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Is digital divide an issue for students with learning disabilities?

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ABSTRACT

The purpose of this study was to examine if digital divide exists between elementary school aged children with learning disabilities (LD) and their nondisabled peers in Taiwan. A self-reported questionnaire regarding information and communication technology (ICT) access and ICT competency, Scale of Digital Participation of Elementary School Students, designed by the authors, was used to collect data. Totally, 117 students with LD and 117 peers without disabilities were recruited in this investigation and were conducted with the questionnaire. The results indicated that there was no significant difference in the opportunities to access computers and the Internet at home and at school between children with and without LD. However, there was a significant difference found in ICT competencies between children with and without LD. Moreover, students without LD enhanced their computer competency gradually year by year, but students with LD eventually did not. The findings of this study supported the notion that mere provision of ICT access is not sufficient for children with LD to master ICT skills. A specific designed ICT instruction programs should be provided to children with LD. Finally, suggestions for future studies were also discussed.

1. Introduction

Regardless of use, the information and communication technology (ICT) has become ubiquitous. The skills needed to use ICT are becoming one of the most important life skills. With the blending of ICT into our daily life, so came the wide exploration of ICT in education (e.g. de Jong, Specht, & Koper, 2010; Huang et al., 2010; Tosun & Baris, 2011). ICT not only enhances learning, but reduces the gap in access to learning resources, especially concerning demographic factors. For example, Elen and colleagues found that students in remote villages could successfully complete social studies assignments remotely when given access to the Internet (Elen et al., 2010). Thus, ICT plays a role of the equalizer for participating in learning activities.

Due to the impact of ICT on learning, both developed and developing countries have enacted educational technology policies to quicken integration of ICT in educational environments (European Commission, 2008; NEPAD e-Africa Commission, 2003a, 2003b). The Taiwanese government is no different; Taiwan has invested lots of effort in creating a high quality e-learning environment for students by attempting to place a computer in each classroom that is Internet accessible and connected to an interactive whiteboard (Taiwan Ministry of Education, 2012).

The ICT can be very beneficial to students with disabilities, because ICT cannot only enhance learning but also allow for easier participation during learning activities. The benefits of ICT for students with disabilities might include: accessing to online course easily, working on one's own pace, learning at home, communicating with peers easily, availability of information anywhere and at any time, feeling more independent, confident and less stressed, the ability to keep up with the rest of the class, and to use materials in alternate formats (Fichten et al., 2009). For example, students with motor control difficulty (e.g., cerebral palsy) could gain access to digital libraries to read books even if students are only mobile enough to use a single switch to interact with a computer. Students with reading difficulties could get cognitive supports in comprehending e-text content (Ko, Chiang, Lin, & Chen, 2011). Therefore, learning enhanced by ICT is needed for students with disabilities.

However, a problem has been introduced alongside the adoption of ICT. Not all students have equal opportunities to access information technology. Unequal access to ICT for some students has created a digital divide. The issue of the digital divide has been explored since the1990s in relation to several factors including: demography, gender, social economic status (SES), disabilities,

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and age (Lebens, Graff, & Mayer, 2009; Martin, 2003; Mckenzie, 2007; Stoilescu & McDougall, 2011; Vicente & López, 2010; Yael & Zeev, 2006).

Persons with disabilities have fewer opportunities to access ICT. Two surveys from the early 2000s indicated that the percentage of individuals with disabilities that owned a computer or had access to the Internet was much lower than those without disabilities (Department for Education and Skills, 2001; Russell & Stafford, 2002). A survey from 2010 indicated that less than 40% of Americans with disabilities used broadband Internet connections at home while the percentage for those without disabilities was 68% (U.S. National Telecommunications and Information Administration, 2011a). Only about 35.3% of Taiwanese individuals with disabilities who are older than 12 years old surf the web (Taiwan Research, Development and Evaluation Commission, 2012). However, more than 77.6% Taiwanese individuals without disabilities who are older than 12 years old surf on the web (Taiwan Network Information Center, 2011).

Providing equipment and adaptive computer devices might increase ICT access. However, solving the access problem does not inevitably bridge the digital divide for students with disabilities. In fact, the concept of the digital divide has been extended from the difference between "haves and have-nots" (Warschauer, 2003) to inequity affecting those who lack the opportunity and skills to access ICT (Mäkinen, 2006). Digital divide which contains two issues, access and ability, is complex and dynamic (DiMaggio, Hargittai, Celeste, & Shafer, 2004; Hargittai, 2003; Latimer, 2001; Mossberger, Tolbert, & Stansbury, 2003; Stanley, 2003; van Dijk, 1999; van Dijk & Hacker, 2003; Warschauer, 2003). According to van Dijk's research (2006), the attention is shifted from physical access to skills and usage. In most developed countries, it seems that the divide of physical access is closing; whereas divide of digital skills and the use of applications remains or widens (van Dijk, 2006). In addition to ICT and Internet access, the opportunity and skills needed to use ICT should be considered when exploring the problem of the digital divide.

Learning disabilities (LD) are a group of disorders that affect the ability to acquire or use listening, speaking, concentrating, reading, writing, reasoning or math skills(Hallahan, Lloyd, Kauffman, Weiss, & Martinez, 2004). School-aged children with LD represent about 5% of students (Hallahan et al., 2004). Students with LD may have difficulties in spelling, reading fluency, and organization. There are over 80% of students with LD and related mild disabilities encounter reading difficulties (Janet & Beverly, 2009).

Using ICT to support students with learning disabilities (LD) to effectively participate in learning activities has been documented in previous studies (Anderson-Inman, Knox-Quinn, & Horney, 1996; Batorowicz, Missiuna, & Pollock, 2012; Hetzroni & Shrieber, 2004). For example, implementing the word process or visual organization software can enhance writing quality for students with writing difficulties (Hetzroni & Shrieber, 2004). Utilization of talking word or web-based reader programs can assist students with reading difficulties to read effectively (Ko, Chang, Lin, & Chen, 2011). Previous studies have supported that use of ICT or adaptive software, e.g. talking word, e-reader, can enhance learning performances for students with learning disabilities. However, most studies focused on investigating the effects of using specific software on students with learning disabilities. There was no study investigating the ICT operation skills for students with learning disabilities. Since basic ICT skills are prerequisite in using software, students with LD should possess specific ICT skills before using adaptive software.

Previous studies have proposed that two major barriers for students to use ICT were lacking access to computers and lack of adequate time for ICT training (Brunvand & Abadeh, 2010; Chadwick, Wesson, & Fullwood, 2013). These two barriers theoretically should not be existed for students with LD, comparing with their peers, because most of students with LD study with their peers in regular classroom and receive special education in resources room to learn basic academic skills. They access general education curriculum, including ICT skills training program, with their peer in the regular class. Therefore, for students with LD, the opportunities to access to computer and obtain ICT training should be as equal as their peer at school because of the curriculum requirements of general education standard in Taiwan. However, could we just assume that the real status of ICT access and ICT skills of students with LD are as same as their peers or not worse than their peers at least? That will be pleasing if there is no difference between children with and without LD in ICT access and ICT skills. Otherwise, we should provide appropriate interventions to remediate the problems of ICT access or ICT skills for students with LD. Since the previous research has demonstrated the effectiveness of improving the ICT skills for students with disabilities by providing specifically designed instruction. For example, learning text entry skill and basic Office skills from web-based learning system (Wu & Chen, 2012; Yeh et al., 2009), learning IE and basic skill by face to face training (Wong, Chan, Li-Tsang, & Lam, 2004; Wu & Chen, 2012). Therefore, we should seriously consider how to provide the proper instruction for students with LD if the results of this study reveal the insufficient ICT skills for students with LD.

Previous digital divide surveys seemed to overlook students with LD when gathering data on persons with disabilities (U.S. National Telecommunications and Information Administration, 2011a; Taiwan Research, Development and Evaluation Commission, 2012). It could be that limitations for students with physical or intellectual impairments are more obvious than those with learning disabilities, causing a lack of attention given to this population. Furthermore, when it comes to ICT usage, one might assume that the related skills of students with LD are similar to their nondisabled student peers. This is because most children with LD participate in general education curriculum with access to the same ICT equipment as nondisabled students. However, can equal access to ICT guarantee equality in skills acquiring for students with LD? The answer is uncertain, because the previous research literature has not explored this assumption yet.

Exploring the opportunities and skills needed by students with LD to use ICT can help educators better determine whether current information technology learning programs meet the needs of students with disabilities. Since children with LD learn their ICT skills via the same curriculum as their peers, they might learn as well as their typical developing peers. Then we do not need to regard it as an issue. On the other hand, although students with LD have the same opportunity to learn ICT skills with their nondisabled peers, they might not learn whatever was taught in the class because of their limitations on word recognition, spelling, attention, or working memory (Hallahan et al., 2004; William, 2007). Therefore, children with LD might perform poorer than their peers due to their inherent limitations. If this is the condition, educators might need to reorganize the curriculum, and to develop specific ICT curriculum to meet the special needs of children with LD.

Therefore, this study aims to investigate the two major components of digital divide, the opportunities and skills to use ICT by elementary school students with LD in Taiwan. The research questions explored include:

(1) Do students with and without LD have equal opportunities to access ICT?
(2) Do students with and without LD differ in their mastery of ICT skills?
(3) Do the ICT skills for students with LD and without LD improve as they are promoted to higher grades?