



Digital diversity among upper secondary students: A multilevel analysis of the relationship between cultural capital, self-efficacy, strategic use of information and digital competence



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ABSTRACT

This paper addresses digital diversity among upper secondary students. Since 2006 digital skills and competence has been embedded as key competence in the Norwegian national curriculum. A sample of 593 Norwegian students from 43 upper secondary schools participated in a survey with a digital competence quiz and a self-report questionnaire. Analysis showed differences in students' digital competence and indication of digital diversity on both student and school level. A multilevel analysis reveals that cultural capital, language integration at home, self-efficacy, strategic use of information and average grades of the students predict 20% of the variation in students' digital competence score and 49% of the variation between schools' average digital competence score.

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1. Introduction

During the last decade, information and communication technology (ICT) has played an important role at work and in leisure activities (CERI & OECD, 2010). Currently, there are many initiatives, e.g. in Australia, Estonia, Hong Kong, Japan, Korea, Norway, and the US, to define and understand how ICT can be implemented and used in learning and for educational purposes (Balanskat & Gertsch, 2010; Cha, et al., 2011; Ferrari, 2012; Law, 2008; Zhong, 2011).

The Internet has always existed for the upper secondary school students', and the term digital native is sometimes used to understand the generation growing up with technology and Internet (Boyd, 2014; Prensky, 2001). However, the term digital native does not indicate that students are automatically digitally knowledgeable, because there is a huge variation in what students are able to do with technology and what they know about technology (Hargittai, 2010). Students have to put in effort and time in order to develop their digital competence and become digitally literate (Boyd, 2014). It is therefore interesting to examine further what explains the variation in digital competence among students.

This paper addresses diversity in digital competence among upper secondary school students, and the ambition is to examine the relationship between student's digital competence, their cultural capital, strategic use of information, self-efficacy and achievements at school (see Fig. 1).

2. Perspectives

2.1. Context

Since 2006, the ability to use ICT is one of five key competencies in the Norwegian curriculum. The ability to use ICT is defined as transversal and embedded in the subject aims throughout the whole curriculum (Norwegian Directorate for Education and Training, 2012). This situation has justified investments in digital infrastructure, software and resources. Today, there is almost one computer per student in

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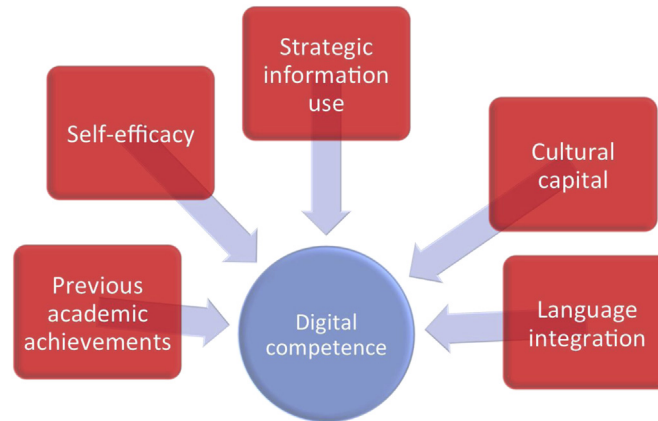


Fig. 1. A model showing digital competence as a dependent variable and self-efficacy, strategic information use, previous academic achievements, cultural capital and language integration at home as independent variables.

Norwegian upper secondary school (European Commission, 2013b), and many students have access to and use the same laptop at home and at school.

2.2. Digital competence

In order to identify what, and how, students possess, use and learn with technology, various concepts are used in the literature. For example: digital skills (Goldhammer, Naumann & Keßel, 2013; Matzat & Sadowski, 2012), digital competence (Ferrari, 2013; Hatlevik & Christophersen, 2013), and digital literacy (Aviram & Eshet-Alkalai, 2006; Gui & Argentin, 2011; Katz & Macklin, 2007). A common feature of concepts as digital competence, digital skills, and digital literacy is that they consist of the domain part, digital, in combination with a description of a knowledge perspective as for example skills or literacy.

This paper emphasizes the importance of digital competence when analysing and understanding what students are able to do with technology. The concept of digital competence a) is in alignment with the cross-national framework of digital competence (Binkley et al., 2012; Ferrari, 2013), b) is in alignment with competence aims in the Norwegian curriculum (Norwegian Directorate for Education and Training, 2012), and c) implies a broader understanding of what student's can do compared with concepts as Internet skills (Litt, 2013; Van Deursen & Van Dijk, 2009) or digital skills (Goldhammer et al., 2013; Hargittai, 2010). The latter concept deals with the technical conditions, whereas digital competence is a broader concept that contains student's understandings and critical reflections in addition to skills. A shift seems to appear from looking into technical ability to including reflection and creativity (Ala-Mutka, 2011; Calvani, Fini, Ranieri, & Picci, 2012).

This paper understands digital competence as the skills, knowledge and attitudes that make learners able to use digital media for participation, work and problem solving, independently and in collaboration with others in a critical, responsible and creative manner. This means that digital competence is more than skills as it contains knowledge and attitude. This understanding emphasizes students ability to be critical, responsible and creative in their use of technology.

Overall, this understanding of digital competence is in line with the definition from the European framework (Ferrari, 2012), the models from the 21st century skills (Binkley et al., 2012) and with the competence aims from the national curriculum (Norwegian Directorate for Education and Training, 2012).

2.3. Self-efficacy

The concept of self-efficacy captures peoples perceived expectations about their ability to solve a task or achieve a goal as an active agent (Bandura, 1997; Sáinz & Eccles, 2012). When students are confident and able to solve an assignment, they are probably more willing to focus on the task.

Some studies (Abele & Spurk, 2009; Broos & Roe, 2006; Yang & Cheng, 2009) emphasise the importance of task-specific self-efficacy. They underpin that having a more task-specific self-efficacy directed at a concrete goal can be more relevant for potential for learning and achievements compared with having more general self-efficacy not directed at a specific goal.

Previous studies show a positive correlation between performance and computer-related self-efficacy (Barbeite & Weiss, 2004; Wan, Wang, & Haggerty, 2008; Yang & Cheng, 2009). Self-efficacy is important for developing digital competence (Hatlevik, Ottestad & Throndsen, 2014; Krumsvik, 2011; Tømte, 2011) and being able to use technology in learning (Devolder, van Braak, & Tondeur, 2012; Solhaug, 2009).

2.4. Strategic information use

Previous research studies indicate that strategies for processing information can be part of student's learning strategies and therefore play an important role for how students learn (Weinstein, Husman, & Dierking, 2000). The concept learning strategies involves student's

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