

Investigating How Digital Technologies Can Support a Triad-Approach for Student Assessment in Higher Education

Étude des technologies numériques comme appuis à l'évaluation tripartite des étudiants universitaires

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Abstract

The purpose of this research study was to investigate if and how digital technologies could be used to support a triad-approach for student assessment in higher education. This triad-approach consisted of self-reflection, peer feedback, and instructor assessment practices in a pre-service teacher education course at a Canadian university. Through online surveys, journal postings, and post-course interviews the study participants indicated that digital technologies could be used to effectively support such a triad-approach only if students were more actively involved in the assessment process and the course instructor placed a greater emphasis on formative assessment practices.

Résumé

Le but de cette recherche était d'étudier dans quelle mesure les technologies numériques pouvaient être utilisées pour soutenir une approche triadique de l'évaluation des étudiants universitaires. Cette approche tripartite consistait dans l'autoréflexion, la rétroaction par les pairs et les pratiques d'évaluation de l'enseignant dans un cours de formation des futurs enseignants au sein d'une université canadienne. À l'aide de sondages en ligne, d'annonces de journaux et d'entrevues post-formation, les participants à l'étude ont indiqué que les technologies numériques pouvaient être utilisées pour soutenir efficacement une telle approche triadique, à condition que les étudiants soient impliqués plus activement dans le processus d'évaluation et que l'enseignant mette davantage l'accent sur les pratiques d'évaluation formative.

Introduction

A number of educational researchers have stated that assessment drives approaches to learning in higher education (Biggs, 1998; Hedberg & Corrent-Agostinho, 1999; Herman & Linn, 2013; Marton & Saljo, 1984; Ramsden, 2003; Thistlethwaite, 2006). Entwistle (2000) indicates that the design of the assessment activity and the associated feedback can influence the type of learning

that takes place in a course or program. For example, standardized tests with minimal feedback can lead to memorization and a surface approach to learning while collaborative group projects can encourage dialogue, richer forms of feedback, and deeper modes of learning. The purpose of this research study was to investigate if and how digital technologies could be used to support a triad-approach to assessment in higher education. This triad approach consisted of self-reflection, peer feedback, and instructor assessment practices in a pre-service teacher education course at a Canadian university.

There has been a shift in the way teachers and researchers think about student learning in higher education, over the last two decades. Instead of characterizing learning as an acquisition process based on teacher transmission, it is now more commonly conceptualized as a process of students actively constructing their own knowledge and skills (Barr & Tagg, 1995; DeCorte, 1996; Taber, 2011). Students interact with subject concepts, transforming and discussing them with others, in order to internalize meaning and make connections with what they already know. Terms like “learning-centered,” which have entered the vocabulary of higher education, are one reflection of this new way of thinking. Even though there is disagreement over the precise definition of a learning-centered approach, the core assumptions are “active engagement in learning and learner responsibility for the management of learning” (Lea, Stephenson & Troy, 2003, p. 323).

Despite this shift in conceptions of teaching and learning, a parallel shift in relation to assessment and feedback has been slower to emerge. In higher education, the assessment process is still largely controlled by and seen as the responsibility of teachers; and feedback is still generally conceptualized as a transmission process, even though some educational researchers have challenged this viewpoint (Boud, 2000; Sadler, 1998; Wiggins, 2012; Yorke, 2003). Teachers “transmit” feedback messages to students about what is right and wrong in their academic course work, about its strengths and weaknesses, and students use this information to make subsequent improvements.

There are a number of problems with this transmission view of assessment and feedback. Firstly, if the assessment process is exclusively in the hands of teachers, then it is difficult to see how students can become empowered and develop the self-regulation skills needed to prepare them for learning outside higher education institutions and throughout life (Boud, 2000). Secondly, there is an assumption that when teachers transmit feedback information to students these messages are easily decoded and translated into action. Yet, there is strong evidence that feedback messages are often complex and difficult to decipher, and that students require opportunities to actively construct an understanding of them (e.g., through discussion) before they can be used to regulate performance (Ferguson, 2011; Higgins, Hartley & Skelton, 2001; Ivancic, Clark & Rimmershaw, 2000). Thirdly, viewing feedback as a cognitive process involving only transfer of information ignores the way feedback interacts with motivation and beliefs. Research shows that feedback both regulates and is regulated by motivational beliefs. For example, external feedback has been shown to influence how students feel about themselves (positively or negatively), and what and how they learn (Dweck, 1999). Fourthly, as a result of this transmission view of assessment, the workload of teachers in higher education increases year by year as student numbers and class sizes become larger. One way of addressing this issue is to re-examine the nature of assessment feedback, and who provides it (e.g., self, peer, and instructor), in relation to its effectiveness in supporting learning processes.

Self-Assessment

Alverno College (2006) defines self-assessment feedback as “the ability of students to observe, analyze, and judge their own performances on the basis of criteria and to determine how they can improve it” (p. 1). This assessment process is often referred to as metacognition “thinking about one’s own thinking” (Costa, 1985). Akyol and Garrison (2011) have recently demonstrated how this notion of self-regulated learning or metacognition is “a collaborative process where internal and external conditions are being constantly assessed” (p. 184). In addition, they have described three dimensions of metacognition, which involve the knowledge, monitoring, and regulation of cognition. The knowledge of cognition refers to awareness of self as a learner and includes entering knowledge and motivation associated with the inquiry process, academic discipline, and expectancies. The monitoring of the cognition dimension implies the awareness and willingness to reflect upon the learning process. And, the regulation of metacognition focuses on the action dimension of the learning experience. It involves the employment of strategies to achieve meaningful learning outcomes.

Two major criticisms of self-assessment in higher education are that students do not possess the necessary skills and experience to properly assess themselves and thus, this form of assessment is unreliable and simply leads to grade inflation (Rust, 2002). Conversely, others suggest that self-assessment is a key process for helping students to reflect, understand, and take action and responsibility for their learning (Brown, 2004).

Peer Assessment

The Foundation Coalition (2002) indicates “peer assessment allows students to assess other students (their peers) in a course. Peer assessment can also provide data that might be used in assigning individual grades for team assignments” (p. 1). The French moralist and essayist Joubert (1842) is attributed with the quote “to teach is to learn twice” and in an effective course experience all participants are both learners and teachers. The term “teaching” rather than “teacher” presence implies that everyone in the course is responsible for providing input on the design, facilitation and direction of the teaching process.

A number of concerns have been raised about this assessment approach including students’ lack of confidence in the process, their ability to provide meaningful feedback, and pressure from peers to provide positive feedback and grades (Langan & Wheeler, 2003). These issues are countered by those who emphasize that peer assessment provides students with richer and more authentic opportunities to learn from their peers (e.g., view and critique each other’s work) as well as potentially reducing teacher workload (Boud, 2007).

Instructor Assessment

Instructor assessment practices in higher education are often limited to high-stakes summative assessment activities such as mid-term and final examinations (Boud, 2000). The role of an instructor should be to provide ongoing and meaningful assessment feedback in order to help students develop the necessary metacognitive skills and strategies to take responsibility for their learning.

Thus, teachers have begun to place a greater emphasis on formative assessment practices (Gibbs, 2006; Gibbs & Simpson 2004; Gorsky, Caspi & Trumper, 2006; William, 2011). Pask's (1976) Conversation Theory of Learning suggests that learning takes place through our intrapersonal (inner voice) and interpersonal (external voice with others) conversations and that assessment feedback helps shape and regulate this dialogue in higher education courses. Nicol and Macfarlane-Dick (2006) have developed seven principles of good assessment feedback based on the work of Pask:

Good feedback:

1. Helps clarify what good performance is (goals, criteria, standards)
2. Facilitates the development of self-assessment and reflection in learning
3. Delivers high quality information to students about their learning
4. Encourages teacher and peer dialogue around learning
5. Encourages positive motivational beliefs and self esteem
6. Provides opportunities to close the gap between current and desired performance
7. Provides information to teachers that can be used to help shape teaching.

The increased collaborative digital technologies such as blogs, wikis, and other social networking applications in higher education can provide an opportunity to reinforce these principles of good assessment feedback. The term Web 2.0 was coined by O'Reilly in 2005 to describe the trend in the use of World Wide Web technology to enhance creativity, information sharing, and, most notably, collaboration among users. Brown and Adler (2008) add that the capabilities of these Web 2.0 tools have "shifted attention from access to information toward access to people" (p. 18). The focus of this research study was to investigate whether digital technologies could be used to support and enhance self-reflection, peer feedback, and instructor assessment practices in a pre-service teacher education course at a Canadian university.

Methods of Investigation

An action research (Stringer, 2007) and case-based method (Creswell, 2013) were utilized to investigate how digital technologies could support student assessment in higher education. There are various forms of action research and the framework defined by Gilmore, Krantz and Ramirez (1986) was utilized:

Action research . . . aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction. Accomplishing this twin goal requires the active collaboration of researcher and client, and thus it stresses the importance of co-learning as a primary aspect of the research process. (p.161)

There have been concerns about the validity of this methodology as it is often carried about by individuals who are interested parties in the research (i.e., instructors) and thus, potentially biased in the data gathering and analysis (Pine, 2009). The justification for action research counters this criticism by suggesting that it is impossible to access practice without involving the practitioner. Practice is action informed by values and aims, which are not fully accessible from

the outside. The practitioner may not even be wholly aware of the meaning of his or her values until she or he tries to embody them in her action (Kemmis, 2009).

This approach consisted of quantitative (pre- and post-course online surveys) and qualitative (online journal entries and post-course student interviews) research methods to collect and analyze data from students enrolled in a pre-service teacher education course entitled, Current and Emerging Pedagogical Technologies. This is a second year course where students explore and investigate the potential for integrating digital technologies into their future teaching practice.

Data Collection

The principal researcher for this study was also the course instructor and thus, data was collected by an undergraduate student research assistant (USRA) in order to minimize perceptions of coercion and bias. The USRA invited all students enrolled in the course to be part of this research project and a total of 22 students participated in this study (96% response rate). The project received institutional ethics approval and the students signed an informed consent form. The consent form offered the participants confidentiality and the ability to withdraw from the study at any time.

The data collection process began with a pre-course online survey that was designed by the principal research and has not been validated statistically (Appendix A). The purpose of this survey was to identify students' initial perceptions about the value of self-reflection, peer feedback, and instructor assessment based on previous course experiences. The survey consisted of a mixture of Likert-scale and open-ended questions and the second version of the *Free Assessment Survey Tool* (<http://toofast.ca>) was used to administer an online version of the survey.

Throughout the semester the student participants were also asked to complete an online journal entry after each major assessment activity (total of 5 assignments). These journal entries asked students to explain how they made use of self-reflection, peer review, and instructor assessment feedback to improve each of the course assignments (n=22, 96% response rate). The *Majarha ePortfolio system* (<http://mahara.org>) was used to facilitate this online journaling process.

At the end of the academic semester, the students were asked to complete a post-course online survey about their perceptions of self-reflection, peer feedback, and teacher assessment based on their course experience (n=18, 78% response rate). This survey consisted of identical questions from the pre-course survey.

Finally, the students were invited to participate in a 30-minute post-course interview with the USRA to discuss the course assessment practices as well as the preliminary survey and journal findings. Four students volunteered to be interviewed and these interviews were digitally recorded and transcribed by the USRA.

Data Analysis

A constant comparative approach was used to identify patterns, themes, and categories of analysis that “emerge out of the data rather than being imposed on them prior to data collection and analysis” (Patton, 1990, p. 390). The pre- and post-course online survey along with the

journal data were exported into *MS Excel* for descriptive statistical and thematic analysis by the USRA and the course instructor. The means were calculated for the pre- and post-study Likert scale questions and 2-tail *t*-tests were performed in order to determine whether or not the differences in the mean scores were statistically significant ($p < 0.05$). The survey data was correlated with the students' journal responses throughout the semester. At the end of the semester, a preliminary report was compiled and emailed to each of the student participants who were then invited to participate in a post-course interview to discuss the initial study findings. These interviews were digitally recorded and transcribed.

Findings

The study findings are reported based on student perceptions of the use of digital technologies to support self, peer, and instructor assessment activities to improve academic course work.

Self-assessment

The pre-course survey results indicated that students had a wide range of perceptions regarding the value of self-assessment feedback. One student indicated “I don’t find it too important to me. I see by my grades how I am doing instead of evaluating myself” (Survey Participant 11) while another stated “I would rather get feedback from a teacher or a peer” (Survey Participant 6). A number of students commented that they did not have much previous experience with self-assessment activities and thus, “I can sometimes have a hard time recognizing where I can improve when I’m self evaluating” (Survey Participant 17).

During the course, students used digital technologies to support several self-assessment activities such as *Audacity* (<http://audacity.sourceforge.net/>) for self-assessment narrations of project artifacts (e.g., digital stories created in *MS Photostory* (<http://microsoft-photo-story.en.softonic.com/>), *Google Blogger* (<http://www.blogger.com/home>) for online journaling, and *Google Sites* (<https://sites.google.com/>) for the creation of an ePortfolio. The students who participated in this study were asked to rate the value of self-assessment feedback before and after the course. The results are displayed in Table 1.

Table 1: Students’ perceptions of the value of self-assessment feedback

	High/ very high	Medium	Low/ very low	Mean	Diff.	<i>p</i> value
Before course	41%	45%	14%	2.95	+0.46	0.2345 (not significant)
After course	59%	35%	6%	3.41		

These results suggest that some students had a higher perception regarding the value of self-assessment at the end of the course but approximately one-third of the students were still ambivalent about the use of this type of assessment feedback and the difference in the pre- and post-means was not statistically significant. These findings were confirmed in the post-course interviews when students were asked to describe how they used self-assessment feedback to improve their course work. One student stated that assessment was the responsibility of the

course instructor and “Personally I didn’t feel I needed to do it . . . I don’t really value my opinion on assignments once I’ve finished them” (Interview Participant 3). Conversely, another student described how self-assessment activities helped her internalize her learning “I could see how I did things, what worked and what didn’t. I could also see my goals and if I really got to where I wanted to be” (Interview Participant 1). This comment was echoed by Interview Participant 4 who indicated:

When I started to analyze and critique my own work I started seeing areas for improvement. I always want to give myself a good self-evaluation so I made changes or modified certain parts of the assignment to feel comfortable about giving myself a fair but good evaluation.

Peer Assessment

The student participants expressed a number of concerns about peer assessment activities based on their previous course experiences in the pre-course survey. These issues ranged from frustration, confusion, and academic loafing to intimidation with the process. For example, one student stated “It was frustrating because it didn’t really mean anything. The teacher re-marked the assignment anyways . . .” (Survey Participant 15). Another student was confused by the peer assessment process as “I didn’t know if their feedback would be right or wrong” (Survey Participant 21). Several students commented about academic loafing “I feel sometimes my classmates may not be paying attention and just give marks based on the hope that people will grade them lightly” (Survey Participant 5) and how the fear of intimidation limits the quality and honesty of the peer assessment “Students are always intimidated when evaluating their peers in fear of giving them a bad mark” (Survey Participant 11).

Digital technologies were used in the course to support a variety of peer assessment activities. These activities included using *Google Docs* (www.docs.google.com/) for peer review of student lesson plans. The group tools in the *Blackboard Learning Management System* (<http://www.blackboard.com/>) to provide peer review of project artifacts (e.g., digital stories created in *MS Photostory* - <http://www.windowphotostory.com/>). And, *Wikispaces* (<http://www.wikispaces.com/>) for the co-construction and peer editing of online discussion summaries and class notes. The students were also asked to rate the value of peer-assessment feedback before and after the course (Table 2).

Table 2: Students’ perceptions of the value of peer assessment feedback

	High/ very high	Medium	Low/ very low	Mean	Diff.	p value
Before course	19%	62%	19%	3.23	+0.59	0.0367 (significant)
After course	53%	23.5%	23.5%	3.82		

Before the course, less than twenty percent of the students had a high perception of the value of peer assessment feedback. Whereas, after the course a very slight majority of students had a more positive perception of this form of assessment feedback and the difference in pre- and post-course mean scores were significant. These results were tempered by the post-course interview

results. One student indicated “I can see how it would be useful but I found that my peers either gave me wrong feedback, like telling me to do it one way when clearly the assignment said to do it another way, or just told me something I already knew and was working on” (Interview Participant 1). Another student described how she used peer-assessment feedback “as a guideline for my work. It was nice to have someone review my work in the middle of the process because it let me know that I was on the right track” (Interview Participant 4). And Interview Participant 2 stated that “Any time we are able to have more eyes on something to add suggestions, it is worthwhile to take advantage of it.”

Instructor Assessment

In the pre-course survey, students indicated they received a range of assessment feedback from their instructors, which was usually summative in nature. One student stated that “It all depends on the teacher” (Survey Participant 3) while another complained that “No one tells me anything and since I don’t have the same teachers for each course, I don’t really know how to improve my course work” (Survey Participant 21). Several students stressed “that it is important to be able to adapt to requirements that others set for you” (Survey Participant 14).

Interactive technologies were used by the course instructor primarily to provide students with formative assessment feedback. For example, the instructor gave initial assessment comments and grades on all assignments in digital format (e.g., student lesson plans in *Google Docs*, digital stories in *MS Photostory*, WebQuests in *QuestGarden* - <http://questgarden.com/>). Students then had the opportunity to revise their assignments based on this feedback and resubmit final versions to their ePortfolios (e.g., *Google Sites*) for summative assessment. It appears that this emphasis on formative feedback impacted students’ perceptions regarding the value of instructor assessment (Table 3).

Table 3: Students’ perceptions of the value of instructor assessment feedback

	High/ very high	Medium	Low/ very low	Mean	Diff.	p value
Before course	64%	36%	0%	3.86	+0.64	0.006 (significant)
After course	94%	6%	0%	4.50		

These survey results indicate that almost all of the students involved in this study had a much higher perception of instructor assessment, after the course and the difference in pre- and post-course mean scores were very significant. In the post-course interviews, the students explained how they used the instructor’s formative assessment comments to improve their course work: “The feedback allowed me to re-examine how I did something and then go back to review and make changes where necessary” (Interview Participant 2). For several students, this was the first time they had received formative feedback from an instructor and one student commented that “... having an instructor give you a first mark, and then being able to go back and revise was really helpful in improving my work” (Interview Participant 1). Another student emphasized how he “really liked the formative feedback from the instructor because it allows you to improve

on similar assignments you might have to do again in the same class or maybe another course – sort of like a building block approach to learning” (Interview Participant 4).

Discussion and Recommendations

The student participants in this research study were asked to provide recommendations for how digital technologies could be used to design meaningful self, peer, and instructor assessment activities in their online journal assignment postings and the post-study interviews.

Self-Assessment

With regards to self-assessment practices, the students provided specific recommendations for how digital technologies could be used for grading rubrics and online journaling in higher education courses.

Rubrics

The Teaching, Learning, and Technology (TLT) Group (2011) define a rubric as “an explicit set of criteria used for assessing a particular type of work or performance. A rubric usually also includes levels of potential achievement for each criterion, and sometimes also includes work or performance samples that typify each of those levels” (n.p.). The participants in this study indicated that rubrics can be useful for clarifying assignment and assessment expectations only when students are actively involved in their co-construction. In the post-study interviews, one participant stated that without student involvement rubrics “can become simple check-lists, a way to make sure that you’ve covered everything the teacher wants for the assignment rather than what you really wanted to do and learn” (Interview Participant 3). Unfortunately, this comment suggests that without student involvement rubrics have the potential to support a surface rather than a deep approach to learning.

In terms of recommendations, the students suggested that several types of digital technologies could be used to support the co-construction of assessment rubrics. These included applications such as *Rubistar* (<http://rubistar.4teachers.org/index.php>), *Teachnology* (http://www.teachnology.com/web_tools/rubrics/), and *Google Docs*. The students in this study preferred using *Google Docs* based on the simplicity and their familiarity with this tool. An example of a co-constructed assessment rubric for a lesson plan assignment is illustrated in Figure 1.

The study participants also recommended that students should have the opportunity to practice applying the co-constructed rubric to previous completed course work and that they should have the ability to add one unique grading component or criteria (e.g., creativity).

In addition, digital technologies can be used to provide a variety of options for students to self-assess themselves. For example, students can use *Audacity* (<http://audacity.sourceforge.net/>), the open-source audio tool to create self-assessment narrations of how they achieved the various learning outcomes outlined in the rubric. The use of self-assessment audio feedback can be of powerful way for students to internalize their learning (Ice, Curtis, Phillips & Wells, 2007).

Assessment rubric for a lesson plan assignment:

Component	Beginning	Developing	Accomplished	Your Score & Comments	Peer Score & Comments	Instructor Score & Comments
Peer Review	0.25 points <i>Incomplete</i> peer review of another student's lesson plan	0.5 points Basic comments regarding: · What you learned from reviewing this lesson plan? · What you liked about this lesson plan? · What recommendations or advice you shared with your colleague to help improve this lesson plan?	1.0 points Substantive and reflective comments about what you learned from reviewing another student's lesson plan, what you liked about the plan, and suggestions for improving this document.			
Self-Reflection	0.25 points <i>Incomplete</i> self-reflection of the lesson plan assignment	0.5 points Completed self-reflection scoring of the lesson plan assignment with basic comments for each component	1.0 points Completed self-reflection scoring of the lesson plan assignment with substantive and reflective comments about each			

Figure 1. Assessment rubric for a lesson plan assignment
<http://tinyurl.com/lessonplanrubric>

Online Journals

Students in professional programs such as Teacher Education and Nursing are often required to maintain either a course or program journal. Online blogging tools such as *WordPress* (<http://wordpress.org/>) and *Google's Blogger* (<http://www.blogger.com/>) are commonly being used to support this type of self-assessment activity.

Students in this study indicated online journals can be useful for self-reflection but that too often they can become a “boring and repetitive activity when I am simply being asked to reply to a set of teacher directed questions. Usually, I just post what I think the teacher wants to hear not what I’m really thinking” (Interview Participant 2). Again, without student involvement this type of self-assessment activity can reinforce a surface rather than a deep approach to learning.

The study participants strongly recommended that students should have much greater control over their online journal postings. They suggested that there should be more opportunities for “freedom of expression rather than conforming to a teacher set structure” (Interview Participant 1). The students involved in this study proposed that their online journal assignment should be focused on processed-orientated postings that led to a final product such as an end of the semester self-reflection paper. And, that this paper could be assessed using a co-constructed rubric in *Google Docs*.

In the post-course interviews, the student participants stated they thought the use of digital technologies to support self-reflection was a useful type of formative assessment but that summative assessment practices should be the responsibility of the course instructor. This is consistent with the findings from a study conducted by Sitzman et al., (2010), which found that self-assessment techniques contribute to student motivation and satisfaction but lack of confidence with summative grading.

Peer assessment

The student participants suggested a variety of ways that peer assessment activities could be enhanced through the use of digital technologies in the post-study surveys and interviews. They indicated the biggest barrier to completing this type of peer activity, outside of class, was finding a common time and place to meet. The students suggested that digital technologies could potentially be used to overcome this challenge. For example, the group areas in learning management systems such as *Blackboard* could be used to communicate and share documents about the peer assessment process for individual and group projects. These group areas usually consist of asynchronous (e.g., email and discussion board) and synchronous (e.g., chat) communication tools along with a file exchange function.

The students also indicated that during the course they had been impressed with how easy it was to provide peer review feedback on written assignment by sharing *Google Docs* (Figure 2). This application allowed them to control who had commenting and editing privileges for their documents.



Figure 2. Peer review of a writing assignment in Google Docs

In addition, online journal applications such as *Blogger* could be used to provide peer review feedback on individual project work and wiki tools such as *Wikispaces* (<http://www.wikispaces.com/>). The history files of a wiki summary clearly demonstrate the contribution and critique that was made by each member of the group.

A number of students involved in this study were also taking an introductory Biology course. They commented in their journals and post-course interviews on how the instructor in this course was using the University of California at Los Angeles' *Calibrated Peer Review* (<http://cpr.molsci.ucla.edu/>) tool to teach them how to provide constructive feedback to their peers on the laboratory manuscript assignments for the course. The Biology instructor also used personal response systems (e.g., clickers) for study group quizzes and discussion prompts. Crouch and Mazur (2001) describe how clickers can be used to support a form of peer instruction. The process begins with the teacher posing a question or problem. The students

initially work individually toward a solution and “vote” on what they believe is the correct answer by selecting the desired numbered or lettered response on their clicker. The results are then projected for the entire class to view. For a good question, there is usually a broad range of responses. Students are then required to compare and discuss their solutions with the person next to them in the classroom in order to come to a consensus. Another “vote” is taken but this time only one response or clicker per group can be utilized. In most circumstances, the range of responses decreases and usually centers around the correct answer. As an alternative to this process, this Biology instructor also had groups of students generate the quiz questions in advance of the classroom session.

While the student participants appreciated the ability of digital technologies to provide increased flexibility and communication opportunities to complete peer assessment activities, outside of the classroom, they had several concerns. First, a number of students expressed concern about their lack of experience with peer assessment in the post-study interviews. They strongly recommended that instructors should “provide guidance and a class orientation on how to give each other meaningful feedback” (Instructor 4). Another student suggested that there should be “opportunities for oral and written feedback” (Instructor 2). He thought that digital technologies were being used primarily to provide written peer feedback and that students should also be learning how to provide oral feedback to each other. This comment was echoed by a student who suggested that instructors should “provide class time to begin and conclude peer assessment activities” (Instructor 1). She believed that this combination of face-to-face and online interaction would help to build trust and accountability for the peer assessment process.

The students in the post-course interviews also recommended that this form of assessment should be used in combination with self and instructor assessment practices in order to triangulate the feedback.

Instructor Assessment

In terms of instructor assessment, the student participants provided several suggestions about how digital technologies could be used to support these practices. The first idea was to have instructors use collaborative writing tools such as *Google Docs* to provide formative assessment feedback at check-points or milestones for individual or group projects. This would allow students to receive instructor feedback throughout the process of constructing the project rather than just focusing on summative assessment feedback for the final product.

The students also encouraged instructors to take a portfolio approach to assessment. This would involve students receiving a second chance or opportunity for summative assessment on their course assignments. For example, students would initially submit and receive instructor assessment for each of the required course assignments. Throughout the semester, students would have the opportunity to revise these assignments, based on the initial instructor feedback, and then post them to their course or program portfolios for final summative assessment by the instructor. There are a range of e-Portfolio tools that can support this process ranging from the *LiveText* (<https://www.livetext.com/>) commercial application to the free *Google Sites* (<http://sites.google.com/>) tool.

In addition, digital technologies can be used to support external expert assessment opportunities. For example, students can publically share critiques of academic articles by using blogging tools

such as *WordPress* and *Blogger*. The authors' of these articles can then be invited to post comments about these critiques to the students' blogs. External experts can also provide assessment feedback on individual or group presentations through the use of web-based video technologies. These types of presentations can be video recorded and either streamed live (e.g., *Livestream* - <http://www.livestream.com/>) or posted to a video sharing site such as *YouTube* (<http://www.youtube.com/>). The external experts can then provide assessment feedback in either synchronous (e.g., real-time audio) or asynchronous formats (e.g., online discussion forums) to the students. Figure 3 illustrates a video recording of an individual student presentation that has been posted to *YouTube*.

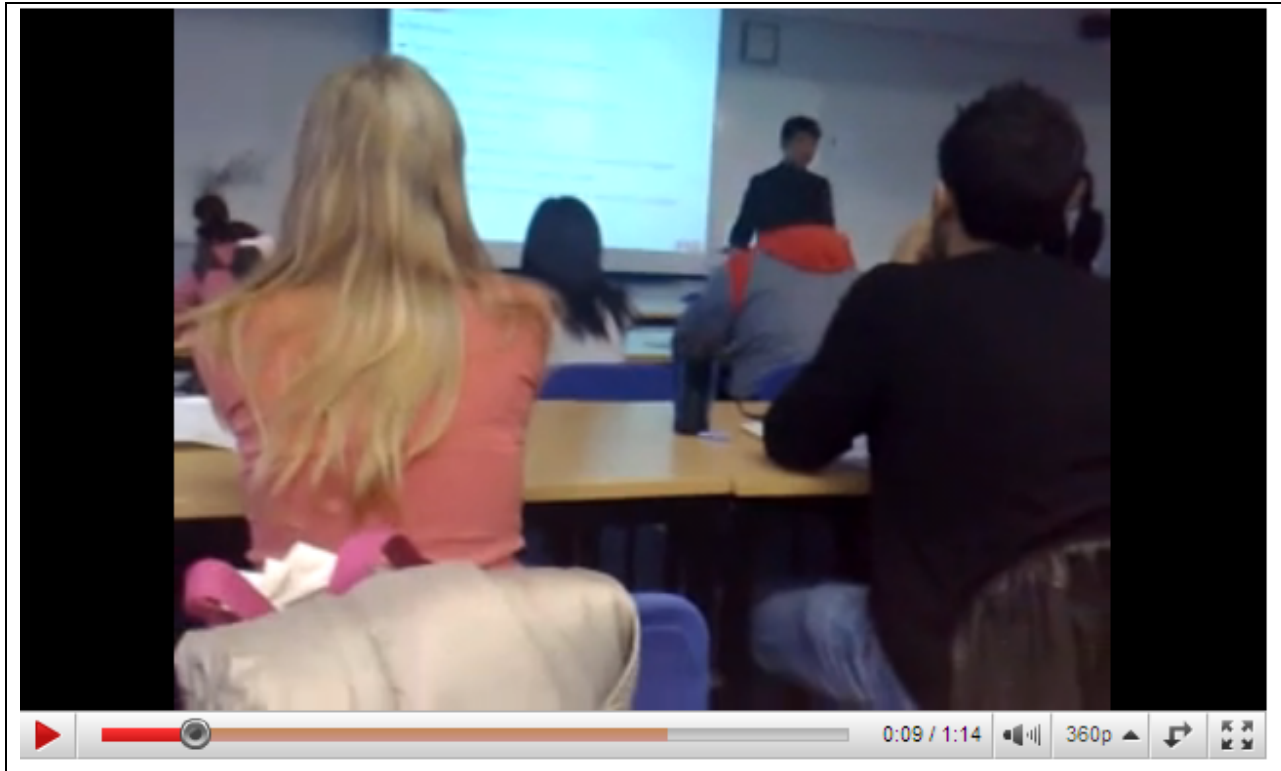


Figure 3. Example of a video recording of student presentation posted to *YouTube*

Besides providing ideas on how digital technologies could be used to support instructor assessment activities, the student participants in the interview sessions also had three recommendations for faculty members. The first recommendation was that instructors should “focus on providing students with ongoing formative assessment feedback rather than on just summative midterm and final examination comments” (Interview Participant 2). The second was that instructors should strive to “provide oral feedback in addition to their written assessment feedback. For example, instructors could request that students meet them during office hour sessions to orally debrief about assignments” (Interview Participant 4). Finally, Interview Participant 3 emphasized “Let us provide instructors with more feedback on their assignments and teaching practice throughout the semester, not just at the end” and he recommended Angelo and Cross’ (1993) book on *Classroom assessment techniques: A handbook for college teachers* to facilitate this process. This focus on assessment being a process that involves two-way communication is consistent with Pask’s (1976) Conversation Theory of Learning.

Conclusion

Throughout this study, the student participants were asked to comment about how they used self, peer, and instructor assessment feedback to improve their course work. One student commented that “I used the self-reflection for checking my work and making sure I had everything I needed. I used peer-review for a different perspective on my work and I used instructor feedback to understand how I could improve my work” (Interview Participant 4). Another student stated that “Self reflection showed me what I liked about my work and what needed to be improved, peer feedback gave comments on what could be done better and then instructor feedback gave ideas on how the assignment could be fixed up to get a better mark” (Interview Participant 2).

In addition, there were numerous comments in the student online journals about how digital technologies helped them integrate these three forms of assessment into a triad approach (Figure 4).

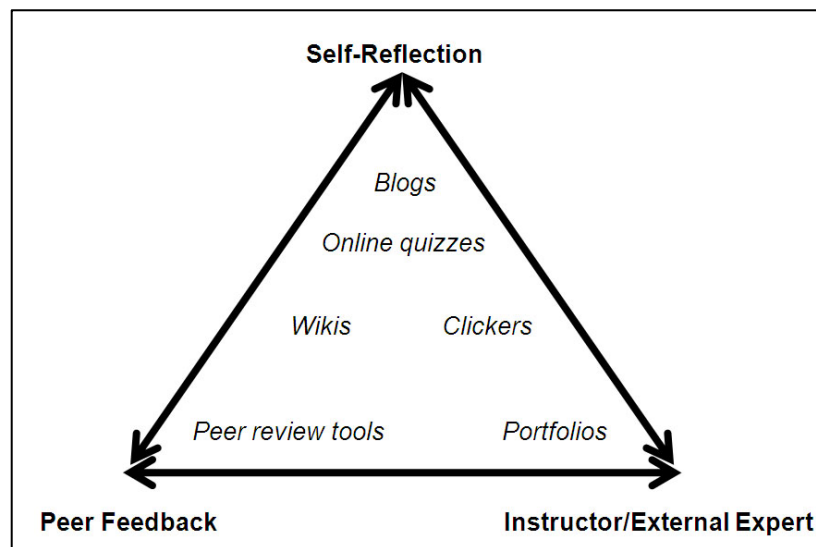


Figure 4. Using digital technologies to support a triad approach to assessment

For example, students were using rubrics, blogs, and online quizzes to provide themselves with self-reflection and feedback on their course assignments. Students received further feedback on their course work from their peers through the use of digital technologies such wikis and clickers. Finally, instructors and in some cases external experts reviewed students’ ePortfolios and used video technologies to observe student performance, diagnose student misconceptions, and provide additional formative assessment feedback.

An international call for a greater focus on assessment *for* learning, rather than on assessment for *just* measurement and accountability of student performance is well documented in the educational research literature (Yeh, 2009). The use of digital technologies to support an increased focus on formative assessment practices may lead to Hattie’s (2009) vision of a visible teaching and learning framework where “teachers SEE learning through the eyes of their students and students SEE themselves as their own teachers” (p.238).

Study Limitations

The two major limitations of this study were the small sample size and the focus on self-reported data. The small sample size (n=22) meant that significance is limited for the analysis of the quantitative survey data and thus, the results cannot be readily generalized or transferred to other higher education course contexts. The surveys, journal entries, and interviews conducted in this study all relied on self-reported data, which was limited by the fact that it was only verified by the author of this study. This data may contain several potential sources of bias such as selective memory of the student participant (i.e., remembering or not remembering experiences or events that occurred at some point in the course) and exaggeration (i.e., the act of representing outcomes or embellishing events as more significant than is actually suggested from other data) (Brutus, 2013).

Further Research

The findings from this study strongly suggest that students require direction and practice in order to properly conduct self and peer assessments using digital technologies. Likewise, instructors also need guidance and support in order to properly facilitate all three forms of assessment through the use of technology. Thus, further research needs to be conducted in order to determine what type of training interventions are effective in helping students and instructors use digital technologies to support a triad-approach to assessment.

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Appendix A: Pre-Course Student Online Survey Questions

Important Note: The purpose of this survey is to gather student responses that will help inform the types of assessment practices used in the Mount Royal University Education Program. Participation in this survey is voluntary and your responses will be kept confidential. Non-participation in this study will not jeopardize student progress in this EDUC2325: Understanding Current and Emerging Pedagogical Technologies course or the Education Program. Completion of the questionnaire below will constitute informed consent in this *How do students make use of self-assessment, peer assessment and teacher assessment feedback to improve their academic course work?* study. This study has been approved by the Mount Royal Human Research Ethics Board (HREB).

Name: _____

A: Self Assessment Feedback

Alverno College (2001) defines self assessment feedback as the ability of students to observe, analyze, and judge their own performance on the basis of criteria and determine how they can improve it.

1. What kind of previous experience do you have with self-assessment activities (i.e. journals, learning logs, portfolios)?
2. How did you make use of this self-assessment feedback to improve your academic course work (e.g., strategies, processes)?
3. Based on your previous experience, how would you rate the value of this self-assessment feedback?
1 (very low), 2 (low), 3 (medium), 4 (high), 5 (very high)
4. Why?

B: Peer Assessment Feedback

Peer review is a process used for checking the work performed by one's equals (peers) to ensure it meets specific criteria.

1. What kind of previous experience do you have with peer assessment activities (i.e. group work, presentations, papers)?
2. How did you make use of this peer assessment feedback to improve your academic course work (e.g., strategies, processes)?
3. Based on your previous experience, how would you rate the value of this peer assessment feedback?
1 (very low), 2 (low), 3 (medium), 4 (high), 5 (very high)
4. Why?

C: Teacher Assessment Feedback

Teacher assessment feedback on student work.

1. What kind of previous experience do you have with teacher assessment activities and feedback (i.e. mid-terms, papers, final exams)?
2. How did you make use of this teacher assessment feedback to improve your academic course work (e.g., strategies, processes)?
3. Based on your previous experience, how would you rate the value of this teacher feedback?
1 (very low), 2 (low), 3 (medium), 4 (high), 5 (very high)
4. Why?

D: Integration of Self-Assessment, Peer Assessment and Instructor Assessment Feedback

1. Do you have previous experience integrating all three forms of assessment feedback to improve your academic course work? (Yes/No)
2. If yes, please explain how you have integrated all three forms of assessment to improve your academic course work (e.g., strategies, processes)?

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