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Through the Lens of the Reviewer: Information Literacy, an LMS, and Peer Review

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Abstract

This research paper describes the use of peer review to improve information literacy. Peer-reviewed assignments for learning have been seen favorably within the literature. The articulated benefits range from students feeling more engaged, having expressed less anxiety, or found to be better equipped to perform in unfamiliar areas outside their current learning environments. However, minimal research examines the benefits specifically for the feedback provider (reviewer) when a more modern tool, such as the Canvas Learning Management System (LMS) is used. During the fall 2015 semester, a study was conducted to examine the peer review process from the vantage point of the reviewer when mitigated by an LMS. Since peer review is seen as a social activity, this study is guided by a social constructivism teaching framework to investigate peer review activities for (a) linear relationships to that of a perceived social element inclusion, (b) changes in learning from the perspective of the reviewer rather than the receiver of feedback, and (c) improvement in perceived information literacy. Additionally, this research examines Canvas attributes as identified by Sondergaard & Mulder [1] (2012) of (a) Automation, (b) Simplicity, (c) Customizability, and (d) Accessibility, which support statements from the literature that indicate a lack of investigation of more modern peer review tools. Survey results, both qualitative and quantitative, were analyzed across three different peer-reviewed assignments for this examination. Of the 91 respondents, representing a 32% response rate, descriptive analysis revealed themes ranging from *Changes in Student Efforts* to *Valued New Perspectives*; whereas, expected Active Learning and Social Benefits slightly contradicted the positive tone that was originally found in the thematic review. Overwhelming positive ratings were collected regarding the use of the LMS to support and implement a peer-reviewed assignment. Perceived affects upon the peer reviewer, and how these types of assignments can support the proposed ABET General Criterion 3 Student Outcomes and General Criterion 5 Curriculum currently under revision are discussed. Lastly, these data are represented for use as an evaluation baseline for future planned investigations and for other faculty and course developers, who are considering implementation of peer-reviewed activities within first-year program courses.

Introduction

The specific problem under investigation came from the need to properly train first-year engineering students about the importance of information literacy, to collect reliable data and how resource citation can truly support research findings in this highly digitized age of search, copy, and paste. During a naturally occurring conversation with another faculty member, it was suggested to use peer review to support the learning of the subject material. Coincidentally, the university had recently implemented the Canvas Learning Management System (LMS), which has the ability to easily introduce and manage the peer review process via internal application functioning. While wanting to continue to provide opportunities for Active Learning events in a large lecture hall course (>250), and due to the importance of peer review in STEM fields, the addition of a peer-reviewed assessment was found to be an applicable solution as suggested during the faculty to faculty conversation. Thus, a study was born.

Guided by a social constructivism teaching framework, a study investigating peer review activities using an LMS was initiated to examine (a) linear relationships to that of perceived social

element inclusion, (b) changes in learning from the perspective of the reviewer rather than the receiver of feedback, (c) improvement in perceived information literacy skills, and (d) process support, if any, provided by an automated LMS assignment; all are variables found to be of importance within the literature regarding Peer Review.

Research Questions

1. Does student knowledge of information literacy and citation increase when completing a peer-reviewed activity as a reviewer?

2. Are the social elements of Active Learning, Authentic Learning, and Student Interaction and Collaboration, viewed positively in a Face-to-Face (F2F) courses when utilizing an online peer-reviewed activity in a large lecture hall setting?

3. What impact, if any, does a Learning Management System (LMS) have upon a peer-reviewed activity as perceived by the students?

Literature Review

Social Constructivist Teaching Framework

Constructivism as defined by Keengwe, Onchwari, and Agamba [2] (2014) is "an educational theory that emphasizes hands-on, activity-based teaching and learning in which students develop their own frames of thought," (p. 888). When using constructivism, the overarching expectation is to provide a more meaningful learning experience based upon learner's self-exploration and construction of tools used during a learning activity; whereas, social constructivism focuses upon the "interdependence of social and individual processes in the co-construction of knowledge," [3] (p. 345). However, the social element is viewed as having more potential than individual self-exploration as students have the opportunity for exposure to those who are more advanced in their thinking [4]; thus, through interpersonal relationships, student learning can evolve [5].

While not without criticism in the literature due to the possible lack of realism in the theory's foundation [6], the literature supports the utilization of a social constructivist framework for the implementation of selected in-class elements [7,2-4]. Additionally, the framework supports a strong relation to the work of Vygotsky, who posited that social learning events better support cognitive development, and that social learning is a primary event over that of an individual exploration [8]. Placing social interaction above all creates a belief in a "contiguous process that exists each time people willfully interact with each other in the world around them" [7] (p. 221). Furthermore, because the effects of social influence cannot be removed [3], social aspects will always have a bearing upon a learning outcome.

Bronack, Riedl, and Tashner [7] (2006) created a conceptual framework for social constructivism based upon a summary of literature findings. The authors identified the following principles for effective application of social constructivism: (a) "learning is participatory, (b) knowledge is social, (c) learning leads development through predictable stages via shared activity, (d) a useful knowledge base emerges through meaningful activity with others, and (e) learners develop dispositions relative to the communities in which they practice," (p. 221). Thus, supporting the statements that social sphere plays a larger role in one's ability to learn, such as through a social discussion or interaction in which dialogue is exchanged.

Since the current elements under investigation take place within an LMS arena, it should be expected that a virtual community is created. To identify as a virtual community, the group's social interaction with peers, such as the interaction that takes place during a peer review event, takes place virtually. At times, people tend to gravitate to others with similar interests, but that is not a requirement of a peer event. Hence, elements of a course should be designed in such

a way as to "provoke the kinds of thoughtful engagement that helps students develop effective thinking skills and attitudes that contribute to effective problem solving and critical thinking," [2] (p. 889). Therefore, using a social constructivist teaching framework provides an effective framework to examine a peer-reviewed activity, and is a valid, well-supported, approach to examine Active Learning, Authentic Learning, Student Interaction and Collaboration, and improvements in Learning Achievement on behalf of the reviewer.

Active Learning and ABET Professional Skill Requirements in Engineering

Active Learning is best suited for STEM fields of study and is a natural learning mechanism to support STEM learning events [9]. One such activity supporting the theory of Active Learning is peer review. Peer review is common place in active creative engineering environments, in which peers in the professional sphere are tasked to provide continual feedback, or evaluation [2], until project completion.

Engaging learners in the very notion of asking them to evaluate work of their peers for the possibility of uncovering abnormalities or inconsistencies [2] creates a reflective atmosphere. During this evaluation process, there is a period of reflection that takes place, which supports a natural dialogue [2]; hence, extending the power for learning. This process naturally allows learners to rely upon their previous knowledge of the subject and compare data presented to either confirm incorrectness or to create a new understanding of the topic in which to investigate and support. Therefore, Active Learning helps students to "scaffold the zone of proximal development for individual construction of knowledge and to facilitate effective learning," [2] (p.889). It should be noted that while the literature indicated a need to train those who are reviewers, since the activities under investigation in the current study contained a process requiring specific answers and outcomes, no training was provided other than the requirement to download and review a properly formatted citation and APA-referenced documents.

Investigations of Active Learning environments have indicated improvement of examination scores [10] and provide a more in-depth understanding of the topic and the affordance of gaining engineering competencies [9] sought by program accreditation entities. As seen in the most recent call to update the Accreditation Board for Engineering and Technology, Inc. (ABET) EC2000 Criterion 3 and 5 by the Engineering Accreditation Commission (EAC) arm of ABET, students need to be prepared for real world experiences [11]. Thus, equating to professional skills learned and supporting three of the six ABET Criterion 3 2014-2015 suggested topic areas for update concerning: (a) communication skills, (b) professional responsibility, and (c) teamwork.

The Power of Peer Review…but only for Writing Assessment

A plethora of tools have been designed to facilitate the peer review process for learning in education [12]. Many researchers have even examined peer review in support of learning in all different conditions, such as: (a) conducted in synchronous [13] or asynchronous formats [14-15] (b) selecting to use pair-wise reviewer assignment in lieu of free selection processes [16], (c) utilizing pre-made software programs for the management of the overall peer review process [12], or (d) for the purpose of using an institutional peer review program to manage first-year student assessment expectations [17]. Additionally, Sondergaard & Mulder [1] (2012) provide a substantial list of advantages for using peer review to establish a deeper learning atmosphere supported by timely feedback and the creation of "an alternative channel for student engagement and participation," (p. 347). Findings also indicate that if first-year students are more engaged in the grading process they are more informed and less likely to experience anxiety; thus, perform better in unfamiliar areas, such as when a peer review task is assigned that

requires a higher-order skill in order to complete [1].

However, the majority of peer review investigations only examined courses designed to support the improvement of writing skills, such as Introduction to Writing [13,15,18-20] and English as a Foreign Language (EFL) [14], or courses that focus upon written skills in other areas of the curriculum such as Biology [17], Physics [21], and Geography [22], and not tasks that require specific step-by-step application, such as information citation for research reporting. Additionally, within earlier studies, perception of the task was the main theme found within this field of inquiry [1] but the overall examination of influence and perceived growth of the participants, who conducted the review, was under-investigated. Furthermore, very few investigations (a) define peer review in comparison to peer assessment(16), (b) examine the peer review process from the vantage of the feedback provider [1] sometimes referred to in the literature simply as the reviewer, nor (c) examine the use of peer review when using an auto-assign feature found within a more current LMS, such as Canvas, in comparison to externally or proprietary-created tools for peer review management.

Nevertheless, the tone for support of peer review remained positive within the literature, indicating the need for a directed peer review approach when available [15,19,21-22,24], and supported Active Learning pedagogy [25] for the power of learning due to the many social aspects of the overall peer review process.

Methods

During the fall semester of 2015, a study was conducted in an introductory computing course for non-computer science majors. Fall research is typical for the large-lecture course (n=281) in question. The purpose of this study was to investigate peer review as it relates to Active Learning, Authentic Learning, Student Interaction and Collaboration, as well as process support capabilities, if any, when using an LMS to automate peer review assignments.

Sample and Context

The sample found in this study consisted of students enrolled in an introductory computer science course for non-computer science majors taught in the College of Engineering at a private institution in the southeast United States. Approximately 281 students were enrolled in the course during the fall 2015 semester. The sample included 91 students yielding a response rate of 32%.

The survey group consisted of age ranges in the following categories: (a) 17-23 (n=84), (b) 24-34 (n=6), and 35+ (n=1). Females represented 32% (n=29) of the overall respondents; 15% (n=14) reported English as their second language.

Figure 1 represents student demographics by enrollment year for the sample under investigation with first-year students representing 69% (n=63) of the sample.

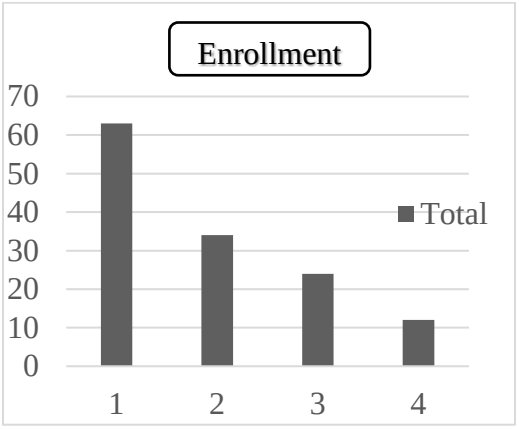

Figure 1: Distribution of students by enrollment year.

Ethical Considerations, Preparations, and Design

Throughout the term, learning modules were released the week before assignments were due; thus, to not overwhelm students in terms of due dates. Students were assigned three different weekly peer-reviewed assignments at weeks five,

nine, and fourteen. Each peer-reviewed assignment contained a different computer science topic to investigate using differentiating tactics. However, each assignment requested that students use at least two scholarly sources to support their viewpoints and to format their citations and references using APA style and format. Peer-review Assignment 1 offered a two-author comparative essay and students were asked to explain which author best supported their statements and why. Peer-review Assignment 2 asked students to investigate the power of Artificial Intelligence (AI) using three of the eight Instructor-provided online AI interactive tools or three student-identified tools of their choice. Students were to provide screenshots of their interaction and a summary of their experiences to outline the tool's ability to create a true, and meaningful interaction. Additionally, students were asked to support their views using scholarly references from library-only sources. The last assignment, Peer-review Assignment 3, asked students to formally discuss the impact of today's technology on their everyday life; thus, making this assignment a highly authentic assessment option due to the personal nature of the question being asked; hence, there is no boilerplate answer that can be found online. Lastly, when in the lab, Lab Instructors reminded students about ethical and moral conduct when completing peer reviews for each assignment.

In support of learning, students were given (a) a full lecture surrounding digital literacy, (b) a lecture on the importance of citation when reporting research, (c) online APA references for exploration and review, (d) the option to take a Basic Library Training module for extra credit completion, and (e) were asked to conduct APA style and format guideline information research outside of class. Within the directions of the third peer-reviewed assignment, students were provided a formal APA-formatted sample paper to reference.

While learning modules were time-released at the beginning of the term, the last four modules were released together for the last four weeks of the term. This release option provided students with extended time in which to complete larger end-of-term assignments. Students were encouraged to read the sample paper ahead of time since it was to be available for use for both Peer-review Assignments 2 and 3.

After each assignment due date, the LMS automatically assigned each student to another student to review. Peer reviews were not anonymous. Students were provided with an Instructor-created, Canvas-distributed, scoring rubric to use when conducting their review and for grading. This was the same rubric used by the Instructor to finalize each peer-reviewed assignment grade. However, students were only asked to review the original assignment posting to examine the level of information literacy and credibility alongside APA-style format for correctness, but not the remaining rubric criterion unless warranted. Additionally, students were provided with a comment window within the LMS peer review area to provide qualitative feedback. Each student was encouraged to provide supportive feedback within this window, especially if points were deducted from the scoring rubric area.

Data Collection and Analysis

For this study, a survey was used to examine student ratings of the following criterion when completing a peer-review assignment: (a) Active Learning, Authentic Learning, and Student Interaction and Collaboration, (b) changes in learning and the affect thereof upon the reviewer rather than the receiver of feedback in a peer review activity, and (c) the perceived improvement in engineering students' ability to increase information literacy and citation skills. Additionally, this research examined student perceptions of an LMS' attributes used to support a peer-review activity as identified by Sondergaard & Mulder [1] (2012) of (a) Automation, (b) Simplicity, (c) Customizability, and (d) Accessibility to support statements from the literature that indicated a lack of investigation of a more modern peer review tool.

An electronic survey, using Survey Monkey, was distributed the last week of the course after the last peer-review assignment was submitted. Announcements were posted in the course LMS one month before the survey's release to gather informed consent and inform students of the active research being conducted. E-mail announcements were also sent using the university student roster portal to support the face-to-face (F2F) modality nature of the large-lecture hall course since the LMS is only used as a content repository and assignment collector. Reminder notifications, using both methods of dissemination, were additionally sent two weeks prior to the end of the term alongside the survey release and end dates to gain additional participation. A total of 91 (32%) responses were collected, but open-ended question answer responses varied depending upon the question asked.

Types of specific peer review survey questions included: (a) did your review efforts change during the peer review process from the first peer-reviewed assignment to the third peer-reviewed assignment, (b) did reviewing of the work of others increase your knowledge of information literary (e.g. source identification and application), (c) do you believe that your application of APA format and citation has improved during the course based upon the three-part peer review process, and (d) did you find it helpful to review another classmates' assignments for learning. Additionally, the survey contained open-ended questions to allow for student elaboration where needed. Further, to survey for Active Learning, Authentic Learning, and Student Interaction and Collaboration survey questions, ***Questions 1-13*** referred to from this point as "***active variables***," were adopted from researchers Walker and Fraser [5] (2005), and used with permission. Cronbach's Alpha for the active variables was reported by Walker and Fraser [5] to be (a) .75 for Active Learning, (b) .89 for Authentic Learning, and (c) .94 for Student Interaction and Collaboration; whereas, items 14-22 presented an Cronbach's Alpha of .75. Thus, no questions were removed from the analysis. (To request a copy of the survey please email the author). A descriptive analysis was completed on open-ended questions, whereas, statistical comparisons were conducted between active variables and Peer-reviewed Assignment scores to examine for a relationship, if any, between these two variable sets.

Results and Discussion

Research Question 1: Does student knowledge of information literacy and citation increase when completing a peer-reviewed activity as a reviewer?

The majority of reviewers indicated that no changes were made to their efforts during the peer review process from being a reviewer (n=74; 81%), nor did students believe reviewing the work of others increased their knowledge of information literacy (n=60; 66%). Nevertheless, negative beliefs were lessened slightly between the two views. Additionally, reviewers did not believe their APA knowledge had increased (n=60; 66%). However, the most surprising result was in their belief that 41% of the reviewers (n=37) found the task helpful to review another's posting for their own learning. Open-ended comments had more favorable data to share. A thematic framework was developed for classification and summary of the open-ended question data and divided it into the following four categories: (a) ***Efforts Changed***, (b) ***Knowledge Gained***, (c) ***New APA Knowledge Increased***, and (d) ***Peer-Reviewed Assignments Helpful***.

Efforts Changed

During qualitative analysis for open-ended comments in this category (n=11), only two themes emerged regarding Changed Efforts: (a) Time (n=7; 63%) and (b) Importance of the Event (n=5; 45%). Other themes were present but in far less quantity to be considered significant. There were no criticisms with most comments affirming that over time their efforts were given more importance: "*The second time I was more scholarly*," and "*I added more of what*

I thought while writing my review to help the person who wrote the submission."

Knowledge Gained

During qualitative analysis for open-ended comments in this category (n=25), only one theme emerged regarding Knowledge Gained. It was regarding the Opportunity to Review from a Different Point of View (n=23; 92%). Very refreshing comments were provided: (a) "*Identifying new ideas that i would have never imagined by myself*," (b) "*Reading to new ideas from others helps me understand of the how and why others think on the subject*," and (c) "*I just liked seeing other peoples ideas and validating my thoughts*." Others comments even mentioned the need to conduct additional research about both the topic explored in the original posting and regarding APA formatting and citation to "*…give some constructive criticism on the topic my peer chose*." Other themes were present but in far less quantity to be considered significant, and no criticism was presented.

New APA Knowledge Increase

During qualitative analysis for open-ended comments for this category (n=27), only two main themes emerged regarding New APA Knowledge: (a) Positive Learning Experience (n=23; 85%) and (b) Need More Practice (n=23; 85%). It should be noted that for every positive learning statement made within the same comment area, there was a reference to a need to learn more; hence the identification of the Need More Practice theme. Comments of (a) "*I have a better understanding of what APA is but still have much to learn on the topic*," and (b) "*Practice makes perfect! Coming into this semester I had never used APA before, where now I have used it in three of my classes this semester*," truly displayed an overall positive event. Other themes were present but in far less quantity to be considered significant. One criticism was made with regard to missing instructions regarding how to perform an APA analysis. While the APA and Information Literary lecture is given early in the term, it takes place after the add/drop period; thus, it is highly likely that the student simply did not attend the large-lecture hall lecture discussion. Nevertheless, learning support procedures are referenced in the Methods section and indicate that the instructor provided several resources to support the exploration of these procedures and the topic overall.

Peer-Reviewed Assignments Helpful

During qualitative analysis for open-ended comments for this category (n=33), only two themes emerged regarding Peer-Reviewed Assignments Helpful: (a) Different Views/New Perspectives (n=20; 61%), and (b) Ability to Compare (n=9; 27%). Other themes were present but in far less quantity to be considered significant. However, the requests to be placed in peer-review teams (n=3) was a unique finding. Again, no criticisms were seen during analysis and several positives were noted in this data: (a) "*It was helpful to view other views on different topics, and broaden my understanding of topics I didn't fully understand*," (b) "*Because it helped me catch me own mistakes and gave me power*," and (c*) "It was helpful to view others' work to compare with my own. I can learn from mistakes I or they made and improve upon the next assignment.*"

Research Question 2: Are the social elements of Active Learning, Authentic Learning, and Student Interaction and Collaboration, viewed positively in a Face-to-Face (F2F) course when utilizing an online peer-reviewed activity in a large lecture hall setting?

To investigate Research Question 2, scaled Likert Scale data was examined. Descriptives are briefly discussed in this section as they relate to positive findings due to the framing of the research question. Additionally, correlation coefficients to examine for a relationship, if any, between the active variables and that of the Peer-reviewed Assignment scores were compared. It should be noted that the following five point Likert scale items ranging from positive to negative were used for all three scaled active variables: (a) ***Always*** = 1, (b) ***Often*** = 2, (c)

Sometimes = 3, (d) ***Seldom*** = 4, and (e) ***Never*** = 5. Due to the closed nature of these survey items, with N/A not being an option as an intended design, students (n=91) had to provide an answer to each question or simply skip the question altogether. All students elected to answer each question in full for each of the three active variables categories (n=91). Lastly, Likert scaled-items were recoded to provide positive to negative alignment for statistical comparison.

Active Learning

Table 1 reports the frequencies and percentages associated with Active Learning satisfaction. The most frequently occurring satisfaction was Often (n=21), and the least common satisfaction scores fall under the heading of Sometimes (3, n=7; 3.33, n=2; 3.67, n=2). For this category, *M* = 2.047, 95% CI (1, 3.67), it should be noted that no results reported Seldom or Never.

Table 1: *Frequencies and Percentages for Active Learning*

Active Learning Scales	Frequency
1	9
1.33	7
1.67	17
2	21
2.33	20
2.67	6
3	7
3.33	2
3.67	2

Authentic Learning

Table 2 reports the frequencies and percentages associated with Authentic Learning satisfaction. The most frequently occurring satisfaction was Often (n=20), and the least common satisfaction scores fall under the heading of Seldom (4, n=2; 4.75, n=1). For this category, *M* = 2.28, 95% CI (1, 4.75), it should be noted that there were no 'Never' scaled ratings reported for this scaled item.

Table 2: *Frequencies and Percentages for Authentic Learning*

Authentic Learning Scales	Frequency
1	4
1.25	3
1.5	10
1.75	10
2	20
2.25	8
2.5	8
2.75	7
3	11
3.25	2
3.5	4
3.75	1
4	2
4.75	1

Student Interaction and Collaboration

Table 3 reports the frequencies and percentages associated with Student Interaction and Collaboration satisfaction. The most frequently occurring satisfaction was Often (n=35), and the least common satisfaction scores fall under the heading of Never (n=1). For this category, *M* = 2.94, 95% CI (1, 5), it should be noted that this was the first category that needed binning due to the variability of the unique numbers presented. Additionally, this was the first scaled category to present the Never result indicating a slight level of dissatisfaction (n=1) being reported with regard to the ability to collaborate and share with others. However, this is not concerning due to the majority of rating found in Often and Sometimes rating areas (n=69).

Table 3: *Frequencies and Percentages for Student Interaction and Collaboration*

Student Interaction and Collaboration Scales	Frequency
1 to 2	8
2 to 3	35
3 to 4	34
4 to 5	13
5 to 6	1

Active Learning Scale Comparisons to Peer-reviewed Assignment Scores

Correlation and a linear regression analyses were conducted to examine the relationship, if any, between each set of Peer-reviewed Assignment scores to that of each Active Variable category as a potential predictor. It should be noted that outliers of zero scores on Peer-reviewed Assignments were removed from the analysis and data for Active Variables were recoded to ensure positive alignment between Likert items to test scores for analysis; thus, reducing the sample to 77 (n=77).

Tables 4-6 present summary statistical data and correlation and regression analysis results. As can be seen in each table, all but two comparisons, Authentic Active Variable to both Peer-reviewed Assignments 1 and 3, presented a negative correlation, neither of which was significant. Indicating that if students perceived the learning event to be more authentic their Peer-reviewed assignment scores for Assignments 1 and 3 would decrease. This was a highly unexpected result. Additionally, there was a positive significant relationship between the Interaction Active Variable and both Peer-reviewed Assignments 1 ($p<.05$) and 2 ($p<.05$). This indicated when students believed there was more interaction, their scores would thus increase. This, however, was an expected, and, hoped for, outcome.

Table 4: *Summary statistics, correlations, and results from the regression analysis for Peer Review 1.*

Variable	Mean	Std.	Correlation with Peer Review	Multiple Regression b Weights	Multiple Regress β Weights
Peer Review 1	36.17	4.19	--	--	--
Active Scale	3.96	.63	.30	2.12	2.86
Authentic Scale	3.68	.69	-.08	-.74	-1.06
Interaction Scale	3.05	.89	.01*	.18	.32

*Relationship is significant using alpha = 0.05.

Table 5: *Summary statistics, correlations, and results from the regression analysis for Peer Review 2.*

Variable	Mean	Std.	Correlation with Peer Review	Multiple Regression b Weights	Multiple Regress β Weights
Peer Review 2	46.41	5.62	--	--	--
Active Scale	3.96	.63	.07	.45	.43
Authentic Scale	3.68	.69	.14	1.19	1.21
Interaction Scale	3.05	.89	.02*	-.16	-.21

*Relationship is significant using alpha = 0.05.

Table 6: *Summary statistics, correlations, and results from the regression analysis for Peer Review 3.*

Variable	Mean	Std.	Correlation with Peer Review	Multiple Regression b Weights	Multiple Regress β Weights
Peer Review 3	36.68	4.26	--	--	--
Active Scale	3.96	.63	.06	.50	.07
Authentic Scale	3.68	.69	-.12	-.97	-.16
Interaction Scale	3.05	.89	.08	.57	.12

The multiple regression model for these three predictors produced an R^2 value of [Peer-reviewed Assignment 1] $R^2 = .11$, $F(3, 73) = 2.93$, $p < .05$, [Peer-reviewed Assignment 2] $R^2 = .02$, $F(3, 73) = .56$, $p > .05$, and [Peer-reviewed Assignment 3] $R^2 = .03$, $F(3, 73) = .78$, $p > .05$. Thus, only the Peer-reviewed Assignment 1 presented significance and could explain 11% of the variability of the response data; whereas, Peer-reviewed Assignments 2 and 3 only accounted for 2% and 3% respectively without any significance. This event offers limited support of a relationship. However, it appears that only the newness of a Peer-reviewed Assignment can account or be the causation of this significance. Whereas, both Peer-reviewed Assignments, Assignments 1 and 3, that required an expected review of or creation of a written work caused a negative view of the authentic nature of the assignment. It should be noted that only the Peer-reviewed Assignment 2 required a hands-on element in which students seem to have enjoyed on all levels of the investigation, both from a qualitative and quantitative analysis.

Research Question 3: What impact, if any, does a Learning Management System (LMS) have upon a peer-reviewed activity as perceived by the students?

Lastly, a brief analysis was conducted to review mean scores and frequencies of non-scaled Canvas results to ensure that the LMS did not hinder the overall process. While frequencies ranged from 1 to 5 in two of the four categories, the results (n=91) were overwhelmingly positive with regard to the use of Canvas to automatic and support facilitation of the peer-reviewed process in a large-lecture hall course.

Rating scales for these items were equated to an A-F grading scale (A=1; B=2, C=3, D=4, and F=5). Tables 7-10 report the frequencies associated with the following variables: (a) Automation, $M = 1.68$, 95% CI (1, 4), (b) Simplicity, $M = 1.73$, 95% CI (1, 5) (c) Customization, $M = 1.86$, 95% CI (1, 4), and (d) Accessibility, $M = 1.6$, 95% CI (1, 5).

Automation of my Assigned Reviews

Table 7: *Frequencies and Percentages for Automation.*

Automation	Frequency
1	46
2	31
3	11
4	3

The most frequently occurring satisfaction rating for Automation was A (n=46) with B (n=31) reflecting the second highest rating. The least common satisfaction score was a 4 or a D rating (n=3).

Simplicity to Complete my Assigned Reviews

Table 8: *Frequencies and Percentages for Simplicity*

Simplicity	Frequency
1	45
2	29
3	14
4	2
5	1

The most frequently occurring satisfaction rating for Simplicity was again an A (n=45) with B (n=29) reflecting the second highest rating. The least common satisfaction score was a 5 or an F rating (n=1).

Customization when Completing my Assigned Reviews

Table 9: *Frequencies and Percentages for Customization.*

Customization	Frequency
1	42
2	22
3	24
4	3

The most frequently occurring satisfaction rating for Customization was A (n=42). The least common satisfaction score was a 4 or a D rating (n=3).

Accessibility to my Assigned Reviews

Table 10: *Frequencies and Percentages for Accessibility.*

Accessibility	Frequency
1	52
2	23
3	13
4	1
5	2

The most frequently occurring satisfaction rating for Accessibility was A (n=52). The least common satisfaction score was a 5 or an F rating (n=2).

In all instances, students rated the Canvas LMS very high with regard to interaction with the tool, indicating the Peer-reviewed Assignments were not hindered by the use of a more current tool for learning.

Conclusion and Future Work

During this study, while a strong positive response was not found, the qualitative analysis proved to be most fruitful to this investigation as it uncovered many positive responses to the deployment of a peer-reviewed assignment for the learning of skills pertaining to Information Literacy. As the original literature review revealed, during a social experience, students can be "exposed to those who are more advanced in their thinking [4]," thus, the simple exposure to thoughts other than one's own, whether more advanced or not, proved helpful. However, based upon the data collected, the peer-reviewed elements were not as socially aligned as expected. Nevertheless, there was a hint that social influence has the ability to change submission habits as students indicated that it was good to review previous assignment submissions so they know how to submit or view what was submitted incorrectly. The simplicity of a peer-reviewed activity from the point of the reviewer may not have appeared to change nor alter the reviewer's submission and viewpoints. However, it is the researcher's opinion that if social elements could have been more emphasized and embedded in the event, the peer review event may actually have had a larger affect. The inclusion, then, for a peer review event in a first year student course has the potential to support higher order thinking and to increase the awareness of articles submitted.

If speaking to Bronack, Riedl, and Tashner's[7] framework that social sphere plays a larger role in one's ability to learn, the peer-reviewed assignment as designed did not appear to create a

social element, but another assignment needing to be constructed; thus, the expected active learning element of this assignment was missed and caused a negative correlation in some respects. Additionally, a social 'culture' may not have been created, but only assumed on the part of the instructor due to the required interaction element – this is evident from the students' request to be partnered. Lastly, the F2F modality may have hindered the expected "online" social element and peer review assignment positive transference as students simply perceived the online element as non-existent.

All-in-all, the interpersonal nature of the peer-reviewed assignments needs to be encouraged via the instructor as suggested by the literature. Therefore, as the findings indicate, it is believed that a culture may not have been created in order to establish a social community for learning during this event possibly due to the "non" intra-dependent nature of the lab section assignment; meaning that all 250+ students did not know each other enough, and could not establish a community nor culture. Therefore, an "intra" Peer-reviewed assignment is suggested to ensure students can review peer-submissions within their own quadrant or lab section. Again, this is supported via the students' qualitative comments in which they requested they be assigned to a team member.

Future investigations of this nature should include a detailed analysis of the peer-reviewed assignment feedback provided to each student in order to obtain a literal analysis of the feedback to ensure there is an impact, if on any level, upon the reviewee's change in assignment to assignment. This is the researcher's next planned step in the data review process. Lastly, future investigations should provide a more in-depth analysis of the reflective comments presented from the reviewer to gauge the ability of the reviewer to provide feedback to fellow students in order to ascertain levels of equivalence of review. These are planned future projects of investigation for follow-up.

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