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ADOPTING THE ROLE OF ONLINE TEACHER AS A RESEARCHER AND MODEL BUILDER OF LEARNERS' NEEDS TO APPROACH TIME AS A CONTEXT-DEPENDENT FACTOR WITHIN NETWORKING SETTINGS

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Adopting the role of online teacher as a researcher and model builder of learners' needs to approach time as a context-dependent factor within networking settings

ABSTRACT

This study adopts a context-based approach to the issue of time within networking learning settings. To approach time as a context-dependent factor, the role of online teacher as a researcher and model builder of learners' needs is suggested. Specifically, an online network of mathematics teachers has been formed in the context of an online course aiming to prepare these teachers to introduce the use of educational software in their teaching practices. To form this network, the 'constructivist teaching experiment' methodology (Cobb, Wood, & Yakel, 1990) was used. A specific curriculum was designed for the participants in this e-learning network. During this experiment, the course was adapted to take into account the specific learning needs of the aforementioned teachers, who were mainly investigated through synchronous communication via informal conversation. The data collected provided evidence that time is perceived by learners as a context-dependent factor. The results also suggest that, using the aforementioned methodology to formulate an e-learning network, learners needs can be better acknowledged to succesfully meet the aims of the course within the time limits scheduled for the whole procedure.

KEYWORDS

Time issues; e-learning networks; Context; Teacher as researcher; Online teaching experiment

1. INTRODUCTION

The advantages of Information and Communication Technologies (ICT) in teaching and learning have been acknowledged by many researchers (Harasim, Hiltz, Teles, & Turoff, 1995; Jonassen, 1999; Maureen, 2000). In fact, these technologies can be used to establish constructivist and collaborative learning contexts (Jonassen, 1999; Dillembourg, 1999). Specifically, online collaborative learning situations can provide a natural setting for demanding cognitive activities (Dillenbourg, 1999), as well as great opportunities for learners to be motivated in order for them actively construct their knowledge, enhance their diversity and their understanding of the concepts being learned, as well as acquire a sense of belonging online (Scardamalia, and Bereiter, 1996). In addition, the benefits are acknowledged of establishing networks to help individuals and/or institutions to pursue shared goals that could not be accomplished independently (Karl, 1998b). Within successful online learning networks, individuals and/or institutions can interact cooperatively by sharing information based upon a shared expertise or passion for a joint enterprise (Harasim, Hiltz, Teles, & Turoff, 1995). Karl (1998a) also suggests that the strength of networks lies in their exceptional ability to enhance and deepen critical thinking and creativity through dialogue and exchange, to bring people together for common causes while respecting diversity, to transcend isolation and strengthen local action; to link organizing efforts and structures; to facilitate participation; to be flexible and respond quickly to new and challenging situations.

Online education is also supported by the idea that ICTs can help learners to overcome barriers of space and time. When learners participate in online learning settings, they can learn in their own time and space by exploiting the asynchronous capabilities of ICTs and the easy access to a considerable amount of learning resources from their own location. However, participation in e-learning courses therefore, however flexibly presented, will still require some coordination between the learner´s personal time and the time schedule of the course. In fact, online learning may be taken up at the study times preferred by the learner, while the length of study time may be left to the discretion of the teacher. Lacking the immediate guidance of a teacher, online learners may spend more or less time on tasks than was intended and sometimes postpone study until just before the deadline for assessment (Thorpe, 2006). Online learners might also need extra time to overcome possible information overload, as well as to acquire the necessary technical skills to appropriately participate in online courses (Hiltz & Turoff, 1985).

Where time is concerned, the emphasis has been on building in individualization. This is not done through imposing a strict pace but by drawing on the use of asynchronous technologies (Garrison and Baynton, 1987). However, there seems to be some contradiction between individualization in terms of when students study and how studying is paced and what constitutes effective support for learning (Dieumegard, Clouaire and Leblanc, 2006). In fact, despite trying to adapt the online course to fit with each learner's life style and preferences within online learning settings, learners' activities can still become unsynchronized. Thus, in spite of the remarkable features of the technologies available, a key factor in achieving great learning effects is the way in which online teachers and co-learners interact to help each other organize their own learning tasks and study times (Dieumegard et al., p. 219). Another crucial factor that negatively affects the outcome of an online course is possible mismatch between the course designers' perceptions of the amount of time intended for each course and the learners' perceptions

of the tasks in question, as well as their cognitive development, personal lifestyles and needs (Thorpe, 2006). It therefore seems that e-learning can both ease time constraints and also introduce new time restrictions. On the whole, it seems that time remains a strategic issue in online learning; an issue that requires explicit attention on the part of online teachers and designers of online courses, as well as online learners.

To this end, it is worth noting that time and learning are inter-related historically. Time is implicitly connected with learning success as the latter often has to be measured within time constraints. Time can be conceived as straightforward, because it can be measured objectively and in the same way for all students. Nonetheless, students experience time subjectively, influenced by their estimations of the expected study time and workload of the tasks in question, as well as their perception of the way these tasks fit within the other activities in their lives (Thorpe, 2006). For the aforementioned reasons, the perceptions and behaviours of teachers and learners that hinder learners' ability to meet the scheduled deadlines have to be carefully examined. Factors that may influence learning are related to how learners manage their study time, how much study time they expect to be required and whether the pacing and quantity of study time expected by the educators match the pacing and quantity of study time on the part of the learners (Thorpe, 2006). In addition, learners' perceptions about how long a learning activity will take are affected by whether they find this activity interesting and the context. Students' learning approaches (be they 'deep' or 'surface' approaches) also affect the total time they need to perform the assigned tasks (Trigwell, 2006; Lockwood, 1992). There is also evidence to support the idea that study time is influenced by why learners are studying, by the teaching approach used, as well as by how the learners perceive this approach (Lawless, 2000). On the whole, it seems that there is no simple causal relationship between study workload and learner response: the whole learning and teaching context seems to play important role (Thorpe, 2006).

It is therefore necessary to adopt a course design and teaching model that can acknowledge the importance of time within the whole context of each online course, while also taking into account the learners' perceptions regarding all the aforementioned time-related issues. A course designed with these elements in mind will help learners to effectively cope with their time difficulties and successfully meet its aims. Here, it is worth noting that some strategies have been proposed (Thorpe, 2006) to help students catch up when they fall behind in their study time, namely: (a) not setting new tasks the week before assignment deadlines, (b) building in reading or review weeks, (c) establishing study-free weeks, especially during national or public holidays, (d) providing information about estimated study times, and (e) grouping study tasks into blocks of time that are clearly indicated.

However, the previously mentioned strategies are not enough to provide courses that can deal accurately with the wide variety of learner needs and study time approaches. For this reason, the 'teacher as a researcher' approach (Cobb & Steffe, 1983) within a 'constructivist teaching experiment' (Cobb, Wood & Yakel, 1990) is considered appropriate in a networking context. According to this approach, the teacher does not rigidly follow his/her teaching plan but acts as a researcher attempting to form models of his/her students' knowledge. Next, the teacher transforms his/her teaching plan and intervenes to create an encouraging environment for the students to improve their knowledge according to their needs. In the online context, this approach could be used by empowering the online teacher to act as a researcher, trying to form models of her/his students' knowledge

and their learning approaches, intentions and reasons for learning, as well as their perceptions regarding the time issues related to the learning context as a whole and their individual needs. By forming such models, the teacher can effectively transform the flow of the course and help her/his students to overcome time management issues and make progress in their learning.

Taking the above into consideration, an e-learning course was designed for the education of maths teachers. The main aim of this course was, firstly, to familiarize teachers with the well-known educational software Cabri-Geometry II (Laborde, 1990) used to teach a range of geometrical concepts, and subsequently introduce it into their teaching practices. The formation of this course was based on the theoretical background of constructivist and social theories of learning (Jonassen, 1999; Vygotsky, 1978). A network was set up of teachers participating in this course, based on the aforementioned 'constructivist teaching experiment' methodology. The aim of this study is to explore the role this methodology played in helping participants estimate and overcome the time-related issues that emerged during the course. To date, there has been no report of such methodology used to estimate and overcome time management issues within networking settings.

The following section of this paper presents the context of the study, the specific aims and the curriculum designed for this e-learning course, followed by an analysis of the data collected. Subsequently, the data are discussed and conclusions drawn.

2. THE CONTEXT OF THE STUDY

A Mathematics Teacher E-Learning Network (MTELN) was designed to function within a wider e-learning context (Chlapanis & Dimitrakopoulou, 2004) whose aim was to familiarize teachers with ICTs and help to introduce these into the everyday teaching practice of secondary and primary teachers. Educating these teachers to appropriately integrate ICTs into their real teaching practices was considered essential due to the fact that the great capabilities of ICTs in establishing constructivist and collaborative e-learning settings are widely accepted (Koschmann, 1996; Jonassen, 1999). In fact, it was acknowledged that appropriately designed computer learning environments can catalytically and positively affect the whole learning context in terms of learning content, learning activities and the roles of teachers and learners (Scardamalia & Bereiter, 1996).

E-learning has been considered appropriate for teacher education as it provides them with opportunities for lifelong learning, which is necessary to improve their teaching. Without doubt, teacher education using traditional face-to-face educational settings is extremely difficult, not only because it involves adults who have problems arranging a mutually acceptable lesson time but also because they are scattered over different geographical regions. Thus, the e-learning context seems to provide great opportunities for teacher education as it can help them balance learning inequalities created by time, space and physical health (Maureen, 2000).

AIMS OF MTELN

The main aims of MTELN were, firstly, to familiarize its participants with the tools of Cabri-Geometry II (Laborde, 1990) and, secondly, to train them in employing its advantages in their teaching practices. Cabri-Geometry II has been selected for teacher education because: (a) it has been designed for the teaching and learning of a variety of Euclidean geometrical concepts, (b) it can

effectively support teaching and learning in the context of modern social and constructivist learning theories, and (c) its effectiveness on students' learning of mathematics has been acknowledged by many researchers (Mariotti, 1995; Holzl, 2001; Kordaki & Balomenou, 2006).

The specific aims of MTELN, formulated by analyzing its main aims, were to help the participants: (a) to cooperate through MTELN in order to conceptualize modern social and constructivist learning theories in the context of Cabri-Geometry II, while at the same time exploiting its features to design learning activities which would be appropriate within the context of the Greek mathematical curricula, (b) to prepare teaching plans integrating the activities they designed, (c) to teach lessons using the teaching plans they formed, and (d) to evaluate these lessons. The MTELN work was mainly managed through synchronous communication via chat. All teaching processes in MTELN took place exclusively using the available networking facilities by Microsoft Sharepoint™ Portal Server 2001, namely: (a) uploading and downloading learning materials, and (b) communicating via forum, chat and email.

PARTICIPANTS, DATA RESOURCES AND RESEARCH METHODOLOGY

Seven Secondary Education mathematics teachers participated as learners in MTELN. The duration of this course was 9-weeks, to suit the teachers' needs. The data collected from this 'online teaching experiment' consisted of the learning materials provided to the participants, the course plan, the learners' work, the synchronous communication logs via chat and the logs of asynchronous communication via forum. At the end of the course, the participants in MTELN were also asked through clinical interviews performed using telephone calls to '*express their opinion about the most important factors that kept them in line with the aims of the course and successfully encounter the tasks given within the limits of time scheduled during the whole procedure*'. The data collected from these interviews were analyzed and then classified into categories according to topics that emerged from them. In terms of methodology, this research is a qualitative study (Cohen & Manion, 1989) and especially a case study aiming to investigate the role of the 'online teaching experiment' methodology on the learners' commitment to the aims of the course and on their ability to manage the tasks assigned to them in a timely fashion during the whole procedure.

The MTELN curriculum

A primary curriculum of MTELN was designed before the course began and was organized into 4 learning units. Despite the fact that the duration of each learning unit was expected to be 1 week, this was extended to 2 weeks to facilitate learners' needs, upon the decision of the researcher, who acted as a teacher of MTELN, as she exploited the feedback given by the learners during chat sessions. The transformation of both curriculum and course schedule emerged from the interpretation of the feedback given. Thus, the duration of the course came to be 9 weeks: 4X2=8 weeks for the completion of the activities included in the total of learning units, plus 1 week for final conclusions. Each week, the learners were provided with a study topic and a main question for discussion. The content of each Learning Unit (L.Unit) - in its final version – was as follows:

- **L.Unit 1:** Introducing all the participants to MTELN. Presenting the aims and the outline of the course and discussing the features of Cabri-Geometry II. Forming learner-groups and assigning the following project to each group: 'Design at least one learning activity in the context of Greek secondary education mathematics curricula by exploiting the

features of Cabri and taking also into account modern social and constructivist theories of learning' (2 weeks were needed).

- **L.Unit 2:** Correcting and improving the activities designed during the work performed in the context of Unit 1 to make them more consistent with modern theories of learning and to exploit fully the features of Cabri II. This work was completed through small group and whole class discussions and negotiations of the opinions of all the participants in MTELN. Next, each group was given the task of writing a report of their work and publishing it in the designated dedicated virtual place (1 week for the design of learning activities and 1 week for improvements).
- **L.Unit 3:** Designing a teaching plan accompanied by a pupil work-sheet. All participants of MTELN were asked to perform this task individually while at the same time exploiting the work performed in the previous units. This work was also completed through small group and whole class discussions and negotiations of the opinions of all the participants. Next, each individual was given the task of publishing his/her own teaching plans and pupils' work-sheets in a specific dedicated virtual place. (2 weeks were needed).
- **L. Unit 4:** Actual teaching using the learning materials constructed. Assessment of teaching and learning as well as writing and publishing a final report demonstrating the work performed in the context of all learning units by each participant. Final discussions, negotiations and conclusions (3 weeks were needed).

3. DATA ANALYSIS AND DISCUSSION

The results emerging from the analysis of this 9-week experiment and from the participants' interviews gave us evidence about the following issues considered as essential for the learners commitment to the aims of the course and their ability to meet deadlines: (a) motivation about the learning subject in question, (b) trust in teacher's knowledge, (c) excitement about online learning, (d) acknowledgment of the participants' previous knowledge and professional experience, (e) encouragement to move ahead during the course, (f) a sense of belonging to a friendly and active network, (g) participation in active and collaborative learning, and (h) acknowledgement of learners' scientific needs and personal limitations. In the following section, these issues are further discussed.

- **Motivation about the learning subject in question:** Here, it is worth noting that all the participants voluntarily participated in the MTELN network because they had an interest to learn about the use of technology in their teaching practices. They also reported that their interest was reinforced by their realization of the advantages of Cabri as seen throughout the course, by watching the teacher of MTELN and other researchers derive a positive experience from using the software. Future prospects for the use of ICT in the classroom were also considered as encouraging motivation.
- **Trust in teacher's knowledge:** All participants in MTELN emphasized that their trust on their teacher's knowledge about the subject matter in question and their appreciation on her communication capabilities to create a warm and encouraging atmosphere during the course fuelled them to be committed to its time schedule and its aims.
- **Excitement in online learning:** Participation in this online course was an innovative learning approach for all the members of MTELN who expressed excitement and curiosity towards the e-learning capabilities.
- **Acknowledgement of the participants' previous knowledge and professional**

experience: Here as well, all the participants expressed that they felt appreciated and respected as professionals during the course. In fact, an attempt has been made to maintain a positive and respectful atmosphere among the participants by: (a) respecting each member of MTELN as a professional as well as a different personality, (b) acknowledging all the opinions expressed, (c) focusing on the positive points presented, (d) treating the negative points expressed by the participants as opportunities for fruitful discussions, (e) asking learners to reflect on their previous knowledge and experience, and (f) entrusting them with investigational activities while at the same time providing support and constructive feedback.

- **Encouragement to move ahead during the course:** All the participants expressed that they stayed committed to the aims of the course within its time limits due to the fact that they were encouraged to participate and move ahead. In fact, a serious attempt was made to invite all participants to participate and also move ahead towards the fulfilment of the aims of the course by: (a) assuaging their worries fears regarding the use of Computer Mediated Communication, (b) encouraging them to externalize their difficulties regarding the use of the proposed educational software in their teaching practices, (c), challenging them to focus on the positive effects of the proposed educational software in their teaching practices, (d) encouraging all participants to contribute within the network by asking each one – and especially those who remained silent - to communicate their ideas with the whole e-class, (e) externalizing the e-teacher's personal experience, including both positive experiences and negative thinking, such as fears and difficulties and how these were overcome through real practice, and (g) encouraging progress by providing constructive feedback to each participant.
- **A sense of belonging to a friendly and active network:** All the participants also expressed that their feelings of belonging in a friendly and active network helped them to be committed to the time scheduled and the aims of the course. Actually, an effort has been made for cultivation of a vital, warm and friendly atmosphere by: (a) exchanging information (in the form of text and/or images) about personal issues, family situation, job issues, (b) using informal but accurate language, (c) using humor, and being on a first name basis, (d) the teacher entering the chat-room first and welcoming each member of the network (the teacher also wishes goodbye to each member of the network and leaves the room only after all the other members have left), (e) no question or opinion being left without discussion and negotiation, (f) scheduling chat-meetings regularly (two chat-meetings per week) and (g) defining specific tasks, discussion and reflection topics each week.
- **Participation in active and collaborative learning:** In fact, the participants were encouraged to: (a) Collaborate each other by asking them to form groups during chatting and then discuss their work with the other members of each group, (b) take initiative. That means freedom in choosing both the specific topic of each learning activity and the persons to cooperate with when dealing with each activity. In addition, the participants were encouraged to share the new knowledge they acquired during the experiment to their colleagues in schools, (c) reflect and discuss about the learning activities they designed during the course as well as after their implementation in real classrooms.
- **Acknowledgement of participants scientific needs as well as their personal limitations:** Here, various scientific topics coming from the participants own needs were addressed, namely: (a) Limitations in introducing Cabri to every day educational practices in terms

of: infrastructure, curricula, educational system, good examples and personal strengths in introducing a novelty to the curriculum, (b) Absolutist and constructivist epistemological perspectives of Mathematics and the role of Cabri-tools in changing the whole context of mathematical learning including learning activities and the roles of teachers and learners, (c) Didactics of Mathematics within the context of modern social and constructivist theories of learning and the catalytic role of Cabri-tools in teaching and learning Geometry, (d) Design, realization and evaluation of a teaching event using ICT, and (e) The role of the mathematics teacher in the context of ICT as facilitator of learners encouraging them to be actively involved in their learning. The role of life-long education in both personal and professional teacher development was also acknowledged.

Finally, the participants of MTELN acknowledged the effect that cooperatively defining specific deadlines via chat-meetings had in helping them stay on track and meet course aims and deadlines. The time and the length of each chat-meeting were also tailored to suit the needs of the participants.

4. CONCLUSIONS

This study presented the role of the 'constructivist teaching experiment' methodology within the online context –where the online teacher acts as a researcher and model builder of learners' needs- in the successful formation of an e-learning network aiming at the familiarization and the introduction of the well-known educational software Cabri-Geometry II to the everyday practice of mathematics teachers in secondary schools. The theoretical background of the network was based on modern constructivist and social theories of learning. This methodology gave opportunities for the development of an open, safe, flexible and friendly communication environment where the participants' scientific and personal needs were acknowledged. Within this environment, the participants were encouraged to successfully meet the aims of the course according to the time limits established. The data emerging from this experiment demonstrated that, through the participants' eyes, the time issue within an online learning environment is situated within the whole learning context and it is influenced by various factors such as: (a) motivation about the learning subject in question, (b) trust in teacher's knowledge, (c) excitement in online learning, (d) acknowledgment of the participants' previous knowledge and professional experience, (e) encouragement to move ahead during the course, (f) a sense of belonging to a friendly and active network, (g) participation in active and collaborative learning, and (h) acknowledgement of learners' scientific needs and personal limitations. However, due to the fact that the sample of participants in this study was limited, further studies with bigger number of subjects are needed to validate the role of the aforementioned methodology to estimate and overcome time issues within the online context.

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