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Review article

Identifying emerging trends for implementing learning technology in special education: A state-of-the-art review of selected articles published in 2008–2012

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ABSTRACT

As electronic learning (e-learning) becomes increasingly popular in education worldwide, learning technology (LT) has been applied in various learning environments and activities to promote meaningful, efficient, and effective learning. LT has also been adopted by researchers and teacher-practitioners in the field of special education, but as yet little review-based research has been published. This review research thus carefully examined the trends of LT implementations in special education, providing a comprehensive analysis of 26 studies published in indexed journals in the past five years (2008–2012). Two research questions were addressed: (a) What are the major research aims, methodologies, and outcomes in these studies of implementing LT in the field of special education? and (b) What types of LT are mainly used with special education students, and for what kinds of students? Major findings include that examining the learning effectiveness of LT using was the most common research purpose (75%); researchers primarily relied on experimental studies (46%, 12 studies), followed by interviews and questionnaires (19%, 5 studies). Moreover, the most common use of LT was computer-assisted technology (such as web-based mentoring, educational computer games, laptop computers) in special education; studies investigating the use of LT with mentally disabled students were more than those with physically disabled ones. It is expected that the findings of this work and their implications will serve as valuable references with regard to the use of LT with special education students.

Contents

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1. Introduction

Learning technology (LT) refers to a wide range of technologies that can be used to support learning, teaching and assessment in education (Jonassen, 2004; Liu, Liu, & Hwang, 2011; Liu, 2008; Rushby & Seabrook, 2008; Tsai & Hwang, 2013). As electronic learning (e-learning) becomes increasingly popular, LT has been widely accepted and applied into many learning environments and activities (e.g., Chen, Shih, & Liu, 2013; Chiu & Liu, 2013; Evans, 2008; Liu, Lo, & Wang, 2013; Spence & Liu, 2013; Sun, Tsai, Finger, Chen, & Yeh, 2008; Yesilyurt, 2011). These developments have prompted educators and researchers to develop a number of educational applications for LT to improve both teaching practices and learning outcomes.

Recently, LT has also been applied in the field of special education, and both teachers and students claim that it not only helps improve academic achievement, but also makes learning activities easier (Chiang & Jacobs, 2010). Two literature reviews (Fitzgerald, Koury, & Mitchem, 2008; Pennington, 2010) have synthesized studies of implementing LT into special education. Fitzgerald et al. (2008) reviewed the use of technology to teach students with autism spectrum disorders, while Pennington (2010) examined the literature on the effects of computer-mediated instruction on the learning outcomes of students with mild and moderate disabilities. While these two studies provide valuable information, both only focused on one type of disability, and they did not examine or categorize research trends in terms of research aims, methodologies, and outcomes. It is these gaps in the literature that the current study addresses.

Based on a literature review conducted by Wu et al. (2012), the research trends of mobile learning studies in education have been categorized into three main areas: evaluating the effectiveness of mobile learning, the design of educational activities, and users' affective responses. This categorization system was adopted in the present study to examine the research aims of the focal literature for two reasons. First, mobile learning is one kind of LT (Liu & Hwang, 2010), which is also the main focus of the present study, although the current work broadens the research area from mobile devices to all kinds of learning technology, including computer assisted technology. Second, both the earlier and the current study examine education, with the former taking a broader view, while this one only looks at the field of special education.

In sum, the aim of the current study was to identify the research directions, methods and trends in the related literature over the past five years, from 2008 to 2012. It practically provides an organized framework for researchers and teacher-practitioners planning further LT studies and activities.

1.1. Definition of learning technology

Learning technology (LT) refers to a wide range of technologies that can be used to support learning, teaching and assessment (Liu, 2008; Liu & Hwang, 2010; Rushby & Seabrook, 2008). Liu and Hwang (2010) also use this term to refer to electronic devices as well as information and communication technology (ICT) which can be used to develop new knowledge and skills in all kinds of educational fields, including special education.

Three components of the paradigm shift that has occurred in e-learning are from e-learning to mobile learning (m-learning; Hsu, Hwang, & Chang, 2013; Liu & Hwang, 2010), and then to context-aware ubiquitous learning (u-learning; Hwang, Kuo, Yin, & Chuang, 2010; Hwang, Tsai, Chu, & Kinshuk Chen, 2012; Hwang, Tsai, & Yang, 2008; Liu & Hwang, 2010). In the present study, LT will only refer to the electronic devices and ICT used in e-learning and m-learning. LT in e-learning includes computer-assisted programs, specific software and computer networks; LT in m-learning includes any mobile devices (such as smart phones, tablet PCs, iPad, iPods) which are capable of wireless communication (Kagohara et al., 2013). The reason why u-learning applications (such as QR codes, RFID, and GPS) were not examined in this work is because in the studies we examined applications of LT in u-learning have not been applied in the field of special education yet.

Different terms were used to refer to similar concept of LT. Fitzgerald et al. (2008) used the term "computer-related instruction" to indicate teaching instructions that had LT involved in. "Computer-assisted instruction (CAI)" also referred to the use of LT in teaching in Pennington's (2010) study. The current paper will refer to them as "LT".