Integrating Scholarly Articles within E-Learning Courses

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Abstract. E-learning systems support course-based learning. Inadequate course materials provided to learners can result in a decline in effective learning. The designed framework discussed in this paper illustrates that learning can be advanced and assist learners through a better method of learning. In turn, it helps learners build diversified skills including research, aptitude and analysis. This framework is based on the notion that an educational theory can foster a circle of educational knowledge building and sharing between educators and learners emphasizing a better understanding of scholarly articles. Three case studies have validated this framework and in each case study the result highlighted the fact that students' learning and motivation to learn was significantly increased.

Keywords: Scholarly articles, e-learning, learners.

1 Introduction

E-learning is gaining popularity faster in Western countries than in Eastern countries, according to a European survey report [1]. Large European organizations and universities have progressively prepared themselves for the implementation of e-learning in education and training, and investment in e-learning systems is substantial. Because of the competitive advantage to be gained by establishing an early foothold in the market, many e-learning suppliers and designers around the world are striving to produce good e-learning systems.

It has always been a challenge to design an e-learning system that can meet its goal of satisfying learners and educators. More than one researcher [2,3] has recommended using quality frameworks and/or criteria to develop effective e-learning systems. Levis' research [3] is a good example. He introduced criteria that would be appropriate for developing a good e-learning system and they include 1) good learning management software; 2) flexible and collaborative platforms; 3) interesting catalogue content; 4) a good customized learning programme; 5) an effective system integrator and consulting group; and 6) support from training companies which include technology in their blended offerings.

Although these categories are already familiar to academic educators, there is still a desire for an e-learning system that can provide good functionality and learning

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support to online learners. They sought ways to improve their teaching including course design methods and teaching strategies. Nonetheless none seems to add much value towards contributing to learners' motivation and their learning ability as they find the learning materials that are presented on e-learning systems are superficial learning and not deep learning which is of an intrinsic value considered to be more important for them.

The objective of this paper is to provide a constructive guided learning scholarly articles framework to support this goal. The focus of this paper places heavy emphasis on research, its integration and incorporation within learning activities, and on allowing learners to build their research, analytical and critical review skills. It is based on the concept of scholarly articles as the key subject context integrated within courses as part of a test assessment or a tutorial-based activity in an e-learning environment, as an alternative approach for maintaining educational sustainability. In turn, the aim of this framework is to help learners understand scholarly articles by encouraging them to discuss challenging issues online with other global learners and, through the appropriate use of a tool for collaboration, to generate inventive and innovative ideas.

In this paper, 'scholarly articles' will be frequently mentioned; however, the framework itself is the main topic of discussion. The structure of the paper is as follows: Sections 2 and 3 highlight issues of teaching and learning challenges faced by educators and learners. Section 4 outlines e-learning systems' characteristics and limitations. Our framework, SOAR (Scholarly Articles) is introduced in section 5. Section 6 describes framework validation and case studies are presented in section 7. The last section is an update of our future direction.

2 Challenges Faced by Educators

Educators believe that there are challenges to educating learners. Teaching materials, in particular, must be well-prepared so that learners can understand them. Because learners' learning objectives vary and not all educators design their courses to satisfy all learners, consequently, educators could have been exploring new teaching approaches to try to improve themselves. However, in some cases, the blame is not placed on educators' teaching approach. It could be either a problem of assessment or poor development of the course design. The consideration of materials to be added to e-learning systems involves time and thinking similar to developing a teaching strategy to help learners understand; hence it is equally difficult for educators. In this respect, educators fail to realize how to make learners think and analyze subject matter critically, and helping them identify learning can be more than just understanding concepts.

It is understandable that educators immersed in a learning culture based on traditional teaching methods may be strongly influenced to believe that the fundamental aim is for every student to learn concepts before they attempt to apply those concepts [4]. In reality, not all learners can solve problems even if they have a good knowledge of concepts. This is due to the lack of an integrated learning process that builds their cognitive learning more creatively through blending concept learning and problem solving.

To remain competitive at the cutting-edge of technology, the integration of a research component within any e-learning course should be strongly encouraged. Research drives innovation, and new technologies push improvements to our lives through newly created products, processes and services.

Importantly, in order to maintain a high quality of online teaching, learners must aim not only to learn past theories and their present applications, but should also focus on their own future works. In other words, learning is not simply an act, a process or an experience of gaining knowledge and skills; it should be a lifelong process of transforming information and experience into knowledge, skills, behaviour, and attitudes [5].

3 Challenges Faced by Learners

Two challenges are faced by learners when using e-learning systems: 1) uninteresting course materials fail to promote learners into deep learning and 2) learning approaches [6] are insufficient to increase knowledge that extends beyond theories and concepts.

4 Characteristics of E-learning Systems

Moodle [7] and Blackboard [8] are two popular Learning Management Systems (LMS) [9] that support SCORM specifications [10]. They have similar characteristics with respect to a set of homogenous settings. For example, the prerequisite for every system is a basic setting to allow educators to upload, download and perform course backup. A course announcements and calendar administration tool provides educators with the ability to manage users, roles, courses, instructions and facilities, and to generate reports.

Assessment features such as the grading of coursework, testing, and the ability to handle pre-/post-assessments and individual grades are provided. Unique features found in some e-learning systems include access tracking of learners; for example, how many articles have they posted/read; which pages have they accessed; how many tasks have been submitted? Other tracking facilities include showing how many learners have accessed a page, and when. The introduction of forums enables collaborative work and topic discussions, and good functional support is provided for learners' needs. No matter how easy and flexible e-learning functionalities are, however, they cannot promote deep learning.

Observing educators uploading online course materials shows that they routinely follow a structured and step by step approach. Their first task in uploading to any e-learning tool is usually to name a folder. All course materials are classified and categorized into topics and titles for learners to download and read. Next is the upload of test assessments in which learners take part.

Little research has found that course content alone is beneficial to learners in enabling them to excel, to become involved in critical reviews or develop the ability to think and devise new solutions. If educators choose the conventional method in Figure 1, which focuses on course-based materials, the learning curve for learners is likely to remain broad and fail to promote learning in depth.

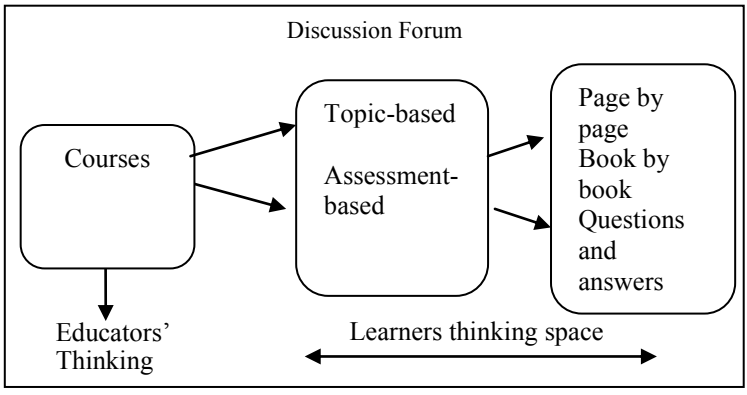

Fig. 1. Steps for uploading materials in e-learning

5 Framework

Scholars all over the world publish scientific articles, and getting a paper published is the first step toward achieving academic success. It is not a scholar's responsibility to find out what learners like to read and to write; similarly, it is unrealistic for every learner to expect to understand each scholar's work easily. This can be a controversial issue in understanding the fundamental concepts of learning. However, from a research perspective, it is not at all controversial for learners to acquire ideas from scholarly papers. The goal in this paper is to seek a way to enhance the learning process as effectively as possible, and to encourage students to learn widely and deeply beyond the concepts level.

Our framework allows learners a thinking space in which to develop creativity and apply it by enabling them to build their problem solving and research skills. This framework is designed based on Brown et al.'s [11] educational theory and framework (figure 2), which aims to foster a circle of educational knowledge building and sharing. It emphasizes three key terms: create, use and remix, each of which is explained as follows:

Create*:* is the support of the development of reusable and shareable learning content and scenarios

Use*:* is the encouragement of teachers and lecturers to discover, review, critique and build on others' work

Remix: is the enabling of teachers and lecturers to integrate others' work into their own teaching

Brown's framework provided an existing concept on which we could successfully base our framework [12] because it is aligned closely with our understanding of learning. The goal in developing this framework is to guide educators through the process of integrating a research component within their courses. It addresses the issue that quality online teaching should be well-supported by a good facilitation

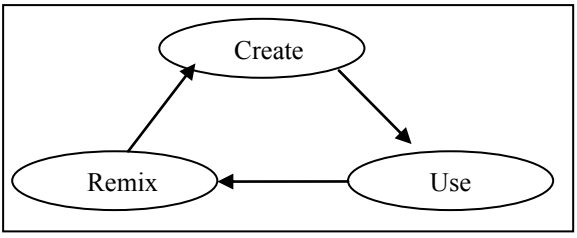

Fig. 2. Brown and Adler's [11] framework on the circle of educational knowledge building and sharing

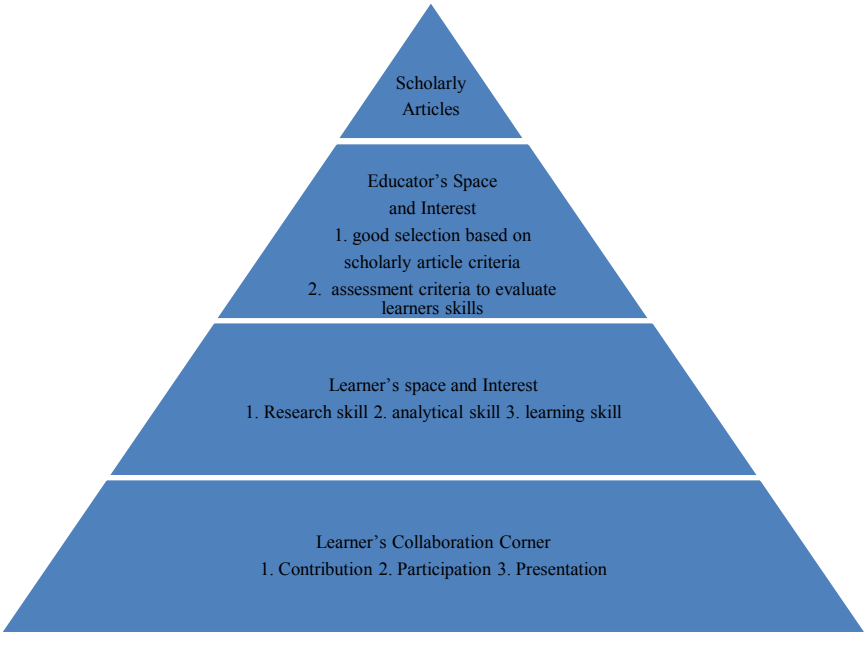

Fig. 3. SOAR Framework

process so that online learners can trust that the e-learning system is a good system through which they can excel at other social skills, including networking.

Our framework in Figure 3, the SOAR Framework requires a subject as an input. Scholarly articles are picked because past, present and future works in each field are clearly presented. This ***creates*** an educators' thinking space in which to decide whether to ***use*** scholarly articles [12] as a 1) class activity, 2) a test assessment or 3) whether to integrate it and ***remix*** it into a tutorial. The e-learning interface acts as a middle process or agent to facilitate open discussion via social networking and as a process to promote a learners' space which will encourage more collaboration, participation and presentation.

6 Framework Validation

Two post-graduate courses from different faculties have validated SOAR. Because these subjects have a large number of student enrolments the use of an online learning tool is highly demanded. Educators aim to help learners develop an interest in understanding their subjects and having research that is integrated within their courses. Certainly they support the idea of testing SOAR framework and evaluate that its value is of benefit to students in terms of critical review and improving their ability in thinking, writing and talking.

To validate this practice-based framework, two stakeholders are required, i.e. educators and learners, a subject input, scholarly articles and a tool to support learners' collaboration and participation. Without an appropriate e-learning system, managing scholarly articles for a large class size would be difficult, especially if critical discussions and online participation are required. It is essential to have a learning tool to test the framework.

The framework consists of the basic procedure and steps below which outlines that they are not difficult to follow: an educator **creates** his or her thinking space to decide where to **use** scholarly articles when using an e-learning system. He asks whether it is for a class activity, 2) a test assessment or 3) to integrate it and remix it into tutorials. With regard to two post-graduate courses, educators prefer to **remix** it into tutorials**.**

1. Educators create a subject folder for materials to be uploaded to an e-learning system.
2. Every topic is attached with a document, e.g. a scholarly article for learners to download and read and assessment criteria are attached for completing the task.
3. A group discussion board is created for learners to discuss weekly papers.
4. Learners are assigned to read weekly scholarly articles.
5. Learners upload their questions which relate to the industry context with reference to the paper.
6. Learners can upload their questions on a discussion board.
7. Learners invite other learners on the same course to provide their inputs and comments.
8. Educators use their skill and knowledge to review learners' research questions and other learners' comments as to whether they are valid or invalid. Educators can make comments to correct or clarify matters on the discussion board.
9. Learners are required to deliver a presentation online. In the presentation, learners must discuss the paper's topic and their questions relating to an industry case, and provide a summary or outline the statistics of other learners' comments on the questions asked on the discussion board.

- Steps 1, 2, 3 and 4 Educator's thinking space and interest (1. good selection based on scholarly article criteria, 2. assessment criteria to evaluate learners' skills)
- Steps 5 and 6 Learners space and interest (rresearch skill, analytical skill and thinking skill)
- Steps 7, 8 and 9 Learners' collaboration corner (1. contribution 2. participation and 3. presentation)

7 The First Case Study

One author of this paper is a subject coordinator who coordinates a post-graduate subject offered to information technology students. A past survey result showed high ratings for the teaching, but not for the subject. In order to validate our proposed framework, we selected a postgraduate subject with two classes, A and B, as the main focus of the case study and as part of the unit analysis. We carried out an experiment on 50 students from both classes in five weeks and, according to what was observed, data were analyzed from surveys and information that was posted by students on an online discussion board using an e-learning tool.

Past feedback from many students expressed concern about the difficulty in understanding scholarly articles. Many could not interpret what the authors discussed in the paper. As a result, students did not like the subject or the support materials handed out by the subject coordinator. Rather than re-design the whole subject, the coordinator analyzed all aspects of the learning factors that impacted on the students' learning, and reviewed all processes, including tools and techniques. The learning environment was the first area to be evaluated to discover whether there were any missing or inappropriate resource supports for the students.

The learning tool that was provided to the students provided good functionality and adequate features, according to our observation, and was therefore not believed to be the cause of the problem. As such, the tool was retained. Next, the coordinator reviewed ten different scholarly articles, carefully selected by us, to determine whether they were difficult for students. This review confirmed that there was no replacement of the existing articles, as that was not the primary teaching goal. The teaching goal was to encourage students to undertake deep learning, rather than surface learning and the objective was not, therefore, to change the ten papers being used. Instead, the coordinator revisited the presentation structure, as a result of which it was recognized that it was necessary to re-engineer the presentation process so that the subject matter would be explicitly clear to students, both informatively and intuitively. It was decided to outline any missing steps between the old and new presentation structures, in order to achieve improvement in the subject.

Our objective is to ensure that students are more engaged in their learning and hence we proposed the development of a collaborative interface between students at group and class levels for questions and discussions. This interface acted as a two-way communication process that made groups responsible for posting their designed questions and the class responsible for feedback on the designed questions.

Fifty students from two classes in one semester took part in the new process. Ten scholarly articles were chosen, on topics ranging from understanding Michael Porter's framework on the five forces to strategic information planning. Papers published by ACM, MISQ and IEEE were the focus. Students listened attentively to the settings for the paper discussion in the first lesson. Each group was made up of five students. Ten groups of five students per group were formed, and each group was given a different paper topic to read, analyze and discuss. Of the concerns raised, some students were confused about the actual process because it was the first time they had experienced such a framework. A minority of students felt insecure and lacking in confidence because detailed data had to be collected and interpreted in one of the steps, and they had no prior knowledge of research skills.

There were no negative responses from students about the learning process, but acceptance of change was not readily forthcoming when the new framework was introduced

7.1 Result from the First Case Study

The first week of presentations by the two classes went well. Students knew what to do for each paper. They had to: 1) identify a problem issue discussed in the paper (a process equivalent to requirements gathering [13]) 2) contribute their opinions or comments on the paper (a process equivalent to requirements elicitation [14]), 3) ask the class for feedback on questions they have asked (a process equivalent to requirements clarification [15]), 4) respond to comments from their classmates (a process equivalent to requirements review [16]), 5) know how to summarize their findings and propose a strategy (a process equivalent to that of requirements changes [17]), and 6) present their data or findings in a class presentation (a process equivalent to requirements traceability [18]).

The presentation structure, the learning tool and the interface for group discussion are the events on which we sought understanding. Students claimed that class A's papers were more difficult than class B's papers. The statistics report showed that class A received more responses than class B, even though the papers were difficult. We believe that class A students received a high response rate due to the fact that the topic interested them and thus they focused on that, rather than on the paper's difficulty. The same group of students had to analyze data (feedback) from the class and summarize their findings in one presentation slide. Two of the five questions had to involve a critical review of the research into technology and an analysis of the data collected from their classmates. They were also required to propose ideas for solutions to a particular problem based on their classmates' feedback.

In other words, they had to be able to think of a strategic approach and show why it was useful, thought provoking, innovative and interesting. Most importantly, they were asked to summarize findings from the five questions and to conduct an oral presentation to the class the following week in order to leverage knowledge and knowledge transfer of the topic, ideas and solutions for the class.

After week five, an anonymous survey was distributed to all students to evaluate their responses to the framework. Forty-one out of 50 students completed and returned the survey. Nine students did not complete it as they did not attend the class. The survey findings are shown in Table 1, Figures 4 and 5.

Difficult papers were rated with an asterisk, indicating that students had difficulty reading them and understanding the scope, and that they had to read them more than once. Before we reviewed the learning process, we were convinced by our students

Table 1. Classes A and B data with students' responses to the paper

	Class A (16/20)					**Class B (25/30)**				
Paper	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Difficulty	*	*	-	-	*	-	-	*	*	*
PaperLength	**8**	**15**	**6**	**5**	**24**	**13**	**7**	**8**	**6**	**11**
Responses	**8**	**3**	**2**	**2**	**1**	**4**	**3**	**9**	**4**	**5**

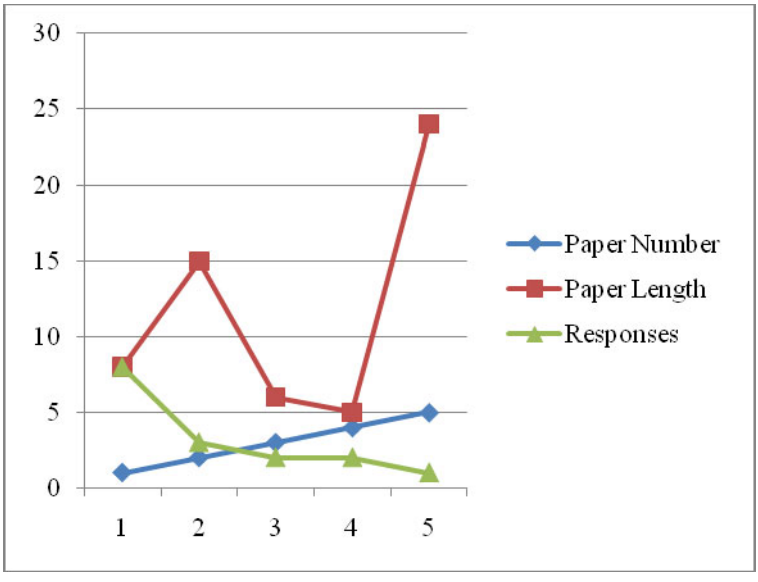

Fig. 4. Class A Data with students' responses to the paper

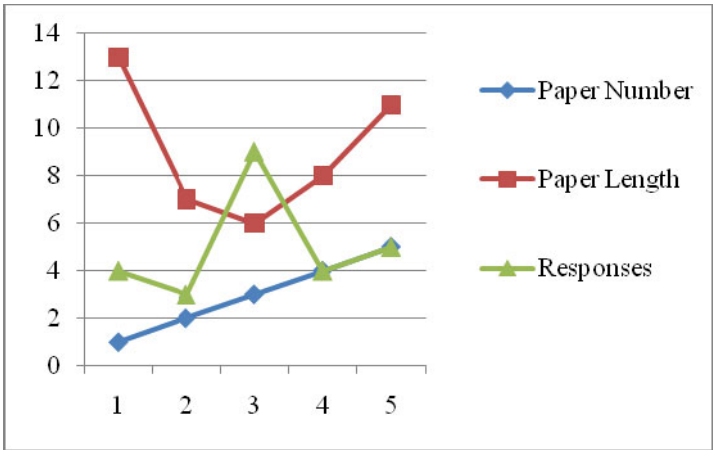

Fig. 5. Class B data with students' responses to the paper

that scholarly papers were too hard to read. We think that this is the same belief that drove a similar situation in software development, in which the team always found it difficult to understand some of the users' requirements because they were vague or incomplete. In fact, a well-developed process to help developers understand requirements simplifies the situation and makes users' requirements understandable. This learning framework underpins the process for assisting students to overcome the barrier of reading difficult papers. The aim is to make them realize that academic

papers are not complicated or hard to understand. It is a guiding process on the 'how' and 'what' of reading scholarly articles.

We were also keen to know whether students liked the presentation structure. The process for the presentation was to have them read an article, post designed questions and then analyze data from the class feedback and comments from the subject coordinator for an oral presentation. In this question, we were able to gain many valuable insights from students' responses. Most of their comments are similar and we summarized them in relation to four aspects: 1) article topics, 2) paper discussion, 3) questions posted on the forum, and 4) their oral presentation. We were pleased to find that feedback from the students was positive. For the article topics, the words used repeatedly were:

'Topics are current significant, clear and interesting', 'good knowledge', 'It sharpened our thinking', 'Topics are thought-provoking', 'They give us business aspects of a technical field', 'They broadened our knowledge of IT strategies'. The comments on the paper discussion showed that students felt it was *'informative',* and that *'team dynamics were unique'*. They agreed that the process involved two-way discussion and they *'enjoyed it'*. They also believed that such discussion helped them *'not only get to know each other better but also able to share their experience and knowledge within the group level and class level'*. On the questions posted on the forum, one student commented that *'questions are a good help to think critically and relate to the paper and real life experiences'*. As for the oral presentation, many students claimed that the purpose was to *'help understand the topic well', 'stimulate discussion in class and feedback from the subject coordinator'*. Students commented that *'there was a lot of information'* and *'argumentative and critical evaluation'*. They felt that they learned how to *'build oral communication skills, negotiation skills and analytical skills, as well'*.

As a supplementary question, we wanted to know whether students found the presentation structure helpful to their learning, for example, whether it led to better understanding of the scholarly articles. Ninety-eight percent of students agreed that the presentation structure did help them to understand the scholarly papers better. One student offered a comment that was not negative about the presentation structure, but rather concerned the length of the paper. He felt that some articles were slightly longer than others and thus took longer to read. Another student believed that some students' answers in the forum discussion showed a lack of clarity: either their answers were incomplete or the meaning was not clear and it would have been better if they had provided resource links to justify their findings clearly from journals or books.

7.2 Result from the Second Case Study

One semester later, the same technique was validated in the same subject. The total number of students enrolled was 50 and each group had ten students. They were given scholarly articles to read and told to use the framework in Figure 3 to assist their understanding. At the end of the teaching semester, students were asked to complete a survey designed by the subject coordinator. Students' responses in the result findings (see Table 2 and Figure 6) are similar to those of the first case study.

Table 2. Class C data with students' responses to the paper

Class C					
Paper	1	2	3	4	5
Difficulty	*	*	*	*	*
Paper Length	7	8	15	10	11
Responses	9	10	8	10	10

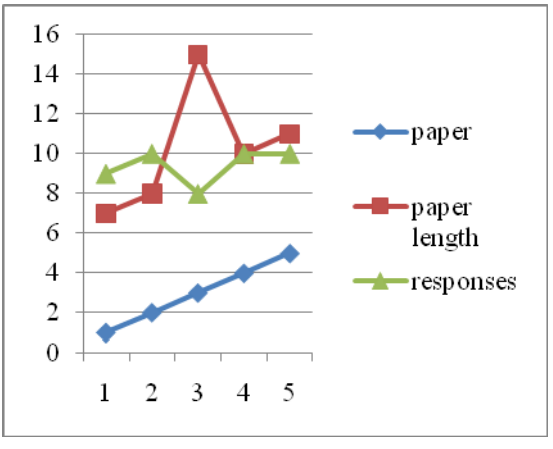

Fig. 6. Class C data with students' responses to the paper

Some constructive comments were made in this semester, particularly in relation to the questions posted on the forum, and their oral presentation. Two students commented that the questions posted on the forum by groups analyzed them *quantitatively*, which did not provide useful insights on the paper's topic. Ideally, it would be helpful for groups to provide in-depth answers.

7.3 Result from the Third Case Study

It is highly recommended that the framework should be cross validated in different subjects in order to evaluate its results. In another faculty, a research-based subject with heavy emphasis on scholarly articles did not receive a good subject rating; hence the subject coordinator wanted to seek subject improvement. He agreed to use the framework for a trial period during one semester to see whether this would help to improve his subject rating level. He was interested to discover whether the length of scholarly articles affected students' ability to read and understand.

In total, 20 students were enrolled in the subject (Class D). Although the enrolment was not large, the number of students seemed sufficient for us to analyze the results, as long as they were new students learning how to read and understand scholarly articles for the first time.

Fifteen students took part and completed surveys. The information in the returned surveys enabled us to explicitly investigate whether there was any validity threat to the technique. Not to our surprise, the students' feedback was similar to that of students in the first subject. The following Table 3 and Figure 7 illustrate the Class D data.

Table 3. Class D data with students' responses to the paper

	Class D (15/20)				
Paper	1	2	3	4	5
Difficulty	*	-	*	-	*
Paper Length	9	15	7	6	14
Responses	3	2	5	2	3

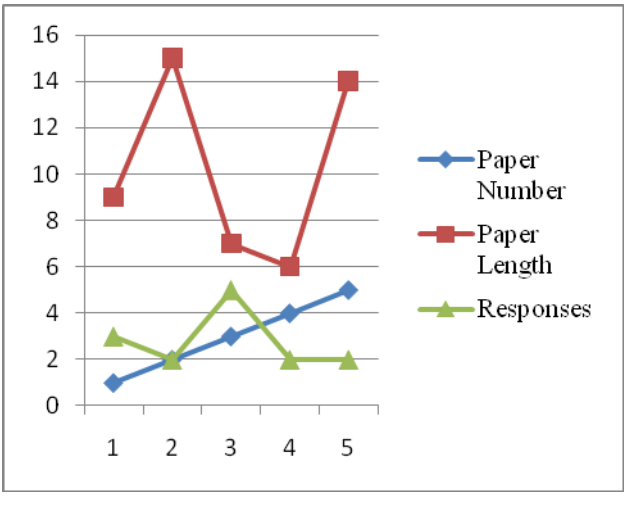

Fig. 7. Class D data with students' responses to the paper

The results shown in this table and diagram clearly identified to the subject coordinator that there is no significant evidence that students' difficulty in understanding scholarly articles is due to the length of the paper. Three students mention that papers 1, 3 and 5 were difficult despite their length and size. Paper 1 had 9 pages, paper 3 had 7 pages and paper 5 had 14 pages. The most highly rated by students was paper 3. Five students felt that it was difficult. In the survey, we asked students to comment on the usefulness of the presentation structure. Fifteen students agreed that the process of presentation really helped them to better learn the concepts and theories discussed in the papers. One student commented that the presentation can be time-consuming but is nevertheless thought-provoking.

In order to establish the framework reliability and effectiveness, it must be validated in more than one case study. The more case studies involved in the validation, the more accurate and reliable that the framework can be considered to be.

8 Conclusion and Future Works

In this paper, we introduced the feasibility of integrating scholarly articles into e-learning courses. We presented our framework drawn from the works of Brown [17]. The framework has been validated in a small learning environment of an e-learning system. Validation on a large-scale environment, particularly of students using e-learning systems for programming subjects, will be part of our future work in the next phase. Existing case studies reveal that the technique can be applied effectively in research-based and coursework-based subjects in which students might be experiencing difficulty in understanding scholarly articles. The framework appears to be convincing enough to be suitable for use in small classes.

Our future research study will seek to validate this framework in large classes and in programming subjects, to establish whether it is suitable for use in such contexts. Many concerns remain to be addressed: for example, is this technique able to support a large class of, say, 600 students? Is a learning tool a necessary aid for supporting resources and setting up a forum discussion? What are the limitations of this technique? These questions will roll into the next phase of our research investigation, which will be more in-depth and analytical.

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