



## Using online collaboration applications for group assignments: The interplay between design and human characteristics

Elizabeth Koh <sup>a,\*</sup>, John Lim <sup>b,1</sup>

<sup>a</sup> National Institute of Education, Nanyang Technological University, 1 Nanyang Walk, Singapore 637616, Singapore

<sup>b</sup> Department of Information Systems, School of Computing, National University of Singapore, 15 Computing Drive, Building 'COM2', #03–31, Singapore 117418, Singapore

### ARTICLE INFO

#### Article history:

Received 17 August 2010  
Received in revised form  
2 February 2012  
Accepted 6 February 2012

#### Keywords:

Collaborative learning  
Architectures for educational technology system  
Authoring tools and methods  
Computer-mediated communication  
Individual differences

### ABSTRACT

In recent years, educators and students are increasingly employing online collaboration applications such as Google Docs™ and PBWorks™ for group projects and assignments. Yet, the effectiveness of these emerging technologies has not been rigorously examined. Anchoring upon and informed by the existing literature, two design characteristics – sociability and visibility, and two human characteristics – gender and age, are focused on, which are salient in online collaboration applications. A field experiment was conducted to examine the direct and moderating effects of design and human characteristics on learning outcomes. The research found that sociability improved process satisfaction and positive social environment while visibility enhanced academic performance and solution satisfaction of learners. Males had higher solution satisfaction while older learners had higher academic performance. Moderating effects were also found. Both theoretical and practical implications are drawn. In particular, a rubric for online collaboration application selection for academic performance is conceived. This study provides empirical support for online collaboration application effectiveness in education which will augur well for future adoption, use and evolution.

© 2012 Elsevier Ltd. All rights reserved.

### 1. Introduction

In recent years, developments in the IT consumer industry have seen a shift from offline software to online software services. One of the forefronts of this trend is online collaboration applications such as Google Docs™, Zoho Writer™, and PBWorks™. These are based on cloud computing software services and allow the editing of documents online where each revision of the document is tracked. Educators and students are increasingly employing many of these applications for their projects and assignments (Deters, Cuthrell, & Stapleton, 2010). A report by the Joint Information Systems Committee in the U.K. documents 26 examples of online collaboration application use in higher education (Minocha, 2009). A U.S. based survey reported that 64% of students in higher education used online collaboration applications at least several times per month to connect with classmates, to study, and to work on class assignments (CDW-G, 2010).

The increasing ease of access and the reducing cost of usage have led to a widespread grassroots utilization of online collaboration applications. More importantly, these applications turn individual document creation into group workspaces in which project teams can co-author a single document. Some of these applications even add functionalities such as user profiles, group chats, task schedulers, which could potentially enhance the collaborative experience for users. Besides facilitating team-based collaboration, these applications also provide the ability for documents to be shared with other individuals. Indeed, these technological designs could allow more group interaction and enhance learning outcomes for learners (Cress & Kimmerle, 2008; Wang, 2010).

Using online collaboration applications, two design elements are conceptualized to affect learning outcomes – sociability and visibility. Sociability of the application refers to the extent that technology facilitates the emergence of a sound social space in which healthy social relationships among group members are formed, as seen in group norms, roles, and beliefs (Kreijns, Kirschner, Jochems, & van Buuren, 2007). The sociability of these technologies could embed new ways for collaborating online (Laurillard, 2009) and affect desired outcomes in education (Chou & Min, 2009). Visibility concerns the different modes of access for group workspaces. Online collaboration

\* Corresponding author. Tel.: +65 6790 3888; fax: +65 6515 1458.

E-mail addresses: [elizabeth.koh@nie.edu.sg](mailto:elizabeth.koh@nie.edu.sg) (E. Koh), [jlim@nus.edu.sg](mailto:jlim@nus.edu.sg) (J. Lim).

<sup>1</sup> Tel.: +65 6516 6773; fax: +65 6779 7365.

applications provide a private mode, i.e., viewed only by team members, and a public mode, i.e., the ability to share the workspace with other members of the public. In the public mode of visibility, the transparency of the collaboration process could affect the learner's collaboration and outcomes (Guth, 2007, pp. 61–68). Further research is needed to examine the effect of different sociability levels and visibility modes on learning outcomes.

In addition, as technology features do not exist in silos, the study will also examine learner characteristics. Gender and age are salient factors that have been examined in the literature. Besides directly affecting learning outcomes, learner characteristics interact with system design to affect outcomes (Sharda et al., 2004). Based on the theoretical frameworks of Piccoli, Ahmad, and Ives (2001) and Sharda et al. (2004), the study will examine two areas of interest, the design and human dimension on the effectiveness of online collaboration applications for education. The research question is, what is the impact of system design (sociability and visibility) and learner characteristics (gender and age) on learning outcomes? This question was empirically examined in a longitudinal field experiment utilizing two different wiki software for a group assignment with 235 undergraduates.

There are three main contributions of the research. First, the study delineates two salient design characteristics relevant to the emerging technology, online collaboration applications. Second, many existing components of literature on online collaboration applications are descriptive in nature (Hew & Cheung, 2009) and this empirical study concretely associates the adoption of this new technology to learning outcomes. Third, both theoretical and practical implications can be drawn from the research which can provide directions for researchers, educators, students and system designers. In particular, an online collaboration application selection rubric is derived from the findings. This rubric provides educators and students with guidelines on how to select online collaboration applications to enhance academic performance based on age-related needs.

The paper begins with a review of the literature on technology-mediated collaboration, learning outcomes, the design dimension, and the human dimension. Next, the research framework and hypotheses are laid out followed by the research methodology. The data analysis and results are then described. Subsequently, the empirical results are discussed followed by implications of the findings and concluding remarks.

## 2. Literature review

### 2.1. Technology-mediated collaboration and outcomes

In this day and age, technology-mediated learning has steadily diffused into the mainstream of the educational landscape. Students and educators are using ICT tools to learn and teach in one way or the other (Bruns & Humphreys, 2007, pp. 1–10; Siau, Sheng, & Nah, 2006; Wang, 2010). The effectiveness of ICT for education has been widely explored in research. Researchers have investigated several outcomes of technology-mediated collaboration and learning. For instance, Tyran and Shepherd (2001) measure both academic performance and behavior, and perceptions and attitudes in their empirical study. Academic performance measured included learning achievement and retention while perceptions and attitudes included self-esteem, motivation to learn, and attitudes toward others. In sum, salient outcomes of technology-mediated collaboration and learning include academic performance, self-reported learning, solution satisfaction, process satisfaction, and positive social environment (Bloom, 1956; Cress & Kimmerle, 2008; Kreijns, Kirschner, & Jochems, 2002; Tyran & Shepherd, 2001).

Academic performance and self-reported learning are learning outcomes of the cognitive nature. These outcomes measure the learner's basic knowledge, secondary comprehension, application, analysis, synthesis and evaluation of the subject matter (Bloom, 1956). Academic performance as graded by the educator has been commonly used in literature to measure cognitive learning outcomes. Besides objective grades, perceived cognitive learning has also been used to measure learning (Alavi, 1994).

Another important learning outcome is satisfaction. This has been widely used as a key measure of learning outcomes. Satisfaction can be evaluated on the process and the solution (Green & Taber, 1980; Ocker & Yaverbaum, 2001). Process satisfaction is the learner's attitudes, respect, and appreciation for the experience during the learning journey while solution satisfaction is the learner's attitudes, respect, and appreciation for the final outcome (Ocker & Yaverbaum, 2001; Sharda et al., 2004). The invocation of group collaboration necessitates the inclusion of outcomes involving the group and the social environment. Another key measure is the learner's ability to interact with other people and to function in groups. Rourke (2000) advocates that online collaboration requires members to trust and feel close to each other, and to sense camaraderie and comradeship before they will engage in valuable collaborative behavior. Similarly, Kreijns et al. (2007) articulate a sound social environment for online collaboration which comprises affective work relationships, strong group cohesiveness, trust, respect and belonging, satisfaction, and a strong sense of community.

In education, group assignments have been used as a method to enhance learning outcomes. Grounded in the social constructivist approach to learning (Vygotsky, 1978), learners learn as they reflect on their own experiences with other individuals. This is especially salient in the case of a group assignment where a group of learners work together to solve a problem. As learners discuss and share, they contribute different understandings that lead to new, shared knowledge and attitudes. Similarly, the social interdependency theory believes in the instructional use of small groups for learners to work together and maximize their own and each other's learning (Johnson & Johnson, 1989).

Technology-mediated collaboration is not in any way inferior to the face-to-face setting in enhancing cognitive and affective outcomes. However, a commonly held caveat among researchers and educators is that technology can enhance learning only with adequate learner and educator support. Based on past research, Piccoli et al. (2001) developed a two dimensional framework of virtual learning environment effectiveness. The research delineated a human dimension involving characteristics such as learner maturity and educator teaching style and a design dimension featuring the learning model and technology characteristics. These two dimensions were posited to directly affect the outcomes of academic performance, self-efficacy and satisfaction (Piccoli et al., 2001). Sharda et al. (2004) adapt the framework for what they term "computer-supported collaborative learning requiring immersive presence". Basically, these collaborative technologies are utilized in a laboratory setting but allow learners located at different laboratories to communicate and collaborate at the same time i.e., synchronously. The research extends the framework of Piccoli et al. (2001) by examining the psychomotor outcome of learning and also

Download English Version:

<https://daneshyari.com/en/article/348707>

Download Persian Version:

<https://daneshyari.com/article/348707>

[Daneshyari.com](https://daneshyari.com)