COMPUTERIZED COLLABORATIVE LEARNING - HOW TO PREPARE PRE-SERVICE STUDENT TEACHERS!

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Abstract

Computerized Collaborative Learning (CCL) is a collaborative dialogue between learners to achieve a product through reconstructing knowledge for the production of a jointly cognitive outcome using various services of Information Communication Technologies (ICT) tools. This study examines the nature of the added pedagogical value of the use of CCL in the training of pre-service teachers. The study took place in different higher educational institutes in Israel during the years 2010- 2012, and reflects the views and perceptions of the student teachers toward the effectiveness of CCL from the cognitive, social and emotional perspectives. It scrutinizes the CCL experience in an Online and face-to-face (F2F) courses and takes into account the learners' difficulties in CCL, the instructor role and the preferred use of CCL tools among the participants.

Introduction

In the last decade, "Collaborative Learning" (CL) got a pedagogical focus and came to the attention of researchers, in part because it is a socio-cultural and inter-personal process that encourages active, meaningful learning based on inter-personal relationships. Reconstructing knowledge requires social interactions between individuals, and cognitive processes within the individual. This interaction between students and their mutual support, increases learning and improves student performance (Guri-Rosenblit, 2009). According to Levy (2007), social interaction starts with a partial agreement between group members. Therefore, team members proceed in completing the given collaborative task by avoiding arguing in order not to hinder their progress in performing the task.

A growing interest in social learning/teaching environments has been computerized learning. This concept is based on the assumption that knowledge is better acquired by the personal and active building of information. The integration of diverse knowledge sources along with social interaction enhances the meaning we give to learning that is created by negotiation (McNamara & Brown, 2008; Salmon, 2004; Tinto, 1998). These learning environments have become more common because of the development of online infrastructure and information stores; shared media and processing; and the publication and storage of information. This infrastructure has led to forming many collective knowledge environments that operate naturally throughout the network.

Computerized Collaborative Learning (CCL) is defined as a dialogue and collaboration between learners for achieving an agreed upon objective through reconstructing knowledge for the production of joint cognitive outcomes by intelligent use of the various ICT tools (Whatley et al., 2008). The learning process can be conducted at various levels of collaboration: within a class, between classes and between different institutions. Working with a computer-based task allows for the development of cognitive skills, both personal and social, as well as ICT skills, such as data handling and evaluation. CCL environments require advanced technological skill to support CL starting with the cognitive principles of planning, sharing and distribution of knowledge. All this is accomplished through encouragement and the support of the learning community (Lara, 2003).

In the era of ICT development, one can easily communicate using online learning sites and integrate with a wide range of tools that support collaborative learning, such as forums, announcements, blogs, wikis, chat, conceptual maps and others, in addition to online learning sessions, with audio and video capabilities (Alavi & Gallupe, 2003). The CCL tools allow us to edit, communicate, and send feedback to other colleagues in similar learning communities (Herwing et al., 2007). In a collaborative learning setting, there must be good communication between all members. Therefore, by a good communication the group can construct a thorough full knowledge and provide a more coherent and sophisticated clarifications.

Social interaction between participants in an online environment also creates an important sense of belonging (Rovai, 2002). Social presence in CCL environments is related positively to the perception of the learning and to the satisfaction of the learner. Positive meaningful feedback from instructors and colleagues increase the willingness of students to take part in a more meaningful, cooperative learning method (Miura & Yamashita, 2007; Trevino, 2005).

The *Web 2 era* is characterized by the development of a wide range of computer-based tools that allow collaboration, independent content creation and web applications that were individually built and privately used (Herwing et al., 2007). Many of the tools have significant pedagogical potential, related to the personal aspects of the participants involved in the process of teaching and learning. These tools will help strengthen the personal commitment to the learning group and will help develop relations between the learners about learning issues and will deepen the ties between them and the teachers/moderators in different educational fields. Richardson (2009) notes, that the considerable use of Web 2 has changed Internet use in the last decade. It has changed the perception of people's use of the Internet and methods of organizing information. Many of the tools allow for continuous tracking of the progress of the learners, allowing a more precise estimate of the individual's contribution to the group and the group's contribution to the collective learning; hence it allows evaluation of the learning process and not just the final product.

We believe that in CCL tasks, students are committed to the learning process. Personal involvement over time will help in constructing the knowledge to be learned and therefore result in achieving higher thinking skills. This study aims to examine the nature of the added pedagogical value of the use of computerized tools in the training of pre-service teachers. The study took place in different educational institutions, and reflects the views and opinions of the student teachers enrolled in higher education institutions toward CCL.

The goals of the research were to: obtain a clear and accurate picture about how collaborative learning and pedagogical content contribute to the evaluation of the effectiveness of CCL; allow the characterization of CCL processes; and offer practical recommendations for the application methods of these tools in teaching and learning in student teacher education programs. More specifically, they were to:

- Assess the effectiveness of CCL - from the cognitive, social and emotional aspects.
- Examine how students perceive the role of the lecturer / facilitator in CCL.
- Inspect whether student teacher prefer to use a specific tool in CCL.
- Examine the significance of the experience with CCL versus learning face-to-face.

One of the new aspects in the current study is the CCL application, in terms of group formation, task subject's allocation, and students' choice of the CL tools of their choice to work with. Researching this type of learning that occurs in such an electronic environment has become increasingly important in helping us understand the most effective ways of using online technologies in teacher education programs.

Methodology

The present study was carried out during the years 2010- 2012 using a quantitative research approach. The quantitative data included a survey of attitudes towards CCL using an online questionnaire.

Sample.
The sample consists of 4 different groups from 10 different higher educational institutes in Israel and it includes 128 participants 99 women (77%) and 29 men (23%). The participants' ages ranged from 19 to 53, mean age was 27.82 years.

Group A (*n=31; female= 71%, male= 29%*): Students from Institution A, enrolled in a traditional F2F course. Three weeks into the course students were given a collaborative task that was due in five weeks. All groups were assigned the same task by the instructor, they were asked to form 6 groups of 5 students each (one group consisted of 6 students). Each group chose a subject matter to prepare their computerized learning unit, using one collaborative tool. At the end

of the fifth week, the groups were asked to present their learning unit in class in 25 minutes. Presentations included their method of communication with elaboration including the advocates, obstacles encountered while working on the task and using the computerized tool, interesting aspects and advantages using the computerized tool, justification of the group members for their computerized tool choice.

Group B (*n=27; female= 63%, male=27%*): Students from institution B enrolled in a traditional F2F course. First five weeks students did not get acquainted with each other. After the fifth meeting, students were asked to select a topic from a list of five related to scientific articles. The task was to analyze the article. For each topic five students were allocated according to the choice they made. The two students that were left unaffiliated they were asked to freely join different groups. Group members were asked to work remotely on the article they chose. They had to choose a collaborative tool to work with: forums, wiki, blogs, Google Docs, social network, and emails. Each group was asked to make a presentation of 20 minutes including their role assignment, method of communication, and their learning process.

Group C (*n=50; female= 86%, male=14%):* Students from institution C, formed two courses (N_1=23, N_2=27). First four meetings students were exposed to the theoretical principals of CL method. Later on they were assigned a collaborative task that was due in five weeks. They consulted with their instructors all along. In both courses students were divided by the instructor into five groups, 4 students each. In both students selected a topic and got the approval of the instructor, avoiding duplicate topics, and preparing a computerized learning unit, using one collaborative tool. The last two weeks of the course were presentation weeks; students presented their computerized learning unit in front of all students in 25 minutes using the CL tool that they chose to work with. Each student evaluated each presentation and assigned a grade (1-10).

Group D (*n=20; female= 85%, male= 15%*): A fully e-learning synchronous[1] intercollegiate course with two F2F meetings at the end of each semester, consisting of up to15 students from 8 different colleges studying together. The instructors from the different colleges taught jointly. Several working forum groups were established and the students were asked to freely join on a first sign into the forum first accepted basis. Students from the same college were not allowed to be in the same forum, therefore the group members were strangers. Assignments were given gradually; starting with individual work, and moving on to collaborative work. Students needed to communicate via computerized tools together in order to achieve their products.

Instrument.

The questionnaire consisted of three parts. The first gathered demographic data such as age, gender, and the institute. The second, the CCL section of the questionnaire, contains 50 Statements classified into five categories: (a)

evaluation of the effectiveness of CCL, (b) characterization of learners' difficulty in CCL, (c) evaluation of instructor/facilitator role perception in CCL, (d) evaluation of social interaction and reciprocal support between the learners in CCL task, and (e) CCL learning experience in an online and face-to face (F2F) courses. Responses were measured using a five-point Likert scale (1 to 5), with 1= "completely disagree" and 5= "completely agree." The third part addresses computerized collaborative tools; this section contains seven sets of statements, which are constructed according to a five-point Likert scale (1 to 5) with 1= "completely disagree" and 5= "completely agree." The statements are about students' preference for working with 9 different computerized collaborative tools such as: forum, chat, blog, Google Docs, conceptual maps, wiki, email, SMS and synchronous tools.

Procedure.
Toward the end of the semester, students in these classes were given the link to the online questionnaire and asked to fill it out and submit it. Students are enrolled in their courses toward achieving their academic degree. We chose courses that we or one of our colleagues taught and used the CCL method. These courses were described above in the sample section; the four different groups correspond to the four courses that were chosen to participate in this study.

Primary Findings and Discussion

Effectiveness of Computerized Collaborative Learning (CCL)

Findings showed that 83% of the students perceived CCL as an effective method, significant for teaching and deepening their knowledge. Ninety-five percent of the students thought that the learning time was utilized well, and that it was all due to ICT. ICT overcomes all time and geographical barriers, allowing everyone from his own location to follow and play an essential part in the progression of the task. Ninety percent of the students declared that CCL helped them better prepare for the tasks, and got them interested and more involved in the course. The fact that the collaborative tasks displayed on the course site were available not only to the instructor, but to all of the students for viewing and commenting, motivated the participants to make an extra effort to produce better work (Eshet-Alkalai & Geri, 2007; Raban, 2007). Collaboration helps construct group knowledge; therefore, it helps enrich the course content. Ninety-two percent of the students reported that newly acquired knowledge, tracking other group members' activity, collaboration in problem solving, and the option of immediate feedback, added to the self and peer evaluation of the learning process and the products.

In order to test whether there is a difference in evaluating the effectiveness of CCL between students from the different groups; a one-way analysis of variance (ANOVA) test was administered. The results were not significant with ($F(3,124) = 2.36$, $p=0.074$).
Computer-based learning not only enhances education by speeding up interaction and producing almost immediate responses, it also provides very fast information searches and retrieval that are easy methods to understand. Internet based

communication, allows students to share with others, problem solving, research and search for new communication tools, and learn a new approach to acquiring knowledge (Florea, 1999).

Learners' Difficulty in CCL

Despite the advantages, there are some disadvantages in CCL; it doesn't suite all learners and not all learning styles. Implementation of teaching / learning technologies requires technical literacy and needs additional investment to acquire the necessary technical skills (Yan, 2006).

Although most students think that CCL is very effective, 46% of the students feel that this method doesn't fit their learning styles and 31% reported that working with computerized tools requires long time investment because of their unfamiliarity with these tools and/or uncertainty of their own capabilities. Technological problems can't always be solved when needed, and this might jeopardize the interaction between the learners causing problems during the CCL process. Thirty-four percent reported that member differences (social and intellectual, level of proficiency using the ICT tools), and time coordination problems among the group members increased the problems.

The CCL method has disadvantages when applied in asynchronous[2] learning settings; problems encountered could lower the motivation of the learners, and might cause them to neglect and not to take their work seriously (Ragoonaden, 2000). Almost half of the students reported that they felt uncomfortable and ignored, when the answers to their notes were delayed. This causes confusion and discontent among students. Different researchers (Frank et al., 2003; Kreijns et al., 2003) noted that lack of control of the learning environment and of the computerized tools used in the collaborative assignments makes it difficult for the cooperation between students. This leads to difficulties in decision-making and negatively affects the quality of the CL and its final outcomes.

In order to test whether there is a difference in learners' difficulty in CCL between students from the different institutes (groups), a one-way analysis of variance (ANOVA) test was administered; the results were significant with ($F(3,124) = 6.31$, $p<0.01$). To examine the source of the difference between the groups, a Tukey test was administered. It shows that there were a significant differences between group C ($M=2.84$, $sd=0.44$) and the other groups: A ($M=2.35$, $sd=0.29$), B ($M=2.28$, $sd=0.31$), D ((M=2.16, sd=0.41). Students from group C show higher difficulty level than students from the other groups.
We can attribute the results to the fact that the students from group C were college students, and were required to perform the CCL parallel to the regular course studies, hence; causing difficulties and stress.

Instructor/Facilitator Role Perception in CCL

Instructor role has great importance due to the significant elements that s/he adds to the CCL process, facilitating and instructing throughout the whole course of

action. In this study 87% of the students indicated that the instructor helped them focus on the relevant content, and encouraged them to collaborate. Seventy-five percent of the students stated that the instructor gave significant notes, and technological assistance that satisfied them. Research shows that the instructor has a significant role in creating stimulating, supportive, computerized collaborative environments that help the students stay focused on the educational goals (Mason, 1997; Tagg, 1994). The Instructor motivates, supports, encourages leadership, provides communication skills, creates discussion, criticizes and solves problems. On the one hand 70% of the students reported comfortable feelings toward the involvement of the instructor in the group discussions, and on the other hand 80% reported that they invested extra time and effort in their work to avoid criticism from the instructor. Tagg (1994) adds that the instructor should be responsible for the content material in CCL, deleting the irrelevant content and redirecting to achieve the educational goals. Only 55% of the students think that the lecturer assessment of each student in the CCL was accurate.

In order to test whether there is a difference in evaluating the instructor role in CCL between students from the different groups, a one-way analysis of variance (ANOVA) test was administered; the results were significant with ($F(3,124) = 7.18$, $p>0.01$). Despite the significant difference in the instructor role perception in CCL between the groups, Tukey test show that students from group C ($M=4.39$, $SD=0.37$) and group A ($M=4.38$, $SD=0.44$) attribute higher importance to the instructor involvement than the other groups B & D; where in the later there was no significance difference in their Instructor role perception. Students from groups A & C learn in a F2F setting; hence, they meet the instructor on a weekly basis, and have the opportunity to discuss their progress in person.

Social Interaction and Reciprocal Support Between the Learners in CCL Task

In regards to the social emotional aspect, 74% of the students indicated that the contribution of CCL is great, and they enjoyed working on their CCL tasks. Over 90% felt that CCL empowers them, and strengthens their feeling of responsibility toward self-learning and helps them participate as an effective group member. Despite the fact that they are geographically separated, 85% of the students indicated that CCL assisted them in making new contacts with other students in the course. Seventy-four percent of the students indicated that role distribution among the group members was clear; they worked as a group, and developed learning activities that promoted interaction and collaboration. CCL provides accessibility to information and the activities of the group members, which allows an increase in collaboration between the students and the instructor (Ragoonaden, 2000; Royer, 1997). In order to perform CCL tasks effectively, a higher level of commitment is required of the group members. Findings show that only 54% of the students perceived the commitment level of their colleagues as high, compared to 32% that perceived it as medium, and 14% perceived it as low. These perceptions were formulated as a result of the lack of communication and the poor feedback they received.

In order to test whether there is a difference in social interaction and reciprocal support in CCL between students from the different groups, a one-way analysis of variance (ANOVA) test with Tukey's was used; the results were significant with ($F(3,124) = 2.52$, $p<0.01$). The four groups assist highly positive the social interaction and the mutual support between the learners in CCL. No significant differences were found between group A (M=4.35, SD=0.33) and group C (M=4.3, SD=0.32), neither between group B (M=3.84, SD=0.35) and group D (M=3.81, SD=0.30). However there was a significant difference between groups A, C vs. groups B, D. Students from groups A, C learn in a F2F setting; hence, they meet each other on a weekly basis, and have the opportunity to discuss their progress in person. This opportunity is not available for groups B and D. People's natures are diverse; researchers (Florea, 1999; Ragoonaden, 2000; Schutte, 1996) found that independent students, who prefer to work individually, feel that the CCL agitates their working schedule and prefer to finish their tasks without being dependent on others.

CCL Learning Experience in an Online & Face-to-Face (F2F) courses

In this study the CCL tasks were performed in different ways, two of the tasks in groups A and C were part of a F2F course in order to examine the usefulness and convenience of the method. Most of the students (79%) find that CCL method is fun and challenging.

In order to test whether there is a different experience in CCL; between F2F and online students from the different groups, a one-way analysis of variance (ANOVA) test was administered; the results were not significant with ($F(3,124) = 1.75$, $p=0.161$). Schutte (1996) found that the CCL setting was more useful and effective and produced better results among students. However, some of the students in this study have reservation about the CCL in an online setting, because they are more accustomed and familiar to F2F Courses.

Preference Use of CCL Tool Among Student Teachers

The findings show that forums (M=4.84), emails (M=4.82) and Google documents (M=4.35) are the most popular tools to work with among students; all students agreed that these tools are easy and less complicated with minimal technological problems, allowing them to communicate better with their colleagues. SMS, synchronous tools and chat, were ranked next. Students indicated that updating contents and adding comments in these tools is easy and comfortable. Blogs, wikis and mind maps were ranked the lowest; they required knowledge and familiarity. In addition, technical problems were encountered. For the CCL project, findings show that the Google documents (M=4.69) was the most popular application to be used. 91% preferred to use it for the collaborative work. Wiki was ranked 7th with 67% (M=3.32), and Blogs was ranked last with 61% (M=3.01).

Summary

The current study inspected how students in education perceive CCL using different learning approaches. It examined different aspects of CCL among the students: Effectiveness, Learners difficulties, Instructor/Facilitator role, Social interaction, and the CCL learning experience in courses.

Several CCL methods were inspected based on the computerized tools used. The study results show that most of the students express positive attitudes towards CCL. It is perceived as an effective experience, a rich and enjoyable learning method that allows for greater accomplishments.

Findings show that presenting the individual student's products or the group products to their colleagues in CCL environment, could improve the product quality, and empower the student's learning performance. Contrary to the claim that Distance Learning decreases social interaction, findings show that CCL empowers social interaction between students of diverse backgrounds. The social interaction, and the mutual support between the students, increases learning and improve student performance.

With the freedom of choice, students prefer a computerized tool that allows simple interaction, with minimum technological difficulties in term of writing and editing contents such as Forums and emails. All students agreed that these tools are easy and less complicated with minimal technological problems and allows them to communicate better with their colleagues. Wiki was the least chosen tool for the CCL task, despite the fact that the wiki is defined as the tool for computerized collaboration. Students from the four different preferred to use forum, email, and Google Docs. This could be due to the unfriendly editors available in some of the wikis.

Students accept positively the presence of the instructor in their learning processes. On the one hand s/he facilitates the process, and on the other hand s/he motivates the students to invest extra time and effort in their work, in order to avoid negative comments. Students who performed the CCL task along with their regular classes and met with their instructors weekly, reported a higher level of communication within the group members, and attribute more importance to the instructor role in the group discussion.

Creating meaningful collaborative learning in an online environment entails sizable efforts of instructors in planning and moderating the discussions, and the interactions among the learners (Salmon, 2004). The experience students gain and report when working within a CCL setting, makes all the efforts worthwhile.

Notes

1. Synchronous: Synchronous online classes are those that require students and instructors to be online at the same time. Lectures, discussions, and

presentations occur at a specific hour. All students must be online at that specific hour in order to participate.

2. Asynchronous: classes are just the opposite Synchronous online classes. Instructors provide materials, lectures, tests, and assignments that can be accessed at any time. Students may be given a timeframe – usually a one week window – during which they need to connect at least once or twice. But overall, students are free to contribute whenever they choose

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