

Contents lists available at [ScienceDirect](#)

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Student rules: Exploring patterns of students' computer- efficacy and engagement with digital technologies in learning

Sarah K. Howard^{*}, Jun Ma, Jie Yang

University of Wollongong, Wollongong, 2522, NSW, Australia

ARTICLE INFO

Article history:

Received 30 November 2015

Received in revised form 20 May 2016

Accepted 21 May 2016

Available online 24 May 2016

Keywords:

Data mining

Student beliefs

Computer-efficacy

Engagement

Technology integration

ABSTRACT

Teachers' beliefs about students' engagement in and knowledge of digital technologies will affect technologically integrated learning designs. Over the past few decades, teachers have tended to feel that students were confident and engaged users of digital technologies, but there is a growing body of research challenging this assumption. Given this disparity, it is necessary to examine students' confidence and engagement using digital technologies to understand how differences may affect experiences in technologically integrated learning. However, the complexity of teaching and learning can make it difficult to isolate and study multiple factors and their effects. This paper proposes the use of data mining techniques to examine unique patterns among key factors of students' technology use and experiences related to learning, as a way to inform teachers' practice and learning design. To do this, association rules mining and fuzzy representations are used to analyze a large student questionnaire dataset ($N = 8817$). Results reveal substantially different patterns among school engagement and computer-efficacy factors between students with positive and negative engagement with digital technologies. Findings suggest implications for learning design and how teachers may attend to different experiences in technologically integrated learning and future research in this area.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Teachers' decisions about how to design learning, such as selecting teaching strategies, resources and assessments are, in part, mediated by what they *think* students will find engaging and how they *believe* students learn (Trigwell & Prosser, 2004). In regard to technology integration, two guiding beliefs have been that students are confident users of and engaged in using digital technologies; and, technology use will increase engagement in learning and improve learning outcomes (e.g. Selwyn, 2009; Thompson, 2013). However, research has shown that many students are not confident or engaged in using digital technology (e.g. Margaryan, Littlejohn, & Vojt, 2011; Wang, Hsu, Campbell, Coster, & Longhurst, 2014; Warschauer & Matuchniak, 2010). Disagreement on this point suggests a possible range of student experiences using technology, where some are engaged and others are not. It is important to understand variation in students' technology-related experiences, as misalignment between teacher and student expectations of technology use may lead to students' disengagement in learning. The purpose of this paper is to examine variations in students' confidence and engagement with digital technologies in learning and consider possible implications for teachers' learning design. A better understanding of these differences, and

^{*} Corresponding author. School of Education, Faculty of Social Sciences, University of Wollongong, Wollongong, NSW, 2522, Australia.
E-mail address: sahoward@uow.edu.au (S.K. Howard).

what they mean for learning, is needed to develop more effective and inclusive learning designs (Könings, Seidel, & van Merriënboer, 2014; Li, 2007; Skryabin, Zhang, Liu, & Zhang, 2015).

To do this, we first address teachers' perceptions of students' needs and experiences in the classroom, followed by a conceptual framework of key factors affecting students use of information and communication technologies (ICTs) in learning. Data mining techniques, association rules mining and fuzzy representation, are used in the analytic framework. Data mining techniques can provide new insight into relations among known factors of digital integration, which can build on existing knowledge (Baker, 2010). Our analysis broadly examines eight key factors of ICT use, and then focuses on ICT engagement, computer-efficacy and school engagement. Results show two distinctly different patterns among these factors, which suggest differences in students' experiences in technologically integrated learning. Implications for learning design and student support when using ICTs are discussed, as well as directions for future research and model development.

2. Teachers' perceptions of students' needs

In education, there is still a strong belief that young people are able to confidently use digital technologies, and that they want to use these tools in learning. This belief has influenced how public and educational systems think about technology integration and learning (Margaryan et al., 2011; Selwyn, 2009; Thompson, 2013). It also affects how teachers select and integrate digital technologies in the classroom. However, assumptions about students' knowledge of and engagement in digital technologies can be problematic in teachers' learning designs (Philip & Garcia, 2013).

Often teachers will be motivated to select and integrate digital technologies that are perceived to be of value. In part, this value is ascribed by how much they feel it may engage students and support learning (Ertmer & Ottenbreit-Leftwich, 2010; Inan & Lowther, 2010; Kim, Kim, Lee, Spector, & DeMeester, 2013; Mumtaz, 2000). For example, Ottenbreit-Leftwich, Glazewski, Newby, and Ertmer (2010) study of teachers' perceptions of digital technologies found that teachers largely believed "technology could be used to engage and motivate students" (p. 1331). Bebell and Kay (2010) found that 83% of middle school teachers in a large-scale 1-to-1 laptop program in the United States felt traditional students' engagement in learning improved when using laptops. Further, 84% of teachers felt low achieving students were more engaged and 71% felt high achieving students were more engaged.

While there is a large amount of research considering students' use of digital technologies, further research is needed to understand their "reactions or even behaviors during learning procedures which may 'engage' them," particularly in relation to educational practices (Pellas, 2014, p. 159). In studies such as Bebell and Kay's (2010), student engagement in digital technologies has often been reported by teachers or observed by a researcher, rather than by students. However, perceptions of what students *need* in learning should relate to their experiences, beliefs and knowledge (Hughes, 2005; Koehler, Mishra, & Yahya, 2007; Könings, Seidel, Brand-Gruwel, van Merriënboer, 2014). If differences between teachers and students' expectations of *how* learning happens and *what* is being learned are too large, students will be at risk of becoming unengaged and may struggle to develop learning and thinking skills (Vermunt & Verloop, 1999).

Teachers have a high level of accuracy when judging students' academic achievement (e.g. Südkamp, Kaiser & Möller, 2012), but research has shown a disconnect between teacher and student experiences in and perceptions of learning (e.g. Könings, Seidel, Brand-Gruwel et al., 2014; Perrotta, 2013). Könings, Seidel, Brand-Gruwel et al. (2014) found that only 30% of teachers and students were in agreement about expectations of learning and what was being learned in the classroom. Moreover, not all students report the same experience or quality of learning (Ellis, Goodyear, Bluic & Ellis, 2011). Research has shown that the benefits of using digital technologies in the classroom come from teaching rather than the technology (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011; Warschauer, Zheng, Niiya, Cotten, & Farkas, 2014), so how teachers understand students' capability and experience in learning is critical for technology integration to be effective.

Therefore, while teachers may feel students are engaged in using digital technologies, basing learning design on this assumption may be risky. To effectively integrate digital technologies in learning, it is important to understanding the possible breadth of student experience using digital technologies, and question *if* and *how* digital technologies are engaging for students.

3. Factors affecting students' use and experiences

Digital technologies used in learning include, but are not exclusively, the use of laptops, smartphones and tablets, various software packages, online resources, etc. (e.g. Inan & Lowther, 2010; Thompson, 2013). In regard to young people's actual use of digital technologies, research has shown that it is generally low-level (Margaryan et al., 2011; Wang et al., 2014). Personal interests and entertainment dominate use, and as a result, young people are not necessarily confident or engaged with using digital technologies to learn (Warschauer et al., 2014). In regard to learning, most students have not used digital technologies in deep and/or critical ways (e.g. Thompson, 2013; Wang et al., 2014; Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010). However, this finding is not necessarily consistent across all young people. Students from higher socio-economic backgrounds, who also often have higher levels of access, are *more likely* to have experienced using technology to support critical thinking than students of lower socio-economic background (Perrotta, 2013; Warschauer & Matuchniak, 2010). Access to digital technologies and how this translates to use of and engagement with different tools is complex (e.g. Bennett & Maton, 2010). Some studies have found positive effects on engagement in school and learning from increased access to technology in school (e.g. Bebell & Kay, 2010) and from increased use outside school (e.g. Wang et al., 2014). Yet, research has also shown

Download English Version:

<https://daneshyari.com/en/article/348161>

Download Persian Version:

<https://daneshyari.com/article/348161>

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