

Collaborative Summarizing Feature: Supporting Group Knowledge Construction in an Online Discussion Forum

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Abstract

—Experts agree that online discussion forum has the potential to support individual and group knowledge construction collaboratively. Previous studies show that challenges faced by students entering online collaborative learning are managing motivation, the feeling of uncertainty, difficulty in putting their thoughts in texts, summarizing large numbers of postings especially during exploration and integration phases of the Practical Inquiry Model. In the lens of instructors, monitoring discussion progress to provide prompt feedback when needed is not a trivial task. This study proposes a collaborative summarizing feature integrated to an online discussion forum to support group knowledge construction in the learning management system. The Community of the Inquiry Model is used to guide the study. Students evaluate, integrate, and extract the content of others' postings to compose a summary collaboratively. They can add, edit, delete, and restructure the summary. The contributors' names are automatically displayed to support social presence. The feature facilitates the presence of the CoI model in a different format compared to that of the online discussion forum.

1. Introduction

Online discussion forum has the potential to promote critical thinking [1]. Online learning should be planned and managed in earnest as susceptible to changes in learning motivation and a sense of uncertainty [2]. Failures in online discussion could appear in the forms of: low participation rates, students actively conveying the idea but not responding to each other, many of the ideas emerging but fragmented and not leading to the conclusion.

Previous experiences of observing an online discussion forum have shown that one of the obstacles encountered in the beginning of discussion is low participation level [3]. Students wait for each other to response. Once it has been resolved, the discussion goes fast and many ideas are presented, students face a new challenge i.e. the difficulty to navigate in a large number of postings, to draw conclusion of the discussion to construct meaning. They are uncertain about the accuracy

and validity of such messages. On the other hand, lecturers also encounter heavy cognitive loads in monitoring the discussion to provide prompt feedbacks.

Summing up ideas requires the ability to assess, analyze, associate, compare, take excerpts, and presents them systematically. This study proposes a supporting feature for online discussion forums to facilitate group knowledge construction. The feature enables facilitators to provide prompt and meaningful feedbacks. This work is guided by the Community of Inquiry (CoI) framework [4]. The result of the study is expected to improve the effectiveness of collaborative online learning.

A preliminary study was conducted on Linear Algebra class of 2015 involving 63 students at the Faculty of Computer Science, Universitas Indonesia [3]. The study reveals that: at the beginning of a discussion, students are waiting for each other to respond, and during the discussion it is difficult for them to draw conclusion from a large amount of information. The current study proposes a collaborative summarizing tool integrated to a discussion forum

The class was conducted in a blended learning approach which combined the face-to-face and online sessions through a learning management system named Student-centered e-Learning System (Scele). The study exhibits the following results.

- Students face difficulties to synchronize the outcome of the discussion,
- Students are not sure about the truth values of the messages and their own understanding,
- Students face difficulties to present ideas in texts,
- Students are expecting lecturers to provide conclusions on each discussion topic,
- Students are advantaged by summaries provided by other participants,
- Students face difficulties to navigate many contents and to cross references of different resources for accuracy.

Responding to the above needs, the current study aims to develop a supporting feature for online discussion forums to help lecturers and students to achieve the learning objectives through the construction of shared knowledge. The research question guiding this study is: “to propose a feature supporting online discussion forums to help group knowledge construction.”

2. Relevant Literature Review

In line with the rapid development of Internet and the learning management system, there is a paradigm shift from teacher-centered to student-centered learning. With the implementation of the new paradigm, learners do not only put themselves in individual learning; they learn, share, and construct knowledge with their peers. We call this approach as Social Learning. Collaboration in learning is essential in the lens of social constructivism, human development is socially situated, and knowledge is constructed through interaction with others. Internal knowledge construction and social learning activities are mediated by metacognition (knowledge of cognition, monitoring of cognition, and regulations of cognition) [5]. Consistent with the approach, the Community of Inquiry (CoI) serves as a framework for teaching and learning using computer-mediated-communication in facilitating an educational experience.

The CoI framework constitutes three interrelated elements essential to an educational experience: cognitive presence, social presence, and teaching presence [4]. Social presence reflects the ability of learners to present their personality and affection into the community of inquiry. Social presence is important to create safe and comfortable environment for a critical discourse. Learners present themselves as 'real people' (social presence) by, for instance, mentioning names, open communication, and greeting. Teaching presence demonstrates the role of participants to design, facilitate, and direct cognitive and social processes in constructing knowledge. Cognitive presence is the extent to which they are able to construct meaning through sustained discourse.

Based on the CoI framework, construction of knowledge modeled in the Practical Inquiry Model operationalizes cognitive presence. Four stages of an inquiry process start with a triggering event, followed by shifting to exploration (in search of relevant information, including information gathering), then moving into integration (syntheses) and resolution. At each of the phases there may be a need to go back to previous phases for a new direction [4].

Harasim claims that two critical roles of teachers in collaborative knowledge construction are facilitating the learning process and providing learning resources to the groups and ensuring that the core concepts and practices of the subject are integrated entirely [6]. Three phases of knowledge construction through a discourse in a group are: idea generating, idea organizing, and synthesis [6]. Idea generating occurs at the exploration phase indicated by brainstorming where divergent thoughts are emerged. Idea organizing is the phase where ideas are compared, analyzed, and categorized. It is the intersection of exploration and integration phases. In the third phase, the process of synthesis and consensus occurs through collaborative assignments such as summarizing collaboratively.

In a position paper, Zydney identifies strategies for creating a community of inquiry through online asynchronous discussions: to model social presence, encourage peer facilitation, provide modest instructor facilitation, and provide prompt feedbacks [7]. Peer facilitation enhances social, cognitive, and teaching presences of learners.

3. The Proposed Feature

A preliminary study was conducted on Linear Algebra class of 2015 involving 63 first year computer science students at Universitas Indonesia [3]. The class was conducted in a blended learning approach which combined the face-to-face and online sessions through a learning management system named Student-centered e-Learning System (Scele). Asynchronous discussion forums are initiated for each topic.

The screenshot displays three messages in a discussion forum. Each message has a header with a subject line, author, and timestamp, followed by the message content and a footer with action links.

Message 1:
 Subject: Re: Terjebak dalam ketidakseamaan
 by Student A - Wednesday, 11 February 2015, 05:27 PM
 Content: Selamat sore semua 😊
 Saya ingin menjawab/menanggapi bahan diskusi yang telah Bu Kasiyah berikan. Semoga sesuai dengan yang telah dijelaskan di kelas :D
 1. Solusi trivial sendiri adalah sebuah solusi yang tiap unknownnya akan bernilai 0. Misal $x_1=0, x_2=0, x_3=0, \dots, x_n=0$. Jadi spl ini konsisten (memiliki solusi).
 Mohon ditambahkan dan bila ada kesalahan mohon dikoreksi. Terima kasih :D
 Footer: Show parent | Edit | Split | Delete | Reply

Message 2:
 Subject: Re: Terjebak dalam ketidakseamaan
 by Student B Wednesday, 11 February 2015, 05:54 PM
 Content: Saya sependapat dengan [User] 😊
 Karena misalnya ada suatu matriks augmented pada kolom terakhirnya bernilai 0 semua, maka garis - garis persamaannya pasti melewati titik (0,0) sehingga salah satu solusinya antara lain semua *unknown*-nya bernilai 0 dimana disebut sebagai solusi trivial.
 Apabila ada kesalahan mohon dikoreksi.
 Terimakasih.
 Footer: Show parent | Edit | Split | Delete | Reply

Message 3:
 Subject: Re: Terjebak dalam ketidakseamaan
 by Student B Wednesday, 11 February 2015, 05:40 PM
 Content: Selamat sore Bu Kasiyah,
 Saya ingin menanggapi pernyataan nomor 2 :
 SPL tidak mempunyai solusi bukanlah SPL sebenarnya.

Figure 1.1 Sample of an Online Discussion Forum in Scele

Based on students' feedback on the forums, students are advantaged by summaries provided by other participants. However, students are not sure about the truth values of the messages posted by other students. They expect lecturers to provide conclusions on each discussion topic. In addition to that, students encounter challenges.

- synchronizing the ideas emerged in discussion forums,
- presenting ideas in texts,
- navigating many contents and crossing references of different resources for accuracy.

Responding to the above needs, the current study aims to develop a supporting feature for online discussion forums to help lecturers and students to achieve the learning objectives through the construction of shared knowledge. The research question guiding this study is: "to propose a feature supporting online discussion forums to help group knowledge construction."

A. Overview of the Proposed Feature

The proposed feature is a tool attached to an asynchronous discussion forum to facilitate participants to summarize the discussion collaboratively (see Figure 1). The participants of a discussion forum analyze and evaluate the content of postings, and then extract the essence and build a summary collaboratively. It is based on the CoI framework. Summarizing ideas in online discussion forums is an important form of teaching presence. It leads students to monitor the group learning process and reflect it with their own understanding. Summarizing involves critical thinking (cognitive presence) in the process of knowledge formation.

Knowledge construction is individual and social processes, involving: identification of an issue, exploration of ideas or information, connection/integration of ideas that emerge to answer the trigger, and application of the new ideas in different contexts [8]. Usually, composing a summary begins during the integration phase. However, learners may start to summarize collaboratively at the problem identification phase. Along with the progress of the discussion, participants can add, update, and restructure the summary.

It should be noted that the indicators of the triggering event do not appear in this summary because the content of the summary is the substance of the discussion only. It does not contain a dialogue between participants. The results of the exploration phase will appear in the early period of discussion and may be revised in line with the development of the discussion. Indicators of integration are dominated by editing the summary and adding new information. The resolution indicators appear at the end of the discussion period in the forms of the proposed application of the new knowledge in other contexts, or defending a solution.

B. Design of the Proposed Feature

The process encapsulates the essence of the discussion is not simply copying the important part of the message and then putting ideas (analysis and synthesis). To take an important part of a message, the students must assess the accuracy and relevance of the idea, choose the parts that are important to be integrated with other ideas that have been written in the summary. The composition of the sentences in the summary also needs to be examined and sorted logically. It summarizes the process of helping participants to shape their own knowledge through the establishment of shared knowledge collaboratively. The prototype of the feature is presented in Figure1.

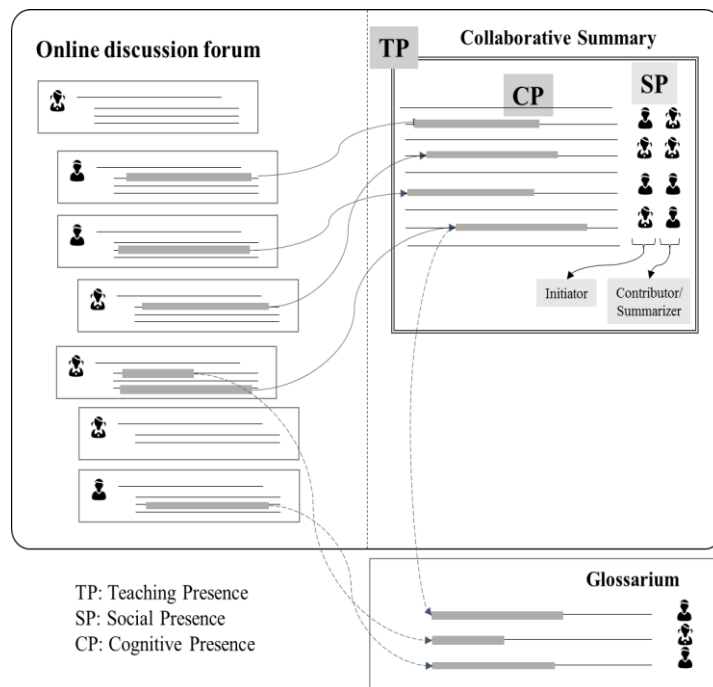


Figure 1 The Prototype of the Collaborative Summary

Discussion begins when a participant (a lecturer or a student) posts a trigger in a discussion forum. The first step is the identification of the problem, followed by brainstorming and exploration of relevant ideas, the connection/integration of ideas that emerge to answer the trigger, and the resolution. When a participant enters the discussion forum, then this summary page appears automatically. He/she reads the messages emerging in the discussion page, evaluates the messages, takes the core content, and then copies and pastes or paraphrases it into the summary page. The system will display the name of the contributors (the summarizer and the idea initiator). The contributors' names pop up every time they update the summary.

If the sentences in the summary are less logical, the contributor can reorder them. He/she can correct the contents of the summary. Basic concepts found in the discussion page or summary can be put into a Glossary or Wiki. This feature is similar to the Wiki in terms of generating written material together dynamically. Unlike the Wiki, this feature is integrated with an online discussion forum.

The proposed feature is different from online discussion forums in terms of the emergence of the CoI components. The indicator of social presence in the feature is simpler; it is generated automatically by the system, whereas in an online discussion forum the social presence is more varied and raised by participants. Dialogues between participants, which are dominant in online discussion forums, do not appear in this feature. Collaboration between the participants is reflected by the process of preparing a summary as a result of collective thinking.

The cognitive presence implicitly or explicitly appears in the feature by the following indicators.

- adding new information in the summary as a result of evaluating the information and reflecting to one's own understanding,
- revising the content of the summary as a result of finding mistakes or misconception,
- rearranging the summary content to be more systematic, indicating that the contributor finds that the sequence of the sentences in the summary is less logical.

C. Potentials of the Feature

The main purpose of this feature is to assist the establishment of shared knowledge actively. It has the potentials to help students learn, as the following.

- Supporting the establishment of shared knowledge and the sense of certainty of the participants towards their learning outcomes,
- directing students to focus on important issues,
- increasing sense of presence (being there and being together with others),
- facilitating the process monitoring and diagnosing learning outcomes and misconceptions,
- providing space for scaffolding,
- supporting students to monitor their learning process,
- improving learning skills, such as selecting relevant information, testing for accuracy of information, and presenting ideas systematically,
- strengthening the awareness of the learning process,
- facilitating the process of internalization and articulation of knowledge.

This feature allows lecturers to monitor the progress of the discussions and misconceptions diagnosed as early as possible. Thus, they can provide feedback and support learning as needed. Summarizing the scaffolding is along the implementation process. Lecturers can begin to encapsulate partially, and then other participants add, correct, or reorder. Learners also act as scaffolders for others. Gradually the students are expected to perform independently without any intervention from the lecturer.

D. Challenges

Construction of shared knowledge in a collaborative online discussion forum is challenging. The feature is intended to support an online discussion forum, without eliminating or reducing the benefits offered by online discussion forums. It requires the preparation of both students and lecturers. Without proper preparation, it can lead students to take shortcuts. They learn from the summary and ignore the discussion process. Therefore, students need to understand the importance of collaboration in active learning. Students will take active parts of learning activities if they understand the benefits of such activities for their own development.

It should be noted that the needs of students and faculty members to these features may differ per their respective roles. Features to monitor the learning process of students in the running stage of problem solving, the presence of cognition, critical thinking are the needs of lecturers, whereas the students need to monitor their own learning. The proposed feature supports students and faculty to reach common conclusion, manage large amount of information, and monitor the discussion progress. To be active participants in collaborative learning, students need to have high motivation and self-regulation in learning.

In this study, the role of students composing a summary in the feature is voluntary-based. At first, the lecturer modeled how to summarize a discussion, and then he/she asked students to do it collaboratively. The results of the study may be different if the work is compulsory-based. In any approach, lecturers and students need to make an agreement.

4. Conclusion

Asynchronous online discussion is potential to support individual and collaborative knowledge construction. Summarizing large amount of posting during exploration and integration phases of inquiry has become a challenge for students. This study proposes a collaborative summarizing feature integrated with an online discussion forum to support group knowledge construction. The feature is potential to help students learn and improve their learning skills. It facilitates instructors

to monitor the discussion progress such that they can focus on providing useful feedback. More works should be done to study the impact of the system on students' participation, learning outcome, and critical thinking.

References

- [1] Gokhale, A. A "Collaborative learning enhances critical thinking," 1995.
- [2] Palloff, R and K. Pratt, "Collaborating online: Learning together in community," 2010.
- [3] Junus, K., L. Sadita, and H. Suhartanto. Social, cognitive, teaching, and metacognitive presence in general and focus group discussion: Case study in blended e-learning Linear Algebra class. Proceedings of Frontiers in Education Conference (FIE), IEEE, 2014.
- [4] Garrison, D. R., T. Anderson, and W. Archer, "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education," *Internet High. Educ.*, vol. 2, no. 2, pp. 87–105, 1999.
- [5] Akyol, Zehra, and D. Randy Garrison. "Assessing metacognition in an online community of inquiry." *The Internet and Higher Education* 14.3 (2011): 183-190.
- [6] Harasim, L., *Learning theory and online technologies*. 2012.
- [7] Zydney, Janet. "Strategies for creating a community of inquiry through online asynchronous discussions." *Journal of online learning and teaching* 10.1 (2014): 153.
- [8] Garrison, D. R., and J. Ben Arbaugh. "Researching the community of inquiry framework: Review, issues, and future directions." *The Internet and Higher Education* 10.3 (2007): 157-172.