria for a particular task in order to effectively attain them (Locke, 2000; Sadler, 1989; Shepard, 2006). Sadler (1989) postulates that if students are made aware of learning goals and success criteria, they will be better able to evaluate their own performance which will improve their ability to self-monitor. If this is done effectively, Sadler (2010) suggests that the need for reliance on “feedback-as-telling” will be eliminated altogether. He favours this option because empirical evidence shows that written feedback often leads to minimal improvement in subsequent work. Shepard (2006) argues that a focus on learning goals and success criteria in the classroom will not only help students but it will also help teachers design better instructional and assessment practices. Currently, educational administrators have adopted policies that promote instructional practices that explicitly help students clarify and understand learning goals and success criteria (OMET, 2011; WECDSB, 2010).

Feedback

It has already been noted that Wiliam’s (2011) definition of formative assessment suggests that evidence elicited from an assessment must be interpreted and used by the learners as well as their teachers. Feedback plays an important role in this process. Ramaprasad (1983) defined feedback as information about the gap between actual level

and the desired level of performance, which in turn leads to corrective action to minimize the gap. He identified a dual role for feedback as well; he referred to the “feedback loop” between teaching and learning. In a four-year development and research project conducted in England, *Learning How to Learn*, Black, James, McCormick, Pedder and Wiliam (2006) verified that feedback provided to students by their teachers was among five of the most effective formative assessment strategies in improving student achievement (the other four being questioning techniques, identifying learning goals and success criteria, peer-assessment and self-assessment). Similarly, Hattie and Timperley (2007), in their synthesis of over 134 meta-analyses, provide quantitative evidence (using effect sizes as a common measure to allow valid comparisons) that feedback was one of the most powerful influences on student achievement. Later, in his book *Visible Learning*, Hattie (2009) provides a framework for understanding effective feedback. Firstly, effective feedback answers three questions for the student learner: “Where am I going?” (i.e., learning goals); “How am I going?” (i.e., self-assessment); and “Where to next?” (i.e., new goals). Secondly, each feedback question may work at one or more of four levels: the task level, the process level, the self-regulation level and the self level. Hattie suggests that the self level, which includes feedback that focusses on personal evaluation of the learner, such as “good work,” but does not address any of the three questions, is rarely effective in improving achievement.

Other researchers have noted the precarious nature of feedback. Kluger and DeNisi (1996) conducted a meta-analysis on feedback intervention practices and found that there is large variability on the effects of feedback interventions on performance; in fact, in over one-third of the cases reviewed, feedback interventions cause negative effects on performance. In general, they found that feedback interventions that direct attention to meta-task processes (which involve the self) reduce the effects of that feedback intervention on performance while those that direct attention to the task increase the effects of that feedback on performance (Kluger & DeNisi, 1996). Moreover, the type of response a student may give depends on a multitude of factors including the nature of the task, the individual receiving the feedback, the recipient's perceptions of the person giving the feedback, and whether the current performance is higher or lower than the goal (Kluger & DeNisi, 1996). Wiliam (2011) suggests that there are essentially eight different ways that students may respond to feedback depending on where they are at in relation to the goal and only two of them – (1) and (2) – are favourable:

- 1) exert less effort if performance exceeds the goal
- 2) increase effort if performance falls short of the goal
- 3) increase aspiration if performance exceeds the goal
- 4) reduce aspiration if performance falls short of the goal
- 5) decide the goal is too easy if performance exceeds the goal
- 6) decide the goal is too hard if performance falls short of the goal
- 7) ignore the feedback if performance exceeds the goal
- 8) ignore the feedback if performance falls short of the goal.

Considering that teachers spend a fair amount of time providing feedback, the fact that six out of the eight possible responses to feedback are unfavourable may be disconcerting.

Even if a response is favourable in the short-term, the type of response that a student gives to feedback may be secondary to how the student views the purpose of the feedback. For example, if a student feels that the purpose of feedback is to report on achievement, he/she may value the mark more than the feedback. If a student feels that the purpose of the feedback is to improve student learning, he/she may act on the feedback. Ideally, teachers would prefer the second scenario. This is why it is important to understand students' perceptions of the purpose of feedback.

The ways in which students respond to feedback have also been categorized according to student orientation in four perceptual dimensions: feedback utility, sensitivity, confidentiality, and retention (King et al., 2009). These dimensions were explored by King's research team in a study to design a psychometric instrument that could measure a student's reaction to feedback in public speaking (2009). While the construct of retention of feedback is not relevant to written feedback, the other three constructs apply to assessing responses to written feedback as well. Smith and King looked at the construct of sensitivity to feedback to see how feedback sensitivity mediated relationships between message intensity and response to the feedback. They found that students that are more sensitive to feedback responded better to feedback that was low intensity (i.e., feedback that was not as negatively worded or harsh) while students that were not as sensitive were not as adversely affected by high intensity feedback (2004). In the classroom, applied level students have been observed to have a propensity to

responding to feedback in emotional rather than cognitive ways. Assessing orientations to feedback should give some insight into this type of behaviour.

Student Motivation

Some researchers suggest that the assessment and evaluation system that is currently so prevalent in our education system may, in fact, be a disservice to students. Early researchers such as Deci (1971) and Lepper and Green (1973) conducted experiments to support the notion that extrinsic incentives undermine children's intrinsic interest in an activity: children in the studies were found to be less likely to repeat an activity if they had previously been rewarded for participating in it and those incentives were then no longer provided. In later studies, where Lepper, Henderlong and Iyengar (2005) examined the correlation between the age of a student in a US classroom and intrinsic motivation, the authors found that, for students from grades 3 to 8, intrinsic motivation appeared to decrease as age increased. Thus, teachers in the intermediate and senior grades are faced with a greater challenge when attempting to provide feedback that will elicit student response. Natriello (1982) found that student disengagement from high school is related to an environment where evaluations are contradictory, uncontrollable by the student, unpredictable, or unattainable. He observed that students who experienced high levels of incompatibilities in authority and evaluations systems for academic work set their goals lower and engaged in fewer tasks that required effort. These students would experience significant variation among teachers in their approaches to the evaluation of students – some teachers have well-defined systems for assigning and evaluating tasks and others may have no system at all. Ironically, such students perceived

themselves to be working harder and putting forth more effort! Kohn (2011), a strong critic against rewarding students with extrinsic rewards such as gold stars, praise, and grades, insists that, when it comes to formative assessment, no grades should be assigned. The intention is to help students develop the motivation to learn rather than achieve high grades.

Other research suggests that praise may be an effective motivator for learning if it is used correctly. After numerous studies on motivation, Dweck (2007) concluded that students who had a growth mind-set (i.e., who believed that intelligence could be altered through effort and education) were more likely to put forth effort to improve learning, whereas students with a fixed mind-set (i.e., who viewed intelligence as a fixed trait) sought tasks that served to prove their intelligence and avoided those that might not. More importantly, when considering feedback practices, if students were praised for their intelligence, they were more likely to adopt a fixed mind-set, whereas if they were praised for their effort, they would adopt a growth mind-set. Thus, it seems that praise that addresses process skills such as the learning skills identified by the Ontario Ministry of Education (i.e., good work habits, organization, collaboration, initiative, independence and self-regulation) may have an important role in feedback practices since it may help to foster a growth mind-set in students.

In general, research on motivation highlights that the classroom assessment environment has an impact on student learning. Good formative assessment practices not only provide students with cognitive information about where they are in their learning, they also help to develop in students a feeling that they are in control of their own

learning (Brookhart, 2008). In other words, effective feedback not only should address where students are at and where they should go to next, it also should aim to create a classroom environment that promotes learning and growth. This is no easy task, considering that the students in any given classroom come with previous experiences, preconceptions and mind-sets that determine how they will respond to feedback. Brookhart (2011) proposes that feedback needs to be tailored depending on the needs of the learner: feedback is only effective if the student receiving it understands it and is able to use it. In general, Brookhart (2011) suggests that teachers should focus their feedback on process and limit items of focus for struggling students. For successful students, she suggests that teachers should comment on areas of strength in the work, perhaps suggesting next steps that may include enrichment or expansion beyond the assigned learning goals. However, she cautions that there is a broader range than just two categories of students and so it is necessary to consider each individual student's needs and past experiences when delivering feedback.

Self-Regulation

As mentioned earlier, the ultimate goal of feedback should be to foster students to become the owners of their own learning (Wiliam, 2011). This has been an important theme in formative assessment research (Boekaerts, 2006; Sadler, 1989, 2010; Shepard, 2006; Wiliam, 2011). Thus, understanding the nature of self-regulation is another critical factor to consider when tailoring feedback to student needs. Boekaerts and Corno (2005) propose that, depending on the self-regulation “track” a student is on, response to feedback may vary. Students whose self-regulation processes (SR) maintain a “growth”

perspective (top-down SR) have a strong focus on learning goals while those that maintain a “well-being” perspective (bottom-up SR) are more concerned with maintaining or restoring positive feelings. Most teachers of applied level students would agree that these students typically demonstrate behaviour that suggests they are primarily in the “well-being” regulation mode as they often will choose not to do a task that may make them feel incompetent. Boekaerts and Corno (2005) suggest that it is important for students to acquire meta-cognitive knowledge that will help them interpret failure and address it in a positive way - they refer to this as volitional strategies. Positive volitional strategies will help students stay on the growth track rather than resort to the well-being track. This gives teachers important insight into student responses to feedback; the challenge is to provide a classroom environment that helps low-achieving students to develop positive volitional strategies to transition them from the well-being track to the growth track permanently.

The Purpose of this Study

While the research referenced so far applies to feedback that may include a variety of delivery methods including oral and written feedback, this study uses the relevant research to look more closely at written feedback, which, for the purpose of this study, refers to the detailed descriptive feedback that students may receive on a task in writing. It generally does not include an evaluative mark, letter, or ranking. By assimilating the research findings on formative assessment, feedback practices, student motivation and self-regulation, an operational list of criteria for effective written feedback for applied level learners will be proposed in an attempt to maintain some consistency in the type of

written feedback provided. The purpose of this study is to explore students' perceptions of various written feedback practices and identify those that have a significant positive impact on applied level students' perceptions of assessment. The research questions that will be investigated are:

- 1) What are applied level mathematics students' perceptions of written feedback?
- 2) Do current recommended written feedback practices bring about desired changes in students' perceptions of written feedback?
- 3) How do written feedback practices influence students' perceptions of assessment?

The significance of this study is quite obvious; formative assessment is among the professional development initiatives of the local school board where I teach. In the recent past, the WECDSB (partly in response to a demand to meet provincial standards) has embarked on several initiatives to improve student learning at the applied level.

Assessment has been an important component of these initiatives. For the past several years, board consultants have facilitated mandatory grade level professional learning communities (PLCs) prioritizing Grade 9 applied level mathematics teachers in particular because of low standardized test scores at this level. These PLCs took the form of in-service workshops (i.e., teachers were given release time to attend) which covered a variety of topics, including assessment practices. More recently, embedded professional development has been introduced: teachers are encouraged to invite a board expert into their classrooms to model the integration of new technology, teaching methods or assessment practices. The targeted classrooms continue to be grade 9 applied mathematics classes. In this past year, board-directed workshops were phased out and

voluntary self-directed professional development release days were introduced: teachers were encouraged to apply for a designated release day where they were provided the opportunity to work collaboratively with consultants and/or their peers to develop lesson plans, activities or assessment tools to improve student performance. Board consultants are also currently working at the grade 7 and 8 level in a “Leading Student Achievement” initiative that seeks to train grade 7 and 8 teachers to improve assessment and engagement processes so that students are better prepared for grade 9 (and the standardized testing that accompanies it). The results of this study may reveal omissions in current efforts regarding formative assessment practices in general, and written feedback practices specifically, with regards to applied level learners. Findings should help to inform teachers on assessment and feedback in applied level mathematics classrooms – what works and what does not work to promote student learning. Furthermore, it may give administrators some insight into relevant professional training in the area of assessment and feedback.

CHAPTER 3

RESEARCH DESIGN

Methodology

Practical action research provided the framework for this study. Its process was an iterative one, whereby the teacher-researcher used the results of preliminary findings to adjust feedback practices and continued to collect relevant data and adjust practices during the course of the study, in an attempt to distil from the process the most effective feedback practices. This is consistent with the Dialectic Action Research Spiral proposed by Mills (2011). The practical action research framework seemed appropriate for this study because it allowed the teacher-researcher to make changes in feedback approaches based on student responses throughout the study. Also, the results of the study were ultimately intended to be used to develop an action plan for applied mathematics teachers so that they may examine and modify their own written feedback practices according to the findings to improve student learning.

Practical action research is consistent with a mixed methods research design: the teacher-researcher collects data using multiple sources, both quantitative and qualitative, and a variety of tools, including questionnaires and interviews, in an effort to come up with an action plan to address the area of focus. The three research questions posed above lend themselves to an explanatory sequential mixed methods design (Creswell, 2012). In this design, quantitative data were collected first and then several cases were examined in more detail using a qualitative approach. Thus, the first two research questions, 1) What are applied level mathematics students' perceptions of

written feedback? and 2) Do current recommended written feedback practices bring about desired changes in students' perceptions of assessment?, were addressed using a quantitative approach (i.e., questionnaires) in order to measure whether or not changes in perception and orientation occurred. The third research question, 3) How do written feedback practices influence students' perceptions about written feedback?, was explored using a qualitative approach (i.e., one-on-one interviews). The rationale for this approach was twofold. Firstly, the quantitative data would help to detect changes if any occurred: the first question sought to determine what perceptions were out there; the second question aimed to determine whether or not currently recommended feedback practices would change perceptions. The third question, which was addressed using a qualitative approach, was posed to gain insight into how feedback practices influenced perceptions. Secondly, given the nature of applied level students, it was felt that more thoughtful and genuine responses concerning specific aspects of feedback practices would be best obtained through an interview process rather than data collection methods that would have required excessive reading and/or writing on the student's part.

Participants. This study was conducted in the researcher's own classroom, a grade 9 applied level mathematics class at a secondary school within the WECDSB. A total of 23 students were enrolled in the course: eight females and 15 males. One of the male students was a returning Gr. 10 student (i.e., he was not successful in attaining a Gr. 9 academic level credit the previous year). Two other students, one male and one female, were also Gr. 10 students upgrading from the essential level program, a program designed to prepare low performing students for the workplace. Sixty-five percent of the class

(i.e., 15 students) fell under the special education umbrella: five students had accommodation logs, which means they were being monitored by the special education department due to a history of difficulties in a regular classroom; 10 students had individual education plans (IEPs) which specified various degrees of speciality ranging from “communication learning disabilities” to “not formally identified.” One of the remaining students was undergoing testing during the semester and had not yet been identified. The class average hovered around 65% and remained fairly consistent throughout the semester. Preliminary results from EQAO testing also showed a class average of 64.8%.

Students were informed of general aspects of the study and their potential role in early September. After receiving approval from the Research Ethics Board, a letter of information and a consent form were sent home with students in October requiring that both the student and the parent consent to participation in the survey. The letter specified that:

- students participating in the survey would remain anonymous to the teacher,
- all information provided by students would remain confidential, and
- participation was completely voluntary (see Appendix C) .

Fifteen students participated in the quantitative study and six students participated in the qualitative study. Of the fifteen students that agreed to participate in the surveys, seven were female and eight were male. To protect the teacher-student relationship, the participants remained anonymous to the teacher-researcher for the remainder of the semester. A third party, a teacher colleague, collected and tracked response forms, coded

surveys and administered them so that student participants would remain anonymous to the teacher. Students were given the option to withdraw from the study at any time.

Table 1

Background of Interview Participants

<u>Name</u>	<u>Gender</u>	<u>Grade</u>	<u>Midterm Mark (%)</u>	<u>Final Mark (%)</u>	<u>EQAO Score</u>	<u>Spec. Ed. Designation</u>
Erin	female	9	56	66	Level 3	IEP - Not formally Identified -deficient in numeracy skills
Kate	female	9	64	66	Level 2	Accommodation Log - deficient in literacy and numeracy skills
Levis	male	9	74	67	Level2	IEP – Not formally identified – deficient in short-term memory; math problem solving
Chad	male	9	71	72	Level 3	IEP –Not formally identified – deficient in literacy skills
Dean	male	9	55	65	Level 3	IEP – communication - learning disability - deficient in written communication skills
David	male	10	80	83	Level 4	No IEP

A second letter of consent for participation in the interview process was sent out in early December to those students who showed an interest in participating in this process (see Appendix D). As an incentive, a \$5 lunch voucher to the student-run school café was offered to participating students. In total, 6 students volunteered to take part – two females and four males. All these participants had good attendance; no one was

absent more than 5 days through the semester. Table 1 summarizes some relevant background information of each of these participants. (All names are pseudonyms.)

In an effort to clarify the dual nature of the teacher-researcher role in the classroom during the semester and to avoid jeopardizing the teacher-student relationship, students were informed that the teacher was acting as a researcher only in the following situations:

- 1) during the initial discussion about the research project and the process of consent with the class,
- 2) during the organization and administration of the surveys (the researcher was not in the classroom during administration of the surveys), and
- 3) while conducting the one-on-one interviews.

All other activities were considered routine classroom activities.

Context. Throughout the duration of the semester, written descriptive feedback was given on all formative assessments using an operational list of criteria derived from the findings of current leaders in the field of formative assessment and feedback (Dweck, 2007; Hattie & Timperley, 2007; Wiliam, 2011). Thus, for the purpose of this study, written feedback is feedback that

- is written using handwriting (or font style, if the feedback is in electronic form) and terminology that students can read and understand.
- links specifically to learning goals and success criteria.
- provides precise information about what students are doing well, what needs improvement and what specific steps they can take to attain learning goals.

- causes students to think.
- is tailored to the needs of individual students - it is limited and focuses on process for struggling students; it focuses on enrichment or expansion for successful students.
- is provided frequently and in a timely manner to allow for improvement in learning prior to assessment *of* learning.
- uses praise to reward effort, not intelligence.
- is not judgmental and does not include an evaluative mark, letter, or ranking.
- fosters a classroom environment that encourages students to become self-regulated for growth.

In accordance with the Dialectic Action Research Spiral (Mills, 2011) approach, while the content of the feedback essentially remained the same, changes in the way feedback was provided occurred during the semester based on student responses to feedback. To focus students' attention to learning goals, students were given a photocopied list of learning goals at the beginning of each unit. These goals were referred to throughout the unit and students were encouraged to check each learning goal off if they felt they had mastered it. Written feedback remained focussed on these learning goals. Occasionally, students were asked to respond to the feedback their teacher provided by re-submitting assessments once corrections were made. As evidence arose to suggest that students remained performance goal-oriented (i.e., they were primarily interested in achieving a favourable mark) rather than learning goal-oriented (Elliot & Dweck, 1988) , a shift from mark-based to solely comment-based formative

assessments occurred to help students focus on comments and how they related to learning goals. Low stakes exit cards were also used to assess student understanding – these cards were returned with feedback only to those students who demonstrated a lack of understanding. Anecdotal records were kept to monitor the progress of students but these assessments were not used to determine their grades. Self-assessment was encouraged as well: using a traffic light model, students were asked to submit their assignments into a green folder if they felt they had met their learning goal, a yellow folder if they weren't quite sure; and a red folder if they knew they still did not understand. Dialogue about written feedback and how to use feedback was ongoing throughout the semester so that students became aware of the importance of using feedback to improve their learning. Through this dialogue, the teacher-researcher hoped to gain some insight into how to improve feedback and assessment practices throughout the semester.

Data Collection and Analysis. This study was conducted during the first semester of the 2013-2014 school year. A survey intended to measure students' perceptions towards written feedback was conducted at three points during the semester to observe changes, if any. Three surveys rather than two were deemed necessary after results from a pilot questionnaire conducted on several grade 8 students indicated that some students would have had very little experience with feedback in mathematics courses depending on the methodology used by their elementary teachers. Some members of this pilot group reported that self-evaluation was common (i.e., students often marked their own work) and that only numerical grades were provided on mathematics

assessments. Thus, the first survey, which was conducted in mid-October, was intended to determine student experiences with and perceptions on written feedback from previous years in the study of mathematics, prior to any interventions. The second survey was administered in mid-November, after students had received some written feedback from the teacher-researcher (as prescribed by current research on feedback practices), to measure early perceptions of written feedback. Finally, a third survey was conducted at the end of the semester in mid-January, after the teacher-researcher had used written feedback practices outlined in the guidelines with frequency and had adjusted practices based on student feedback. One-on-one interviews were conducted near the end of the semester over the months of December and January to explore how written feedback practices may have influenced students' perceptions about feedback and, ultimately, assessment. For these interviews, students were asked to bring a portfolio including samples of their assessments from their notebooks so that these items could be examined and discussed with respect to the feedback provided and how it was interpreted and used by the student.

Quantitative Data. A pre-, during and post-test survey design was used to address primarily the first two research questions:

- 1) What are applied level mathematics students' perceptions of written feedback?
- 2) Do current recommended written feedback practices bring about desired changes in students' perceptions of written feedback?

The survey tool that was used to measure students' perceptions and changes in

perceptions was adapted from an existing instrument, the Instructional Feedback Orientation Scale (IFOS) (King et al., 2009), which was designed to assess students' perceptions of instructional feedback. The IFOS is a 27-item scale that uses a 5-point Likert-type response format. It includes four dimensions of feedback: *feedback utility*, *sensitivity*, *confidentiality* and *retention*. There are 10 items on *feedback utility* (e.g., "I think feedback from teachers is vitally important in improving my performance."), 9 items on *sensitivity* (e.g., "My feelings can be easily hurt by corrective feedback from a teacher."), 5 items on *confidentiality* (e.g., "I do not like to receive corrective feedback in front of other people."), and 3 items on *retention* (e.g., "I can't remember what teachers want me to do when they provide feedback."). Chronbach's alpha coefficient scores for reliability for the IFOS have been reported as .85 for utility, .86 for sensitivity, .74 for confidentiality, and .69 for retention (King et al., 2009). Preliminary evidence for concurrent validity and discriminant validity for the four dimensions of the IFOS has also been established (King et al., 2009).

Adaptations of the tool were deemed necessary for several reasons. Slight modifications to the wording in the instrument were required because the language was geared to college and university level students. For example, the word "instructional" was replaced with the word "written" in items where it appears as students would better understand what this means and presumably all written feedback is "instructional" feedback. Also, there is no distinction made between written corrective feedback and oral corrective feedback in the original IFOS - the tool was designed for and tested in communication studies classrooms and, therefore, some of the items, including all of the

items in the confidentiality sub-scale refer implicitly to oral feedback. Since this study is focussing on written feedback, phrases such as “listen carefully” were replaced with “read carefully.” All of the items in the confidentiality sub-scale were modified to address students’ feelings towards confidentiality of written feedback. For example, the item “I do not like to discuss written feedback provided by my teacher with my classmates” was included in this sub-scale. Also, the questions in the *retention* sub-scale were eliminated because they primarily addressed oral feedback and were deemed irrelevant in this context. Instead, an additional bank of questions were developed to measure the students’ *comprehension* of written feedback (because grade 9 applied level students generally have variable reading and writing skills). Items such as “It is easy to read my teachers’ handwriting in written feedback” and “I understand what I have to do to improve my work when I read the written feedback my teacher provides” were included for this purpose. Finally, a section on general background information was included at the beginning of the survey. A preliminary adapted version of the IFOS was piloted with a small group of students who would be entering grade 9 within a month; slight changes to the tool were also made based on the feedback from these students.

To allow for easy detection of response bias, the direction of one statement in each of the four sub-scales of the questionnaire was reversed. Each questionnaire was examined carefully before the data was input and there was no evidence of response bias in any of the questionnaires; thus, all of the data collected was used in the analysis. These four statements were reverse coded during data input.

The data collected from the three sets of questionnaires were analyzed using SPSS

data analysis software. While participants in the survey remained anonymous to the researcher during the semester, it was possible, after the semester was over, to use the process of triangulation (Creswell, 2012) to corroborate survey data with data collected from the teacher's mark book.

Qualitative Data. To further explore students' perceptions of assessment, qualitative data were collected using one-on-one interviews and student portfolios of both formative and summative assessments. The interviews were conducted during the students' lunch period to avoid interfering with class instructional time. To maintain a comfortable, non-threatening and familiar atmosphere, the interviews took place in the classroom. They lasted approximately 20 minutes. As part of normal classroom routine, students are typically asked to keep a notebook including all student assessments. The six students who participated in the interviews were asked to bring a portfolio of these assessments – both formative and summative. These portfolios were examined and discussed during the one-on-one interviews.

Using a self-designed interview protocol, the researcher asked questions to determine 1) what the student's perception of the purpose of assessment was, 2) whether or not the student used the feedback that was provided, 3) how the student interpreted the feedback that was provided, 4) how the student used the feedback that was provided, and 5) how the student responded to positive or negative feedback. The interview questions can be found in Appendix B. Students were encouraged to support their comments with examples from their portfolios. In each interview, several assessments from the student portfolio were reviewed and the interviewee was prompted to explain what the feedback

meant to him and how he may have used it to improve performance in future assessments. Field notes were also taken to note either appropriate or inappropriate student responses to feedback for the same learning goal in later assessments in the same unit. Photographs of these assessments were taken for further examination after the discussions.

The interviews were audio-taped and transcribed. Member checking (Janesick, 2000) was used to validate the findings; a copy of the transcriptions along with explicit written instructions was given to each of the respective participants to review. Students were given the opportunity to modify or elaborate on their comments in writing if they felt that their ideas were expressed inaccurately or were not complete. These transcripts were returned with no changes. Triangulation (Creswell, 2012) of the interview data with survey data was also possible after the semester was over. The data was then coded and analyzed for any emerging themes.

CHAPTER 4

FINDINGS

Quantitative Results

Overall group mean scores for each sub-scale (i.e., feedback utility, sensitivity, confidentiality, comprehension) in the IFOS survey at each level of measure (i.e., Time 1 – October 8, Time 2 - November 20 and Time 3- January 16) are reported in Table 2. In general, the lower the score in the feedback utility sub-scale, the more useful feedback is perceived, the lower the score in the sensitivity sub-scale, the more sensitive a student is to feedback, the lower the score in the confidentiality sub-scale, the more a student prefers confidentiality, and the lower the score in the comprehension sub-scale, the more a student feels that he or she understands the meaning of the feedback received. Most scores fell into the mid-range between 2 and 3; however, the higher scores for sensitivity suggest that students, in general, are not particularly sensitive to corrective feedback.

To examine any changes in the scores over time, repeated measures ANOVA analysis was conducted using a one-factor within-subjects design (Kiess & Green, 2012) for each sub-scale. This analysis was selected because there was a small number of participants and with large differences among them with respect to academic ability and special needs. Also, while participants remained anonymous during the study, it was possible to track each participant's response for each of the three levels of measure. Thus, a within-subjects design was possible and served to decrease the amount of variability in the scores and increase the power of the statistical test.

Table 2

Group Mean Scores of IFOS Sub-scales for Each Time Measured

<u>Sub-scales</u>	<u>Time</u>	<u>N</u>	<u>Descriptive Statistics</u>			
			<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>	<u>Std. Deviation</u>
Feedback Utility	1	15	1.45	3.64	2.4061	.64086
	2	15	1.55	4.18	2.5515	.71124
	3 ^a	13	1.82	3.00	2.4545	.40144
Sensitivity	1	15	2.56	5.00	3.9407	.64497
	2	15	2.44	5.00	3.8074	.70707
	3 ^a	13	2.56	4.22	3.4957	.57845
Confidentiality	1	15	1.00	4.00	2.4889	.76497
	2	15	1.33	3.67	2.5778	.69541
	3 ^a	13	1.33	4.00	2.6923	.78718
Comprehension	1	15	1.25	3.75	2.3667	.68051
	2	15	1.75	3.75	2.5667	.54663
	3 ^a	13	1.25	3.49	2.5377	.61824

^aTwo students were absent when the third survey was administered.

The sphericity test for repeated measures ANOVA indicated that sphericity could be assumed and that a repeated measures ANOVA was appropriate. With an alpha level of 0.05, a one-factor within-subjects analysis of variance indicated that there were no statistically significant differences among means for any of the four sub-scales: for the feedback utility sub-scale, $F(2, 24) = 0.35, p=.71$; for the sensitivity sub-scale, $F(2,24) =$

2.68, $p = .09$; for the confidentiality sub-scale, $F(2, 24) = 0.13$, $p = .88$; and for the comprehension sub-scale, $F(2, 24) = 0.83$, $p = .45$. This suggests that there were no significant changes in student orientations toward feedback during the time frame of the study.

To analyze frequency distributions, the data from the survey results were recoded to collapse the five-point Likert scale into three categories: “agree,” “neither agree nor disagree,” and “disagree.” The frequency distributions of responses for all questions in each of the four sub-scales of the IFOS are summarized in Tables 3 – 6.

The overall frequencies for each sub-scale for each of the 3 levels of measure are summarized in Table 7. In general, students that selected “agree” in the feedback utility sub-scale felt that feedback was useful; students that selected “agree” in the sensitivity sub-scale were sensitive to feedback and could be easily hurt by it; students that selected “agree” in the confidentiality sub-scale preferred confidentiality and did not want others to know about or see the feedback they were receiving; and, students that selected “agree” in the comprehension sub-scale felt that they understood the meaning of the feedback that they received.

Overall, the trends remained similar during all three testing times: the majority of participants agreed that feedback was useful (Time 1 – 53.3%; Time 2 – 53.3% and Time 3 – 61.5%); the majority of students disagreed to being sensitive about receiving corrective feedback (Time 1 – 86.7%; Time 2 – 73.3% and Time 3 – 53.8%) although there is a trend suggesting that students’ were more inclined to select the “neither agree nor disagree” option over time; on the other hand, a large proportion of students agreed

that they preferred to keep feedback confidential (Time 1 – 40.0%; Time 2 – 46.7% and Time 3 – 38.5%); finally, the majority of students agreed that they comprehended the feedback they received (Time 1 – 80.0%, Time 2 – 46.7% and Time 3 – 61.5%).

Table 3

Feedback Utility - Frequencies

Question	Time 1 (N=15)			Time 2 (N=15)			Time 3 (N=13) ^a		
	Agree	Neither Agree nor Disagree	Disagree	Agree	Neither Agree nor Disagree	Disagree	Agree	Neither Agree nor Disagree	Disagree
Feedback is very important	60.0	26.7	13.3	33	60	6.7	69.2	23.1	7.7
I read comments carefully	53.3	33.3	13.3	53.3	40.0	6.7	61.5	38.5	0.0
I reflect on a teacher's feedback	46.7	33.3	20.0	33.3	60.0	6.7	53.8	38.5	7.7
I am extremely encouraged by positive feedback	53.3	33.3	13.3	46.7	46.7	6.7	53.8	23.1	23.1
Feedback provides clear direction on how to improve	80.0	20.0	0.0	60.0	33.3	6.7	53.8	46.2	0.0
Feedback can be a valuable form of praise	40	60	0.0	40.0	46.7	13.3	23.1	76.9	0.0
I pay careful attention to feedback	26.7	46.7	26.7	26.7	53.3	20.0	46.2	53.8	0.0
Feedback motivates me to improve my understanding of concepts	53.3	33.3	13.3	46.7	26.7	26.7	46.2	38.5	15.4
Feedback motivates me to improve my performance on assessments	60.0	33.3	6.7	46.7	33.3	20.0	53.8	23.1	23.1
Feedback is a waste of time	6.7	26.7	66.7	13.3	26.7	60.0	7.7	23.1	69.2
I feel relieved when I receive positive feedback	80.0	20.0	0.0	66.7	20.0	13.3	76.9	15.4	7.7

^aTwo students were absent when the third survey was administered.

Table 4

Sensitivity - Frequencies

Question	Time 1 (N=15)				Time 2 (N=15)				Time 3 (N=13) ^a			
	Agree	Neither Agree nor Disagree	Disagree	Agree	Agree	Neither Agree nor Disagree	Disagree	Agree	Agree	Neither Agree nor Disagree	Disagree	Disagree
My feelings are easily hurt by corrective feedback	13.3	33.3	53.3	6.7	6.7	33.3	60.0	7.7	7.7	38.5	53.8	
I feel threatened by corrective feedback	6.7	13.3	80.0	6.7	6.7	26.7	66.7	7.7	7.7	30.8	61.5	
Corrective feedback hurts my feelings	0.0	13.3	86.7	13.3	13.3	6.7	80.0	7.7	7.7	46.2	46.2	
Corrective feedback is intimidating	6.7	26.7	66.7	6.7	6.7	26.7	66.7	0.0	0.0	38.5	61.5	
My feelings are not easily hurt by corrective feedback	73.3	13.3	13.3	66.7	66.7	26.7	6.7	69.2	69.2	30.8	0.0	
It is difficult to get over corrective feedback	6.7	6.7	86.7	0.0	0.0	26.7	73.3	30.8	30.8	23.1	46.2	
Corrective feedback is embarrassing	6.7	26.7	66.7	6.7	6.7	40.0	53.3	7.7	7.7	46.2	46.2	
I dwell on negative feelings that result from corrective feedback	6.7	26.7	66.7	6.7	6.7	33.3	60.0	23.1	23.1	23.1	53.8	
Corrective feedback increases the stress I feel about future performance	6.7	26.7	66.7	26.7	26.7	20.0	53.3	23.1	23.1	30.8	46.2	

^aTwo students were absent when the third survey was administered.

Table 5

Confidentiality - Frequencies

Question	Time 1 (N=15)				Time 2 (N=15)				Time 3 (N=13) ^a			
	Agree	Neither Agree nor Disagree	Disagree	Agree	Neither Agree nor Disagree	Disagree	Agree	Disagree	Neither Agree nor Disagree	Agree	Disagree	Disagree
I do not like others to know what feedback I am receiving from teachers	53.3	26.7	20.0	60.0	26.7	13.3	38.5	15.4	46.2	30.8	23.1	46.2
I feel comfortable talking about feedback with my teacher when students are present	6.7	60.0	33.3	20.0	26.7	53.3	23.1	46.2	30.8	23.1	46.2	30.8
I do not like to discuss feedback with my classmates	60.0	33.3	6.7	40.0	20.0	40.0	46.2	30.8	23.1	46.2	30.8	30.8

^aTwo students were absent when the third survey was administered.

Table 6

Comprehension - Frequencies

Question	Time 1 (N=15)				Time 2 (N=15)				Time 3 (N=13) ^a			
	Agree	Neither Agree nor Disagree	Disagree	Agree	Neither Agree nor Disagree	Disagree	Agree	Disagree	Neither Agree nor Disagree	Agree	Disagree	Disagree
It is easy to read teacher's handwriting	73.3	13.3	13.3	33.3	26.7	40.0	23.1	23.1	53.8	38.5	0.0	38.5
I can understand what comments mean	60.0	26.7	13.3	46.7	46.7	6.7	61.5	38.5	46.2	38.5	38.5	38.5
My teachers use words that are difficult to understand	13.3	46.7	40.0	6.7	26.7	66.7	15.4	46.2	46.2	38.5	38.5	38.5
I understand what I have to do to improve when I read feedback	60.0	33.3	6.7	60.0	40.0	0.0	76.9	15.4	15.4	7.7	7.7	7.7

^aTwo students were absent when the third survey was administered.

Table 7

Overall Frequencies for Each Sub-scale

		Sub-scale Categories			
		<u>Feedback Utility</u>	<u>Sensitivity</u>	<u>Confidentiality</u>	<u>Comprehension</u>
Time 1	Agree	53.3	0.0	40.0	80.0
	Neither	40.0	13.3	53.3	6.7
	Disagree	6.7	86.7	6.7	13.3
Time 2	Agree	53.3	6.7	46.7	46.7
	Neither	33.3	20.0	46.7	40.0
	Disagree	13.3	73.3	6.7	13.3
Time 3	Agree	61.5	0.0	38.5	61.5
	Neither	38.5	46.2	38.5	38.5
	Disagree	0.0	53.8	23.1	0.0

To examine possible gender differences, the overall scores for males and females in each subscale for Time 3 were compared. An independent-samples t-test was conducted comparing mean scores for males and females assuming a normally distributed population and equal variances. Results (Table 8) indicated no significant differences between the groups at the 0.05 level (2-tailed).

Table 8

Gender Comparison for Each Sub-scale (Time 3)

	<u>Mean Score</u>		<u>Equality of Means t-test</u>	<u>Sig. (two-tailed)</u>
	<u>Females (N=7)</u>	<u>Males (N=6)</u>		
Feedback Utility	2.38	2.55	.74	.474
Sensitivity	3.57	3.41	-.49	.631
Confidentiality	2.62	2.78	.35	.734
Comprehension	2.32	2.79	1.42	.184

A Pearson correlation was used to analyze bivariate correlations between pairs of sub-scales in the IFOS for each of the three time measures (Tables 9 - 11). This method of analysis seemed appropriate assuming that the Likert scale measures could be interpreted at the interval level and that all of the paired measures being correlated would form a bivariate normal distribution in the population. Results indicate that, for Time 1, feedback utility and comprehension were significantly positively correlated, $r(15) = +.57$, $p = .03$. For Time 2, the positive correlation between feedback utility and comprehension appeared even stronger: $r(15) = +.79$, $p = .00$. A significant positive correlation between feedback utility and comprehension remained in Time 3 as well: $r(13) = .62$, $p = .02$. This suggests that throughout the semester students who felt they had better comprehension of the feedback also found it more useful. Confidentiality and sensitivity were only significantly positively related in Time 1, $r(15) = +.56$, $p = .03$, suggesting that, at the beginning of the study students who were more sensitive to corrective feedback also preferred confidentiality. This relationship was not evident in the subsequent measures. A negative correlation between sensitivity and comprehension grew to become significant

in Time 3, $r(13) = -.64$, $p = .02$. This suggests that, in the latter part of the semester, students who felt they comprehended the feedback they received were less sensitive to it. There is also a significant strong negative correlation between sensitivity and feedback utility in Time 3, $r(13) = -.89$, $p = .00$, suggesting that students who found feedback more useful were also less sensitive to it.

Table 9

Correlations between Paired IFOS Scores (Time 1)

		<u>Feedback Utility</u>	<u>Sensitivity</u>	<u>Confidentiality</u>	<u>Comprehension</u>
Feedback Utility	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	15			
Sensitivity	Pearson Correlation	-.144	1		
	Sig. (2-tailed)	.610			
	N	15	15		
Confidentiality	Pearson Correlation	-.293	.562*	1	
	Sig. (2-tailed)	.290	.029		
	N	15	15	15	
Comprehension	Pearson Correlation	.569*	-.037	.168	1
	Sig. (2-tailed)	.027	.895	.548	
	N	15	15	15	15

*Correlation is significant at the 0.05 level (2-tailed).

Table 10

Correlations between Paired IFOS Scores (Time 2)

		<u>Feedback Utility</u>	<u>Sensitivity</u>	<u>Confidentiality</u>	<u>Comprehension</u>
Feedback Utility	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	15			
Sensitivity	Pearson Correlation	.213	1		
	Sig. (2-tailed)	.445			
	N	15	15		
Confidentiality	Pearson Correlation	.189	.286	1	
	Sig. (2-tailed)	.499	.302		
	N	15	15	15	
Comprehension	Pearson Correlation	.788**	-.206	.205	1
	Sig. (2-tailed)	.000	.462	.464	
	N	15	15	15	15

**Correlation is significant at the 0.01 level (2-tailed).

Table 11

Correlations between Paired IFOS Scores (Time 3)

		<u>Feedback Utility</u>	<u>Sensitivity</u>	<u>Confidentiality</u>	<u>Comprehension</u>
Feedback Utility	Pearson	1			
	Correlation				
	Sig. (2-tailed)				
	N	13			
Sensitivity	Pearson	-.888**	1		
	Correlation				
	Sig. (2-tailed)	.000			
	N	13	13		
Confidentiality	Pearson	-.120	.221	1	
	Correlation				
	Sig. (2-tailed)	.697	.469		
	N	13	13	13	
Comprehension	Pearson	.624*	-.639*	.112	1
	Correlation				
	Sig. (2-tailed)	.023	.019	.716	
	N	13	13	13	13

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

To determine whether or not the 15 participants were able to accurately self-report their current performance and to test for response bias, their actual marks, given as numeric values, were compared to their reported marks, given as levels (i.e., on the questionnaire, students were asked to select a range within which their mark would fall - these ranges were converted to levels accordingly). The correlation was found to be high: $r(15) = +0.92$, $p = 0.00$ (Table 12). In fact, only three students out of the 15 survey

respondents did not report within their actual achievement level; two of the students estimated one level too high and the third was two levels higher. This was assumed to be more likely due to poor estimation skills rather than response bias. Most students possessed a fairly accurate perception of their achievement at that point in the course.

Table 12

Correlation between Actual versus Reported Midterm Marks

		<u>Reported</u> <u>Midterm Mark</u>
Actual	Pearson Correlation	.916**
Midterm Mark	Sig. (2-tailed)	.000
	N	15

**Correlation is significant at the 0.01 level (2-tailed).

To determine whether or not feedback orientation was related to student achievement, a Pearson correlation was also used to analyze bivariate correlations between report card marks and each of the sub-scales in the IFOS scales for the last two measurement periods (Table 13). These points of measure were selected because both the surveys and the reporting of marks occurred within the same month. The IFOS scores for Time 2 were compared to Midterm marks (both measures were taken in November) while those for Time 3 were compared to Final Marks (both measures were taken in January). Significant positive correlations were found between marks and sensitivity in both instances. For the midterm marks versus Time 2 sensitivity scores, $r(15) = +.57$, $p = .03$ and for final marks versus Time 3 sensitivity scores, $r(13) = +.67$, $p = .01$. While repeated measures ANOVA results indicated no significant changes in feedback

orientation over time, it is interesting to note that the strength of the correlation between achievement and sensitivity did increase over time. The positive correlation suggests that students with a higher sensitivity to feedback (which, recall, would result in a lower score on that IFOS sub-scale) tend to have lower marks. A significant negative correlation between final marks and Time 3 feedback utility scores was also observed, $r(13) = -.65$, $p = .02$. Thus, near the end of the study period, students who reported that they found feedback more useful (i.e., scored low in this category on the IFOS) also achieved higher marks. No other significant correlations were found between the other sub-scales and marks.

Table 13

Correlations between Report Card Marks and IFOS Scores

<u>Sub-scales</u>		<u>Midterm Mark vs. Time 2</u>	<u>Final Mark vs. Time 3</u>
Feedback Utility	Pearson Correlation	-.149	-.648*
	Sig. (2-tailed)	.595	.017
	N	15	13 ^a
Sensitivity	Pearson Correlation	.569*	.665*
	Sig. (2-tailed)	.027	.013
	N	15	13
Confidentiality	Pearson Correlation	.317	.364
	Sig. (2-tailed)	.249	.222
	N	15	13
Comprehension	Pearson Correlation	-.395	-.286
	Sig. (2-tailed)	.145	.343
	N	15	13

^aTwo of the participating students were absent when the third survey was administered.

*Correlation is significant at the 0.05 level (2-tailed).

Qualitative Results

The themes that emerged from the interviews have been grouped into three main categories: *perceptions of assessment*, *perceptions of descriptive written feedback* and *responses to feedback*. Within each of these categories, sub-categories were developed to delineate the different perceptions and responses that emerged in the data.

Perceptions of Assessment

Student perceptions of assessment were subcategorized into four main themes. Three of these themes consider assessment as a tool for the teacher, while the fourth looks at assessment as a tool for the student.

Assessment is used as a tool for the teacher to measure academic performance. In their research on achievement motivation, Nicholls and Dweck (1979) proposed that there were two major goals that students would pursue in achievement situations: performance goals and learning goals. Performance goals are those whereby students strive to maintain positive judgments about their ability and avoid negative judgments. Learning goals are those whereby students strive to increase their ability or master new tasks. Some of the responses that came from the interviews suggested that most of the participants were performance goal-oriented and, thus saw the purpose of assessment primarily as a tool to come up with a grade.

David, a grade 10 student who had been unsuccessful in the grade 9 academic math program and so was repeating it at the applied level, was a prime example of the performance goal-oriented student. He was one of the higher achievers in the class. He and his classmates were fairly competitive with each other and, so, they often reported

their marks to one another as soon as assessments were returned: “Well, me and R and S have a competition...to see who gets a better mark. I think R is beating us right now, so...actually, after EQAO, he won’t be...” Most tasks were easy for David and so he often submitted assessment tasks early; he was more interested in completing tasks with efficiency than with accuracy. When asked what he thought the information that the teacher gathers from assessment was used for, David reported “our marks – our average.” He also reported that he did not read feedback on the assessments carefully, especially if he “got the marks” for a question anyway. He perceived assessments as an opportunity to accumulate marks.

Chad was a grade 9 student who felt somewhat misplaced in the grade 9 applied program. He came to high school with an IEP and it was obvious that he had deficiencies in literary skills; thus, his elementary teachers recommended the applied level stream for him. However, he demonstrated strong thinking skills when challenged with harder mathematics problems and was performing above average in the class. Chad seemed preoccupied by the idea that high marks would bring about a level change from the applied to the academic and so was encouraged by higher marks. When Chad was asked why he thought teachers give assessments, his response reflected this: “...to see if they’re still at the right level as everybody else and, I think, they also give the quizzes and tests also for the school, of course, for their grades.”

Erin struggled at the beginning of the semester because her learning deficiencies were not detected and accommodated for by the special education department until mid-semester. She was a conscientious and fairly determined female with reasonably

developed learning skills for an applied level student. Erin was one of the few students in the class that possessed traits that would classify her as more learning goal-oriented. She showed a genuine interest in improving her understanding of concepts – she asked more questions and completed more homework than her classmates. Regardless, it was fairly obvious to her as well that information gathered from assessments was used to “get a mark for the report card.”

In fact, and not surprisingly, most of the students interviewed alluded to the importance of assessments as a way to collect data for grades.

Assessment is used as a tool for the teacher to measure learning skills. Some participants seemed to perceive assessments as more of a way to assess behaviour and learning skills rather than academic performance. They felt that low marks or negative comments on an assessment reflected that they either were not paying attention in class or not completing enough homework and that the intention of the assessment was to make them “work harder.” When prompted further about the meaning of “work harder,” students had difficulty giving concrete examples of what it meant, using phrases like “keep working,” “pay attention,” and “study more.”

Kate was a quiet, shy girl who also had learning difficulties. Her IEP specified needs in learning skills, cognitive skills, and numeracy skills, among others. When asked why she thought teachers gave assessments, she responded: “to see if you were paying attention in class or if you were doing your homework and if you were listening.” These ideas recurred throughout the interview. She reported that the marks that she received on her assessments indicated to her that she needed to pay attention more and “just take your

time, and study a lot and...” She used the same terminology later on when she was asked about corrective written feedback on a few of her assessments: “Well, it makes me feel like I have to improve on that certain thing...I have to pay attention more and study more...” Her responses remained vague.

Chad also intimated that teachers may have the intention of assessing homework habits through assessments: “I think the teachers give students the assessments to check up to see if they are doing their work because you can’t always check their homework.” Chad saw assessments as the teacher’s way to monitor student behaviour.

Assessment is used as a tool for the teacher to teach better. Most of the participants could see that assessments could be used to improve teacher performance.

Levis was aware that assessments could give information to the teacher about how to proceed in a lesson. When he suggested that assessments were used to see where students were at, he followed it with the suggestion that teachers would then “maybe work with (the students) a little more if they’re not, um...if they’re not doing too good.” Chad suggested that the information gathered from assessments helped the teacher become a better teacher “because they see how the students they have in their class work and different ways so if they like using things on the board over things that are spoke about and you can see it in their work...” Another student, Dean, an excellent thinker who produced mediocre work, highlighted this function of assessment as well: “I think it’s used for – well – the obvious one is for marking but I think it may also be used for if the student needs help then you can go back and see like how the student learns, like it’s basically about how the student learns and how *you* can help them.” Dean’s comments

emphasize that the onus is on the teacher to react to assessment outcomes.

Assessment is used as a tool for the student to meet learning goals. While this was not as common a response, some students alluded to the idea that an assessment could be used to see how successful the student was in achieving a certain goal. Levis was a quiet male who demonstrated characteristics that he might be learning goal-oriented. He was persistent and perseverant, spending extra hours at lunch and after school trying to master mathematics skills that he had difficulty with. He asked appropriate questions to help clear up misconceptions. Although his performance in class was not stellar, he did not let it discourage him. This behaviour reflects an inclination to use assessments to improve learning. Levis used the expression “to see where they’re at” to describe the purpose of assessments, suggesting that it was the student’s responsibility to see where s/he is in relation to his/her learning goals. David also used this expression, adding “...like to see if they’re having trouble with what they’re learning.”

That students clearly saw some forms of assessment as tools for learning was more apparent by their actions than by their words. Exit cards were periodically used near the end of a lesson to assess a student’s understanding of a concept. The feedback on the card would consist simply of one word – yes, maybe or no – letting students know where they were at in relation to the goal. When Dean received an exit card suggesting that he had not correctly used the distributive property, he immediately re-attempted the task and returned to the teacher for further feedback. This type of response was very common among students during other types of more informal formative assessments and often led to further feedback, both written and oral feedback. Incidentally, it was noted

that response was much quicker when oral feedback was provided. For example, during a work period while students worked on problems on their own individual white boards to consolidate the idea of isolating a variable, the teacher circulated and gave oral feedback to selected students who were struggling; these students were quick to reattempt the question and call their teacher over for further feedback. The use of white boards, in particular, had an unusually strong effect on motivating students to re-attempt a task and seek feedback.

Tasks that gave feedback that elicited immediate response from students also gave some students the momentum to take on the role of mentor. Dean, after he had mastered the skill of multiplying a monomial by a binomial correctly using the distributive property, quickly responded to his classmates who had received “nos” on their exit cards and were still struggling. David also often took on this role when exit cards were used to assess student understanding. They clearly felt in these instances that the assessments were intended to improve *all* students’ learning, not just their own.

Perceptions of Written Descriptive Feedback

Written descriptive feedback is used as a tool for the student to meet learning goals. While, for the most part, participants perceived assessment as primarily a tool for the teacher, they overwhelmingly perceived written descriptive feedback as a tool for the student to meet learning goals. Levis saw written feedback as an opportunity to “self-assess.” He explained: “Uh – like – you – like – give us – like – all the stuff we did wrong and – like – see where we need to work, um, yeah, where we need to work on places, so we can get better on our own kinda thing.” Chad felt that written comments

were more helpful than simple markings to indicate correct or incorrect responses:

I think [written feedback] is to help us do better, instead of just doing an 'X' and a check mark so it's wrong or good. It kind of helps us learn for next time, what to do next time instead of just an 'X' – oh, it's wrong...what do I do next time? With written feedback, it is kind of explaining it to us and makes it easier.

Erin expressed similar sentiments about the purpose of written feedback: “So then I can understand what I did wrong and fix it and so then I can't mistake that again because I know what to do. So it helps...it's like they're teaching me what I have to do next time to improve my skills so...” Dean's comments also supported this notion: “[teachers] take time to give feedback because they want to help students to improve what they're doing.” David, who suggested that teachers give written feedback to save time (presumably because the teacher would not have to address each error verbally with each student during class time), had an interesting perspective which included student accountability when it came to the use of the feedback provided: “if the kids don't read it - that just sucks for them.” This comment reflects that David perceives feedback as a tool to help the student improve his/her learning, whether the student chooses to pay heed to it or not. Whereas students reported that assessment served multiple functions, most of them teacher-oriented, all of them clearly saw written descriptive feedback as solely a tool for the student to improve his/her learning.

Responses to Descriptive Written Feedback

Responses to feedback have been subcategorized into emotional responses and

cognitive responses. Participants were asked how they felt about positive feedback and corrective feedback. These responses were classified as emotional responses.

Participants were also asked to examine feedback in their assessments, verbalize what it meant to them and then explain how they used it to improve their learning. These responses, combined with evidence in the assessments themselves and anecdotal evidence that was routinely collected throughout the semester, were examined to see how students responded cognitively to feedback. Focus was given to cognitive responses that were problematic; that is, those responses that suggested students struggled to respond effectively to the feedback provided.

Emotional Responses to Feedback

Descriptive written feedback is useful and desirable. Most students reported that written feedback was something that they appreciated. They felt that it helped them learn and avoid future mistakes. Erin, who had reasonably good study habits, preferred written feedback over oral feedback because she could review it prior to major assessments: “I’d rather have it in writing so that I can go back to it later and look at it so that I know not to do that mistake again.” Levis, a self-diagnosed visual learner, had the following opinion about written feedback: “Yeah, I think it’s a good idea because, um, it’s just letting kids know what they’re doing wrong or if they’re doing good so it’s just like a visual reminder of something.” And Dean implied that he was quick to respond to feedback: “I look for any mistakes that I made and a way that I can fix that.” Although Chad did not directly comment on the utility of feedback, he certainly expressed that it was desirable: “I like that this class gives this much written feedback.” Students generally perceived that they

used the feedback provided by their teacher to correct their thinking or to improve on a skill.

Responses to positive and corrective feedback varied from student to student.

Some students responded in a productive way while others did not. Dean, who was fairly confident in his abilities, was most expressive about his attitude towards positive and negative feedback (in the dialogue that follows, “R” refers to the teacher-researcher):

R: Do you read the written feedback that your teacher provided carefully?

D: Um, I don’t read it carefully but I do – like - go over it and if I see something that catches my eye – like – I need to be more precise in something, then I will read that comment specifically close to see what I need to do to improve what I’ve done wrong.

R: Ok. So just a few things...

D: Yeah.

R: How come you don’t read it all?

D: Um because sometimes if I’ve made a mistake and she writes a comment about it, I’m already aware that I’ve made the said mistake so...

R: Even after you’ve handed in the test, you’ve already thought about it, you mean?

D: Yeah

Later, when Dean was prompted to share his feelings about positive and corrective feedback on one of his assessments, his irritation at having mistakes pointed out to him comes out clearly:

R: - here’s an example of positive written feedback, uh, given on an assessment. How does it make you feel?

D: Uh, well, if I know I did something – if I know I did good – then it makes me feel better than if I know that I’ve done bad. Like when say a teacher gives me negative feedback but I just – like – I tend to not read it carefully because I – sometimes I don’t like what it says and I know I’ve done something wrong and I don’t need to be reminded of it.

Dean also displayed behaviour in class that indicated that he could be easily irritated by corrective feedback. He would be visibly frustrated when an assessment was returned with unfavorable comments. He did not always respond to feedback effectively.

On the other hand, Levis reported that corrective feedback motivated him to “work harder to fix it for the next time.” Levis behaviour reflected this: he was the type of student who would remain at lunch or after school to seek extra help if his assessments were less than satisfactory. He was rarely discouraged, despite the extra effort he needed to exert to keep up.

David, who exerted very little effort to maintain his mark, remained indifferent to corrective feedback, even when he was given the opportunity to re-submit his assignment for re-marking:

R: ...like – look at this one. This is one I marked twice, remember? I first marked it in red and you got a 6 out of 10 and I asked you to try it again and look what you did. I asked you [reading from the marked assessment] “Where do the equal signs go?” so when you went to correct it, did you look at that comment?

D: I don’t think I did. Probably not.

In fact, whether or not David had read the comment, he did not respond to it. He

re-submitted his assignment without correcting this error.

Cognitive Responses to Feedback

Students' perceptions of descriptive feedback were not, in many cases, consistent with their actual response to written feedback on a cognitive level. Students, for example, may have stated that feedback was useful, but they did not actually use it effectively to improve their thinking or their mathematics skills. Responses were found to be less than adequate for one or more of three reasons: decoding issues, comprehension issues, and/or motivational issues.

Students could not decode the handwriting or short forms. For the interview participants, both the results from the questionnaires and the interviews indicated that, in general, understanding the handwriting was an issue. The IEPs revealed that fully one third of the class (and, incidentally, one third of the participants) had literacy deficiencies in the area of decoding. In general, perhaps due to frustration, applied level students are less inclined to be persistent when it comes to reading text, so it would be expected that if students stumbled over reading handwriting, it would be very unlikely that they would give extra effort to decipher it. Furthermore, based on my daily observations, applied students rarely ask for clarification of written descriptive feedback, presumably because they do not want to reveal further inadequacies to their classmates or their teacher. This is a notable difference when compared to responses I have received from academic students, who generally seek clarification and show more interest in engaging in a dialogue about the feedback they receive from their teacher.

Decoding issues came up frequently during the interviews. In one instance, Levis,

while reading a comment aloud, interrupted to ask “what’s that say?” Kate stumbled over the handwritten word *tune*: “Does that say ‘tune’?” Dean, when asked to report his mark on a particular question, reported “Uh, I can’t really read that. It could either be a 3 or a 5.” And these students have difficulty using contextual clues to help them decipher if they are stumbling. If Kate had read more carefully, she may have concluded that the word *tune* would likely have followed the word *fine* in the teacher’s comment “you can *fine tune* this with a line of best fit.” In Dean’s case, while a mark would not classify as descriptive feedback, it is a clear example of Dean’s inability (or lack of inclination) to use other information provided to help him decipher the mark: the total marks accumulated on the page was given as ‘6’ so a simple subtraction may have helped him determine that it must have been a ‘3’.

Students could also not decode short forms effectively. In particular, the short form “COM” was often misinterpreted. This form was typically used to indicate to students that they had a communication error (i.e., an error in the expression or organization of mathematical thinking or the use of mathematics conventions). Students were taught about this notation prior to receiving their first marked assessment. However, when questioned about the COM notation, most students misinterpreted it. For example, when Chad is asked about a COM error on one of his assignments, he admits “I’m honestly not sure what it means.” When asked if it was because he could not read it he responded: “No - I believe it means that it’s a common error but I’m just guessing on that.” In fact, students are typically reminded of the meaning of COM when assessments are returned to the class but retention issues, which are common in applied level students,

may have prevented Chad from remembering its meaning.

Students did not understand feedback. Considerable evidence came up during the interviews that suggested that students did not understand or know how to respond to the feedback given. That is, even if a comment was very specific to a learning goal, students did not understand that they needed to correct their thinking or take specific actions in order to improve a particular skill. While students may have taken the time to read a comment and could decode it correctly, reflection on its meaning was cursory at best. Also, if they did not understand a comment, they were unlikely to address it with the teacher.

Recall Kate who interpreted feedback as a message to “work harder” and “study more.” Kate was unable to verbalize what specific actions might be required when asked to address a written comment on an assessment on the concept of ‘line of best fit.’ On this assessment, students were asked to predict the height of a skeleton with a given arm span, forearm length and hand span based on correlation data collected from classmates. Kate had incorrectly used the concept of average to determine the height of the skeleton. One of the questions asked to explain, in three or four sentences, how she came up with her answer. The comment on her assessment read: “We used lines of best fit to make predictions. Where should you be drawing a line of best fit?” The dialogue that ensues after Kate is asked about the meaning of the comment clearly indicated the lack of reflection that she initially gave the comment:

R: Do you remember what this assignment is about?

K: I think so.

R: So what do you think that comment means?

K: Well, maybe when I said it on here maybe I, um...

R: Do you think you remembered what it meant when I first gave it to you, or...

K: Um...

R: When you read that comment what did you think?

K: Maybe I put it – like – wrong. I ordered it wrong...

R: You ordered the - so you think it had something to do with the way you put the sentences together?

K: Maybe.

R: Do you remember what a line of best fit is?

K: Yeah, it's where you use a ruler and you try to make all the dots on the line.

R: Good. Okay, did you do that anywhere there?

K: Um, no...

Clearly, Kate thought that the comment related to her writing skills rather than her mathematics skills.

Kate later admitted that she was “a bit confused” by the comment but she did not take the initiative to ask her teacher about it because she was “a bit too shy.”

In another instance, Kate responded oddly to a written comment “Is this a reasonable height?” The question was intended to make her consider her answer for reasonableness which is a skill that is taught repeatedly in mathematics class. She suggested that it meant that she may have “added or subtracted wrong” even though no computations – neither addition nor subtraction – were apparent in her work. Her

response seemed somewhat aloof and illustrated a lack of reflection on the comment.

While Erin, who was more learning-goal orientated, reported that she read her feedback carefully so that she could understand what she did wrong and “fix it” the next time, she too showed evidence of lack of reflection. In an assessment where she is asked to determine the perimeter of a triangle using an algebraic expression, Erin fails to add like terms correctly and then is unable to use the expression to come up with a numeric value of the perimeter, given a value for x . The feedback in this case provides a correct version of the final algebraic expression as well as the correct substitution and final answer. Erin is unclear about what she did wrong, explaining: “Uh... I did the step wrong and I did – probably skipped a step and got confused and didn’t do the rest of the question right...because it didn’t equal 7 cm. “X” didn’t equal 7 cm.” In fact, $x = 7$ was given in the question! When she was prompted further to explain why, she conceded “because... I don’t know why.” She was able to finally see her mistake. In this case, Erin also did not take the initiative to come and ask about the comment earlier because she likely thought she understood it initially.

While Dean, in general, showed a better understanding of his mistakes when he was asked to discuss feedback on an assessment, he, too, conceded that some comments he just did not understand. In response to a comment that was made on a rubric about creating a scale for a scatter plot, Dean admitted: “Uh, well that one there makes me think that, uh – I really didn’t comprehend that one...” And even when Dean did understand his mistakes, there was evidence in his subsequent assessments to suggest that he did not apply what he learned from his mistakes to improve his work. On his

assessment about creating a scale, he had plotted some points incorrectly. These errors were circled and for one of them, the ordered pair was given beside the circled point in an effort to highlight the error. Dean was aware that he had misplaced the point. However, in a summative assessment several days later, he made the same error:

R: Okay. Let's take a minute to see if we've got any plotting on this test now. So when you get something like that, do you consciously say "Oh, I'm going to be really careful next time when I plot? Like, over here, you had to do some plotting..."

D: Well, it's not something I'm really conscious. I'm just going to try harder to clarify my answers and be more precise about my plotting.

R: Ok. Like – for example, right here.

D: Yeah.

R: So you still have the same mistake, no?

D: Uh...

R: Is that the same, uh...

D: Yeah, I believe so.

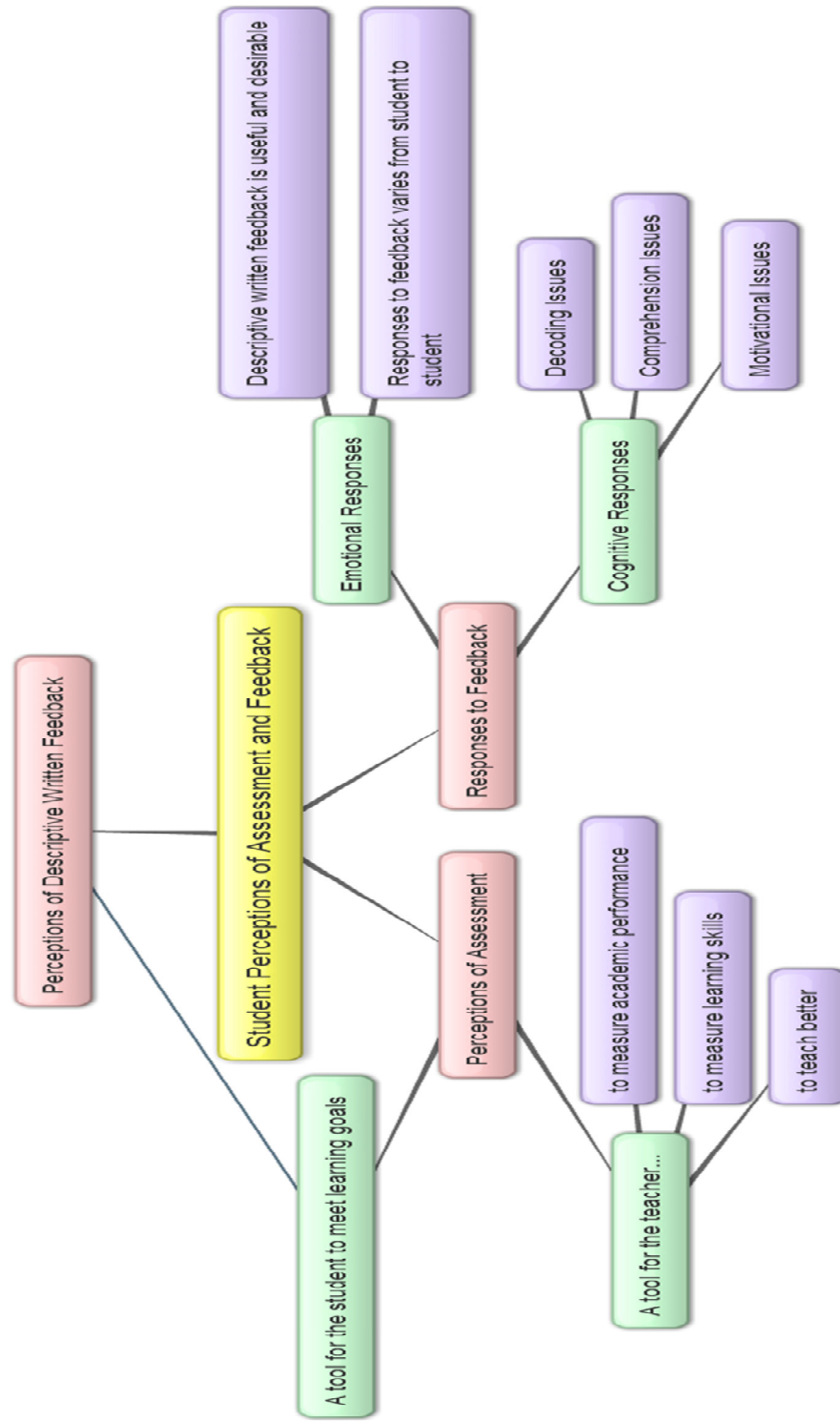
It is interesting to note Dean's use of the elusive expression "try harder." Dean's work contained evidence that he usually could plot ordered pairs accurately, but he was unable to verbalize why he did not in this instance.

Students were not inclined to respond to feedback if they felt that it did not affect their performance. On several occasions, students were asked to re-submit work after they had made corrections based on the feedback they received. Efforts to correct were minimal, at best. When David, the performance goal-oriented high achiever, was asked

why he did not correct the communication errors on his assignment after being given the opportunity, he explained that it was because he got the marks for it already so there was no reason to polish it up. David often reported that he was “happy” with his mark.

An overview of these categorizations is illustrated on the concept map in Figure 1.

Figure 1: Concept Map of Findings



CHAPTER 5

DISCUSSION AND CONCLUSIONS

In this chapter, all data sources will be pulled together to provide answers to the three research questions. The first research question, ‘What are applied level mathematics students’ perceptions of written feedback?’ is addressed using IFOS survey scores and the frequency distribution of the responses. Interview data is also reviewed to compare these results to the quantitative results and discrepancies are discussed. Results from statistical analysis in conjunction with the themes that emerged in the interview data concerning students’ perception of assessment were used to address the second question, ‘Do current recommended written feedback practices bring about desired changes in students’ perceptions of written feedback?’ The third research question ‘How do written feedback practices influence students’ perceptions of assessment?’ is addressed by examining interview data. Implications for practitioners, limitations of the study, and suggestions for future research are also discussed.

Student Perceptions of Written Feedback

Based on both the frequency distributions and sub-scale scores from the IFOS surveys, applied level mathematics students’ perceptions of written feedback can be summarized as follows:

- *Most students find feedback useful.* Despite any changes that students may have experienced throughout the semester with respect to the nature of written feedback that they were receiving, more than half of students consistently reported that feedback was useful at all points of measure.

- Most students are not very sensitive about corrective written feedback.* Compared to the other sub-scales, the mean scores for sensitivity on the IFOS were noticeably higher at all three points of measure, indicating that a large majority of students surveyed were not sensitive to feedback. However, the overall frequency distribution of responses to questions in this sub-scale revealed a trend over the three time periods that placed a larger number of responses in the “neither agree nor disagree” category, suggesting that students may have become more ambivalent about how they felt about corrective feedback. Regardless, by Time 3, there were no responses that fell into the “agree” category for sensitivity. Furthermore, statistical analysis showed no significant changes in orientation to sensitivity overall, thus these trends may be incidental and due to statistical fluctuation.
- More than a third of students prefer to keep their feedback confidential; they do not want to discuss it with classmates.* However, results also suggest that more than a third of students are ambivalent about confidentiality. At any rate, it is clear that students are not comfortable with the idea of discussing feedback with peers or in the presence of peers.
- Most students feel that they understand the feedback that they receive.* It is interesting to note that more students reported that they comprehended feedback in Time 1 than in Time 3. At the same time, there were no responses that fell into the “disagree” category in Time 3, suggesting that students did not feel that they could not comprehend the feedback they were receiving. The change in

orientation for this sub-scale from Time 1 to Time 3 may have occurred because incoming students had limited experience with feedback in mathematics in elementary school. In the pilot test of the IFOS tool, students reported that most mathematics assessments in elementary school were knowledge-based and often self-evaluated, requiring only check marks or Xs. Thus, from their previous experiences, they may have felt they understood feedback well. As the semester progressed, students began to experience more *written* feedback, which required adequate reading skills and a little more attention. Thus, they may have felt less inclined to select “agree” or “strongly agree” from this bank of questions. By the end of the semester, discussions about written feedback, its purpose and how to use it, as well as the adjustments made to feedback practices based on student response may have led students to believe that they had good comprehension of the feedback they were receiving.

Correlations in Time 1 indicate a significant positive relationship between sensitivity to feedback and confidentiality, which is not surprising. Students who are more sensitive to feedback would prefer to keep the feedback they receive confidential. This orientation seems to fall in line Boekaerts and Corno’s (2005) “well-being” self-regulation track: students with a “well-being” perspective respond better to tasks that can make them appear successful as they do not want to be exposed as inept. This relationship is no longer observed in subsequent survey results. The feedback provided to participants during the semester remained for the most part objective and non-evaluative in nature; this may explain why most students reported they were not sensitive to

feedback. It is peculiar, however, that while group scores for the sub-scales of the IFOS suggest that most students are not sensitive to feedback, at the same time, they do prefer to keep it confidential. The pairing of these orientations seems contradictory. It would be difficult to establish an open, non-threatening classroom environment where students can share their learning when students are preoccupied with confidentiality. These data suggest that many of the participants may have remained on the “well-being” track in terms of self-regulation.

Overcoming the desire for confidentiality would open up lines of communication between students and allow for better peer assessment in the classroom. Sharing feedback with peers is a recommended formative assessment practice to improve student learning (Wiliam, 2011) but this is unlikely to occur effectively in an applied level classroom if students continue to favour confidentiality.

The positive correlation between feedback utility and comprehension remained significant for all three testing periods. Presumably, the more students understood the feedback that was given to them, the more they would report it useful. This has logical implications in practice. It is important to ensure that the written feedback that teachers provide is clear and easy to read. Teachers, however, cannot assume that legible handwriting is enough to improve comprehension of feedback. Periodic informal assessments on whether or not students understand the feedback they are receiving should occur early in the semester. This may be done by: a) tracking student responses to feedback to see if it helped to improve their understanding or b) having one-to-one time with each student after an assessment is returned to observe and discuss how the student

interprets the feedback provided. Essentially, the teacher should seek feedback on his/her feedback to improve his/her skills in providing effective feedback. Furthermore, explicitly teaching applied level students about feedback – from the meaning of common notations used to how to use feedback to improve learning – would help to improve comprehension of feedback. Improving student comprehension of feedback should help more students perceive it as useful.

In Time 3, negative correlations between feedback utility and sensitivity and comprehension and sensitivity were also observed. These correlations suggest that students who had better comprehension of feedback and/or found it more useful were also less sensitive to it. Conversely, it could mean that sensitivity to feedback may have impeded students from comprehending it or using it effectively. In this case, the implication is that teachers need to provide feedback that is non-evaluative and focused on helping students meet learning goals. Hattie (2009) classified feedback focused on personal evaluation at the “self level,” the lowest level of feedback and the least likely to improve achievement. On the other hand, feedback focused on the task level is most effective in improving student achievement. Sensitivity towards feedback is less likely if written feedback remains objective and task-oriented.

The significant correlations between report card marks and sensitivity for both Time 2 and Time 3 suggest that students that are more sensitive to feedback also tend to be lower achievers. This orientation may be illuminated using current theories on student motivation. Dweck’s theory on mindsets (2006) might suggest that students who are less sensitive to feedback have a “growth mindset” and use feedback to improve their learning

and, consequently, achieve their goals, while those that are more sensitive have a “fixed mindset” and react negatively to feedback that makes them feel less intelligent and, as a result, do not achieve their goals. Lower achievers that are more sensitive to feedback would also be classified as being on Boekaerts and Corno’s (2005) “well-being” self-regulation track rather than the “growth” track; these types of students prefer to complete tasks that maintain or restore positive feelings and are not particularly focused on meeting learning goals. If one considers sensitivity the predictor variable, the relationship between sensitivity and achievement further substantiates a need to keep written feedback objective and task-oriented so that students are less inclined to give an emotional response to it.

On the other hand, it may be that students with higher marks tend to be less sensitive to feedback (i.e., “student marks” may be the predictor variable). Higher achievers in the applied level appear to remain objective about the purpose of feedback and are better able to use it as a tool to improve their skills, correct their thinking, etc. Meanwhile, low achievers tend to view feedback as a statement about their intellect. Regardless, the implications are the same: written feedback should be carefully designed to effect cognitive responses rather than emotional responses from students.

Some contradictions emerge when comparing interview results with the scores on the four sub-scales of the IFOS. Overall, the interview results confirm students’ orientations towards feedback utility based on the quantitative data; students perceived that written descriptive feedback was used as a tool for the student to meet learning goals and they felt that it was useful and desirable. However, while the IFOS scores suggested

low sensitivity, there is evidence in the interview data to suggest that sensitivity towards corrective written feedback may have been an issue. Also, comprehension of written feedback, which was a major focus of the portfolio discussions, was not always apparent. There were many instances to suggest that students did not understand feedback well enough to respond to it appropriately. Sensitivity toward written feedback was markedly more apparent in the qualitative data based on the variety of emotional responses to corrective feedback observed – some students could deal with it in a positive way, while others were inclined to ignore it, or even resent it. This is consistent with the research done by Kluger and DeNisi (1996), who established that students respond to feedback in different ways, and most of them are negative. Dean, for example, whose IFOS score for sensitivity indicated that he was not sensitive to written feedback, contradicted this in his interview when he expressed that he did not like what negative feedback implied and, therefore, did not read it carefully. With respect to feedback sensitivity, there seems to be a discrepancy between what Dean perceived and his actual behaviour. How should teachers adjust their feedback to serve students like Dean? Dean was the student who responded quickly to an error on an exit card. Without prompting, he was quick to reattempt the question and seek further feedback from his teacher. Thus, it seems that, in Dean's case, less is more. Why provide detailed feedback at the risk of provoking a negative response or getting no response at all when instant feedback on a low stakes activity elicits a favourable one? The latter is more likely to improve student learning.

Also, while both IFOS scores for confidentiality and behaviours observed in the classroom, such as selective participation in various tasks, would place most students in

the study group in a “well-being” mindset and, therefore, more sensitive to feedback, the IFOS group mean scores suggest low sensitivity. It may be that students perceive themselves as not being sensitive to feedback, but their behaviours suggest otherwise. Students tend to view formative assessment as primarily a tool for the teacher to evaluate them. Formative assessment should, in fact, be primarily a tool for the student to meet learning goals. To facilitate a shift in student perceptions of formative assessment, the teacher needs to assume the role of counsel rather than judge. Accordingly, formative assessments should be low stakes and should provide immediate opportunities for reattempting the task when necessary.

A discrepancy between comprehension scores and actual comprehension is also evident. Based on the overall frequencies for comprehension in the IFOS survey, participants perceived that they understood the feedback that was given to them. However, when interview participants were prompted to explain how they interpreted the feedback they received, some struggled with deciphering the handwriting and/or the meaning of the comments provided. In fact, this is a common observation in the applied level classroom; often, despite the amount of written feedback provided, students respond to errors inadequately, incorrectly or not at all on subsequent assessments. Detailed written feedback can be more confusing and less helpful than short, concise feedback. Similar conclusions have been made by other teachers of grade 9 applied mathematics students. Kyle Pearce (2014), a mathematics coach from the Greater Essex Public School Board, recently posted in his blog:

Over the past couple of years, I have been doing quite a bit of experimenting

and have found that sometimes less [feedback] is often better than all at once...The frequency of my feedback has increased to every couple of days. I collect a question that allows students to demonstrate a few learning goals and I then give them some actionable feedback, even if it is really great work. This keeps the marking quick and feedback short enough for both the teacher and the student to benefit. Last year, when I really tried to use descriptive feedback to help improve student achievement in my classroom, I found that I was just giving away too much. Not only was I killing myself to get a ton of written feedback to my students as often as I could, the students weren't improving in the areas outlined. My assumption is that there was too much to read. Often times, students receiving the most feedback were struggling. I can only imagine looking at a book's worth of feedback would be more discouraging than helpful.

This reinforces the notion that less is more when it comes to feedback for struggling students.

Effect of Current Feedback Practices on Student's Perceptions of Written Feedback

Statistical analysis results showed that student perceptions on feedback did not change over time. In general, in terms of establishing a favourable orientation towards written feedback, IFOS results suggested that students were almost there at the beginning of the semester. With the exception of the contradictory results between sensitivity and confidentiality, it seemed that students had positive responses to the use of feedback and their understanding of it. However, improvements in the scores were expected based on

the teacher-researcher's efforts to highlight the use of written feedback to improve learning goals. Significant changes were not detectable.

How Feedback Practices Influence Students' Perceptions of Assessment

Ideally, effective feedback practices should send students the message that the purpose of assessment is ultimately for student learning, *not* evaluation. The interview data revealed four main themes for the purpose of assessment (see Figure 1). Three of these themes saw assessment primarily as a tool for the teacher. The notion that assessments could be used as a tool for the student to meet learning goals remained secondary in the interview discussions.

While interview data alone provided minimal evidence to suggest that feedback practices could influence perceptions of assessment, anecdotal and observational data revealed that students became more focussed on meeting a learning goal when low stakes assessments such as exit cards or homework submissions were used. Response to feedback on these types of assessments was almost immediate if time in the class permitted. The amount of written feedback required for this type of strategy was minimal but response was optimal. Also, the written feedback in these types of assessment often opened channels for oral feedback which, in general, produced more immediate and better responses than written feedback. These observations support Dylan Wiliam's (2011) claims that assessments serve students best when they are "embedded" within routine classroom activities rather than formalized.

Conclusions

Descriptive written feedback is often touted as an important component of

formative assessment. However, the results of this study suggest that descriptive written feedback may need to take on a different appearance in applied level classrooms to improve student learning. The findings show that recommended feedback practices, while perceived as useful by applied level mathematics students, do not always produce the desired effects. Applied level students typically have inadequate literacy skills and struggle with decoding and understanding detailed feedback. In some cases, feedback may be comprehensible but students are not inclined to respond. Some students tend to be sensitive to it and respond emotionally rather than cognitively to feedback. Thus, much attention needs to be given to the construction of comments in written feedback so that they remain non-judgemental and focus on the learning goal being assessed. Even then, applied level students may not pay heed.

Results also suggest that the type of assessments that are used in the applied level mathematics classroom appear to be intricately connected to the effectiveness of written feedback. Detailed feedback on traditional-type quizzes and lengthier assignments requires much effort on the teacher's part and elicits minimal response from students. Applied level students seem to respond better to formative assessment tasks that require minimal written feedback. These types of tasks have the following characteristics:

- They usually focus on only one or two learning goals at a time.
- They are low risk; students do not fear making mistakes because there is no evaluation connected with the tasks.
- The written feedback required to assess these tasks is not time-consuming (e.g., it may be limited to one or two simple words) and, therefore, can be provided

almost immediately (within the same period or on the following day).

- Time is built into the lesson to allow the student to respond to corrective feedback immediately.

A change in classroom climate is apparent when formative assessment and feedback are of this nature. The classroom is abuzz with students consulting with each other or their teacher to determine whether or not they “got it.” Students take more risks as they begin to see their teacher as a facilitator rather than an adjudicator.

The implications of these findings for the applied level mathematics classroom may be welcomed by teachers, who tend to be scrupulous about providing detailed feedback. In this case, ‘less is more.’ Teachers of applied level mathematics students would do best to shift their energies from providing detailed written feedback on formative assessments to revamping their assessment tasks so that they address only one or two learning goals, are brief, and require minimal feedback. This is to be done in such a way so that students are inclined to respond immediately and constructively to the feedback to help them meet their learning goals. It is also important that the teacher, through both words and actions, promotes a culture where students view a mistake as an opportunity for learning rather than an exposure of ineptitude. This can be achieved by offering multiple formative assessments, thereby allowing students repeated attempts to meet a learning goal prior to summative assessments. The opportunity to respond to feedback should be provided in close proximity to the original task. In this way, students will begin to perceive assessment primarily as a tool to meet learning goals. Formative assessments should not require evaluative judgment. Summative assessments serve this

purpose. Ultimately, when these types of formative assessment tasks are undertaken, it is more likely that students will perceive that the purpose of assessment is for student learning.

Limitations and Implications for Future Research

There are limitations to this study that suggest direction for future studies. Firstly, the generalizability of the quantitative results is limited: the sample size was small ($N = 15$) and convenience sampling was used. To extend this research to a sample size and sampling method that better represents the population, cluster sampling of several grade 9 applied mathematics classes across the board should be used. In order to maintain consistency in the way feedback is provided, participating teachers would need to be debriefed on the recommended feedback practices prior to participating and should be required to meet periodically through the study to discuss and agree upon adjustments to feedback practices based on student responses to feedback.

The length of time over which the study took place may also have been a limitation in terms of detecting changes. It may have been ambitious to expect changes in orientation to take place over four months when these students have spent a disproportionate amount of time (up to 10 years in some cases) in elementary school settings where descriptive written feedback may have been minimal or varied. Consequently, when students ranked their feelings towards feedback on the IFOS, they may have relied on their experiences over the years and not just over the semester. This may also be a limitation in the measurement tool used as no indication was given in writing on what experiences to reflect upon when selecting their responses. A

longitudinal study designed to track the same applied level students over several years would be more effective to answer this research question. However, this design would be problematic in a high school setting where the study panel of applied level students would not remain together for more than one semester; to maintain consistency of feedback practices among many different teachers would be a challenge. A similar study could target intermediate level students that generally remain with the same teacher for an entire year. While students are not yet streamed into academic and applied in the intermediate levels, the study could rely on achievement levels as predictors of future applied level students.

It is important to note too that the IFOS tool was limited in the fact that it measured student orientation towards feedback, not assessment. Therefore, students' perceptions of assessment were examined only at the end of the semester through interview data; that is, it was not possible to identify changes in perceptions of assessment. However, the interview participants shared their ideas about assessment in the context of discussing their own work from the current semester. Thus, it was assumed that these perceptions came from their experiences with feedback and assessments during the semester. Nevertheless, this may have been a limitation in the study; a quantitative approach using pre- and post- tests with a tool that can measure student perceptions of assessment may give more insight into whether recommended feedback practices change applied level students perceptions of assessment in a positive way.

For the qualitative study, although interviewees participated on a voluntary basis, were told that responses would remain confidential and would not affect their grades, and

were informed that they could withdraw from the interview at any time, some students may have still struggled with a perceived power imbalance which may have influenced their responses and limited the validity of responses. To minimize this possibility, member checking, to give students the opportunity to confirm or modify their responses, occurred well after the semester ended and grades were assigned.

The IFOS results for orientation towards confidentiality were somewhat surprising. The issue of confidentiality seems very much connected to sensitivity and the effective use of feedback. Ideally, we would like students to receive feedback objectively and pragmatically from both their teachers and their peers. The topic of confidentiality was overlooked during the interviews and warrants further exploration in future research on feedback.

Finally, for the purpose of clarification during the interviews, assessments were defined simply using examples such as quizzes, tests and assignments (see Appendix B for the interview protocol). Reference to more non-traditional assessment practices such as exit cards was inadvertently omitted. Further investigation into students' perceptions of these newer recommended forms of assessment may support the notion that the types of assessments used influence the effectiveness of written feedback.

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APPENDICES

Appendix A: Student Feedback Orientation Scale

The student feedback orientation scale (IFOS) is subdivided into 4 subscales on feedback orientation: *feedback utility*, *sensitivity*, *confidentiality* and *comprehension*. The breaks in scale indicate where the subscales for student feedback orientation begin and end. This version of the survey was the first to be administered to participants. Slight changes were made to background questions in the second and third version so that students could to report their current performance in mathematics.

Student Feedback Orientation Scale

Code Number _____

This questionnaire is designed to determine your perspective on receiving written feedback from your teachers in mathematics assessments.

Background Information

1. Which statement best describes your feelings towards the subject of mathematics?
 - a. I enjoy studying mathematics and usually perform well in it.
 - b. I like mathematics but do not always perform well in it even when I put effort into it.
 - c. I do not like mathematics but I want to understand it so that I can be successful in the future.
 - d. I do not like mathematics and do not see it as a useful skill; therefore, I do not put much effort into it.
2. Which statement best describes your experience in mathematics classes in elementary school?
 - a. My math teachers ***often*** provided written comments on mathematics assessments.
 - b. My math teachers ***sometimes*** provided written comments on mathematics assessments.
 - c. My math teachers ***rarely*** provided written comments on mathematics assessments.
 - d. My math teachers ***never*** provided written comments on mathematics assessments.
3. Circle the range that best describes your performance in mathematics in grades 7 and 8.
 - a. 80 - 100%
 - b. 70 - 80 %
 - c. 60 - 70 %
 - d. 50 - 60 %
 - e. below 50%

Read the following statements about written feedback carefully and circle the number that best describes your opinion.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. I think written feedback from teachers is very important in improving my performance.	1	2	3	4	5
2. I read comments carefully when a teacher provides feedback.	1	2	3	4	5
3. I will usually reflect on a teacher's feedback; it helps to improve my understanding and clear up misconceptions about a concept.	1	2	3	4	5
4. I am extremely encouraged by positive feedback from teachers.	1	2	3	4	5
5. I think that feedback provides clear direction on how to improve my performance.	1	2	3	4	5
6. Feedback from my teachers can be a valuable form of praise.	1	2	3	4	5
7. I pay careful attention to written feedback.	1	2	3	4	5
8. Feedback from my teachers motivates me to improve my understanding of concepts.	1	2	3	4	5
9. Feedback from my teachers motivates me to improve my performance (i.e., to produce higher quality work for assessments).	1	2	3	4	5

		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
10.	Feedback from teachers is a waste of time.	1	2	3	4	5
11.	I feel relieved when I receive positive feedback.	1	2	3	4	5
12.	My feelings can be easily hurt by corrective written feedback from a teacher.	1	2	3	4	5
13.	I feel threatened by corrective feedback.	1	2	3	4	5
14.	Corrective feedback hurts my feelings.	1	2	3	4	5
15.	Corrective feedback is intimidating.	1	2	3	4	5
16.	My feelings are not easily hurt by corrective feedback from a teacher.	1	2	3	4	5
17.	It is difficult to “get over” corrective feedback.	1	2	3	4	5
18.	Corrective feedback is embarrassing.	1	2	3	4	5
19.	I tend to dwell on negative feelings that result from corrective feedback.	1	2	3	4	5
20.	Corrective feedback from a teacher increases the stress I feel about future performance.	1	2	3	4	5

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
21. I do not like for others to know/see what feedback I am receiving from my teacher.	1	2	3	4	5
22. I feel comfortable talking about written feedback with my teacher during class when students are present.	1	2	3	4	5
23. I do not like to discuss written feedback provided by my teacher with my classmates.	1	2	3	4	5
<hr/>					
24. It is easy to read my teachers' handwriting in written feedback.	1	2	3	4	5
25. I can understand what the comments in written feedback mean.	1	2	3	4	5
26. My teachers use words that are difficult to understand when they provide written feedback.	1	2	3	4	5
27. I understand what I have to do to improve my work when I read the feedback my teacher provides.	1	2	3	4	5

*Adapted from the original version prepared by P. E. King et al, 2009

Thank you for taking the time to complete this questionnaire.

Appendix B: Interview Protocol

Project: An Investigation of How Written Feedback Influences Applied Level Mathematics Students' Perceptions of Assessment

Date: _____
Time of Interview: _____
Place: _____
Interviewer: _____
Interviewee: _____

Information provided to the Interviewee: [Script will be read]

"As you know, I am doing a research project about how students feel about written feedback. Written feedback includes any kind of written comments you may receive on your assessments. The information that you provide in this interview will be recorded and analysed. It will remain confidential; no one other than me and you will know what we talked about today. I may use the information that you share with me to make some conclusions about how students feel about written feedback, but your name will never be used in a report or discussion about the research. What you share may help shed some light on how teachers can improve their feedback practices so it is important to be open and honest. Your responses will not affect your final grade in this math course. The audio tape recording will be deleted after the final report is complete. Until then, it will be stored in a locked filing cabinet. The interview will take about 15 minutes. You don't have to answer a question if you don't want to and we can stop at any time."

1. Why do you think teachers give students assessments like quizzes, tests, and assignments?
2. What do you think the information that the teacher gathers from the assessments is used for?
3. What information do you get from an assessment once it is returned to you?
4. Do you read the written feedback your teacher provides carefully? Why or why not?
5. What information do you get from written feedback?
6. How do you use the written feedback given on your assessments? Can you give an example from your portfolio?

7. When you receive positive written feedback on an assessment, how does it make you feel? Can you give an example from your portfolio?

8. When you receive corrective written feedback on an assessment, how does it make you feel? Can you give an example from your portfolio?

9. Why do you think your teacher gives you the written feedback?

Final Comments: Thank you for your comments and for participating in this study. Do you have final comments on your experiences with written feedback?

Appendix C: Letter of Information for Consent to Participate in Research



LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: ***The Effects of Evidence-based Written Feedback Practices on Students' Perceptions of Assessment in Applied Level Mathematics Courses***

You are invited to participate in a research study conducted by Mrs. R. Hyland under the guidance of Dr. George Zhou, from the Faculty of Education at the University of Windsor. The study will take place over the entire semester.

If you have any questions or concerns, please feel to contact Mrs. Hyland at St. Thomas of Villanova at 519-734-6444 or Dr. George Zhou at the U. of Windsor at 519-253-3000 Ext. 3813.

PURPOSE OF THE STUDY

The purpose of this study is to find out how students feel about the written feedback that their teacher provides.

PROCEDURES

If you volunteer to participate in this study, you will be asked to:

1) Fill out three questionnaires about written feedback during class time, each approximately 20 minutes in length. One will be administered at the beginning of the semester, one mid-semester and the other near the end of the semester.

You may also be asked to:

2) Participate in a one-to-one interview with your teacher which will occur in the later weeks of December 2013. In the interview, you will be asked to share and discuss your experiences with written feedback. Your teacher will ask you some questions, take notes and audio tape the session. The interview will occur in your regular classroom at lunch and will take approximately 20 minutes. Lunch will be provided to students participating in the interviews.

To become a participant, you need to have this consent form filled out with the appropriate signatures, after reading it carefully. It is to be returned to Mrs. Baltrusiusas in Room 233 prior to the first survey which will occur on _____. You can submit it in the morning, during lunch or in between classes.

POTENTIAL RISKS AND BENEFITS

There will be low risk involved for any volunteers. A minimal amount of class time will be used for the surveys and participants will remain anonymous. Students will have the option to stop the interview if they do not want to continue to participate in the discussion.

Participants in this study may develop a better understanding of the purpose of feedback and how to use it to meet learning goals. They also will learn about the research process and will come to understand the value of research and how it can impact them directly.

The results of this study may give teachers insight into more effective assessment practices in general, and written feedback practices specifically, to help students learn and perform better.

COMPENSATION FOR PARTICIPATION

Students participating in the interviews will be provided with a pizza lunch.

CONFIDENTIALITY

Students who choose to participate in the surveys will remain anonymous to their teacher. Another teacher will be collecting the consent forms and will be coding the surveys for tracking but no names will appear on the surveys. .

Participants in the interviews will remain confidential. Students will be given appointment dates. Field notes will include first names only. Participants in the interviews may request to review the audio tapes. Another consent form providing further details will be required closer to the interview date for those students who volunteer to be interviewed.

The surveys, audio tapes, transcriptions, field notes and consent forms will be kept in a secure area in a locked filing cabinet until the project is completed and will then be destroyed. Any paper documents will be shredded and recycled. Audio tape recordings will be deleted.

PARTICIPATION AND WITHDRAWAL

Participants have the right to withdraw from the study at any time. They also have the option to remove data from the study. The researcher may also withdraw a student from the study if deemed necessary.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

In January, student participants will be informed of the results of the study in a classroom discussion. The final written report on the results will be available on line on the classroom website given below:

Web address: <http://hylandgr9appliedmath.wikispaces.com>

Date when results are available: February 2014

SUBSEQUENT USE OF DATA

These data may be used in subsequent studies, in publications and in presentations.

RIGHTS OF RESEARCH PARTICIPANTS

If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

Signature of Investigator

Sept 27, 2013

Appendix D: Letter of Consent for Audio Taping in an Interview



CONSENT FOR AUDIO TAPING IN AN INTERVIEW

Student Participant's Name: _____

Title of the Project: *The Effects of Evidence-based Written Feedback Practices on Students' Perceptions of Assessment in Applied Level Mathematics Courses*

I consent to the audio-taping of interviews of my child.

I understand these are voluntary interviews and that my child is free to withdraw at any time by requesting that the taping be stopped. I also understand that my child's name will not be revealed to anyone outside the interview and that taping will be kept confidential. Tapes are filed by number only and store in a locked cabinet.

The destruction of the audio tapes will be completed after transcription and verification.

I understand that confidentiality will be respected and that the audio tape will be for professional use only.

(Signature of Parent or Guardian)

(Date)

VITA AUCTORIS

NAME: Rina Hyland

PLACE OF BIRTH: Leamington, Ontario

YEAR OF BIRTH: 1965

EDUCATION: McMaster University, B. Arts & Sci. (Honours),
Hamilton, Ontario, 1988
University of Windsor, B. Ed., Windsor, Ontario, 1989
University of Windsor, M. Ed., Windsor, Ontario, 2015