COLLABORATIVE LEARNING USING WIKI: A Pilot Study with Master Students in Educational Technology in Portugal

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Abstract: In this paper we describe a collaborative learning experience with post graduate students attending a master degree course in Educational Technology in the University of Minho, Braga, Portugal. The experience involved the use of wiki technology and explored advanced collaborative forms and participative assessment as part of the teaching method. We believed that learning would occur through social interaction generated by the exchange and sharing of information and opinions among a peer group in an online learning community. During the 1st semester of 2006/2007, sixteen master students developed a collaborative wiki. Artefacts and students perceptions of the new learning experience were evaluated and findings are presented as well as suggestions for further research.

1. Introduction

Thinking about the future of learning in the knowledge-based society needs to be holistic as learning will become a lifelong activity that cuts across different learning generations and life spheres such as private, public and work. The focus should therefore be not only on traditional formal learning institutions such as schools and universities but it should also embrace other forms of adult education and many forms of informal learning. Learners need to be prepared not only to operate the technology but also for higher-order skills such as knowing and understanding what it means to live in a digitalized and networked society and specially what it means to work in online collaborative teams where information is shared and knowledge collaboratively constructed.

Governments and higher education stakeholders know education in the knowledge-based society cannot escape the globalisation trend and that ICT is crucial in any educational reform as it enables learning *anywhere*, *anytime* and *anyhow* in our dynamic fast-changing knowledge-based society (Punie & Cabrera, 2006). Several studies have shown that collaborative learning strategies result in more student involvement with the course (Hiltz, 1994, Crook, 1998), and more engagement in the learning process (Harasim, 2000). However there is few research related to the use of wikis for the creation of collaborative learning environments (Leuf & Cunnigham, 2001; Santamaria & Abraira, 2006). More research is needed and so the learning experience we present in this paper intends to be a contribution to the state of the art.

2. Conceptual framework

2.1 Vygostsky: social learning in the zone of proximal development (ZPD)

Traditionally, both pedagogical and theoretical learning models have focused on the individual learner. Human activity, however, is inherently social. When we conceptualize learning, we should therefore be careful in defining the subject that learns. In the conventional view, the learner is an individual person who has the capacity to acquire knowledge. Social learning models, in contrast, emphasize social interaction as the source of learning and social

change as the outcome of learning. This has led to the revival of the Vygotskian cultural-historical research tradition which starts from the observation that learning is fundamentally an interpersonal and social process, embedded in cultural, historical and material contexts. Vygostsky (1978) explained the dynamics of social interaction in the development of child using the concept of zone of proximal development. This has several interpretations, which Lave and Wenger classify in three categories (Lave & Wenger, 1991). First the zone of proximal development may be characterized as the distance between problem-solving abilities exhibited by a learner working alone and when the learner is collaborating with more experienced people. This is the so-called scaffolding interpretation, where a parent or teacher provides support what is necessary for the learner during the initial learning phase, but which becomes unnecessary and can be removed as soon as this phase is over. The second interpretation is a "cultural" interpretation. It construes the ZPD as the distance between the cultural knowledge provided by the socio-historical context and the everyday experience of individuals. In this interpretation the distance between understood knowledge and active knowledge defines ZPD. The third interpretation views ZPD in a "collectivistic" perspective. In this context, the ZPD is the distance between everyday actions and new forms of social action that can be collectively generated. The first two interpretations, therefore, focus on an individual learner in a social context, whereas the third focuses on collective learning.

2.2 Collaborative learning
The term "collaborative learning" refers to an instructional method in which students at various performance levels work together in small groups toward a common goal. The students are responsible for one another's learning as well as their own. Thus, the success of one student helps other students to be successful. Collaborative learning is fundamentally different from the traditional "direct-transfer" or "one-way knowledge transmission" model in which the instructor is the only source of knowledge or skills (Harasim, 2000). In collaborative learning, instruction is learner-centered rather than teacher-centered and knowledge is viewed as a social construct, facilitated by peer interaction, evaluation and cooperation. Therefore, the role of the teacher changes from transferring knowledge to students (the "sage on the stage") to being a facilitator in the students' construction of their own knowledge (the "guide on the side"). Some examples of collaborative learning activities are seminar-style presentations and discussions, debates, group projects, simulation and role-playing exercises, and collaborative composition of essays, exam questions, stories or research plans (Hiltz, 1994; Jobring, 1999). This new conception of learning shifts away the focus from the teacher-student interaction to the role of peer relationships in educational success (Johnson & Johnson, 1989).

Many authors recognize the innovative potentiality of the cooperative learning in the development of educational and distance learning. Some even mention a educational paradigm capable of answering the needs of the new teaching and learning contexts in virtual environments (Harasim 2000; Meirinhos & Osório, 2006).

Although there is some controversy when using the terms "cooperative" and "collaborative" learning, most of the authors take into account a group of aspects that distinguish both concepts. These aspects are control, autonomy, aimed goal, task and interdependence (Slavin, 1990; Crook, 1998). The first one is connected to students or learners autonomy level and to the instructor or teacher control level. We can affirm that in cooperation the instructor controls more and the student has less autonomy. Therefore, in collaborative tasks it's necessary to have more autonomy and consequently to have more cognitive maturity than in cooperation. A second characteristic that differentiates both concepts is the aimed goal. Cooperation is based on giving chores and responsibilities to the elements of the group, so they can reach a goal. In collaboration, the interaction is negotiated and oriented with consensus aiming a common goal. When performing the task in cooperation it is normal to distribute a chore to all elements of the work group, in opposition to collaboration. In cooperation it is emphasized the performance of the task by the group, based on the chores of each student. The collaborative work isn't the addition or overlap of individual work but the establishment of common goals and coordination of the activity. Interdependence is a characteristic of both concepts. In cooperation, interdependence is essential because the contribution of some is only completed with the contribution of the others. In collaboration, interdependence establishes other relational involvement that is necessary to a mutual support and to create a common identity (Coutinho, 2007).

2.3 Wikis and collaborative learning
Although several support tools for collaborative work (BSCW or Groove) have already been tested, wikis are one of the most promising technologies that allow to implement a collaborative techniques on the work group in virtual environments. A wiki is a website produced by several authors through a collective work. It is similar to a blog in its logic structure, but it also allows to add, edit or remove content created by other authors. Wiki allows the challenge of online communication. It allows the creation of new web pages only by clicking on certain buttons and by writing

a text, as if it was a word processor. Wikis allow to publish and share content on the web in a very easy way (Schwartz et al, 2004; Qian, 2007).

According to Leuf & Cunningham (2001) wikis can be used in two different writing modes or styles of usage: the *document mode* and the *thread mode*. In *document mode* contributors create collaborative documents and in the *thread mode* contributors carry out discussions in the wiki environment by posting signed messages. Although there is still few research regarding educational uses of wikis, findings support the use of this tool for collaborative learning (Wijekumar, s/d/; Augar *et al*, 2004; Gomes, 2006; Faquetti & Alves, 2006; Santamaria & Abraira, 2006)

3. Method

3.1 Participants and procedures
The study we present in this paper was developed in the first semester of 2006/07 (October thru February) and enrolled 16 post graduate students who attended a Program on Research Methods in Education (RME). Our previous experience of teaching RME to postgraduate students who work and have difficulties to attend regular classes, suggested that much more could be done in order to prepare wiser researchers for the fast-changing knowledge-based societies we live in. We believed that learning would occur through the exchange and sharing of information and opinions among a peer group in an online community of practice and we used a wiki in order to: a) introduce blended learning solutions in our regular classes; b) to develop collaborative skills that enhanced students autonomy and habits of search of information on the web.In our collaborative activity students were autonomous and controlled the whole learning process.

3.2 Procedures
The instructor presented the project, defined timing and forms of assessment but all other tasks were managed by students. The activity was proposed to students when they were already familiarised with the syllabus of RME program. The idea was that students should organize into groups and study in depth one of the research methodologies proposed by the instructor upon a selected bibliography. Students freely organized into groups and a wiki site was designed (http://claracoutinho.wikispaces.com/). Students edited the wiki database whenever they wanted and the instructor visited the wiki to scaffold students learning through comments and suggestions. The teacher was a mediator who adjusted the level of information and support so as to maximize group ability to take responsibility for own learning.

3.3 Instruments
The wiki learning experience was assessed thru the administration of an online questionnaire at the end of the semester. A mixture of open and closed questions was used. The questionnaire was divided into three sections. The first part included items related to student characteristics such as age, sex and previous experience with collaborative technologies. The second part was composed of 30 items in the format of a 5 five points Likert scale that intended to assess students´ perceptions on the collaborative wiki experience and its potential as learning tool. Most of this items were adapted from previous questionnaires used by the author in previous projects (Coutinho, 2006). The third part, on an open-ended question students were asked to do an overall critical analysis of the wiki experience.

Students´ contributions o the wiki database were evaluated and contributed to student´ s approval in the course. The quality of the essays were really amazing and exceeded all expectations: each topic was organized in an interactive index format that facilitated the search for relevant information; posts were written in an academic format including relevant citations; a final extended bibliography was suggested for further research on the topic.

4. Data analysis and discussion

All participants filled anonymously the online questionnaire (monkeysurvey.com). 42,9% students were female and 57,1 were male. The average age of students was 31 years old (range 24-55) and most students (93%) had a professional occupation (most were High School teachers). 71,4% of the respondents reported they had heard about wikis, but only two had experienced before a collaborative activity using this technological tool.

When asked - *What was your first feeling when the wiki activity was proposed to you in Research Methods in Education program?* - students answers shows an array of opposite attitudes towards the proposal of a collaborative activity, from negative feelings such as: *I thought it would be difficult, that we had to know computer programming* (n=2) and *I thought it would be complicated to access and that it would take much more time than a normal class*

task (n=2), to very positive expectations*: I felt enthusiasm* (n=3), *I thought it would interesting and* useful (n03), *I felt curiosity* (N=3) and even *I was eager to know more about the potential of this learning tool* (n=1).

4.1 The Wiki activity in RME classes
Twelve items of the questionnaire evaluated students´ perceptions on the potential of wiki technology as an educational tool. For each item it was computed the arithmetic mean, and this value was the basis for discussing results; as we used a 5 points Likert scale for degree of agreement (1=Strongly Disagree, 2=Disagree, 3=Neither agree or disagree, 4=Agree and 5=Strongly Agree), we considered the mean of 3 as the cut point for considering the existence of agreement/disagreement. Graph 1 presents the results for N=14.
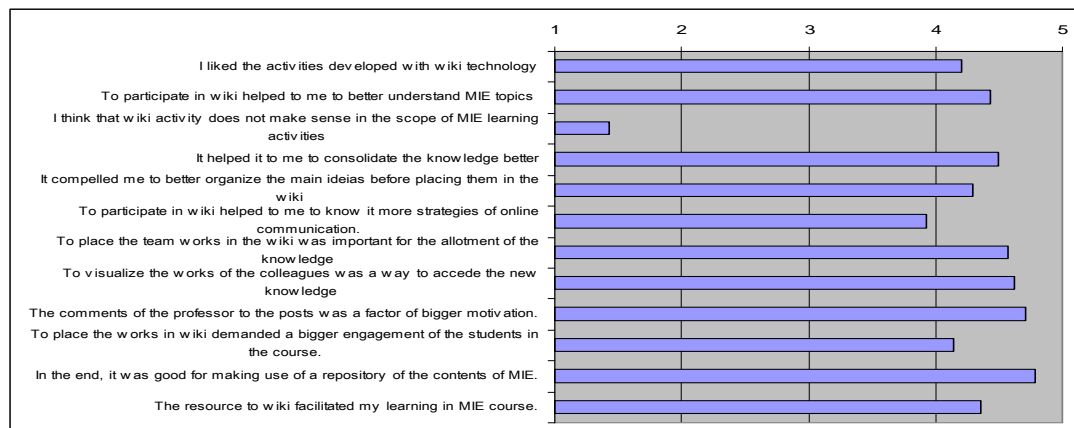

Graph 1 – The Wiki activity in RME classes

The first remark is a very positive response set regarding the new learning experience of using a collaborative wiki in RME classes (all positive agreements over 4 and the negative statement above 2). In fact, students recognized that the wiki activity *helped to better understand the RME topics (It 4=4,5)* and *facilitated learning in RME course (It 12=4,36); the possibility to visualize colleagues posts and accede to new knowledge (It8=4,62, the possibility to share the knowledge(It7=4,57), demanded a bigger engagement of the students in the course (It9=4,14)* but all participants recognized it was important for the group *to have a repository of the contents of RME (It11=4,76).* The instructors´ comments and feedback to students contributions were also valued as a factor of bigger motivation for students participation in the wiki activity *(It 9=4,71).*

4.2 The wiki collaborative learning experience
A global analysis of the 18 items of this questionnaire section show some interesting cues related to the development of a new collaborative learning activity such as the one we present in this paper (Graph 2).
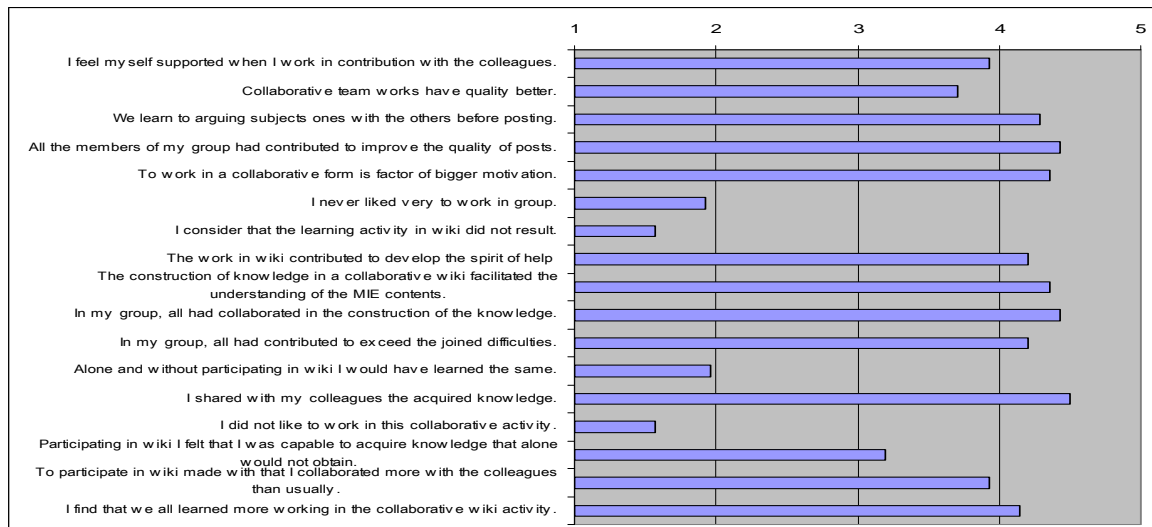
Graph 2 – The collaborative learning activity

In fact, an analysis of students´ answers indicates that though they *enjoyed working in groups* (It 1=4,21, confirmed by negative It 7=1,93 and It 15=1,57) and considered the collaborative activity *was a factor of bigger motivation* (It 6= 4,36), however, they do not believe that *group works have better quality* (It 3=3,2).

They also recognized the importance of *peer interaction* to create a common identity (It 4= 4,29, It 5= 4,43) and *to promote the knowledge construction* and *the knowledge sharing* (It 11=4,43, It 10=4,36, It 14=4,5 confirmed by negative It 13=1,86). Students also recognised that a *relational involvement* was necessary to a mutual support (It 9=4,21, It 12=4,21) and to the *success of the RME* collaborative learning activity (It 10=4,36).

However the rather low average values in the two questionnaire items (items 13 and 16) that intended to evaluate the knowledge construction that occurs when the learner is collaborating with peers or with more experienced people – the ZPD zone – surprised us. In fact, it seems that students´ interaction with peers was not enough in order to make them learn more than when working alone on their own. We then thought that maybe the learner-centred activity we proposed with all responsibility left to students and instructor´s intervention reduced to a minimum instructor could explained the above results. The lack of vertical interaction teacher/student can be responsible for the above evidence? This is an important cue that will certainly guide our attention in future research.

In the final open ended question students critically commented the wiki experience and gave recommendations for future projects. Here are some of the students´comments:

1. It was an enriching activity for beyond the final work (knowledge repository creation), a set of collaborative learning goals between the colleagues was developed. Bigger motivation, basic debate of ideas and points of view and the intervention of the teacher, were the points of bigger interest when working in the Wiki.

2. It was a rather different form of learning that we are not accustomed to. It was interesting and involving.(…)

3. The activity was very positive. It was good and motivating to develop work with a teacher and a group of colleagues who are always available to help. Through the activity a site was created where we can accede the knowledge that other way could be much more difficult. Thanks to the teacher!

4.. The activity developed with resource to wiki contributed for the construction of a repository, accessible to all, and of great utility for those who wants to carry on an inquiry dissertation. I think the collaborative participation made possible a significant learning strategy motivated by the collaborative spirit.

5. A good experience that should be repeated more times in other master programs!

5. Conclusions

Wikis are freely available, reliable and relatively easy to use. However, they are not widely implemented in the education arena as one can verify for the scarceness of studies reported in literature. The pedagogical experience we

present in this paper illustrates a possible usage of wikis to create a repository of knowledge in a b-learning setting in a class of post graduate students who attended a program on RME. In our project, in small groups, student´s developed curricular topics that were posted on the wiki database for the colleagues and the instructor to comment. All groups had different tasks and so, at final, the whole group builds an enormous collaborative repository that can be very useful for someone who starts a dissertation project. The feedback received from students, the quality of the database repository prove the idea was really good and that wikis can be effective in b-learning environments. However we also wanted to test the potential of wikis to promote learning in the ZPD zone. At this point the evidence we obtained is clearly inconclusive: student´s enjoyed working in groups but they do not believe group works have better quality neither that they learned more working in teams than if they worked by themselves. The reasons that explain this evidence are various but we are tempted to attribute this to the deliberate unobtrusive role of the instructor that interfered as less as possible in the wiki experience. Maybe students need more than the peers´ interactions to transpose the ZPD zone and maybe a more effective vertical interaction would result in different findings. Those are the threads for more research to be done in the future.

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