



The Necessity and Relevance of Mobile Computer-Supported Collaborative Learning (mCSCL): A Review

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ABSTRACT

Mobile learning (M-Learning) is a new and current flexible learning landscape which involves the use of mobile devices such as Personal Digital Assistant (PDAs), Mobile Phones and Smartphones to learn at anytime and at any location. M-Learning is currently being adopted worldwide in both academia and industry. The inclusion of social/collaborative learning in mobile learning is of utmost and vital importance due to its benefits and contributing factors to education/learning efficiency and sustainability. Through literature review and related work, this paper presents and discusses the benefits and challenges involved in Mobile Computer-Supported Collaborative Learning (mCSCL) and also outlines its necessity as an adoptable educational objective for training and tertiary institutions in Ghana and worldwide.

Keywords: *Mobile, Computer-Supported, Collaborative Learning, mCSCL, Mobile Device, Face-to-Face (FTF)*

1. INTRODUCTION

There is a saying that “Knowledge which is shared is better”. Social and collaborative learning improve pedagogy and are very important aspects of education. Social and collaborative learning need to be considered as priorities for inclusion in any mode of education. Social and collaborative learning is student-centred and involves a task-based and activity-based approach that collaboratively provides several advantages such as: communication, interpersonal and social co-operation, sharing, caring, openness, creativity, management, practicality, responsibility, involvement and participation [1].

Collaborative learning is a group-based learning approach in which learners are mutually engaged in a coordinated fashion to achieve a learning goal or complete a learning task [2, 3]. Collaboration technologies are typically used to support group collaboration; however, they can be adapted to support collaborative learning. This nexus between collaborative learning and collaboration technology is related to computer-supported collaborative learning (CSCL), in which technology is used to support or better enable collaborative learning [3]. Proliferation of mobile devices and technology in the learning society have improved many daily life aspects of mankind and also increased engagement of learning scenarios amongst various learners globally [4]. Mobile devices are no longer used for voice communication as it was in the past. There are now universal mobile computers carried around by most students, most of the time and these mobile devices have an impact in almost every aspect of their lives, including their education in universities and

polytechnics. Newer generations of students who have lived with such technologies for the greater majority, if not all, of their lives, are passionate and dedicated users of such smart mobile devices [3]. In particular, these students enjoy the connectivity and social interaction which occur from the use of these mobile devices and prefer group-based activities [5]. However, it is up to stakeholders involving management staff and lecturers/teachers of training institutions to implement educational modes involving technology, so that learners/students can adopt technology enhanced learning or use ICT in education. Students may own mobile phones but will not use them or may not know how to use them, collaboratively and socially, to learn without an educational influence and objective from the stakeholders of training and tertiary institutions. This review paper seeks to outline how training and tertiary institutions in Ghana and worldwide can achieve this objective and uses Accra Polytechnic, Ghana to corroborate this fact in the problem formulation of the paper.

This paper is formulated as follows: after Introduction, Background of Social/Collaborative Learning Procedures are discussed in the subsection 1.1. Problem Formulation and Research Questions is presented in Section 2, followed by Research Objectives and Research Methodology in Sections 3 and 4 respectively. A Review of Related Work to this paper is discussed in section 5. Advantages/Benefits and Disadvantages of Mobile Computer-Supported Collaborative Learning (mCSCL) are discussed in Sections 6 and 7 respectively. Challenges and Discussions are presented in Section 8. Finally, Conclusion, Recommendation and Future Work of the research paper are elaborated in Section 9.



1.1 Background of Social/Collaborative Learning Procedures

Generally, *Traditional Teaching Methods* have numerous drawbacks. One of them is the fact that very often students attend a course, take notes and leave without any collaboration in the classroom due to circumstances such as lack of lecture/classroom time or the non realization of the importance of collaborative learning. Social and collaborative learning tries to solve this ineffectiveness. It is an educational method in which students work together in small groups towards a common goal [6]. The teacher acts as a coach, mentor or facilitator of the learning process. The successful achievement of the common goal is shared among all group members. The students take initiative and responsibility for learning.

Face-to-Face (FTF) collaborative learning (CL) provides a rich social and interactive learning environment to learners. With the support of a Personal Computer (PC) network, Computer Supported Collaborative Learning (CSCL) activity can enhance learners' engagement either locally or at a distant location through various computer network technologies [7]. However, PC has been designed for personal use, with the expectation that learners sit behind a computer screen. 'Natural' FTF communication has proved to be harder to obtain using solely CSCL [7]. According to [8] the weaknesses associated with PC-based collaboration can be addressed by mCSCL.

Mobility allows learners to have the physical control and interactivity in their collaborative work since they can carry the mobile device while they establish a FTF interaction. Learners can even access internet resources or communicate with another learner or expert at a distant location. Using a mobile device, learners can regain the benefits of 'natural' FTF collaboration with peers and also interact with each other. While traditional CSCL refers to PC-based collaboration for physically dispersed learners, mCSCL allows learners in FTF collaboration to enjoy computer support using mobile devices. Further advancement of mobile technologies may even open up the exciting possibilities of allowing co-located team members to interact and learn seamlessly with dispersed peers. When this happens, mobile devices can be said to be supporting the convergence of distance collaborative learning with FTF collaborative learning [7]. In particular, mobile learning devices would be supporting learners to act in the physical world, access symbolic internet resources, capture learning experiences, and interact with others locally and at a distance [7].

2. PROBLEM FORMULATION AND RESEARCH QUESTIONS

Sequel to the proliferations and rapid advances of various categories of mobile devices, the well known and still adopted mode of education is the traditional mode. The traditional mode of education, in which an instructor conveys knowledge to a group of learners within limited time, is a common form of teaching despite its limitations [3]. One significant limitation of a lecture or teaching scenario involved in traditional mode of education is that students are passively engaged in learning.

Admission statistics for various tertiary institutions are quite high especially in developing nations, due to the small number of tertiary institutions not meeting the current demands of people seeking access to education. For example, the current admission statistics of a training/tertiary institution in Ghana such as Accra Polytechnic, Ghana [9] shows that the admission rate is with high numbers and academically difficult for one teacher/lecturer to handle. In such a situation, the productivity of traditional education should be enhanced with another educational mode such as mobile learning and to improve learning scenarios in mobile learning, collaborative groups should be formed which will eventually introduce Mobile Computer-Supported Collaborative Learning (mCSCL).

In various training and tertiary institutions, promotion of higher-order thinking through traditional mode of education is very minimal unless there are learning extensions such as a whole class discussion or analysis of case studies. However, interaction and participations of all learners in classes with very high numbers cannot be 100% doable [3]. Collaborative learning in the traditional mode of education is time consuming typically feasible within the short time frame of a lecture [3]. An example is, "think/pair/share", in which students summarise the lecture material to another student sitting next to them and then to the entire class [10].

A technology-driven example of collaborative learning through mobile devices is a system which can be used to poll the audience, colloquially known as "clickers" or more formally as personal response systems, classroom response systems, student response systems, audience response systems, or class communication systems [11, 12, 13] cited by [3]. Clickers are small mobile devices used by students to respond to a multiple-choice question posed by the lecturer/instructor/teacher. They can be used to better engage students in lectures [14]; however, they do not inherently promote higher-order thinking skills [3].



2.1 Research Questions

The two main research questions of this paper are as follows:

- i. What has to be done to implement mCSCL in training and tertiary institutions in order to improve productivity of education through ICT and/or computing technology?
- ii. What will be the pedagogical implications if mCSCL are implemented in a training and tertiary institution?

3. RESEARCH OBJECTIVE

The main objective of this review paper is to outline the necessity of mCSCL as an adoptable educational objective for training and tertiary institutions in Ghana and worldwide.

4. RESEARCH METHODOLOGY

- **Literature Review:** The author adopted integrated and exploratory literature and related work about mobile learning, social/collaborative learning systems as well as mobile devices.

5. REVIEW OF RELATED WORK

In [3] discussions are presented on the issue that an important aspect of education is to promote higher-order thinking skills to learners and the fact that in the lecture environment, learners are passively engaged and it is unlikely that higher-order thinking will occur. [3] further discuss that, although interventions such as “clickers” can be used to increase engagement in lectures, this does not necessarily promote higher-order thinking. Approaches such as collaborative learning are better suited for this but there is little room to use such methods in the short time frame of a lecture. With recent advances in the capabilities of smart mobile devices and their growing penetration rate among the student cohort, it is possible to take advantage of these devices to design a system to promote higher-order thinking skills in the lecture environment. A presentation of the design of a mobile-app-based collaborative learning system named *myVote* and the process for its usage is elaborated in [3].

In [15] discussions are presented on how placing students in a group and assigning them a task does not guarantee that the students will engage in effective collaborative learning behavior. A collaborative learning model that is described in [15] identifies the specific

characteristics exhibited by effective collaborative learning teams, and based on these characteristics, suggests strategies for promoting effective peer interaction. The model in [15] is designed to help an intelligent collaborative learning system recognize and target group interaction problem areas. Once targeted, the system can take actions to help students collaborate more effectively with their peers, maximizing individual student and group learning.

6. ADVANTAGES/BENEFITS OF MOBILE COMPUTER-SUPPORTED COLLABORATIVE LEARNING (mCSCL)

Collaborative learning, which is done through mobile devices of learners, can simply be referred to as mCSCL. Collaborative learning is an umbrella term that covers a range of approaches in which learners achieve an academic goal together [3]. It is a shift from traditional teacher-centered approaches to contemporary learning approaches, including student-centered, social learning, active learning, and constructivism [3].

mCSCL allows collaborative learning to occur ubiquitously and therefore has advantages over collaboration in a traditional educational mode. Notable advantages of mCSCL include:

- Avoidance of traveling risks since learning through collaboration can occur anytime and anywhere and is not bound to a particular location of all participants in the collaboration.
- Collaboration is enhanced through technology and many computer-oriented (response and communication systems) collaborative activities can easily be included in the collaborative learning process.
- There is the convenience of group study location and communication. Apart from risk in travelling, learners are comfortable in collaborating and learning through mobile devices at home or at a convenient location.
- Pedagogy of teachers is improved through mobile learning and further improved through collaboration.
- Money and time issues are saved by learners and teachers because of the ubiquitous nature of mCSCL.

Figure 1, depicts a simple scenario of mCSCL in which there are 4 mobile collaborative learning groups all connected to a teacher/lecturer/instructor who facilitates the collaborative learning through Group leaders and students/learners.

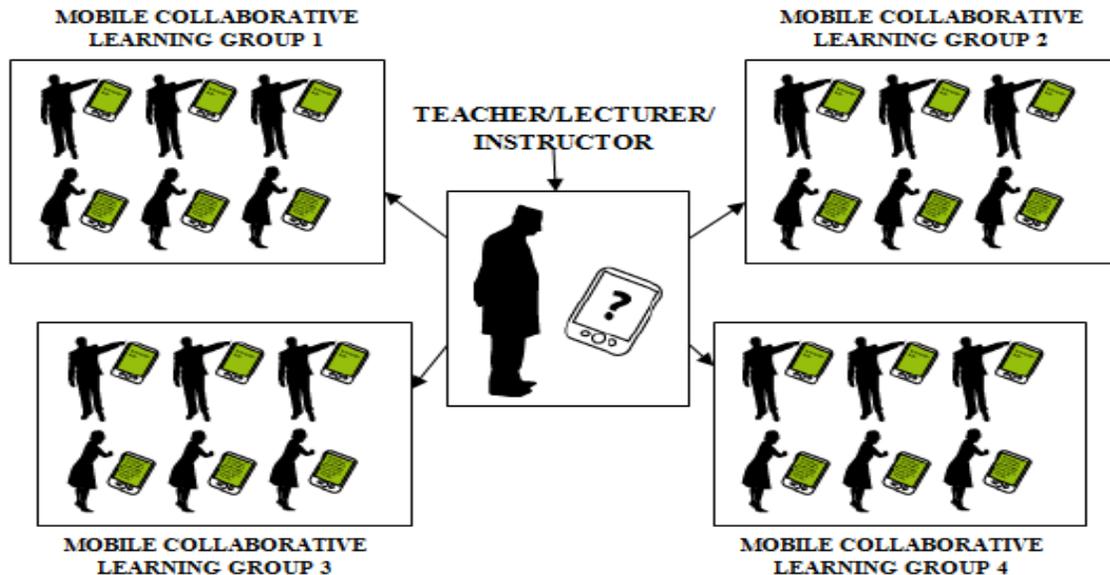


Figure 1: Mobile Computer-Supported Collaborative Learning (mCSCL)

7. DISADVANTAGES OF MOBILE COMPUTER-SUPPORTED COLLABORATIVE LEARNING (mCSCL)

Some notable disadvantages of mCSCL are elaborated below:

- mCSCL is a step further to mobile learning and involves technology and collaboration skills of students so implementation isn't easy.
- Without the right and appropriate technology of both devices and network platforms involved in mCSCL, success of mCSCL is unattainable.
- The right and appropriate technology for successful mCSCL implementation requires a substantial amount of capital which may be difficult to obtain especially for training institutions in rural areas and developing nations.
- There are pedagogical implications in mCSCL, which have to be solved for successful implementation.

8. CHALLENGES AND DISCUSSIONS

In order for training and tertiary institutions to implement mCSCL due to its necessity and benefits/advantages enumerated in section 6, overcoming the

disadvantages and pedagogical implications of mCSCL are crucial factors to be considered. Pedagogical implications such as mobile device literacy in terms of both hardware and the software, collaborative skills in mobile learning and technological issues should be dealt with positively. Pedagogically, it is the objective of mCSCL to be collaborative through participation, social grounding, collaborative learning conversation skills, performance analysis & group processing and promotive interaction [15]. When these pedagogical implications are tackled, then a smooth implementation process of mCSCL can take place and be achieved.

9. CONCLUSION, RECOMMENDATION AND FUTURE WORK

This paper presented a review of the necessity of mCSCL in training and tertiary institutions in Ghana and worldwide. Mobile Computer Collaborative Learning (mCSCL) is important, relevant and necessary with reasons stated in sections 1, 2 and 6 of this paper. For effective future work and implementation of mCSCL as discussed in section 8, all pedagogical implications have to be taken care of by the training and tertiary institutions. In order to make use of the advantages and benefits of mCSCL, this paper recommends



that all training and tertiary institutions in Ghana and worldwide should implement mCSCL as part of their educational modes to enhance productivity in the education that they offer.

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