

Collaborative E-learning Methodologies: an Experience of Active Knowledge in ICT Classrooms

Margarida M. Pinheiro¹, Dora Simões¹

(1) ISCA-UA - Higher Institute of Accountability and Administration and GOVCOPP - Research Unit for Governance, Competitiveness and Public Policies, University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, PORTUGAL
E-mail: margarida.pinheiro@ua.pt and dora.simoes@ua.pt

Abstract

In the present study we highlight a specific environment that makes use of collaborative technological tools, like wikis and forums within an e-learning platform. Both of these approaches convey a lot of responsibility from the teacher to the students and the hoping, as backed up by the literature, is to promote deeper learning and reasoning skills at a higher level. The general goal of this paper is to contribute for the theoretical discussion on how active and collaborative experiences in ICT classrooms play a role on the construction of knowledge in HEIs. Based on the pointed outlines, we intend to: (1) understand how collaborative e-learning environments get students actively involved in the learning process; (2) perspective the role of collaborative tools at the level of group work and (3) find out how students assess their performance within a working group. Data was collected through questionnaires available on the e-learning platform Moodle. Descriptive statistical techniques were used to analyze quantitative data. Within the research questions proposed, the study, points towards some understanding of how a collaborative learning environment seems to get students actively involved in the learning process mainly if the tasks to be perform have an empirical component. The study also has shown that students seem to identify themselves with the need to be involved in simulations of their future professional activity, as well as with the need to regulate their own learning and to promote discussion not only between peers but also with the teacher.

Keywords: Collaborative learning, E-learning, ICT, Active learning, Teaching

1 Introduction

Active and collaborative learning are well known as alternative strategies to conventional teaching models (e.g. Prince, 2004). The pedagogical and socio-economic forces that have driven the higher learning institutions to adopt and incorporate ICT (information and communication technologies) in teaching and learning are already changing the organization and delivery of higher education. However, like Silva *et al.* (2002) say, there is still much to be done to overcome the individualistic matrix to a culture of collaborative learning, within the culture of the universities.

In this study we highlight a specific environment that makes use of collaborative technological tools, like wikis and forums within an e-learning platform. The general goal of this paper is to contribute for the theoretical discussion on how active and collaborative experiences in ICT classrooms play a role in the construction of knowledge in HEIs (Higher Education Institutions). However, we did limit our field of study to the context of the curricular unit of CRM (Customer Relationship Management) Systems, included in the last semester of the last year of the study plan of the first cycle of studies of the Marketing course, available at the ISCA-UA (Higher Institute of

Accounting and Administration of the University of Aveiro), Portugal. Based on the pointed outlines and within the curricular case presented, we intend to: (1) understand how students get actively involved in the learning process within a collaborative learning environment; (2) perspective the role of collaborative tools at the level of group work and (3) find out how students assess their performance within a working group.

This paper is organized into five key points. After the introduction, we try to contextualize the use of ICT at the level of active and collaborative methodologies in the teaching and learning processes in higher education. Then, we focus on the methodological aspects of the study. In the next section we present and discuss the results obtained. The paper ends with the main conclusions of the study.

2 The Paradigm of Learning and Teaching in Higher Education

In the report made for UNESCO by the International Commission on Education for the Twenty-first Century (1996) a complementary mission for education is immediately referred: that of fructifying the creative talents and potentialities of all individuals. In that very same report, the need for a lifelong learning process is strengthened, as one of the keys to access education. The idea conveyed by the group of rapporteurs sustains that education must be built upon the symbiosis of four basilar learning processes: learning to know (acquiring not only a set of codified knowledge, but also, and most importantly, the domain of those instruments), learning to do (adjusting training to the future professional activity, in such a way as to apply the knowledge obtained), learning to live together (cooperating with others in the resolution of common projects) and learning to be (allowing for the full development of the person, rendering him/her apt to create autonomous and critical thoughts, capable to judge different circumstances in life). However, if traditional teaching (understood as a model of transmission of both knowledge and values, in the univocal direction from teacher to student) is primarily oriented by the learning of how to know and, specially in the field of higher vocational training, by the learning of how to do, according to the authors of the above mentioned report, it will be necessary to provide education with structured methodological ways, capable to involve both the learning of how to live together and the learning to be. In such a perspective, it is possible to sustain the idea that learning can't occur without people or a reference to its subjectivities and personal and social contexts (Fyrenius *et al.*, 2007).

On the other hand, the methodological model sustained by the Bologna Process has generated profound implications in the change to student-centred methodologies, which makes the student an active element in learning, properly guided by tutorial support. The implementation of these guidelines does inevitably create the need to re-evaluate the pedagogical activities at the level of goal definition and assessment, as well as, particularly, at the level of execution and follow-up of the methodological processes. The arguments involved in the idea that higher education methodologies have to be rethought are multidimensional and diversified (e.g. Silén and Juhlin, 2008).

2.1 Active and Collaborative Learning

It is not possible to provide unanimously accepted definitions for all of the vocabulary of active learning since different authors have different interpretations. Still, it is possible to provide some generally accepted definitions and to highlight distinctions in how common terms are used (Prince, 2004). Defined as any instructional method that engages students in the learning process, the core elements of active learning are student activity and engagement in the learning process. Although some authors (e.g. Kaufman *et al.*, 1997) distinguish between collaborative and cooperative learning as having distinct historical developments, this study will assume the perspective of Panitz (1996) and Prince (2004) that collaborative learning encompasses cooperative learning as, in either interpretation, the core element is grounded upon consensus building through cooperation by all members of the group.

Despite the empirical support for active learning is extensive, not all is compelling. In fact, while several authors (e.g. McKeachie, 1972) admit that the improvement of active learning over lectures seem to be small, others (e.g. Bonwell and Eison, 1991) conclude that it leads to better student attitudes and improvements in students' thinking and writing, motivating students for further study and developing thinking skills. Still, some global conclusions arise. The collection of studies proposed by Prince (2004) support the premise that collaboration not only enhances academic achievement, student attitudes and student retention, but also provides a natural environment favourable to enhance interpersonal skills.

However, a change in paradigm is hard to achieve. In fact, if teachers were taught by the lecture method, then it is not surprising that this will be the selected method when their turn arrives to take over the classroom. On the other hand, the fact that most students have been exposed only to traditional methods that emphasize a competitive and individualistic approach constitutes a major problem. So, unless teachers and students are trained in alternative teaching and learning techniques and the debate around those issues increases, it seems rather difficult a change in paradigm (Panitz, 1996). That means that, as suggested by Prince (2004), students and teachers may gain if institutions consider non traditional models to promote active and collaborative environments. However, one cannot think that any of these methods is magic and that they are the cure for all educational problems.

2.2 Using ICT to Promote Active and Collaborative Practices

A possibility to promote active and collaborative practices is that of fostering the change of a traditional teaching system to adopt and incorporate ICT in the teaching and learning process. But, as Stahl *et al.* (2006) state, the interplay of learning with technology has problematized the very notion of learning. Namely, about knowing in which arenas and to what extent there are facilitators or obstacles, about understanding the activities mediated by ICT or about the risks in using ICT in teaching and learning at the university level (Ludvigsen and Morch, 2007; Vajargah *et al.*, 2010). Specially, the internet and its expansion through the development of computer networks, allows citizens not only to communicate at a speed never seen before and to access enormous sources of information, but also to connect to any point on the globe. This makes people to address themselves not only as consumers of information and knowledge but also as the creators and sources of that very information and knowledge itself, providing a stimulus for computer supported collaborative learning research.

In the opinion of Stahl and his colleagues (2006), the development of ICT make it possible not only to disseminate and effectively take advantage of innovative educational software, but also to create new forms of socialization and new definitions of individual and collective identity (International Commission on Education for the Twenty-first Century, 1996). More, Ludvigsen and Morch (2007) argued that, the theoretical rationale for a pedagogical and technological framework of a computer supported collaborative learning environment, emerged in response to skills that were previously associated with deep learning, which are important in a knowledge-based society. Lehtinen (2003) believes that the arguments for the use of ICT in education are characteristically inherent to several self-evident benefits of information and communication technology: from the use of a valuable tool for synchronous and asynchronous communication, to the advantage of simulating real-life situations. These can give an idea of how the pedagogical approaches used in ICT are more important than the technical features. One of the desires for the educational use of ICT is that it can, effectively, support the attempts to control the complex relationships of learning tasks (Lehtinen, 2003).

In a broad sense, e-learning refers either to the instructional content or learning experiences delivered or enabled by electronic technologies, and to the use of ICT to enhance and support teaching and learning processes. It incorporates a wide variety of learning strategies and ICT

applications, such as virtual learning environments, or wikis and forums within an e-learning platform (Sife *et al.*, 2007). Previous research has been done on student collaboration using wikis (Judd *et al.*, 2010). Usually promoted as collaborative writing tools, wikis are gaining in attractiveness in educational scenarios. Yet, although wikis include features that are designed to facilitate collaboration, the studies of Judd *et al.* (2010) show evidence that not only students make little use of the wiki's commenting feature but also that the majority of students' contributions are made late in the activity, which makes the possibility of extensive collaboration unlikely. Also, online discussion forums are another collaborative practice in education. Usually connoted as a virtual learning environment in which students are likely to learn, the rationale on forums shows evidence that, by reflecting on peers' contributions in online discussions and articulating emergent understanding, students engage in higher-order processes of information and are led towards the construction of personal meaning which is a product of the students' interaction and collaboration (Judd *et al.*, 2010).

Therefore, ICT mediation learning promotes the construction of complex knowledge structures and support active learning. But, as Judd *et al.* (2010) argue, the social dynamics of computer mediated communication are quite different from those of traditional face-to-face communication: it focus on what is said and remove seemingly extraneous aspects of face to face communication. Also interesting is the conclusion of the very same authors that introverted students are more likely to benefit from computer mediated communication than extroverted students, as introverted students find it easier to express themselves in the depersonalized forum. In the same line, the results of the study of Yukselturk (2010) indicate that achievement, gender and weekly hours of internet use, showed a significant relationship with students' participation level in discussion.

While it is possible to underline teachers' ICT competency, teachers' confidence level in using ICT, and teachers' satisfaction on ICT training programs (Tasir *et al.*, 2012), this study is rather interested on students' performance by the application of technology in terms of the effectiveness and efficiency of the teaching and learning process.

3 The Methodological Procedure

The curricular unit of CRM Systems was planned not only to promote deep learning and reasoning skills in the students, but also to allow the maxim participation of these. So, the curricular plan of the course was designed to include different methodologies to each specific learning outcome. To achieve this, students were firstly organized into groups, according to some specific features identified by a simple survey: available time to work in group, same registration system in the course, and similar grade average on a specific set of units of the curricular plan. In a rotation system (by activity), each group chose a student to be coordinator. Beyond his role as a group member, the coordinator has the added responsibility of ensuring the consistency of the work done, of ensuring the observation of a set of working rules, and of promoting cooperation and mutual aid between members. By the end of each activity, every student answered a questionnaire to evaluate not only his own performance but also the one of his colleagues.

Bordered by the objectives of the curricular unit, four main learning outcomes can be defined. First, in order to identify the major phases that support customer relationship, students have to prepare and present a lesson about each phase of the process. Second, in order to recognize the various levels of a CRM system and how they are integrated and related to the organizational objectives of relationship marketing, students have to do some research about case studies that describe previous experiences on the implementation of a CRM system and to present the results of their analysis. Namely, students have to identify the type of situation portrayed, the main theme, the problem outlined and the decisions taken, the qualitative and the quantitative aspects highlighted, the technological solutions used and the functionalities that aim to support them. In the third learning outcome, students have to recognize, discriminate and use the various features of

each module of a CRM system and be familiar with how the modules are tangled. Finally, in the fourth learning outcome, students have to design, and monitor a program of implementation of a CRM system (including the definition of the business plan, the analysis and the selection of a technological tool according with the business' objectives), and to manage the several projects that can be integrated in the process. The validation of the last two learning outcomes is organized in two complementary parts. On the one hand, and by using a wiki collaborative tool available on an e-learning platform, students have to develop a summary report that conceptually characterizes the CRM systems. On the other hand, and by using collaborative open source software available on the market (VTigerCRM), students have to simulate a business environment and the management of customers' relationships. At the end of course, all the groups present their business in class and provide a portfolio describing the main results of their experience with the software. All the activities are also supported by discussion forums available through the e-learning platform. Finally and in the last class, students are encouraged to answer one more questionnaire to register their opinion about the teaching-learning methodology used. This is the unique anonymous questionnaire. It is important to notice that all the activities proposed had a component in the final grade on the CRM systems curricular unit.

A total of 28 students that attended the curricular unit in continuous assessment were included in the study. Data was collected through questionnaires available on the e-learning platform Moodle. Descriptive statistical techniques were used to analyse quantitative data.

4 Results and Discussion

Within the methodology previously defined, nine groups were found; three with 4 members, four with 3 members and two with 2 members.

4.1 Self and Hetero-assessment of Groups' Activities

Concerning self and hetero-assessment of the groups' activities, data analysis was organized around the four main learning outcomes previously defined: preparation and presentation of a lesson (Table 1), analysis and presentation of a case study (Table 2), and use of a wiki tool and simulation of a business environment (Table 3).

Table 8. Results of Self-/Hetero-assessment by Groups Concerning the Preparation and Presentation of a Lesson

	Group								
	1	2	3	4	5	6	7	8	9
Members	4	4	3	4	2	3	3	3	2
Respondents	4	3	3	4	2	3	3	3	2
<i>a</i> by coordinator	6,0	7,0	22,0	37,0	10,0	12,0	15,0	10,0	10,0
\bar{a} by other members	8,3	4,0	20,0	26,3	10,0	12,5	9,5	10,0	7,0
Δa	-2,3	3,0	2,0	10,7	0,0	-0,5	5,5	0,0	3,0
<i>b</i> of coordinator	4,0	4,0	4,0	4,0	5,0	4,0	5,0	5,0	4,0
\bar{b} of group	4,4	4,0	4,7	4,8	5,0	4,0	4,7	4,3	3,5

a – time spent (in hours), Δa - *a* by coordinator - \bar{a} by other members, *b* – grade of self-/hetero-assessment (1 to 5).

Regarding the preparation and presentation of a lesson, the results show that 96% (27 out of 28) students answered the questionnaires (Table 1). As the majority of the groups present a

positive deviation between the time spent by the coordinator and the average time spent by other members, we can say that the coordinator seems to have assumed its role as responsible for the work done. In fact, if it was not like that, all the group work would have been compromised and the necessary time to fulfil the task proposed (prepare the presentation of the lesson) would be longer. Although there is a substantially different average time between the groups that makes us wonder about the relative merit of the work done, this aspect does not seem to have occurred since all groups self-assessed with a 4 or even a 5 grade (good or very good performance). So, maybe the collaborative task did really get students actively involved in the learning process.

Table 9. Results of Self-/Hetero-assessment by Groups Concerning the Analysis and Presentation of a Case Study

	Group								
	1	2	3	4	5	6	7	8	9
Members	4	4	3	4	2	3	3	3	2
Respondents	4	3	3	3	2	3	1	3	2
<i>a</i> by coordinator	4,0	3,0	6,0	8,0	10,0	20,0	-	10,0	5,0
\bar{a} by other members	3,7	4,0	5,5	7,5	11,0	7,5	3,0	11,5	4,0
Δa	0,3	-1,0	0,5	0,5	-1,0	12,5	-	-1,5	1,0
<i>b</i> of coordinator	4,0	5,0	4,0	4,0	5,0	4,0	-	4,0	4,0
\bar{b} of group	4,3	4,3	3,7	4,3	5,0	4,0	4,0	4,0	4,0

a – time spent (in hours), Δa - *a* by coordinator - \bar{a} by other members, *b* – grade of self-/hetero-assessment (1 to 5).

Table 2 shows that 24 out of 28 (86%) students answered the questionnaire on students' self-assessment and hetero-assessment concerning the analysis and presentation of a case study. Noteworthy is the fact that, in this situation, there are more cases of discrepancy between the time spent by the coordinator and the average time spent by other members, with three negative deviations. As, one more time, most groups self-assessed their performance as grade 4 or 5, eventually, one can assume that the empirical nature of this task is much more appropriate to group discussion than the presentation of a lesson assumed to be much more aligned with theoretical concepts and, consequently, easier to prepare.

Table 10. Results of Self-/Hetero-assessment by Groups Concerning the Use of a Wiki Tool and the Simulation of a Business Environment

	Group								
	1	2	3	4	5	6	7	8	9
Members	4	4	3	4	2	3	3	3	2
Respondents	2	3	3	3	2	2	3	3	2
<i>a</i> by coordinator	25,0	-	20,0	24,0	40,0	-	20,0	8,0	6,0
\bar{a} by other members	12,0	9,7	32,5	24,0	35,0	30,0	7,0	50,0	48,0
Δa	13,0	-	-12,5	0,0	5,0	-	13,0	-42,0	-42,0
<i>b</i> of coordinator	5,0	-	5,0	4,0	5,0	-	5,0	4,0	3,0
\bar{b} of group	4,5	4,3	4,6	4,3	5,0	4,0	5,0	3,9	3,5

a – time spent (in hours), Δa - *a* by coordinator - \bar{a} by other members, *b* – grade of self-/hetero-assessment (1 to 5).

Data in Table 3 shows that 82% of students answered the questionnaires concerning to the last activity (use of wiki tool and simulation of a business environment). Data shows that not only the discrepancy between the time spent by the coordinator and the average time spent by other members is the highest one, but also that this inconsistency is verified in most groups. Also, as students rate their performance with a 4 or a 5, we hypothesize that the complexity of the task (use of wiki tool and simulation of a business environment) seems to justify the greater involvement of the students and, consequently, the more time required to complete the mission. So, maybe, another important conclusion is that of the possibility to perspective the role of collaborative tools due to the difficulty of the work that is developed: more theoretical tasks are more easily prepared by groups while more practical ones not only need more time but, more important, need the discussion inside the group.

Finally, it seems that data reflects the level of effort expected for each activity: the use of a wiki tool and the simulation of a business environment take more time than the preparation and presentation of a lesson and this, in turn, takes more time than the analysis and presentation of a case study.

4.2 Students' Opinions on the Teaching and Learning Methodologies Used

In order to realize students' opinions on the teaching and learning methodologies used in the class, students were invited to answer a last and anonymous questionnaire available on the Moodle platform. There were nineteen answers.

Table 4. Resources and Methodologies Used in Support of the Teaching-learning Process

	Resources and Methodologies			
	Use of collaborative tools (e.g. forums, wikis, etc.)	Preparation and presentation of a lesson	Analysis and presentation of a case study	Simulation of a business
Average	3,8	4,1	3,5	4,6
Mode	4	5	4	6

As we can confirm in Table 4, the central tendency metrics show that students considered the use of collaborative tools very useful (average and mode 4). Considering each specific activity, we can conclude that the students considered the methodology used in the activity "simulation of a business" as the most suitable, followed by the "preparation and presentation of a lesson", and in last, "analysis and presentation of a case study".

Despite the heterogeneity of the class (students aged from 20 to 50 years, and different availabilities of time, given that many of them were employed or doing their internship programs in different companies), students were receptive and motivated to carry out the proposed activities. Nevertheless, it was possible to recognize the two aspects denoted by Judd *et al.* (2010): the majority of students' contributions were made late in the activity and students made little use of the wiki's commenting feature. In both cases, these facts have limited the possibility of extensive collaboration. In general, and as specified in literature by Judd *et al.* (2010), students delayed their contributions to the activities (especially in the last one) and ended up making little use of the potential for content development collaboratively via wiki tool, given the backward state of work in most groups.

5 Conclusions

Within the research questions proposed, the study points towards some understanding of how a collaborative learning environment seems to get students actively involved in the learning process

mainly if the tasks to be performed have an empirical component. More, one can say that the study also has shown that students seem to identify themselves with the need to be involved in simulations of their future professional activity, as well as with the need to regulate their own learning (preparation and presentation of lessons) and to promote discussion not only between peers but also with the teacher.

6 References

- Bonwell, C. C., and Eison, J. A. (1991). Active learning: creating excitement in the classroom. *ASHEERIC Higher Education* (Vol. Report No 1). Washington DC: George Washington University.
- Fyrenius, A., Wirell, S., and Silén, C. (2007). Student approaches to achieve understanding - approaches to learning revisited. *Studies in Higher Education*, 32(2), 149-165.
- International Commission on Education for the Twenty-first Century. (1996). *Learning: the treasure within*. UNESCO, Paris.
- Judd, T., Kennedy, G., and Cropper, S. (2010). Using wikis for collaborative learning: assessing collaboration through contribution. *Australasian Journal of Educational Technology*, 23(3), 341-354.
- Kaufman, D., Sutow, E., and Dunn, K. (1997). Three approaches to cooperative learning in higher education. *The Canadian Journal of Higher Education*, XXVII(2,3), 37-66.
- Lehtinen, E. (2003). Computer-supported collaborative learning: an approach to powerful learning environments. In E. D. Corte, L. Verschaffel, N. Entwistle and Merrieboer (Eds.), *Powerful learning environments: unravelling basic components and dimensions* (pp. 35-51). Oxford: Pergamon.
- Ludvigsen, S., and Morch, A. (2007). Computer-supported collaborative learning: pedagogical and technological scaffolding *Int'l Encyclopedia of Education's 3rd Edition* (Vol. Learning and Cognition): Elsevier.
- McKeachie, W. (1972). Research on college teaching. *Educational Perspectives*, 11(2), 3-10.
- Panitz, T. (1996). Collaborative versus cooperative learning: a comparison of the two concepts which will help us to understand the underlying nature of interactive learning Retrieved 16, May, 2012, from <http://home.capecod.net/~tpanitz/tedsarticles/coopdefinition.htm>
- Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223-231.
- Sife, A. S., Lwoga, E. T., and Sanga, C. (2007). New technologies for teaching and learning: challenges for higher learning institutions in developing countries. *International Journal of Education and Development using Information and Communication Technology*, 3(2), 57-67.
- Silén, C., and Juhlin, L. (2008). Self-directed learning - a learning issue for students and faculty. *Teaching in Higher Education*, 13(4), 461-475.
- Silva, B. D. d., Gomes, M. J., Oliveira, L. R., and Blanco, E. (2002). *The use of ICT in higher education: work in progress at the University of Minho*. Paper presented at the Use of ICT in Education in Southern Europe: research and reflections, part of the 2002 European Conference on Educational Research (ECER, 2002), Lisbon. <http://www.uoc.edu/dt/20137/index.html>
- Stahl, G., Koschmann, T., and Suthers, D. (2006). Computer-supported collaborative learning: an historical perspective. In S. R. K. (Ed.), *Cambridge handbook of the learning sciences* (pp. 409-426). Cambridge, UK: Cambridge University Press.
- Tasir, Z., Abour, M. E. A., Halim, N. D. A., and Harun, J. (2012). Relationship between teachers' ICT competency, confidence level, and satisfaction toward ICT training programmes: a case study among postgraduate students. *The Turkish Online Journal of Educational Technology - TOJET*, 11(1).
- Vajargah, K. F., Jahani, S., and Azadmanesh, N. (2010). Application of ICTs in teaching and learning at university level: the case of shahid beheshti university. *The Turkish Online Journal of Educational Technology - TOJET*, 9(2).
- Yukselturk, E. (2010). An investigation of factors affecting student participation level in an online discussion forum. *The Turkish Online Journal of Educational Technology - TOJET*, 9(2).