Patterns of Contribution and Levels of Cognitive Engagement in an Asynchronous Text-based Collaborative Activity: A Pilot Study among Online Students in the Philippines

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Patterns of Contribution and Levels of Cognitive Engagement in an Asynchronous Text-based Collaborative Activity: A Pilot Study among Online Students in the Philippines

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Abstract

Based on constructivist principles, dialogue engenders further thinking within a learning community. Members are responsible for communicating, defending, proving and justifying, their ideas to the classroom community. Members of online communities and students engaged in Open and Distance e-Learning (ODeL) are, therefore, expected to work together to understand and formulate an information need through the help of shared representations, seek the needed information in a cyclical process of searching, retrieving and sharing, and put the found information to use. To learn more about these claims, a pilot study was conducted among 48 undergraduate students of an introductory programming course at an open university in the Philippines. A question-and-answer platform (Piazza®) was used to facilitate communication and collaboration among students in the online learning community. The results of the content analysis of the discussions showed that different patterns in knowledge contribution influenced students' cognitive engagement.

Keywords: Cognitive Engagement, Online Collaboration, Patterns of Contribution, Text-based Communication

Introduction

Online discussion boards have provided a "middle space" between online and traditional classrooms settings for students to engage with others in synchronous and asynchronous ways (Agosto, Copeland & Zach, 2013). As part of online communities,

members are expected to "work together to understand and formulate an information need through the help of shared representations; seek the needed information cyclical process of searching, retrieving and sharing; and put the found information to use" (Karunakaran, Reddy & Spence 2013).   Thus, members of the community need to engage in active and continuous interaction and exchange of thoughts with their peers to create a synthesis of the group ideas. McConnell (2000) argues that online discussion boards allow learners to have more freedom in exchanging ideas, opinions, facts, experiences and expectations. In alignment with this, Suthers (2006) claimed that in such online spaces learners can develop a culture of learning wherein participatory and inter-subjective meaning making are promoted beyond time and space. Similarly, So (2008) argued that the asynchronous nature of online collaborative discussions promotes creative thinking, reflective writing and critical reasoning. However, unexpectedly, several studies on cognitive engagement in virtual environments have found the opposite to be true and that only a relative few students were able to demonstrate higher order thinking. (Asif, Vertejee & Lalani, 2015; Casimiro, 2016; Chou, 2002; Guan, Tsai & Hwang, 2006; Perkins & Murphy,2006; Shukor, Harum & Tasir, 2011; Shukor, Tasir, Van der Meijdenb & Harun, 2014; Zhu, 2006).

Based on subsequent findings from empirical case studies, Zhu (2006) and Casimiro (2016) believe that it is possible to engage students at higher levels of cognitive engagement in online settings. Casimiro (2016) proposes that sociability is crucial in supporting discourse and leads to knowledge construction. However, Zhu (2006) says that it is not clear whether socializing has any influence on cognitive engagement in an online discussion. He points out that learning design and facilitation are key in cognitive engagement. Finally, Guan, Tsai and Hwang (2006) claim that cognitive engagement is dependent on the quality of discussion, influenced by the characteristics of the participants and discussion topics, the interactions between the participants, the purpose, design and organization of the discussion forums, and not least the moderators' coordination. Previous studies have focused exclusively on measuring the cognitive levels of engagement among students; however, there has not yet been a study that has explored how these levels of engagement come about. This study attempts, therefore, to answer this question by examining internal and external factors proved to have influenced cognitive engagement in online discussions.

Research Design

The University of the Philippines Open University (UPOU) was selected as it provided the several logistical advantages. First, computer-mediated communication is used as a medium for discussion in all of its courses: this makes it possible to observe the full impact of distance in online interactions. Second, the use of English as the main medium of discourse among students and instructors, which decreases the probability of facing problems with students' foreign language anxiety. Finally, the short one hour time difference between Japan (GTM+9) and the Philippines (GMT+8) enabled the researchers to arrange interviews and follow-up sessions with the participants and instructors. The participants considered for the study were students enrolled in a programming course in the University of the Philippines

Open University (UPOU). They were male and female online students who ranged in age from 18 to 50 years old. Students were physically separated from each other and did not meet face-to-face with their teachers in a physical classroom. They undertook guided independent study of carefully selected as well as specially designed learning materials in various media such as print, video, and multimedia.

In the study, eight teams of five to six members were asked to collaboratively answer three semi-structured questions based on course readings. Students were required to first share their individual answers, then discuss them within their teams and finally to come up with a group wrap-up report. Piazza®, an online Question and Answer (Q&A) platform, was chosen as the online venue of these group discussions. Messages posted in the online platform were coded based on the cognitive engagement categories of Van der Meijden (2005). Messages were considered as the unit of analysis as the meaning of each message can be clearly identified and categorized into high (H) or low (L). Qualitative analysis software (QDA Miner 5) was used to in the process of coding and clustering and analyzing the messages.

Results

Content Analysis Results

A total of 428 postings were coded. Data from the content analysis revealed that 44% of the total postings were coded as *affective* and *regulative*; 33% as *high-level of cognitive engagement* and 23% as *low-level of cognitive engagement*. Further analyses revealed that the majority of the messages at the *low level of cognitive engagement* only provided information without elaboration (8.40%), evaluated, summarized or concluded the content (5.40%), and accepted contribution of another participant without elaboration (4.20%). *High-levels of cognitive engagement*, most messages answered a question with elaboration (17.10%), provided examples related to/based on a previous answer or idea (7.90%), and accepted contribution of another participant with elaboration (5.40%). Messages that asked questions that require further explanation, provided information, an idea or thought with elaboration and rejected another participant' opinion with further elaboration accounted for less than 1% of the total number of messages. Researchers then looked into the factors that influenced cognitive engagement among students which led to the finding of three patterns of contribution.

Patterns of Contribution

The following patterns of contribution of knowledge were found and labeled as individualistic, leader-centric, and democratic to reflect their characteristics:
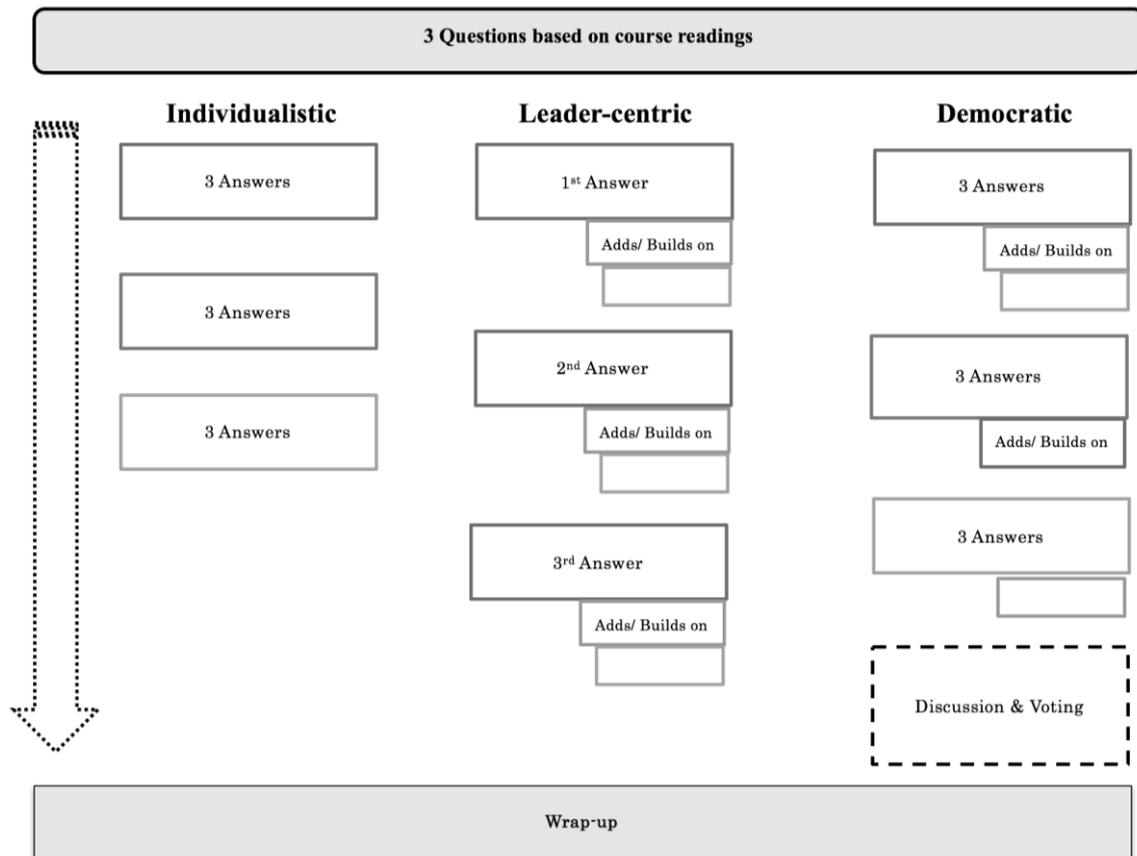

Figure 1. Patterns of Knowledge Contribution.

Individualistic Pattern. In this pattern little interaction was observed among team members. Each member merely posted their own answers and opinions corresponding to each question without discussion with their counterparts. Before the end of the discussion period, one or two members of the team gathered all team members' answers, edited them and posted the final group answer in the forum. The results of the content analysis of this pattern showed that the majority of the messages were categorized as *answering with elaboration* (*CHG 2) which included an example that supported the main idea (*CHG2 EXPL). Messages which asked questions that required further explanation (*CHV2) and messages that accepted contribution of another participant with elaboration (*ACCEPT+) came only from the students who wrapped up the group's opinions. Messages that rejected or contradicted members' opinions with elaboration (*REJECT+) were not to be found.

Leader-centric Pattern. In this pattern, one of the team members took on the leadership role. This student initiated the discussion by posting the questions one by one. First, he/she posted Question 1 and shared his/her answer to be discussed with the whole team. After each member provided their points of views, they moved on to the second question and the third question following exactly the same procedure. This pattern looked well-organized and involved more participation and interaction among team members compared to the individualistic pattern. Nevertheless, the results of the content analysis showed that the majority of the members tended to either accept the contribution of the leader without questioning or contribute with further information to back up the leader's ideas. In contrast to the individualistic pattern, there were fewer messages in the category of answering with elaboration (*CHG2), but more messages that provided examples which supported an idea (*CHG2 EXPL) and those that accepted contribution of another participant with elaboration (*ACCEPT+). The number of messages which asked questions that required explanation (*CHV2) and those that showed disagreement and requested further explanation (*REJECT+) remained very low and were posted mainly by the team leader.

Democratic Pattern. This pattern shared some characteristics of the first and second patterns. First, one team member posted their answers and ideas corresponding to the three questions. The other team members either commented or build on the first student's ideas. After that, another team member posted his/her three answers or ideas and the rest of the team either added or build on the second student's answers. The rest of the team members followed a similar pattern. However, towards the end of the activity, all team members discussed and the voted for the best answers. This was something that was not observed in the individualistic and leader-centric pattern. After the whole team discussed and chose their final answers, one of the members wrapped-up the discussion and edited the team's wrap-up report. The content analysis of the team which followed this pattern shared some similarities with the individualistic and leader-centric pattern. Most students posted messages that belonged to categories *Answering with elaboration* (*CHG2) and provided an example to back a previous answer/idea (*GHG2 EXPL). However, in contrast to the leader-centric pattern, the number of messages in the category of *Accepting contribution of another participant with elaboration* (*ACCEPT+) was smaller, and messages in the category of *Not accepting contribution of another participant with elaboration* (*REJECT+) came from more than two team members.

Conclusions

While previous studies mentioned in the literature review focused on measuring the cognitive levels of engagement among students, this study focused on exploring how these levels of engagement came about. Based on the overall results of the content analysis, messages coded as high level of cognitive engagement were significantly less than those reflecting low levels of cognitive engagement. However, the design of the activity (three semi-structured questions based on course readings), the dynamic that each team took to complete the task, the interaction among team members and the affordance of the online platform triggered three patterns of contribution which created an impact on students' level of

cognitive engagement. The individualistic pattern showed mainly messages coded as *answering with elaboration* (*CHG2) and adding an example that supported the main idea (*CHG2 EXPL). Most members simply posted their ideas without committing to the final group's wrap-up report. As for the leader-centric pattern, most messages fell under the categories of *answering with elaboration* (*CHG2) which included an example that supported the main idea (*CHG2 EXPL), and *accepting contribution of another participant with elaboration* (*ACCEPT+). One peculiarity found in this pattern was that the majority of members built their ideas on the leader's idea. Finally, the democratic pattern showed a wider number of messages at high level of cognitive engagement. In this pattern messages fell under *answering with elaboration* (*CHG2), providing an example to back a previous answer/idea (*GHG2 EXPL), *accepting contribution of another participant with elaboration* (*ACCEPT+) and *not accepting contribution of another participant with elaboration* (*REJECT+).

The next phase of this research aims at determining factors that could produce or replicate these desirable patterns. It is also of interest to see how other online platforms can trigger different communication patterns that can also bring about high levels of engagement.

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