

Tool mediation and learner engagement: an Activity Theory perspective

Dilani S. P. Gedera

Waikato Institute of Technology

Integration of educational technologies in teaching and learning has changed the nature of face-to-face learning. Educational technologies that include LMSs generally offer powerful tools that can be used in enhancing teaching and learning experiences. However, it is not clear to what extent LMSs affect learner engagement in universities. With this focus, this article aims to explore the factors that affected students' engagement with e-learning activities facilitated by Moodle in a blended learning course in a university in New Zealand. With Activity Theory as its research framework, the research methods of this study include individual interviews, online and face-to-face observation of activities and analysis of other relevant documents. This article includes some of the findings of the research and a discussion on how the university learning management system— Moodle and other tools affected students' active participation in learning activities in this course. The article also offers some pedagogical strategies that can be of use to teachers and instructional designers when designing online courses.

Keywords: learner engagement, educational technologies, blended learning, Activity Theory

Introduction

Integration of educational technologies in teaching and learning has changed the nature of face-to-face learning. Many universities and institutions have been incorporating components of e-learning into their programmes (Kim & Bonk, 2006) with the intention of extending on existing modes of course delivery so that students have greater flexibility in choosing learning options. Past studies suggest that e-learning enhances positive outcomes and students' learning experiences (Laurillard, 2004; Walsh, et al., 2012) if it is carefully designed (Rosenberg, 2007).

Some of these educational technologies include Learning Management Systems (LMS) such as Moodle, Blackboard, Oncourse, Angel and Sakai. LMSs provide various tools for course administration and delivery and some of these functions include synchronous and asynchronous communication, development and delivery of course contents, assessments and management of students and class (Coates, Richard & Baldwin, 2005). LMSs generally offer powerful tools that can be used in enhancing teaching and learning experiences. However, research also suggests that technology per se does not provide these potential benefits rather the practitioners should consider how educational technologies can be integrated appropriately to engage learners with their learning in order to achieve learning goals (Gedera & Williams, 2013).

According to Coates (2006), the use of LMS as an asynchronous e-learning platform can influence learner engagement; however, there is little research on these influences and the ways in which an LMS affects engagement. Also, it is not clear to what extent LMSs affect learner engagement in universities (Beer, Clark & Jones, 2010). Moreover, research on engagement within learning management systems allows the identification of what hinders learner engagement in these contexts. With this focus, this article aims to explore the factors that affected students' engagement with e-learning activities facilitated by Moodle in a blended learning course in a university in New Zealand. In particular, my study examines how asynchronous educational technologies influence students' active participation in learning activities in this case study.

The overall project from which this article emerges defines online learner engagement as students' active participation in e-learning activities (e.g. discussion forums, virtual classroom and others) in achieving learning goals where students:

- feel a sense of belonging to a learning community;
- use collaborative ways to co-construct knowledge;
- interact with the content and technology; and
- maintain social and academic interactions with the peers and the lecturer.

Research context and research questions

This article is based on one of the three case studies of a larger project conducted in a university in New Zealand. The course observed as a case study was Post Graduate Diploma in Teaching and was offered in semester A of 2012 academic year. The structure of the course included lectures and class presentations and the class hours were from 4pm to 7pm each Tuesday. The components of the course included an online discussion worth 10%, two oral presentations worth 10% (pair work), and three written assignments. These are: Summary, Impact and Questions (30%); Summaries and position paper (20%- individual); and Final report on a self-chosen topic (30%- individual or pair work). For my purposes, I focused on the online discussion component of this course that was supported by Moodle. There was a required text book for this course and a recommended subject-related dictionary. The supplementary readings were provided on a CD-ROM to students at the beginning of the course. There were nine students in the course comprising both local and international students who are or wanted to be teachers. Out of these nine students, five students participated in my research.

The lecturer teaching this course is an experienced academician who has worked in different countries for over 40 years mostly in teaching, teacher education and administration. The lecturer also had a teaching assistant who is a PhD student in the university. The teaching assistant conducted 3 of the lectures and helped with the assessment tasks of the course. Both the lecturer and the teaching assistant were interviewed twice during the semester.

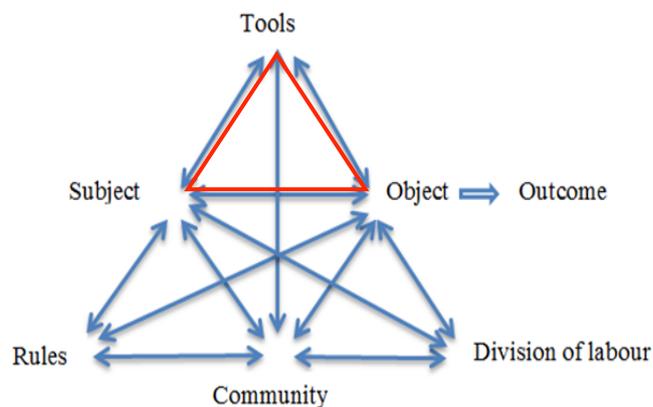


Figure 1: The basic structure of an activity system (adapted from Engeström, 1987)

Research methods and data analysis

This qualitative research was conducted as a case study and data were gathered over a period of one semester. Data were gathered through interviews, observation of online and face-to-face activities and document analysis (course outline, marking guidelines, resources for students i.e. tutorial plans, activity descriptions) throughout the duration of the course.

As the research framework, I used Engeström's (1987) Activity Theory framework. With Activity Theory, scholars are able to examine and document successful and unsuccessful incorporation of educational technologies and activities in particular learning environments. Activity Theory assists scholars to examine how each component of an activity system affect and influence each other. The elements of an activity system include *subject, object, tools, rules, community, division of labour* and *outcome*.

Drawing on the tool mediation principle of Activity Theory (top triangle in Figure 1)—that is human activity is mediated by several tools (Kaptelinin, Activity theory: Implications for human-computer interaction, 1996) this article demonstrates how various tools mediated students' engagement in this course. These tools can be conceptual tools like a mental model, a plan or a strategy; material tools such as teaching materials and resources; psychological tools like a language, or virtual tools such as functions of a website. Tool mediation plays a significant role in how human beings act and interact with the world and in return how their practices influence the way the tools are used.

The online learning activity was recognized as the focus of the data gathering in this research. In analysing data, the relevant units of data were identified and categorized according to Activity theory as a method of typology. In coding and analysing data NVivo was used as a data management tool.

Findings and discussion

My study focused on the Moodle online component in this course. In the online component, students were to read two articles or chapters from the textbook as specified for each week in the course outline. They then had to summarize one of the articles, write an impact statement (how the article impacted on them) and pose two questions about which they would like feedback, answers or comments from their peers. Then they posted the summary, impact statement and the questions in Moodle. As the next step, the students selected two of their peers' questions and responded to them within a given period of time. This activity represented 40% of marks they received (30% for the Summary, Impact statement and Questions (SIQ) and 10% for comments and feedback).

Then the second part of this activity included a face-to-face lead in-class discussion. Each week, on a rotating basis, one or two students were to lead an in-class discussion of ideas discussed in the articles (or book chapters). The presenters were to develop their own questions based on the readings, or read through the SIQ assignment questions that they found particularly interesting and then lead the class discussion. This in-class discussion represented 10% of the marks they received.

Vygotsky introduced the concept of tool mediation—that is when human beings come across an object in the environment—a stimulus, they do not act on it directly, but through the mediation of various tools. These tools are described as “anything that mediates subjects' action upon an object” (Russell, 2002, p. 70). Engeström's (1987) Activity Theory framework emphasizes that human beings not only act on their environment both individually and collectively with the use of tools, but also they learn with tools. These tools can be both external at a primary level—books, computers, networks, and internal at a secondary level—concepts, models, language (Russell, 2002). Humans' social and cultural practices influence the way they use tools and in return their practices are shaped by tools. This was evident in my research where the tools shaped how students participated in learning activities and their practices influenced the way they used the tools.

The analysis demonstrated that the social and cultural tools that mediated students' learning in this blended learning environment included not only the discussion forums, but also the structural design of the courses, the teaching materials as well as the (English) language.

Virtual tool: Discussion forum

Participants in the SIQ Moodle online asynchronous activity of this course highlighted the affordances and constraints of this educational technology. One affordance of Moodle was that with other personal and professional commitments, students had greater flexibility of time, place and pace for learning via Moodle asynchronously (Holmes & Gardner, 2006; Manir, 2009). The analysis showed that non-native English speakers benefitted the most from asynchronicity, giving them more time to reflect on Summary, Impact statement and Questions (SIQs), as they could read their peers' work before they drafted their responses. Students stressed that Moodle was useful because they could have a look at other students' work before they wrote theirs as well as they could compare their work with their peers:

Before I comment on other people's SIQs I will read other people's comments first and that gives me ideas ... I like to see other people's comments first (Olivia, student interview 2).

Yeah, I think it's helpful to do your summary first and jump onto Moodle and have a look and see how someone else has written it... It's quite good for comparison (Lorraine, student interview 1).

Although the non-native English speaking students acknowledged that “*discussing online is useful*”, the online discussions in this case study stopped after week seven. This could be due to the fact that in this case, the discussion forum was used differently. Unlike in a typical online discussion forum where students discuss a topic question or a statement relevant to the subject area, in this case the forum was used as a place for students' to submit their summaries and answer two questions posted by peers (SIQ activity). Therefore, neither dynamism nor dialogues were going on in discussion forums, as the design of the forum was not a threaded whole-class discussion, but individual posts and students just posted answers to two questions which was an end point to discussions.

When David, the lecturer was asked about his experiences of using educational technologies, he explained that he uses computer technology in all his classes, but he also expressed his views on the use of Moodle in his classes as a difficult task:

I got rather naïve with class forum which is a predecessor to Moodle and I'm equally naïve with Moodle because it is not simple... Building up a Moodle website even for simple purposes I want which are interactive are unnecessarily painstaking... There is not enough IT support (David, lecturer interview 1).

Although his views suggested that lecturers need more IT support to use a complicated system like Moodle, the issue of applying pedagogical expertise to LMS design seems more relevant in this case.

Conceptual tool: structural design of the course

Anderson, Rourke, Garrison and Archer (2001) state that “Thoughtful design of learning activities is critical to the attainment of educational outcomes” (p.15). The design and the way courses have been structured are a vital factor that is associated with students’ experiences of learning online. In the context of my study, the design of the online component affected students’ interactions and participation in online discussions.

The online design did not have communication spaces other than one space for personal introductions, which was used by only four student participants at the beginning of the course. Although there was also a synchronous chat icon, students never used it. There were no spaces for asynchronous communication, or a Q&A space for students to clarify issues; however, the lecturer used email as a method of communication, which he thought was more personal and less complicated. The lecturer’s (David’s) preference to send feedback, information and lecture notes via email rather than via Moodle demonstrated his limited knowledge about a range of Moodle features, including the email subscription as well as one-to-one communication functions on Moodle. This was evident in his comment:

I prefer to send them email feedback and other information. I might send them a note saying “here is some extra reading”. I prefer to do that by email because I think that the students would look at Moodle site when they have to do the SIQs, but they are going to get their email and if they want feedback it’s easy for them to get that directly rather than they have to take action like getting into Moodle and say “has my feedback come in yet”? I’m using my email all the time. I find using Moodle rebarbative. (David, lecturer interview 2).

The evidence points to his lack of pedagogical understanding about the learning needs of his students, coupled with his limited knowledge of how to use Moodle to leverage those needs, adversely affected students’ participation.

Not only the design of the online course, but also the design of the online activities is vital in online courses. In particular, the design of online activities can affect students’ learning and community building (Dennen, 2005). This was reflected in the online SIQ activity (where students posted their summary, impact statement and questions they needed feedback on), as students did not feel that they were engaged in a discussion. Melissa compared online and face-to-face activities and commented that in the in-class discussions they could ask for clarifications while they were listening to other people, but their online discussions were not really discussions. In SIQ online activity they just wrote answers to questions to fulfil the requirement for the grade.

I feel more engaged in the face-to-face ones...listening to everyone else’s ideas. You think ‘oh that’s a good idea’ and then you keep asking for clarifications, but on the SIQs... it’s just itself really. You just write it down; you have your 2 questions. I only do that to fulfil one of the requirements for the grade (Melissa, student interview 2).

The students’ lack of engagement with this activity could be related to the design of the course. The lecturer’s use of individual forums where each student posted summaries, impact statement and questions instead of threaded, whole-class discussion forums did not facilitate discussions or interactions among students as a group. The lecturer’s comment, “*the format that I do, works. Since it works I think I have been doing it for a number of years*” and “*an alternative would have been as you said to have as a whole class*” demonstrated his limited technological, pedagogical knowledge (TPK) in designing this online learning activity (Koehler & Mishra, 2009). David’s (lecturer) low TPK perhaps led to negative perceptions about Moodle and reflected in the way he

designed and delivered the online component of his course. Overall, the analysis suggested that because of David's (lecturer) limited knowledge about the features of Moodle, and the apparent mismatch between what he believes in students' best learning interests compared with students' online behaviours, the online tasks appeared to frustrate rather than help his learners.

Material tools: resources and materials

The material tools that are used in delivering content knowledge can affect the way students learn. For example, using PowerPoint slides solely in the course delivery can make students bored and uninterested in lessons.

Both local and international students generally felt that the textbook was hard to understand:

That textbook is too much. I don't like that Brown's text book. I just can't get the gist of it. You have to read over and over again. Some of the articles in the CD he gave us, some of them are ok to read. I could understand them, but Brown is hard. The textbook is not easy to understand. (Melissa, student interview 2).

A number of students also felt that David presented too many PowerPoint slides in one lecture. They believed that other methods could be incorporated:

Well I would say in terms of technology, I'm finally sick of PowerPoint. There must be other ways to do it. That's more on lecture presentation I suppose. (Ken, student interview 2).

And the PowerPoint slides are just too much...40 over slides yesterday. And how it's been designed like it's the same sort of fashion from a text book and it's just put down in there, but then he explains what these mean, still you know it's from the text book. Death by PowerPoint that's what they call it. (Melissa, student interview 2).

The students comments "*sick of PowerPoint*" (Ken, student) and "*death by PowerPoint*" (Melissa, student) indicated their expectation of having a range of course delivery mechanisms. This is consistent with Koehler and Mishra's (2009) views on teachers' technological content knowledge (TCK) that is, delivering content (subject matter) in an effective manner using appropriate technological tools enhances good pedagogy. Therefore, it becomes significant for the teachers to have an understanding of other technological tools that can be used to effectively deliver content.

Psychological tool: language

Learning is mediated by cultural tools that include language (Russell, 2002). Language as a cultural as well as a psychological tool mediates and thus affects the way human beings learn. Human learning is thus shaped by the interactions that are mediated by the physical and psychological tools of the culture. Language was especially relevant as a factor in this case study. Most non-native English speakers' participation in activities was limited because they grappled with the academic language requirements of the content.

David (lecturer) was aware of students' difficulties and the level of their English language competency and mentioned that "*some of the students struggled with the language*". Olivia was one of these students for whom English was a second language. She seemed to have problems with her writing, listening, speaking and reading skills. She described some of her difficulties and how she felt about it in this course.

It's quite hard for me because my English level is not enough to do this course. And also the textbook is hard to read and understand. Every time I do the SIQ, I spend one day to read and write. It's just like a nightmare. I find it very hard to get the points which one I need to write and all (Olivia, student interview 2).

In Olivia's case, she was frustrated when she could not understand the content and it greatly affected her participation in activities in this course. Her comment, "*This course actually made me lose my confidence*" showed how deeply she was affected. Language as a psychological tool limited her active participation in learning activities in this case. Because of the difficulties she faced in the course she was neither satisfied with the course nor did she achieve her objectives.

Generally, the non-native speakers in this case study were unable to express their ideas adequately both online

and face-to-face. However, they felt slightly better in the online component, as they had more time to read other students' work before forming their answers. In the face-to-face context when the students were asked questions, they found it hard to respond immediately, as they needed more time to think in their own language and then translate it into English.

In front of this class in this university, I'm very worried and nervous. It's because of my English... I don't have enough words (Nicky, student interview 2).

SIQ in Moodle, I felt better. In fact I can have more time to answer. Only I have to spend more time and I felt that it's okay. When I do lead in-class discussions sometimes I have the idea in my first language, but I can't immediately translate it into English (Nicky, student interview 2).

The analysis also revealed that it was native speakers who asked almost all of the questions in the face-to-face classes. The non-native speakers' feeling of nervousness and anxiety distinctly affected their participation in learning activities. This also created an imbalance in face-to-face discussions when non-native speakers were paired with native speakers.

The in-class oral presentations conducted by Nicky (non-native speaker) and Melissa (native speaker) at the beginning of the semester and the presentation by Nicky (non-native speaker) and Ken (native speaker) at the end of the semester were apparent examples of imbalanced participation in activities in this case. Consistent with the findings of Freiermuth's (2001) study, when native speakers were paired with non-native speakers, because of their different language competencies, the native speakers tended to dominate the discussion. The literature suggests that when native speakers and non-native speakers are mixed in learning activities, opportunities for non-native speakers are limited (Freiermuth, 2001). Warschauer (1996) accentuate that, in particular, Asian students do not feel comfortable in participating in oral discussions due to their previous experiences. This could be because in many Asian countries, it is uncommon to have oral discussions as part of learning activities. The non-native speakers in the case of my research were also mostly from Asian countries.

Conclusion

Drawing on the tool mediation principle of Activity Theory, this article examined how the learning management system—Moodle and other tools influenced students' active participation in learning activities in this course. In summary, the virtual tools (Moodle forum discussions), conceptual tools (strategies used in the Moodle design), material tools (PowerPoint slides), and (English) language as a psychological tool affected students' active participation in learning activities. Within the participant-tool-object relationship (in Activity Theory framework), the tools mediated and shaped the way students participated in learning activities. It was also evident that the participants' (students' and lecturers') experience, knowledge and skills affected the way they used these tools.

Based on the findings of this research, instructors who teach online or blended learning courses can consider designing forums as a whole-class threaded discussion where students can have a dialogue. Being able to have a reciprocal discussion can facilitate interactions and closer connections among students. Having communication spaces such as private and public Q&A, sharing spaces can also enhance student interaction and participation. In terms of teachers' Technological Pedagogical Knowledge (TPK), it would be beneficial to have regular training sessions in institutions for the staff to upskill themselves in educational technologies as well as to understand the pedagogical purposes of using educational technologies in their courses. This will aid them in integrating appropriate technologies effectively in their courses which in return will benefit students. Most importantly, implementing e-learning activities in blended learning contexts, it is crucial to make sure that the linkage between the objectives of the virtual and physical classes are well established.

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