

Modelling a Peer Assignment Review Process for Collaborative E-learning

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Abstract

The educational culture in most developing countries is lecturer-centred with lecturers as providers of information and students as receivers of information. This approach has impacted on student's ability to seek and create knowledge to support their learning process. A collaborative learning approach that promotes students process of inquiry, critical thinking and skill development thus lacks in the context, yet these aspects are crucial in the knowledge society. If universities in developing countries are to educate students to compete and become active participants in society, the teaching and learning processes underpinned by relevant theories and models should be adopted. This paper proposes an approach to support students' learning in a developing country context - Uganda. Specifically, the authors design and model a peer assignment review process for collaborative e-learning, employing the second stage of development research. The model is based on using student to pedagogically support each other's learning through four process stages: familiarization, assignment, review and feedback. Empirical investigations of the process stages indicated that the peer assignment review process facilitated the students learning. Students indicated that they were able to actively participate in the course, gain experience in critical reading and evaluating peers work, while reflecting on their own work. The empirical investigation further indicated that students were able to adopt and use online technologies in their learning activities. As such the peer assignment review process impacted the students learning both as receivers and providers of reviews creating a level of acceptance to adopt and use the proposed collaborative e-learning approach.

The increasing need to join the knowledge society and use of the Internet has been mirrored in the increasing adoption and use of e-learning in education institutions (Kahiigi, Ekenberg, Hansson, Tusubira, & Danielson, 2008). E-learning facilitates active interaction

between students and lecturers irrespective of time and space in both synchronous and asynchronous modes. As a result, students have an opportunity to improve their performance through knowledge sharing, developing their cognitive skills and reflecting on their learning experience. These aspects are crucial, especially in developing countries where there is a genuine need to join the competitive job market within and outside their borders. As a result, an approach for adoption and effective utilisation of e-learning to support student learning with limited resources and time is proposed.

The notion set forth in this study is employing students to pedagogically support each other's learning through a peer assignment review process. This concept was motivated by the inherent challenge faced by most universities in Uganda and the rest of the developing world, which relates to large student numbers that inhibit the lecturer from providing timely feedback and creating sustainable interactions with students regarding their class assignments (Kahiigi, Danielson, Hansson, Ekenberg, & Tusubira, 2009b). In most cases, when students submit their assignments, because of the large student numbers and other responsibilities the lecturers have, the time taken for students to receive their grades and feedback is protracted. As a result, the assignments are rendered more or less meaningless in terms of shaping and supporting the students learning process, only remaining as grading tools.

This paper aims to discuss and model a peer assignment review process for collaborative e-learning within a developing country context. The collaborative e-learning component is implemented in a blended learning environment as a supplement to the traditional face-to-face learning method. The peer assignment review process focuses on the review and feedback mechanisms and how they impact on the students learning process (De Raadt, Toleman, & Watson, 2005). The assumption made is that students can learn from each other and look at different perspectives presented by peers in order to improve the quality of their work and enhance their understanding of the course concepts (Chung-Hsien, Graf, Lai, & Kinshuk, 2011).

This paper is structured as follows, in the next section a rationale for collaborative e-learning in an education setting is provided, this is followed by a discussion of peer review in collaborative e-learning. Subsequently, the methodological approach taken to develop and model a peer assignment review process is described. The paper further presents an empirical study carried out to test the peer assignment review process stages within a university setting. The final sections of the paper present and discuss the results obtained from the empirical study, draw conclusions, and describe the next research steps.

Rational For Collaborative E-Learning In An Education Setting

With the current knowledge age, educational institutions have been forced into innovative pedagogical methods to cope with emerging challenges and the drive to stay competitive (Kahiigi, Danielson, Hansson, Ekenberg, & Tusubira, 2009a). Most of this development has taken place within the last ten years. One of the crucial elements of focus for the current educational systems is to prepare graduates for participation in a networked information society in which knowledge is seen to be the most critical resource for social and economic development. Collaborative e-learning is one of the promising concepts to facilitate dialogue among students and their lecturers in order to support learning with the aid of information and communication technology (Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 1999; So & Bonk, 2010). Students are able to establish online social and academic support networks while becoming constructively involved in their learning activities. Collaborative e-learning supports a faster learning curve, since students can interactively customize their learning

and have more control of their learning process (Cantoni, Cellario, & Porta, 2004). The belief is that shared understanding through interaction is a natural way for students to learn (Kreijns, Kirschner, & Jochems, 2003). Indeed, Arbaugh (2007) affirms that higher-order learning experiences are obtained through a community of inquiry composed of teachers and students to achieve the desired outcome. Collaborative e-learning within an educational setting can be explained from a constructivist view of learning associated with Vygotsky's (1978) zone of proximal development. This relates the learner's level of understanding and cognitive development to social interaction and collaboration from expert guidance and capable peers. From a contextual perspective, Kahiigi, Hansson, Danielson, Tusubira, & Vesisenaho, (2011) established that students at the university level in Uganda were actively involved in a collaborative learning culture using face-to-face discussion study groups. The introduction of collaborative e-learning in this context was considered an approach that would support and enhance their interaction.

Peer Review In Collaborative E-Learning

The concept of students' engagement in peer review has gained increased attention in several universities in recent years. This can be attributed to the growing focus placed on collaborative learning as an aspect that supports student learning (Zhu, Valcke, Schellens, & Li, 2009). The peer review process within a collaborative e-learning environment involves students having access to their peers' work and providing each other with feedback. Consequently, feedback is seen as an integral part of a learning process through which students construct knowledge and develop their learning (Topping, Smith, Swanson, & Elliot, 2000). By providing constructive feedback to each other, students are placed at the centre of the learning process and achieve greater understanding and appreciation for other students' perspectives. Students are provided with an opportunity to reflect on their peer's work as well as their own (Sahin, 2008), thus reinforcing key learning objectives that facilitate their understanding of what is required in order to improve their performance. Increasingly, lecturers' workload, created from the adoption and use of collaborating e-learning, has been a big concern. The peer review process can potentially reduce the lecturers' workload by enforcing students to review and evaluate each other. Students simultaneously provide each other timely feedback essential to supporting their learning and knowledge development (Richardson, Ertmer, Lehman, & Newby, 2007). Peer review processes cultivate lifelong learning and positively impact the development of employability skills, which include oral and written communication, reading, learning skills and strategies, problem solving, decision making, dependability, and responsibility (Cassidy, 2006). In addition, students become deep rather than surface learners; they work harder with the insight that they will be assessed by their peers; students gain insights into assessment procedures and develop expectations for high quality work; they develop increased responsibility and autonomy; and students take responsibility for their learning (Sahin, 2008).

Despite the benefits derived from implementing peer review processes, there exist challenges. The students' lack of skills to engage in meaningful reviews that are informative (Richardson, Ertmer, Lehman, & Newby, 2007; Sahin, 2008) is one such challenge. Peer review skills development can be linked to a learning environment that supports a process of inquiry and some level of interaction, which enables students to have the confidence to inquire and share knowledge. In addition, Cassidy (2006) and Van den Berg, Admiraal, and Pilot (2006), revealed concerns relating to the validity and reliability of grades given by students resulting from lack of expertise and potential bias. Indeed, Bushell (2006) affirms the need to moderate the peer review

results in order to ensure equity due to possible conscious or unconscious bias of peer reviewers. Thus, the importance of supervised peer reviews in e-learning is emphasized. Additionally, other concerns relating to the peer review process include high levels of subjectivity – students being uncomfortable in carrying out assessments with a notion that it is the teachers' responsibility to assess and award grades, thus considering it an additional burden.

Methodology

The methodology used is based on development research, which involves four iterative stages: analysis of practical problems by researchers and practitioners, development of a solution with a theoretical framework, evaluation and testing of solutions in practice, and documentation and reflection to produced design principles (Reeves, 2000). Development research is based on theory informing practice, leading to the creation of design principles and guidelines that enable practical and theoretical outcomes to be transformed into educational practice (Reeves, Herrington, & Oliver, 2005). The choice of methodology was based on previous research (Kahiigi et al., 2011) in a developing country context that indicated collaborative e-learning as an approach that can have a positive impact on student learning, giving them opportunities to interact and share knowledge. In so doing, development research was employed to model an environment through which such learning experience can be realised in order to support the learning process, thus the peer assignment review process. The study was carried out in two parts. The first part involved the development of the peer assignment review process model. The second part involved empirical testing of the peer assignment review process stages in relation to the student learning process.

In part 1, the second stage of development research (development of a solution with a theoretical framework) is applied to design and elaborate the peer assignment review process model. Initially, a review of previously discussed state-of-the-art research was carried out, which led to theory generation for principles of a peer review model. The model included the notion of supervised peer learning and a developing country perspective added. The outcome of this step was a description of four process stages; these were familiarization, assignment, review, and feedback. Secondly, a consultative workshop involving six lecturers was held at Makerere University in August 2011. The objective of the workshop was twofold: 1) to introduce the lecturers to the peer review assignment process as an approach of using collaborative e-learning in teaching and learning and 2) to solicit the lecturer views and input in the peer assignment review process design. This was particularly important in gaining a developing country perspective on the process. The workshop was divided into two sessions. The first workshop session involved lecturers sharing their experiences, challenges, and needs in relation to the adoption and use of e-learning as well as profiling their students' learning culture. The second workshop session aimed to model the peer assignment review process to fit in the Makerere University learning context. During this session, the lecturers were introduced to a process containing stages that were identified after the theory generation and review of previous research. The aim of this activity was not to influence them into accepting the proposed process stages, but rather to make them aware of and appreciate an alternative approach to adopt and use in their teaching to support student learning. The proposed process stage descriptions acted as initiators of the discussion. The stages were discussed with the lecturers, who examined and elaborated them to fit in their overall student learning process. The output at this stage generated refined process stage descriptions, which will be discussed in the results section.

Part 2 of the study, involved application of the peer assignment review process in a collaborative e-learning environment and then tested empirically as described in the next section.

Case Description

The study was carried out at Makerere University, College of Computing and Information Sciences between October and December 2011 with 998 undergraduate students enrolled in a Database Management Systems (DBMS) course as participants. The DBMS course was a cross-cutting course for students registered for Bachelors of Science in Software Engineering, Bachelors of Science in Computer Science, Bachelors of Information Technology, and Bachelors of Information Systems. This course was unique in that it was taken by students from various disciplines and had a large student population. This DBMS course aimed to provide students with a strong foundation in systematic approaches to the design and implementation of database applications and to provide a practical experience and knowledge in developing database driven applications in real world scenarios. The DBMS course was traditionally taught by three lecturers following the same course outline with lectures held in a classroom setting on campus. The peer assignment review process was embedded within the course and marks earned on the assignment formed part of the final course evaluation. As a result, student participation in the peer assignment review process was mandatory. While the course had other course activities within an online and traditional learning environment, this study focused on the peer assignment review process that was introduced in the student's first assignment.

Prior to the assignment, the students were introduced to the peer assignment review process and given a walkthrough of the application. The students were made aware of their role as reviewer and the importance of providing constructive feedback during the review process. Question and answer sessions were carried out to facilitate a deeper understanding of the process, and further help was sought through the class mailing list to which the lecturers was a part. This approach was adopted to facilitate quick feedback on student queries from peers and the lecturers. After the tutorial, students were required to complete an assignment and make their submissions in an online learning management system (Moodle). To minimize potential bias among the students, after the submission deadline, the system anonymously assigned each student with two peer's assignment to review. The marking criterion developed by the lecturers was discussed with the students after the submission deadline that was set when the lecturer was in class. This aimed to equip the students with possible responses and an explanation of why each response merited a specific score. At completion of the review, the students submitted their reviews and grades were calculated and sent back to each student with feedback on their assignments. Students were awarded up to 5 marks for each peer review completed. However marks were deducted if the peer feedback was not provided as assigned, if the feedback was not given in a timely manner or if the feedback was below average as deemed by the lecturer. The lecturers moderated the peer assignment review process.

Data collection

During the second half of the semester, a 14-item survey questionnaire was developed. The questionnaire aimed to capture student's experience and willingness to adopt the peer assignment review approach in their learning activities. In addition, the questionnaire aimed to elicit the students' understanding of the potential pedagogical benefits. The validity of the questionnaire was based on two aspects: First, the questionnaire items used were contextually modified from Wood & Kurzel, (2008) and De Raadt, Toleman, & Watson, (2005). Secondly, the questionnaire was pre-tested on 10 randomly selected students in the DBMS class at

Makerere University, Uganda. The pre-test aimed to examine the general structure, clarity, and relevance of the questionnaire items. At completion of the pre-test, feedback received from the participants was used to modify the questionnaire.

In order to provide coherence in the responses, the questionnaire was subdivided into sub-themes/sections covering different aspects which included: participants' background characteristics (gender, course unit, email address); items relating to the peer assignment review process stages (familiarization, assignment, review and feedback); and general questions that covered benefits and challenges of adopting the peer assignment review process. Participants were also asked additional comments to cover aspects that might not have been captured.

Students were asked to voluntarily participate in the study at the end of the semester in December 2011. Out of 998 students who were registered to the course 458 students responded to the survey, of which 401 responses were usable, accounting for 40.2% response rate. The unused responses missed required parts of information for data analysis. The questionnaire items were measured on a five-point likert-type scale with possible levels of agreement as Strongly Agree (SA) = 5, Agree (A) = 4, Neutral (N) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1.

Data Analysis

Descriptive statistics (means, standard deviation and frequencies) was used to analyse the questionnaire items using SPSS. The 14 questionnaire items relating to the peer assignment review process stages presented a high level of reliability with a Cronbach alpha coefficient of 0.833. George & Mallery (2003) indicate that a Cronbach alpha coefficient $> .8$ provides a good measure of internal consistency of items in the scale.

Results and Discussion

Results of the study undertaken are presented and discussed in two parts: The first part explicitly discusses the modelling of the peer assignment review process stages. The second part provides preliminary results obtained when the peer assignment review process was empirically applied and tested in an educational setting.

The Peer Assignment Review Process Model

After a joint consensus with the lecturers, the four stages of the peer assignment review process were refined and described as follows:

Stage 1: Familiarization: During this stage, students are introduced to the peer assignment review process and grading criteria are discussed. The students are made aware of their role as reviewer and the importance of providing constructive feedback during the review process. The output of the familiarization stage is skills development and understanding of the peer review process. Students will be able to appreciate how the grades are awarded, students rely on their judgments, and the teacher takes on a moderator role in case a conflict arises.

Stage 2: Assignment: At this stage, the students are given an assignment. Students can engage in discussions, exchange knowledge, and share their understanding of the assignment. This can be done in the online learning environment through the discussion forums or face-to-face interactions. Additional course resources are made available to the students to guide them while they work on their assignments. Actions required at this stage are preparation and dissemination of assignments to the students; setting a deadline for assignment submission;

Students submit completed assignments to the learning system. The output of the assignment stage is completed student assignments, submitted and saved in the peer review system.

Stage 3: Review: This is a major stage of the peer review process; the success of the assessment process is dependent on students being able to make constructive and fair reviews. The students are anonymously assigned two sets of submissions to review against a set of marking criteria. The premise of the anonymous assignment of peer review is meant to reduce collusion and biased marking. Each student submission is assessed by two other students, and an average grade is rewarded. In addition to awarding of marks based on the criteria, students give constructive feedback reflecting upon and identifying the strengths and weaknesses in submissions they are assessing. The lecturer provides the final assessment and feedback on any conflicting students' reviews. Actions required at this stage are the assignment of students' submissions, the review of submissions by students, the submission of completed reviews to the system, and assessing the reviews by lecturers. The output at this stage is completed student reviews.

In an effort to put students in a comfortable state to carry out the reviews and to give constructive feedback, it was agreed that after the assignment stage, the lecturer should go through the assignments with the students, giving them model reviews and preparing them for the review process. This was necessary since the peer assignment review process was a new concept that the students were not used to. In addition, the students would feel comfortable carrying out the reviews based on an informed perspective.

Stage 4: Feedback: The feedback stage marks the end of the peer review process. Students obtain the feedback given on their submissions; students view their grades and comments awarded to their assignment. Anonymity of the student reviewers is maintained at this stage to avoid conflict among the students. Lecturers play a crucial role in resolving any conflicts and supporting students understanding of the comments and grades they received.

The stages of the peer assignment review process are iterative, in order to address issues and challenges encountered at each stage, thus refining the process. Figure 1 illustrates the peer assignment review process.

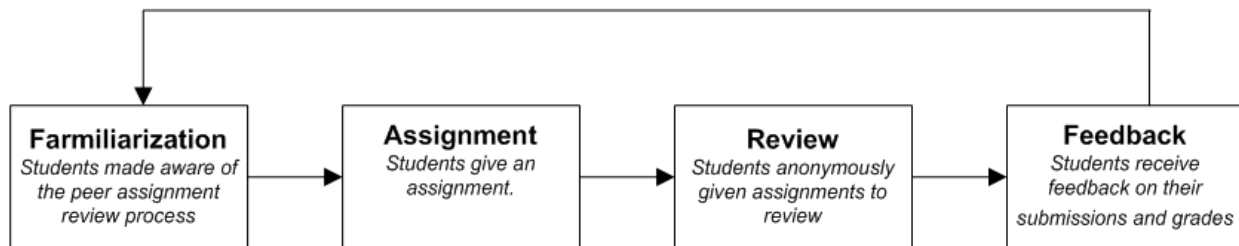


Figure 1. Peer assignment review process.

Based on the peer assignment review process described above, students are exposed to deeper learning and understanding of course content through a collaborative e-learning process in order to achieve the overall learning outcome. This assertion is further elaborated on during the empirical study discussed in the next section.

Empirical Evaluation of The Peer Assignment Review Process

The background characteristics of student participants who took part in the study indicated a gender composition of a 42% female and 58% male distribution. Thirty-nine percent

of the participants were Bachelors of Science in Computer Science, 36% were Bachelor of Information Technology Students, 11% were Bachelors of Science in Software Engineering, and 14% accounted for Bachelors of Information Systems students. For each of the process stages, a summary and discussion of result is presented.

Familiarization stage: The familiarization stage was aimed to impact skills and knowledge of how the peer assignment review process was going to be carried out. Two statements were used to derive responses relating the familiarization stage and its usefulness in engaging the students in the peer assignment review process. The results in Table 1 indicate that the introductory sessions helped participants to understand the peer assignment review process with agreement levels of 32.9% strongly agree and 47.4% agreed ($M = 4.04$, $SD = 0.926$). In addition, 30.8% and 43.1% of the participants strongly agreed and agreed, respectively, that the explanations during the introductory sessions were clear and understandable. These results imply that the introductory sessions had clear structured activities that were discussed and carried out before the assignment task. It can also be deduced that during the introductory sessions, participants understood the peer assignment review process and acquired skills necessary to do it. The relevance of the familiarization stage can be explained by the fact that the peer assignment review process was a new innovation, which participants were experiencing for the first time, thus requiring attention.

Table 1.

Mean, standard deviation, and percentages of the familiarization stage (n = 401)

	Mean	Standard Deviation	%				
			SA	A	N	D	SD
1. The introductory sessions of the peer assignment review process helped me understand the peer assignment review process	4.04	0.926	32.9	47.4	13.5	3.2	2.9
2. The explanations given during the introductory sessions were clear and understandable	3.94	0.971	30.8	43.1	17.7	5.9	2.5

Note: Five-point Likert-type scale: 1- Strongly Disagree, 2- Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Assignment stage: The assignment stage was evaluated by three items as indicated in Table 2. Participants felt that it was more convenient to submit the assignment online than physically with a strong agreement level of 47.2%, ($M=4.01$, $SD = 1.198$). This could point to the fact that participants did not move physically to the faculty to submit their work and that multiple online submissions could be made by the participants at their convenience with previous submissions being overridden by the system before the deadline. Other results indicated that 46.4% of the participants strongly agreed ($M = 4.20$, $SD = 0.990$) that instructions for uploading the assignment were easy to follow and 45.3% of the participants on the other hand agreed that the instructions for reviewing other students' work were easy to follow. This shows that the peer assignment review process was well articulated and implemented to include an instruction manual and demonstrations of the peer assignment review systems to students before the task. It was also observed that students sought help from their peers when using the peer assignment review system, thus facilitating a support mechanism among the students.

Table 2.

Mean, standard deviation, and percentages of the assignment stage (n = 401)

	Mean	Standard Deviation	%				
			SA	A	N	D	SD
3. It was more convenient to submit my assignment online than submitting it physically	4.01	1.198	47.2	25.7	14.1	7.2	5.9
4. The instructions for uploading my assignment were easy to follow	4.20	0.990	46.4	38.0	8.2	4.0	3.5
5. The instructions for reviewing other students assignments were easy to follow	4.11	0.945	38.0	45.3	9.9	3.8	3.0

Note: Five-point Likert-type scale: 1- Strongly Disagree, 2- Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Review stage: Participants were asked for their opinion regarding their experience and perception of the review stage. Results in Table 3 indicate that 45.9% of the participants ($M = 4.06$, $SD = 0.964$) agreed that review criteria and objectives were clear, thus making reviewing other students work simple. This can be attributed to the lecturers having discussed the review criteria and probable answers with the students before they started the review process. Similarly, 48.1 % of the participants ($M = 3.99$, $SD = 0.941$) agreed that the peer review process helped them to better reflect on their course work. Also, 39.2% of the participants agreed that they were able to improve on the quality of their assignment as a result of participating in the peer review process. An implication of these findings is that by critiquing other students' work, participants were able to make comparisons, thus achieving better understanding of their peer's perspective and their own in relation to the course concepts. Cross checking one's understanding is an essential step in the learning process. Indeed, as established in Eryilmaz, Alrushiedat, & Van der Pol (2009), knowledge development and understanding is enforced when students reflect and amend their own work.

Table 3.

Mean, standard deviation and percentages of the review stage (n = 401)

	Mean	Standard Deviation	%				
			SA	A	N	D	SD
6. The review criteria and objectives were clear which made reviewing other students work simple	4.06	0.964	35.3	45.9	11.1	4.4	3.2
7. The peer review process helped me to better reflect on my course work	3.99	0.941	30.4	48.1	15.1	3.0	3.5
8. I felt that I got better skills in the ability to critique the work of others as a result of the peer review process	3.86	0.955	27.1	42.9	21.6	6.5	2.0
9. I was able to improve on the my quality of my assignment as a result of participating in the peer review process	3.81	1.081	29.2	39.2	18.8	8.5	4.2

Note: Five-point Likert-type scale: 1- Strongly Disagree, 2- Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Feedback stage: Results in Table 4 show varied participants' perception in relation to the feedback stage. While 32.8% of the participants ($M = 3.70$, $SD = 1.255$) strongly agreed that the feedback about their assignment came earlier from peers than from the lecturer, 42.2% of the participants ($M = 4.01$, $SD = 1.033$) strongly agreed that they would rather receive comments from the lecturer. An indication to this finding is that although the peer assignment review process delivered immediate feedback, the feedback received was not comparable or better than that from the lecturers. Indeed, it was observed that some students made brief comments, and in some cases students posted the same comment to two different assignments. As a result, participants did not get the expected comments for their assignments; this points to the lack of competence, experience, and skills the students had. It can also be deduced that the participants' experience with the peer assignment process was influenced by their traditional experience that involves lecturer scaffolding.

Table 4.

Mean, standard deviation and percentages of the feedback stage (n = 401)

	Mean	Standard Deviation	%				
			SA	A	N	D	SD
10. Feedback about my assignment came earlier from my peers than from the lecturer	3.70	1.255	32.8	32.1	16.0	10.9	8.1
11. Feedback on my assignment was better than what I would expect in the traditional way (marked by the lecturer)	2.98	1.235	12.0	25.2	25.8	23.0	14.0
12. The feedback I received from my peers was useful for learning the course concepts	3.37	1.167	15.2	37.8	25.0	12.5	9.5
13. The review I received were fair and consistent	3.24	1.169	12.0	37.2	23.7	17.1	9.9
14. I would rather receive comments from the lecturer	4.01	1.033	42.2	26.1	23.8	6.2	1.7

Note: Five-point Likert-type scale: 1- Strongly Disagree, 2- Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

From the study, it was observed that while the benefits of the peer assignment review process have been raised, concerns regarding the similarity of peer generated feedback to grades provided by the lecturer need to be addressed. If the students are not comfortable with the feedback and grades (either good or bad) obtained, then the intended purpose of the peer assignment review process will not be attained.

Conclusions

Adopting a contextualized approach that involved lecturers at Makerere University, Uganda and supported by previous work in the field, a peer assignment review process for collaborative e-learning suitable for developing countries was discussed and developed as an alternative approach to support student learning. The resulting process involves four interrelated stages, viz.: familiarization, assignment, review and feedback, which were empirically tested.

The peer assignment review process described served to assist students in the learning process, allowing them to actively participating in the course, learn how to share documents,

gain experience in critical reading and evaluating peers work, reflect on their own work, and gain experience in using online technologies. As such, the peer assignment review process impacted the students learning both as receivers and providers of reviews. The findings indicated varying views relating to the peer assignment review process stages and how they impacted the students' learning process. Students viewed the familiarization stage to be important as it exposed them to a new peer assignment review approach and the application. The online submission of assignments required less effort than the physical paper submission. Reviewing students' work enabled the students to evaluate other student's assignments and reflect on their own, thus facilitating a better understanding of the course concepts. The feedback and comments made by peers were not valued highly by most of the students, even though this was guided by the marking criteria. This can be attributed to the fact that students lacked experience in making the reviews, thus providing imperfect comments. Encouraging greater accuracy of reviews resulting from continual use of the peer assignment review process may raise this value as students must feel that they are being access with caution and from an informed perspective.

This paper focused on modelling a peer assignment review process and how it impacted the student learning process from a developing country perspective. Preliminary findings indicate a level of acceptance among the students and lecturers in adopting and using the proposed collaborative e-learning approach. Further investigations will be geared towards studying the relationship between the peer assignment review process and the change in the student learning process and its effect on the overall learning outcome. This will form a basis for development of a collaborative e-learning approach at Makerere University.

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