



# Mobile collaborative learning: The role of individual learning in groups through text and video content delivery in tablets



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## ABSTRACT

Supporting mobile collaboration in education and within organizations is a challenging task. This study seeks to shed light on mobile collaborative learning (MCL) by examining the relationships between the learning process (i.e., peer-influenced learning and individual cognitive absorption) and learning impact (i.e., satisfaction, perceived understanding and performance), especially the role of individual learning in groups. The effectiveness of MCL is examined through two types of content delivery, namely video and text. A research framework was proposed that is grounded in learning and cognitive absorption (CA) theories. A set of field experiments was designed and conducted with 1131 secondary students (347 groups) to understand the MCL process and learning impact with mobile tablets in both individual and group settings. Significant differences were found between content delivery types in both individual and group learning modes in regard to how the learning process influences learning impact. Moreover, performance and satisfaction with texts is higher with mobile groups, while videos are more influential for individual learning. Lastly, the study implications and future research directions are discussed.

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## 1. Introduction

A large number of studies have recognized the crucial role of computer-supported collaborative learning (CSCL) in making learning more effective. Learning in a group provides an opportunity to acquire, share, construct meaning, and process information (Fjermestad, 2004; Miranda & Saunders, 2003). According to time, interaction and performance (TIP) theory (McGrath, 1991), the purpose of group learning is either to solve the assigned problem or to acquire special expertise, and it emphasizes temporal processes in group and task performance. To achieve this, learners are usually involved in a variety of intellectual tasks such as information sharing and social construction of meaning (Mennecke, Valacich, & Wheeler, 2000). Although numerous group research projects have been conducted in the past, studies that examine the role of individuals' in-group collaborative learning/training within mobile settings are scant. The focus of this study is therefore on understanding the effectiveness of mobile technologies in facilitating and supporting group collaborative learning, and on measuring

the performance of collaborative learning in groups, in comparison to individual learning in a mobile tablet setting.

Consistent with the increasingly high-level attention paid to in-group learning in education, educators are committed to preparing students for their later professional careers with more intensive group activities (Magni, Paolino, Cappetta, & Proserpio, 2012). Group work is regarded as a fundamental part of most jobs (Ilgen, Hollenbeck, Johnson, & Jundt, 2005), so group-based training has become an important component of management education (Franceschi, Lee, Zanakakis, & Hinds, 2009). To meet this demand, many educators use active learning pedagogies such as cooperative or team-based learning (Gomez, Wu, & Passerini, 2009, 2010). Active learning is often seen as a social and informal process in the context of higher education, whereby ideas are casually exchanged through student involvement and intellectual and interpersonal activities (Menges & Weimer, 1996). Organizations and educational institutions are moving toward a mobile training approach that can actively engage participants, due to the popularity of Bring Your Own Device (BYOD), where employees use their own devices for both personal and work situations (Harris, Patten, & Regan, 2013). In today's organizations, the volume, speed, and complexity of information and communication flow often exceed individual processing capacities (Yuan, Fulk, & Monge, 2007), which require individuals to work together to collect, analyze, and synthesize information. Educational institutions are

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increasingly offering group-based training in an attempt to tackle the challenges of working in group-based situations (e.g., ad-hoc brainstorming groups, problem solving groups, project groups, and others). What remains to be explained is how individuals perform in a group setting, while capturing various individual perceptions regarding peer influence, satisfaction and perceived understanding that takes place with mobile technologies.

According to a recent study (Shah, 2014), individuals who are involved in a group endeavor have the opportunity to activate mechanisms to resolve disagreements and internalize the explanations and arguments provided by their colleagues, through collaborative information seeking. However, simply belonging to a group does not necessarily lead to the activation of these positive processes. Group members need to activate those behaviors that foster a group environment to facilitate individual learning. This can be achieved by leveraging information exchange among group members (Hirst, Van Knippenberg, & Zhou, 2009), based on the premise that learning occurs more effectively when participants interact with their colleagues to construct new knowledge (Duffy & Kirkley, 2004). Further, individuals are better equipped to translate the sense of enjoyment derived from absorption into a value-added experience in terms of learning, thanks to the cognitive activation process of polling ideas and resources from other group members (Hirst et al., 2009). When individuals are overly absorbed in the experience itself, group learning behavior acts as a mechanism for incorporating members' different perspectives on the situation they are facing. The group learning process serves as a mechanism to enable absorbed individuals to channel their cognitive energy into an effective learning experience (Duffy & Kirkley, 2004).

While the multimedia capabilities of information technology have significantly improved, there has been a great interest in further analyzing the choice of appropriate media for educational program content, which are distinct from delivery technologies, to obtain higher learning effectiveness (Sahasrabudhe & Kanungo, 2014). There are a wide range of perspectives on the use of IT for achieving learning effectiveness, ranging from those who assert that media has no influence on learning effectiveness to those who believe that the decisions made regarding media will have a major influence on learning effectiveness. Clark (1994) has stated that media does not influence learning effectiveness, but that media choice may impact efficiency of learning in term of speed and cost. On the other hand, Kozma (1994) and Richey (2000) advocated that technology, symbol systems and processing capabilities ought to be studied for their influence on learning effectiveness. Liu, Liao, and Pratt (2009) studied the influence of different media on e-learning contents, including text and video on the user acceptance of e-learning and user concentration. They found that the richness of the content positively correlated to user concentration, but had mixed results regarding perceived usefulness. The mixed results suggest possible interactions between media choice and other variables influence not only perceived usefulness, but also the learning effectiveness of the educational program, according to the constructivist theory of learning (Piaget, 1950) which posits that learning is a process of helping learners to construct their own meanings. In addition, when learning takes place in groups, the media that is used to present learning materials to facilitate effective learning needs to be further examined (Jonassen, Peck, & Wilson, 1999).

Today common types of contents are accessed via mobile devices, including videos and texts such as pdf, audio, or video files, or a combination of these file types evidenced in e-books and online articles. Different kinds of content have the potential to support learning both through verbal and visual demonstrations that may motivate students to learn. However, both types of content, including video and text, are viewed as passive content, in which viewers are passively reactive to what they are watching (Zacks

et al., 2001). Accordingly, in this study, we introduce a mobile collaborative learning process with both video and text contents delivered through tablets, to ascertain whether the change of learning process from individuals to groups would foster more active learning.

The goal of this study is to understand the effectiveness of active and engaging learning with mobile tablets in a group setting. This is closely linked with the trend in organizations to enhance group-based training in an attempt to support individuals in being better equipped to tackle the challenges of working in group-based situations (Franceschi et al., 2009). Organizations are also asking to renew training approaches, and they are progressively orienting their preferences towards training experiences that require total immersion and engagement of the participants (Magni et al., 2012). Educational institutions are increasingly investing more resources in order to effectively train and support individuals to tackle group-based challenges and situations (e.g., ad-hoc brainstorming groups, problem-solving groups, projects groups). As such, we are motivated to design and investigate a highly absorptive engagement experience that will leverage individual intrinsic motivation in a mobile collaborative learning (MCL) environment. In doing so, we identify cognitive absorption theory as a theoretical lens to measure the states of study participants' full engagement and immersion for this study.

The rest of this article is organized as follows: following the introduction, we present the theoretical background for this study. We then propose a research framework, develop a set of research hypotheses, and describe a set of field experiments that we conducted to test the research framework and hypotheses. After presenting our data analysis results, we discuss the study findings, implications and future research directions.

## 2. Theoretical background

Currently, mobile devices have become increasingly popular, and many mobile applications have been developed to reshape teaching and learning strategies (Chen, Chang, & Wang, 2008). Mobile learning (i.e., m-learning) occurs if learners use mobile devices to obtain learning materials and to support their learning activities anytime and anywhere. Today's education is facing increased pressure to demonstrate the effectiveness of their educational effort. Improving learning and instructional effectiveness through group learning to strengthen the individual learning is the goal and aspiration of the academic community (Slavin, 2011). According to the theory of reciprocity (Bandura, 1986), humans behavior is based on situational and behavioral factors. In this study, we aim to extend knowledge regarding the role of mobile tablet devices for leveraging individual learning behaviors in a group setting through a situational factor, namely the types of content delivery type. Although many recent studies of technology-mediated learning (Cheng, 2011) have recognized the potential value of information & communication technologies (ICTs) in education, the majority of them have focused on the development of mobile ICTs and their pedagogical practices. The portability and immediate communication properties of mobile devices influence learning activities in peer interaction, resource acquirement, and content delivery (Chen et al., 2008). According to the findings of prior research (BenMoussa, 2003; Huang, Huang, & Hsieh, 2008; Triantafyllou, Georgiadou, & Economides, 2008; Huang, Jeng, & Huang, 2009), using mobile devices can support learning activities: (1) to improve communication and collaborative interactions; (2) to provide more learning opportunities for geographically dispersed persons and groups; (3) to encourage active learning; (4) to enhance learner's feedback process; (5) to emphasize time on task; and (6) to acquire content quickly.

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