E–Collaboration Technologies Impact on Learning

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INTRODUCTION

Universities and corporate training facilities have been investing in information technologies (IT) to improve education and training at an increasing rate during the past decade. Many new companies as well as educational units are emerging to provide tools, services and content to enable the effective design of IT-based learning solutions (ASTD, 2004). Although research on technology-mediated learning has increased in recent years, it still lags behind developments in practice. Many predict that the biggest growth in the Internet, and the area that will prove to be one of the biggest agents of change, will be online learning, or e-learning (Bostrom, 2003). The boom in the application of technology to education and training underscores a fundamental need to understand how these technologies can be used to improve the learning process.

E-learning research has only recently attracted the attention of information system (IS) scholars, although the topic has been consistently of interest to educational researchers. In spite of the interest, research in this area has been fragmented (Alavi & Liedner, 2001; Bostrom, 2003). One of the reasons for this fragmentation is the lack of agreement on definitions and terms, especially e-learning. In this article, we focus on the definition given by Alavi and Liedner (2001)—“Technology-mediated learning (or e-learning) is defined as an environment in which the learner’s interactions with learning materials, peers, and/or instructor are mediated through advanced information technology”

Although the initial focus of e-learning in the Educational literature has been at the individual level, a review of Education literature points out that learning strategies are shifting towards a more active and group-oriented learning referred to as cooperative or collaborative learning (Alavi et al., 1995; Kelley, 1998). Collaborative learning (CL) evolved from the work of psychologists such as Johnson (1981) and Slavin et al. (1985). It refers to instructional methods that encourage students to work together to accomplish shared goals, beneficial to all. It involves social (interpersonal) processes where participants help each other to understand as well as encourage each other to work hard to promote learning (Johnson & Johnson, 1999).

CL is a versatile procedure and can be used for a variety of purposes ranging from teaching specific content to ensuring active cognitive processing of information during a lecture or demonstration (Johnson et al., 1992, 1994). CL procedures have also been found to be more effective than traditional instructional methods in promoting student learning and academic achievement (Johnson et al., 1981; Slavin et al., 1985). In a comparison of CL vis-à-vis traditional classroom learning, Education researchers found that a collaborative approach increases student involvement with the course as well as with each other, increases the level of critical & active thinking, promotes problem-solving skills and increases student satisfaction (Gupta & Bostrom, 2004).

E-collaboration technologies facilitate collaborative learning by offering a rich, shared, virtual workspace in which instructors and students can interact one-to-one, one-to-many, and many-to-many in order to learn together anytime and anyplace (Bostrom et al., 2003). These technologies can be broadly classified as asynchronous/online anywhere tools such as email, discussion databases, streaming audio/video; or synchronous/online live (real-time) tools such as instant messaging, chat, audio/video conferencing.

In spite of the growing importance of e-learning and CL, important research is lacking in collaborative learning (CEL). Most of the research in the Education literature has concentrated on face-to-face forms of collaboration or using minimal technology to support it. With advances in information systems, there have
been rapid advances in distance learning and virtual
team learning. Greater amount of learning is now done
using synchronous or asynchronous technology than
ever before and there is a need to understand this phe-
omenon in detail. Finally, the research is lacking good
grounding in theory and has focused on input-output
models rather than focusing on the process involved
in attaining the learning outcomes.

In this article, we first review the IS and Education
literature. Next, we identify the primary reasons for the
inconsistency in findings in both literatures. Finally,
we present a theoretical model for investigating col-
laborative e-learning. The conclusion section briefly
provides directions for future research.

BACKGROUND

E-collaboration technologies are broadly defined as
electronic technologies that enable co Research in col-
laborative e-learning (CEL) has two strong reference
disciplines: IS and Education. As mentioned earlier, IS
e-learning research has been very limited especially in
the CEL area, with only a limited set of chapters focused
on CEL. The empirical research in IS stems from the
long tradition of Group Support System (GSS), an early
e-collaboration technology, research with its focus on
process gains/process losses in collaborative settings.
Some studies have explored the use of GSS to foster
case discussions in a traditional classroom (Hashaim,
Rathnam, & Whinston, 1991; Leidner & Fuller, 1997).
Others have examined the use of GSS to enable col-
laboration in small teams of students in traditional
classes. As summarized in Table 1, some studies have
reported a positive effect of e-collaboration technolo-
gies (Alavi, 1994; Drummond, Boldyreff, & Ramage,
2001), while others have not (Alavi et al., 2002; Hiltz,
Coppola, Rotter, & Turoff, 2000).

Substantial research in the area of technology sup-
ported to learning groups has been done in the area of
education. This research domain is known as computer-
supported collaborative learning or CSCL. In a recent
metareview, Lou, Abrami, and d’Apollonia (2001)
examined 122 studies for comparison between small
groups versus individual learning when students learn
using computer technology. The meta-analysis indicates
that, on average, small group learning has significantly
more positive effects than individual learning on student
individual achievement, group task performance and
several process and affective outcomes. However, the
meta-analysis pointed out a wide variation in the results
of the experiments (Lehtinen, Hakkarainen, Lipponen,
Rahikainen, & Muukkonen, 2003). Post-hoc analysis
suggests that the important structures accounting for
the variance in the outcomes were technology, task,
group and learner characteristics. For details refer to
Lou et al. (2001) and Lehtinen et al. (2003).

Given the potential and pervasiveness of computing
technology, it is important to understand the reasons
for the variance in results in both IS and education. We
highlight four important limitations:

1. Research in the area of CSCL uses both technology
   as well as collaboration to enhance learning. How-
   ever, these studies do not differentiate between
   the effect of collaboration or technology. Most of
   the studies have compared CSCL to individual
   learning without technology. To establish the
effectiveness of CSCL, studies need to analyze
   the incremental benefit of collaboration and/or
   technology.

2. Studies have been done in different contexts
   using different e-collaboration technologies
   making it impossible to compare experiments.
   The studies also do not distinguish between dif-
   ferent pedagogical ideas on how computers have
   been implemented in the learning environment.
   In addition, most of instructional technology
   research in Education has focused on content-
delivery, designed for individuals, whereas, most
IS research has focused on technology to support
   collaboration, not content-delivery. In a typically
   education study, two-person team would sit around
   computer system going through content together.
   We are starting to see much richer blended tech-
   nologies environments being used but there is
   little research on these new environments.

3. There has been a lack of well-controlled experi-
   ments hampering internal validity of results. Only
   a few longitudinal studies have been conducted.
   Studies are also limited in the number of partici-
   pants and amount of content covered. Most of the
   studies described the systems and conditions as
   well as the participants’ conversation processes
   but presented no data on learning outcomes.
   Education researchers also point out the variance
   in results that exists in these studies.
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