

Using Discussion Forums to Mediate Learning in Higher Education: A Literature Review through an Activity Theory Lens

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Abstract

The diffusion of Information and Communication Technologies (ICTs) in education has brought along impediments in the education system where higher institutions of learning are not exempted. The adoption of ICT tools to mediate learning that is not informed by pedagogical and learning theory might not produce the desired results in any given context. Mediating learning with discussion forums is perceived to be one of the simplest ways to use ICTs in education, but the outcomes are not always rewarding. Indisputably, a discussion forum has a potential to transform learning, but contextual factors might influence the effectiveness of a tool, especially when the selection of the tool is not informed by underlying theoretical principles of learning.

This paper demonstrates how Activity Theory is applied as a lens to describe, substantiate and understand how discussion forums have been used in other Higher Education contexts, with the intent to evaluate and understand how mediating learning with an ICT tool - discussion forums in this case - should be based on underlying theoretical principles of learning, taking into account contextual factors that might influence the use of a tool. It transpires from the three case studies analysed in this paper that instructors need guidance to effectively use and monitor discussion forums, or ICT tools in general, hence implying how underlying theoretical principles of learning could be a determining factor to the success of a tool.

Key words: discussion forum, mediation, learning, Activity Theory

1. Introduction

Ineffective use of ICT tools in mediating learning remains a challenge in Higher Education. As instructors in Higher Education are impressed by the use of technology in education, they have developed a culture of adopting any ICT tool at hand and striving to implement it to facilitate learning without consideration of theoretical principles underlying the use of such a tool to effectively mediate learning. However, it remains questionable whether effective learning really takes place when instructors use any available ICT tool, by any means possible, to mediate learning, without a theoretical base. Sharing the same sentiment is Ravenscroft who states that one of the key challenges in e-learning is "how to design or develop the social conditions and communities - in online or blended situations - that give rise to, or accommodate, the dialogue models and discourse practices that are desired in e-learning contexts" (2003, p. 13). A rationale for the ICT tool should arise from underlying assumptions about learning.

Related to the challenge highlighted above is the tendency to adopt any ICT tool in any given context, especially in developing contexts, where many African institutions of higher learning belong. Nevertheless, an ICT tool that has done wonders in Sweden, as an example, might not produce the same results when implemented in an African context. The selection and design of ICT tools to mediate learning should be informed by pedagogical and learning theory so that instructors select and design ICT tools relevant for the context in which they are to be used. Understanding the complexity of how people learn and the conditions under which they learn would guide instructors to make informed decisions when selecting or designing ICT tools. This view is based on Ravenscroft (2003) as well as Mayes and De Freitas's (2004) common notion that implementation or innovation of e-learning tools should be based on underlying principles of learning theory.

Using discussion forums is perceived as one of the simplest ways to mediate learning with ICT tools, which results in instructors adopting discussion forums in their own contexts without considering many other factors involved for the tool to work effectively, or to meet the desired goals (Gunawardena, Plass and Salisbury 2001; Guzdial and Turns 2000). An online discussion forum can be explained in simple

terms as “a virtual learning environment in which students are likely to learn as much from one another as from course materials or lectures” (Thomas 2002, p. 352). The postgraduate course in ICTs in Education offered by the Centre for Educational Technology at the University of Cape Town opened my eyes to this issue of concern in educational ICTs. As an instructor, I have experienced and witnessed ineffective use of the discussion forum, but did not know how to rectify the matter. It is on this basis that this major research question came to my mind: How can discussion forums be used effectively to mediate learning in Higher Education? Surely, discussion forums have a potential to “transform and develop cognition, identities and communities” (Ravenscroft 2003, p.13), which translates into Ravenscroft’s (2003) new definition of learning, but it is questionable whether we use discussion forums effectively in the Higher Education context to facilitate learning. With reference to Shana (2009), it is insufficient to simply make a discussion forum available, as it might not be used effectively.

This paper deals with the study of an activity system that is defined as “a group of people, or a community, who share a common object (or problem space) and who use tools to act on that object, transforming it” (Hardman 2005, p. 260), in different settings. The paper begins by explaining the concept of learning, leading to a discussion on the Zone of Proximal Development (ZPD). An overview of Activity Theory is then provided, focusing on key elements of an activity system. Mwanza’s (2001) eight-step-model is used as a base to interpret various elements of an activity triangular representation. A brief explanation of how Activity Theory is applied in the study is provided in the methodology section, and this is done through the review of three case studies where discussion forums have been used as a mediating tool in the Higher Education context. The findings are then critically evaluated to establish the value of the research question and relevance to own context.

2. Defining learning

It would be wise to open this section with a direct definition of learning in light of learning theories, but finding a proper definition of learning has become challenging due to global trends in education and the evolution of learning theories. What constitutes learning then? Is it the cognitive constructivism theory that emphasises the learner-centred approach and the learning process that is activity oriented (Ravenscroft 2003)? What about the socio-constructivism theory that is rooted in Vygotsky’s (1978) theory of development of higher mental processes? The learning theories hereby illustrated exemplify how all learning theories are significant in shaping learning. They all involve different processes that, when combined, contribute to what constitutes learning. This explains why, as in Ravenscroft’s (2003) view, we should not favour any one theory when introducing new learning technologies.

In addition, emerging learning theories necessitate rethinking of our definition of what learning is, and it is on this basis that Van Oers’s (2008) view of learning as a historically transforming phenomenon can be considered appropriate. Nevertheless, though a changing phenomenon, there are always key factors that characterise learning irrespective of historical period, and these are the fact that learning is always characterised by actions that are performed by people that are learning, and the socio-cultural dimensions of learning (Van Oers 2008). This view of learning is in support of the socio-constructivism theory of learning that is rooted in Vygotsky’s (1978) cultural-historical theory. This partially explains why Activity Theory is the focus of this paper, but it should be noted that Vygotsky’s (1978) theory cannot be viewed in isolation, as nearly all learning theories are interrelated.

Most learning theories regard individual action as the key to understanding how human beings function, including learning, but there is no focus on collective aspects, artefacts, mediation and cultural aspects of human behaviour (Engeström 1999). However, in Vygotsky’s (1978) view, learning is a joint-mediated activity that occurs within a cultural historical environment or context (Barab, Evans and Baek 2004, Engeström 1999, Karrassavidis 2009, Wink and Putney 2002).

Among Vygotsky's contributions to learning theory is the Zone of Proximal Development (ZPD) which is intertwined with learning as mediated activity. In Vygotsky's (1978) view, learning and development is an interrelated, dynamic process where learning takes place through the use of language and relations with others, but then effective learning takes place when learners are given guidance by someone more advanced, e.g. another student, parent or teacher (Wink and Putney 2002). Within this process of learning, ZPD is then explained as the distance between actual developmental level and the level of potential development (Wink and Putney 2002). In highlighting the importance of ZPD, Wink and Putney state that "it is only through continual guidance within the zone of proximal development that learners grasp understanding that is more complex and move on to share it with others" (2002, p. 87). Discussion forum as a mediating tool has a potential to provide opportunities optimal for learning and development in terms of ZPD, e.g. continual guidance in the learning process and a chance to share ideas with others.

To sum up, there is some consensus in educational theory that learning should be understood in terms of these key factors: as an activity from the associationist perspective, as achieving understanding from the cognitive perspective, and as social practice from the situative point of view (Mayes and De Freitas 2004). It is my understanding that these are some of the key features that a mediating tool should have in order to effectively facilitate learning. It is on this basis that Ravenscroft redefines learning as "the transformation and development of cognition, identities and communities" (2003, p.13). It is obvious that this definition emerges from different learning theories, because all of them play an important role in the learning process and shape what learning entails.

3. Discussion forums

In light of the social nature of learning that takes account of the constructivist theory of learning, discussion forums could be suitable tools to mediate learning. Discussion forums promote collaborative learning and sharing of information. In a study conducted by Thomas (2002), it was observed that about half of the messages that were posted to the discussion forum presented in this study showed evidence of high level thinking skills. This provides some form of evidence that if used effectively, discussion forums have a potential to mediate learning. Referring to Thomas (2002), technology mediated learning is more than knowledge transfer, as it provides means for construction of high level knowledge structures.

Discussion forums have some other benefits in the learning process. They promote interaction and discussion among students, enabling them to share ideas and critically reflect on the ideas of other students (Yukselturk 2010). Sharing experiences is one of the principles of the cognitive approach to learning. Discussion forums also allow students to interact asynchronously, i.e. using the same forum but at different times that suit individual students (Yukselturk 2010). The social nature of learning emphasised by different learning theories, e.g. constructivism and situative theories (Ravenscroft 2003), can also be effectively accommodated in discussion forums that facilitate social interaction through online collaborative learning. Collaborative learning supports Vygotsky's (1978) view that learning is a social activity, and people learn better by interacting with one another.

As it was mentioned earlier in this paper, there is a tendency to use discussion forums simply because they are perceived easy to use (Gunawardena et al. 2001 and Guzdial and Turns 2000). Discussion forums should not be used in Higher Education for the sake of using ICTs in education; they should be used based on relevant learning theories. In view of Gunawardena et al., talking from experience of an online discussion forum that did not serve its purpose as there were no clear goals and objectives for participation, "the decision to include an online discussion group must be considered carefully, taking into account characteristics of students, the structure of the content, and the amount of dialogue and collaboration necessary for the learning process" (2001, p. 42). Collaboration is therefore one of the key factors in the process of mediating learning with discussion forums. Keller's (2010) motivation theory is also of high consideration in using discussion forums. Keller (2010) highlights some strategies that

instructors using discussion forums should consider, such as posing challenging questions and problems to be solved, providing relevant topics that increase motivation, and providing feedback, as it contributes to motivation and satisfaction in return.

In terms of the socio-constructivism theory of learning, with reference to Vygotsky's (1978) socio-cultural theory that focuses on instructional dialogue but of a "scaffolding" nature, Ravenscroft highlights one of the key principles of this theory, the fact that "learning occurs through internalizing dialogical activity and its signification systems that occur in the social" (2003, p.9). It therefore makes sense to state that discussion forums are building blocks to the process of "internalizing dialogical activity". They pave the way by creating an environment for the dialogue and arguments to be created, which then need to be internalised for the development of high level thinking skills. However, as Ravenscroft (2003) indicates, conceptualisation of a broader socio-cultural environment in which the dialogue is created is of importance, and this is what leads us to Activity Theory.

4. Overview of Activity Theory

The theoretical framework adopted in this paper is informed by Activity Theory. As stipulated by Kaptelinin, Nardi and Macaulay, "Activity Theory provides a broad theoretical framework for describing the structure, development, and context of human activity" (1999, p. 28). Understanding of context is of importance when ICT tools are innovated, or when change is needed at an institution, because interaction with the tool involves many other factors. Activity Theory therefore enables educators to concentrate on an institution as a whole when planning to mediate learning with new ICT tools. It can be used as a lens to analyse the activity system of an institution when change is needed to transform practices at the institution or organisation, e.g. when integrating ICTs in education (Karasavvidis 2009). Sharing the same sentiment is Lim (2002), highlighting the fact that mediation of learning with ICT is not an individual goal-directed activity; it is part of a larger context, the larger activity system. The concepts "internalisation" and "externalisation" of activities are of utmost importance in understanding the unit of analysis in Activity Theory. As explained by Kaptelinin et al., "internal activities cannot be understood if they are analysed separately, in isolation from external activities, because it is the constant transformation between external and internal that is the very basis of human cognition and activity" (1999, p. 29).

This is an important point of consideration, because it is common habit that when an instructor, as an example, decides to use a certain ICT tool to mediate learning at an institution, no consideration is given to the fact that such a decision should be a collective decision involving many other key players at the institution. In Activity Theory terms we only think of the subjects: the educator implementing change and the students using the tool. No consideration is given to the rules governing the use of the tool, other community members or the division of labour among community members, and sometimes there is not even a clear goal or motive for using a mediating tool. Therefore, as ICT-based innovations are aimed at transforming collective practice, several dimensions need to be conceptualised in the process of innovation (Karasavvidis 2009), and this has implications on instructional design and learning.

Activity Theory originates from the Russian school of cultural psychology, specifically from the work of Vygotsky, Leontiev and Luria (Rasmussen and Ludvigsen 2009). The original triangular model of the activity system is illustrated in Figure 1 below, with only three key elements: tool, subject and object. The analysis of the activity system was object-oriented and cultural tools and signs were used for mediation (Engeström 1999). Every activity is object oriented, and this is what differentiates one activity from another (Rasmussen and Ludvigsen 2009). According to Rasmussen and Ludvigsen (2009), the object of an activity was also Leontiev's (1978) main focus in the analysis of an activity system.

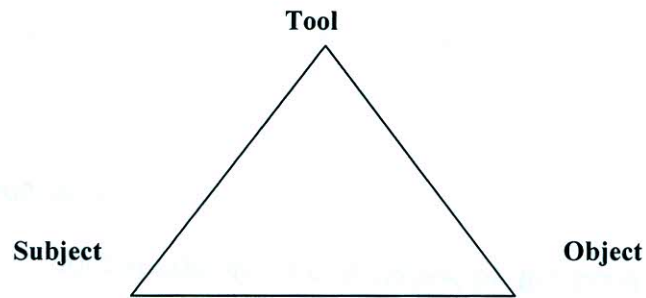


Figure 1: Basic Activity Theory triad

The basic triad model of an activity system was later developed by Engeström (1987). Of particular importance in Engeström's (1987) expanded triad model is the addition of other key elements to the activity system reflecting the collective nature of human activity where distribution of labour, the community and rules are added (Karrasavvidis 2009 and Lim 2002). The central tenet of Engeström's (1987) extended activity system is that human behaviour is situated in a social environment which influences human actions (Scanlon & Issroff 2005). Actions, Scanlon and Issroff (2005) continue, are mediated by the rules that are set up in the community, and the way labour is divided in the community influences the way human beings act. The final outcome of Engeström's (1987) expanded activity system is illustrated in Figure 2 below. The role of the diagram is to fully understand the concept of a community and its tools, and it outlines important elements of the activity and their relationship (Engeström 1999).

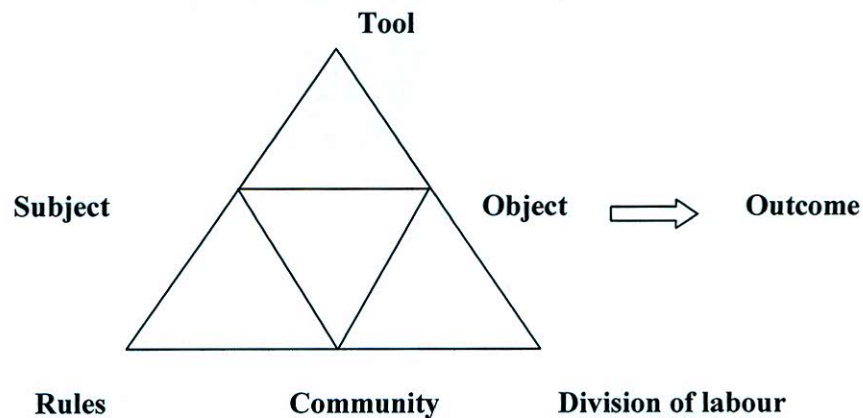


Figure 2: Expanded Activity Theory triad model (Engeström 1987)

The triad model has been integrated with Vygotsky's (1978) socio-cultural theory of learning that highlights the importance of mediation in the learning process. As clearly detailed by Hardman (2005), the original triad model illustrates mediation where the subject acts on the object using a certain tool for mediation. In terms of mediation, Activity Theory facilitates understanding of how a tool should be used, and as per Kaptelinin et al. (1999), this is a crucial point in terms of Activity Theory, as it influences both the internal and external behavioural patterns of people using the tool. Therefore, Kaptelinin et al. stipulate that "tools shape the way human beings interact with reality" (1999, p. 31). Activity Theory provides means to evaluate contextual factors that might influence the use of a certain tool in order to

better understand the social rules of the environment in which the target technological tool is to be integrated (Kaptelinin et al. 1999).

Tools refer both to physical objects as well as psychological tools, and what is important is the fact that they have one *goal*: to influence other people or themselves (Karrasavvidis 2009). In the context of this paper the mediation tool under discussion, discussion forums, can be viewed as a psychological tool as opposed to a physical tool.

The unit of analysis in activity system is the *activity* itself, consisting of the *subject* who can be an individual or a group, an *object* which could be the motive behind the activity, *artefacts*, and *rules* (Kaptelinin et al. 1999). The rules drive relationships in the activity system, while in *division of labour*, labour is divided horizontally among *community members* and vertically among those who are in power (Hardman 2005).

It is also worth noting that the activity system model is dynamic due to continuous interactions of its components, and can therefore change constantly (Hardman 2005 and Lin 2002). Another key element related to change in the activity system is what is referred to as *contradictions* in Activity Theory terms. With reference to Engeström (1999), contradictions are of importance to the theory and arise when external influences cause tension or imbalances in the activity system, and they are the source of development.

5. Methodology

In this section Activity Theory is adopted as a framework to study and describe how discussion forums have been used in Higher Education in different learning environments. The section explores three case studies where discussion forums have been used for teaching and learning in the Higher Education context. These three case studies were selected as they meet the required criteria for this study: the fact that all of them are about using discussion forums as a mediating tool for teaching and learning in the Higher Education context. The first case study explores the use of a discussion forum, the Global module forum, that was set up to identify different levels of participation in the forum, and factors that encourage or discourage student participation (Mason 2010). The second case study involves using a discussion forum World Wide Web to determine the achievement of students (Shana 2009). The third case study focuses on factors that affect participation of students in a discussion forum (Yukselturk 2010). Activity Theory therefore provides a framework for exploring, describing and understanding the experiences of instructors and students who have used discussion forums as mediating tools in different learning environments. Contradictions that arose through interaction with the tool are highlighted.

5.1 Case Study 1: Global module forum

With reference to Mason (2010), an asynchronous forum, Global module, was set up to introduce Marketing students to the forum tool in the university Virtual Learning Environment (VLE), Wolf. The main aim of the forum was to identify different levels of participation in the forum, and factors that encourage or discourage student participation. The task involved posting a brief real life problem related to the course. The forum was to be used in the first two weeks of the course, and 56 students were involved. All the students had previously used Wolf for 18 months, but had not used the discussion forum tool before. As an introduction to the forum, in class the lecturer explained and demonstrated how the forum is used and also gave reasons for the task and its benefits.

As Mason (2010) further explains, the forum tool was designed for students to voluntarily engage actively with a problem and gain in-depth learning via participation, and students were required to ask questions, speculate, find solutions and carry out tasks by thinking about them, discussing and applying concepts. No marks were awarded.

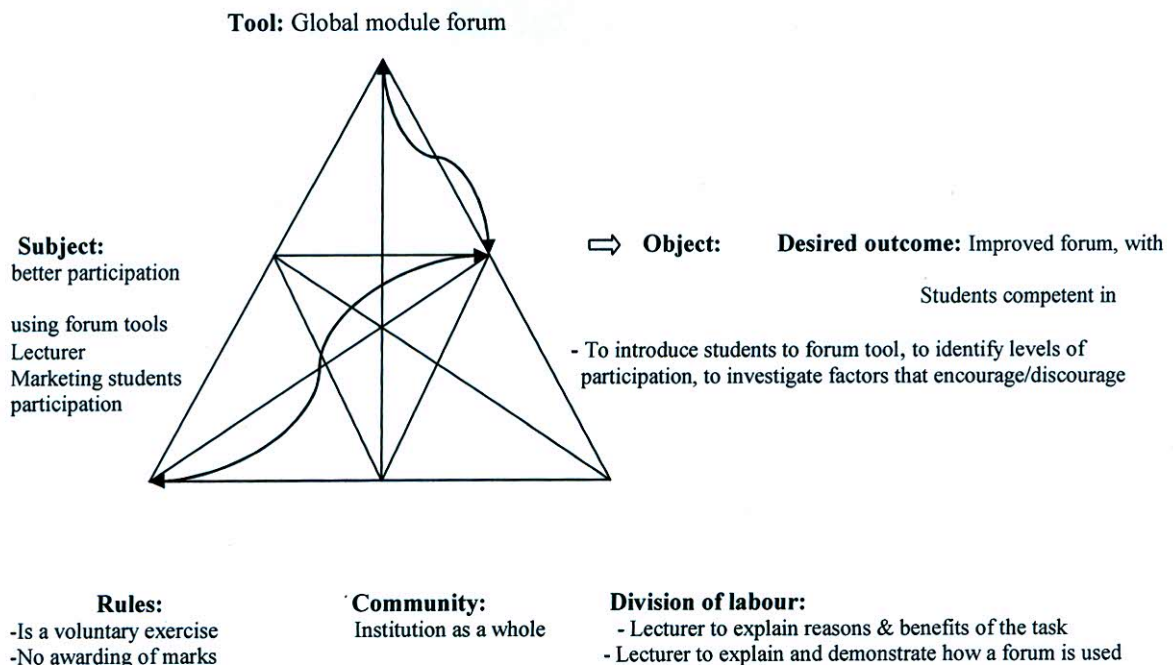
5.1.1 Findings

Despite all the factors that were considered in the design of the forum, only ten of the 56 students (17.9%) participated in the discussion, and each of these ten students posted only once to the forum. An unknown number of students “lurked”, i.e. they simply visited the forum to check what was going on, but did not participate in the discussion. This, according to the lecturer, gave them an opportunity to gain from the task. Nevertheless, the result was generally “unexpected and disappointing” (Mason 2010, p. 261).

From the lecturer’s perspective, there are a number of reasons for low engagement in the forum. As Mason (2010) indicates, firstly, there was a lack of scaffolding to encourage socialisation and interaction among the students, learning content and the tool. Lecturer participation was inadequate in terms of managing the forum, and the postings by the lecturer were insufficient. Furthermore, students’ postings were generally simple; only two older female students posted highly constructed ideas, and students did not apply the new knowledge gained in the process of solving problems; they used common sense. Instructions for the task were also inadequate.

A survey was conducted to investigate the students’ reasons for low participation, and their attitude to the task. As per Mason (2010), from the students’ perspective, the most common reasons for the low participation level were a lack of motivation and a lack of interest, or commitment, due to other problems or responsibilities. Concerning attitude, students indicated that they were generally positive about the forum idea and the task itself. With regards to engagement or non-engagement in the task, some students indicated that they did not participate as they were afraid to give wrong answers as they thought there was a correct answer.

It was concluded that the students understood and appreciated the value of the forum task, but engagement was poor due to infrastructural issues, such as a lack of discussion about the task in class, the task not being integrated with classroom activities, insufficient face-to-face feedback on postings and insufficient help in terms of accessing the site (Mason 2010). This case study is illustrated from the Activity Theory perspective in Figure 3 below. Contradictions are indicated with a curved double arrow connector.



- Forum for 1st 2 weeks only

concepts

- Lecturer to post a real-life problem
- Students to find solutions by asking questions and speculating
- Students to carry out tasks by thinking, discussing & applying

Figure 3: Illustration of Global module forum activity system, with contradictions

Although various components of the activity system were considered in the design of the Global module forum as illustrated in Figure 3 above, participation or engagement in the forum was not successful. This affected the desired outcome of this activity. The loose rules concerning the use of the tool could be regarded as a contradiction, as the students did not feel motivated to participate in the task as a consequence. The period allocated to forum usage was also too brief and resulted in contradictions as students did not have time to familiarise themselves with the tool and the environment. The forum tool itself was also a contradiction as it was a new tool that students had never used before. A combination of all these contradictions diverted the desired outcome.

5.2 Case Study 2: World Wide Web interactive discussion forum

With reference to Shana (2009), a discussion forum, World Wide Web (WWW), was used to determine the achievement of students doing a first year level course in Educational Technology in developing context. Arrangements were made for students to access the forum from anywhere. The study participants were 34 all female students between 18 and 24 years. They were familiar with IT and the Internet, and had been oriented to an electronic learning system. They used English medium, but were allowed to use mother language when it was really a necessity, and a translation service was added to the forum features.

Shana (2009) further explains how the study participants were divided into two groups: the treatment group that was involved in the discussion forum, and the control group that was not involved. The control group used the textbook and other prescribed course materials, while the treatment group used the discussion forum to discuss topics related to the course. In order to encourage student participation, students had to respond to a topic on a weekly basis, which counted for 5% of course participation. The first test (pre-test) was administered to both groups before the discussion forum started. The second and final test (post-test) was given to both groups at the end of the semester, during the 16th week. The forum intervention was purposefully implemented late, after the first test had been written, to give students an opportunity to familiarise themselves with the learning environment and classmates. The forum and its features were introduced to the treatment group before they started. All forum participants - the administrator, students and the instructor - had clear tasks and responsibilities. In order to enhance student participation, students were requested to use discussion data for an assignment task. The instructor guided students critically during the first few weeks of the forum, but started reducing guidance gradually while senior students took over the role of the instructor instead.

5.2.1 Findings

The results indicated that in terms of test scores, there were no significant differences in the pre-test scores between the treatment group and the control group. However, overall test scores indicated that the group that was involved in the discussion forum showed a significant improvement, whereas the control group showed a moderate improvement (Shana 2009).

Based on Mwanza's (2001) eight-step model, the case above can be explained in Activity Theory terms as follows:

The *activity* of interest is the involvement in the World Wide Web discussion forum. The *tool* used to mediate learning is the World Wide Web interactive discussion forum. The *objective* of the activity was to determine the achievement of students. The instructor and the 34 all female students were the *subjects*, as they were the ones actively involved in the forum. The students were divided into two groups: the treatment group and the control group. The *community* in which the activity took place involved the administrator, senior students who were encouraged to join the forum by the instructor to take over the guiding role later, and the whole institution. In terms of *rules* and regulations mediating this activity, the forum participants, the students, were allowed to use their mother language, but only when it was really necessary. Participants were also required to use discussion data for an assignment task.

Concerning *division of labour*, tasks were clearly divided among various members of the activity system. The instructor had to provide discussion topics (information and questions), was responsible for facilitation of the discussion, was required to participate as well, and to monitor the discussion by providing continuous guidance. Students had to read posted messages and reply, ask questions, search for the answers, consult with other students and respond to other students' postings. The administrator was responsible for accepting forum users, controlling the topics, removing threads that were repeated, removing inappropriate material, as well as to supervise the forum activity. Senior students had to assist guiding forum users. The desired *outcome* was to see improvement in terms of student achievement. This case study is further illustrated in Activity Theory terms in Figure 4 below. Contradictions are highlighted.

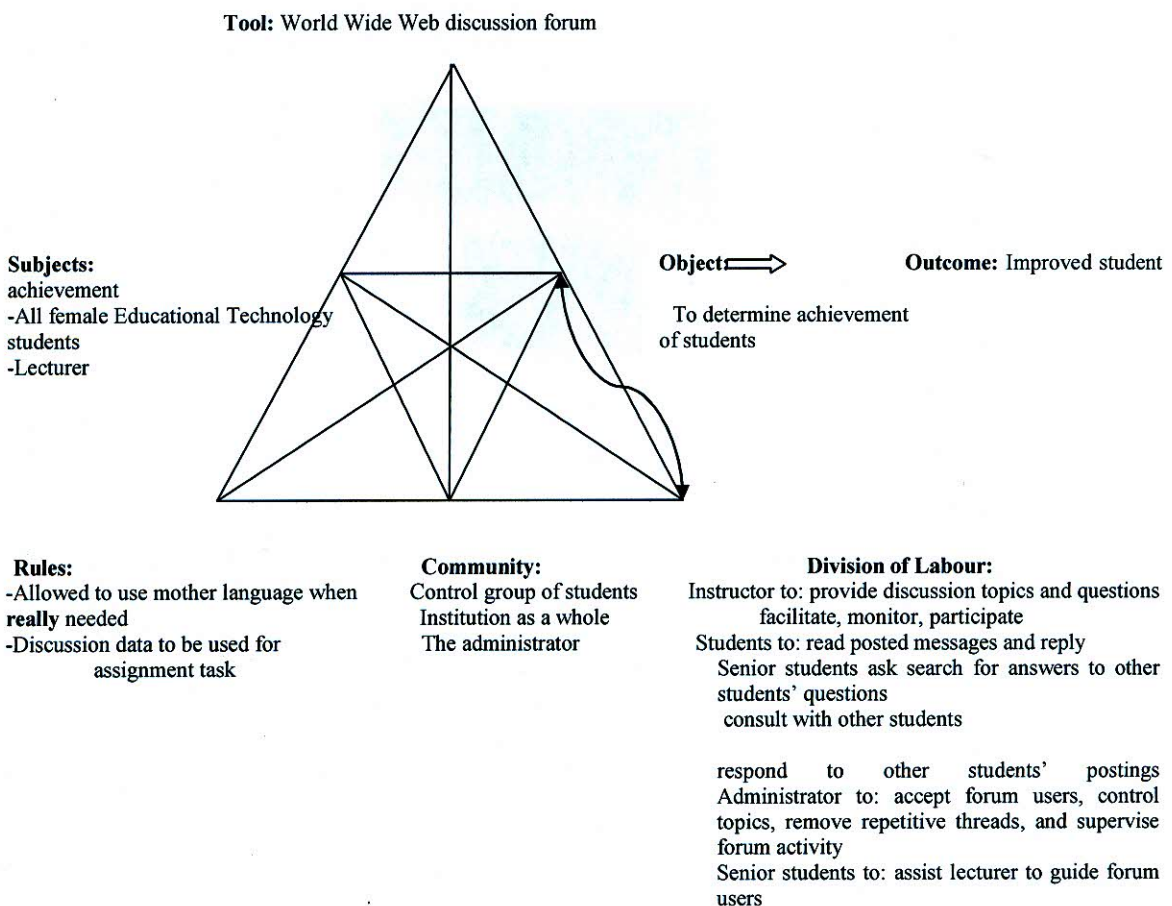


Figure 4: Graphic representation of Case 2 activity system, with contradictions

Contradiction in this activity system arose from division of labour when tasks normally carried out by an instructor were shifted to an administrator and senior students. Overall, this activity was a success as there was a significant improvement among students in the treatment group who used the discussion forum. The desired outcome therefore became a reality.

5.3 Case Study 3: Online course discussion forum

In this study factors that affect participation of students in the discussion forum were analysed for two reasons. The first reason was to investigate the link between demographic factors and the intellectual abilities of participants, as well as categories of students' participation in the forum of an online course. Another purpose was to investigate students' views on a low interaction level in an online course discussion forum (Yukselturk 2010).

As per Yukselturk (2010), the subjects were 196 students registered for a computer course online where students were given online lecture notes, learning activities and visual aids. A face-to-face session for each course was offered at the end of each semester. Male students were more (72.9%) than females (27.1%), with an age range of 19 to 55. The demographic data was collected from application forms during registration. Though more than 60% of the students used the Internet more than 15 hours weekly, only 12.8% had done an online course before. 38.5% of the study participants did not have sufficient information about the course content. Student achievement status was determined through assignments and examination results.

In terms of participation level (Yukselturk 2010), there were three groups of students: *actives*, *moderates* and *inactives*. A total of 838 messages were posted to the forum at the end of the semester, where the average number of messages per student was 4.3. The active students (33.2%) who spent only 14 and less hours per week online posted 5 or more messages, moderate participants (32.7%) posted an average number of messages (4.3), while the inactives (34.7%) who spent 15-30 hours online weekly did not post any message. Among active students, female students were more (45.3%) than males (28.6%), but among moderately active students males were more (37.8%) than females (17%).

5.3.1 Findings

The study revealed that participation level in discussion forum was significantly linked to student achievement, but concerning demographic factors, there was no connection between the age of students and their level of participation in the forum. However, the course outcome was generally disappointing, because 41% of the students failed the course while 26.5% quit the programme after the course (Yukselturk 2010).

Participation in the discussion forum was generally poor (Yukselturk 2010). 34% of the students never posted any message, while 32.7% posted only four or fewer messages. Interviews related to student participation were conducted with six of the students, to analyse factors that affected participation and interaction in the forum.

Yukselturk (2010) further indicates that students reported that they did not have enough interaction in the discussion forum. They also indicated that they had many other responsibilities, different occupations, different backgrounds and previous knowledge levels as well as different ages. These differences affected their participation level. The nature of the programme was another factor. Students felt that

attending the course asynchronously isolated them in learning, and Internet interaction was time consuming. The students also felt that the activities in the discussion forum were insufficient, which made it difficult for them to find common topics for discussion.

In Activity Theory terms this situation resulted in *contradictions*, e.g. when students developed a habit of communicating only with other students whom they knew before joining the programme or those who had a common background. The case study explained here is illustrated in Activity Theory terms in Figure 4 below. Contradictions are highlighted with a curved double arrow connector.

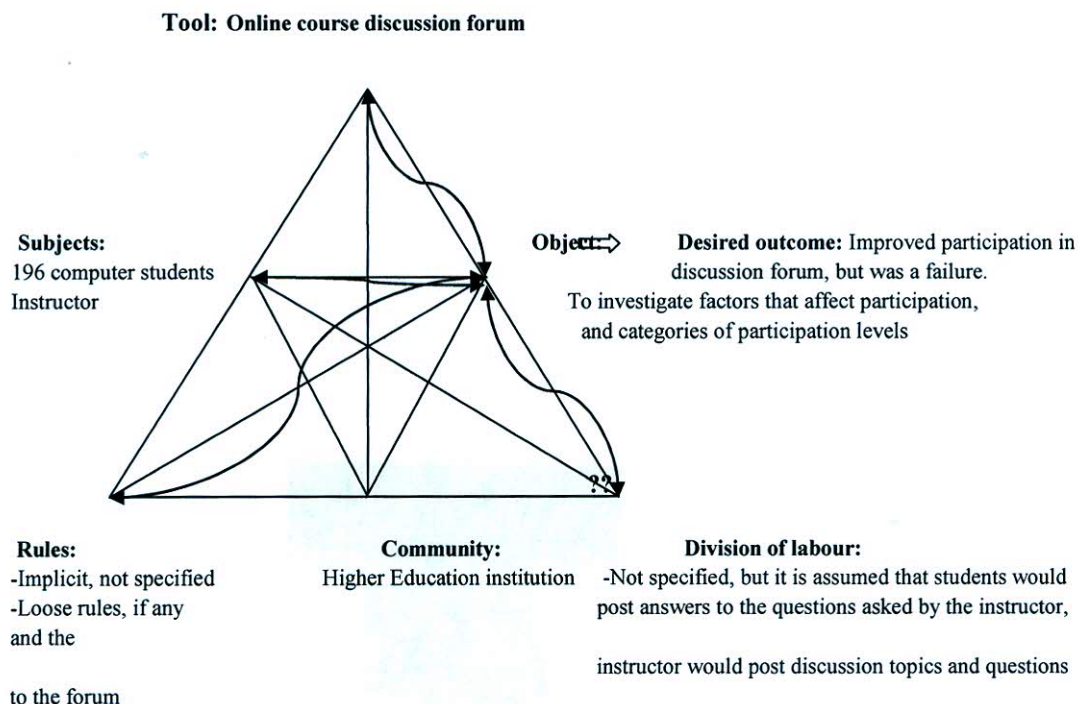


Figure 5: Online course discussion forum activity system with its contradictions

As illustrated in Figure 4, there were no explicit rules set up to guide participants in the process of using this learning mediation tool. Also, though assumed that there was some division of labour, it was not clearly specified, and students were thus unsure of what was expected from them. These are the causes of tension in this activity system. Also, the subjects who did not share the same interests as the majority were from different backgrounds, which was another cause of contradictions in this activity system as participants could not find common topics of interest to discuss. The outcome was much different from the desired goal.

5.4 Interpretation of findings

The analysis of the case studies in this paper supports an important observation made by Kaptelinin (2009, p.30), namely that “tools shape the way human beings interact with reality”. The discussion forums that were used in the three case studies in this paper prove how the design of a tool, the rules governing the use of a tool, the people using a tool and the environment in which the tool is being used all contribute to the success or failure of a tool.

The desired goal was not reached in the first case study where the Global module forum was used, although various components of the activity system were considered in the design of the forum as illustrated in Figure 3. Participation or engagement in the forum was a failure. The loose rules, e.g. the fact that the forum task was voluntary and no marks were to be awarded contributed to a lack of motivation to participate in the task. These were the sources of contradictions. The weakness could be rooted in the fact that there was no reward of any type in this forum. Students therefore did not feel motivated to participate in the forum. It is therefore worth considering Ravenscroft's (2003) view that active participation and engagement can be encouraged by combining behaviouristic and constructionist approaches to learning so that stimulation, motivation and reward are established in an online learning environment.

Scaffolding, which is one of the key tenets of the socio-constructivism theory, also proved to be crucial in the performance of students. This is what was lacking in the third and last case study, where a discussion forum was used in an online course. As students reported, they felt isolated, they did not have enough guidance either from the instructor or other students, and the final result of the course was disappointing. However, a significant improvement was observed in the second case study where sufficient scaffolding was provided through an administrator and senior students. As per Mayes and De Freitas (2004), the scaffolding element should be present in the design of teaching and learning so that the tutor provides guidance. Additionally, these two case studies prove Wink and Putney (2002) correct that "it is only through continual guidance within the zone of proximal development that learners grasp understanding that is more complex and move on to share it with others" (Wink and Putney 2002, p.87) as it was earlier stated in this paper.

The scenario in the third case study is exemplary of how loose rules and division of labour could cause tension in an activity system. A lesson to be learned from this case study is for instructors to set up explicit rules and responsibilities concerning the use of ICT tools. As it stands, nothing prohibited students from taking over the role of the instructor by creating their own small group of interest that deviates from the goals of the activity. This confirms an observation made by Scanlon and Issroff in their studies that "students' and tutors' understanding and expectations about the division of labour and rules of the community have a critical influence on the ways in which learning technologies are used" (2005:437). The issue of the forum participants creating their own discussion group also exemplifies transformation in the activity system. It gives this new community of students an opportunity to discuss their own common topics of interest, though it diverts the objective of the activity.

6. Conclusion

It transpires from the case studies analysed in this paper that instructors need guidance on how to use the discussion forum, or ICT tools in general, effectively. An observation in this regard has already been made by Mayes and De Freitas who propose that "tutors (will) themselves need guidance in the art of scaffolding as they learn to use and monitor e-mail, discussion fora, and synchronous communication tools, to engage students supportively" (2004, p.19). This takes us back to the key concern highlighted earlier in this paper that mediating learning with ICT tools should be based on relevant underlying learning theories. The challenges observed in the case studies analysed in this paper are all linked to different key principles of learning theories where key concepts such as scaffolding, collaboration, previous knowledge and experience and motivation turned out to be determining factors to the success or failure of ICT learning mediation tools.

It can be drawn from the case studies analysed in this paper that Activity Theory is a useful evaluation tool for instructors with intentions to transform learning by using ICT tools as they can learn from the experiences of others. Nevertheless, it should be noted that the context in which a tool is implemented remains crucial in determining the effectiveness of a tool. Another interesting observation to be learned

from case study analysis is the fact that ICT tools evolve as they are manipulated through human interaction, therefore resulting in transformation of the teaching and learning process, and development of an institution.

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