

Digital Culture & Education (DCE)

Publication details, including instructions for authors
<http://www.digitalcultureandeducation.com/>

Learner antecedents of youth's beliefs
about agency and online learning

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Online Publication Date: 15th November 2017



Volume 9, Issue 2
2017

To cite this Article: Arnesen, T., Elstad, E. & Christophersen, K.T. (2017). Learner antecedents of youth's beliefs about agency and online learning. *Digital Culture & Education*, 9(2), 98-117.

URL: <http://www.digitalcultureandeducation.com/cms/wp-content/uploads/2017/11/arnesen.pdf>

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ANTECEDENTS OF YOUTH'S BELIEFS ABOUT AGENCY AND ONLINE LEARNING

Thomas Arnesen, Eyvind Elstad & Knut-Andreas Christophersen

Abstract

Developing students' digital skills and self-confidence in their ability to purposefully use online learning opportunities is considered important for achieving educational objectives. This study empirically explores antecedents of young people's beliefs about agency in online learning by applying structural equation modeling to a sample of 3400 Nordic youth age 15–17. The targeted antecedents are young people's preferences for either net-induced self-determination of learning aims, content, and processes (online culture) or institutionalized schooling as they currently experience it (school culture). We find that both factors are positively related to digital agency, but that the relationship between online culture and school culture is strongly antagonistic. Furthermore, online time in class is positively related to online culture but negatively related to school culture. We argue that formal schooling's efforts to capitalize on students' informal learning experiences through introducing more net-based activities in class might bolster digital agency through improved technical expertise (medium-related online skills), while simultaneously deprivilege institutionalized schooling and the acquisition of the substantial knowledge required for the development of content-related online skills. Students' preference constructions and beliefs regarding formal and informal learning processes are particularly significant if we are to facilitate educationally desirable synergy effects and avoid troubling inconsistencies.

Keywords: student agency, informal learning, formal learning, online culture, school culture

Introduction

Digital media are ubiquitous in the lives of Nordic youth (Roth & Erstad, 2013). Increasing portions of their lives are spent consuming, producing, and interacting with or through digital media (Westlund & Bjur, 2014). Large-scale studies show that Nordic youth are among the most digitized demographic groups in the world and that they perceive themselves as having advanced digital skills (Fraillon, Ainley, Schulz, Friedman, & Gebhardt, 2013). Engagement in participatory digital cultures (Jenkins, Purushotma, Weigel, Clinton, & Robison, 2009) can influence the way young people perceive learning and the role of formal schooling in their lives (see e.g. Loveless & Williamson, 2013), potentially altering how young people see the relationship between their informal online learning experiences and the purposes, processes, and content of formal education (Buckingham & Willett, 2013; Greenhow & Lewin, 2015). From the perspective of education, ubiquitous connectivity offers a plethora of learning opportunities beyond the scope of formal schooling. Arguably, the degree to which young people are able and willing to take advantage of these online opportunities, that is, to exercise agency in online learning, is becoming increasingly important.

Developing students' digital skills and self-confidence in their ability to purposefully use online learning opportunities is considered important for achieving educational

objectives. According to the Organisation for Economic Co-operation and Development (OECD):

Empowering youth to become full participants in today's digital public space, equipping them with the codes and tools of their technology-rich world, and encouraging them to use online learning resources – all while exploring the use of digital technologies to enhance existing education processes ... – are goals that justify the introduction of computer technology into classrooms. (2015, p. 186)

The OECD's Definition and Selection of Competencies (DeSeCo) project named the ability to use tools interactively as a psychosocial prerequisite for a successful and well-functioning life (Rychen & Salganik, 2001).

National policymakers draw on the OECD's work when drafting national curricula. As a testament to the importance attributed to developing students' digital agency, in 2006, the Norwegian government went as far as to include digital competence in the new national curriculum as a basic skill to include in all subjects at all levels (Kunnskapsdepartementet [Department of Education], 2006). Some educational technologists saw this change as an historic event: "Never before has digital competence achieved such status in curricula, neither nationally nor internationally" (Krumsvik, 2011, p. 39). The importance of developing students' digital agency is reflected in educational policy priorities both internationally and nationally.

However, there is no consensus on the factors that influence students' sense of digital agency, although daily participation in informal online culture is often presented as a necessary element. With ubiquitous connectivity, students can engage in participatory digital cultures (Jenkins et al., 2009) that "offer the potential for self-directed or spontaneous learning opportunities" (Greenhow & Lewin, 2015, p. 13). It is presumed that powerful informal pedagogies operate in these everyday participatory online cultures (Loveless & Williamson, 2013), which can empower learners through "greater agency, opportunities to participate in networked communities, and access [to] a wide range of resources to support knowledge building and collaboration" (Loveless & Williamson, 2013, p. 13).

In contrast, digital practices in formal educational contexts are often presumed to exert much less influence on students' sense of digital agency. In fact, many scholars (e.g., Buckingham & Willett, 2013) suggest that there is a widening gap between students' out-of-school digital-life worlds and students' experiences at school, that is, that there is a "digital dissonance" in which "educators and learners [are] unable to recognize the potential benefits" (Greenhow & Lewin, 2015, p. 13). Arguably, educators tend to overlook the diversity of some learners' digital experiences and instead "domesticate" (Salomon, 2016) the Internet and digital technologies to fit traditional, established approaches (Warschauer & Matuchiank, 2010). Internet use in formal contexts, therefore, can conflict with the development of innovative practices seen in some participatory online cultures (Green & Hannon, 2007). Still, the influence of participation in formal school culture can affect students' sense of digital agency in unexpected ways that either complement and expand on or conflict with and compete with the influences of participation in informal digital cultures.

The purpose of this article is to explore the factors that are associated with learners' sense of agency in online learning. We are particularly interested in how students' preferences regarding either informal online cultures (online culture) or formal school cultures (school culture) are associated with students' sense of agency in online learning and whether these preference constructions are primarily synergistically, independently, or antagonistically related to one another. In addition, we want to see how the provision

of time for online activities at school, that is, introducing access to online culture in school settings, is related to students' digital agency.

It is important to explore these issues for a number of reasons. First, an enhanced understanding can inform the design of technology-rich instructional environments in which attributes of formality and informality function synergistically, not antagonistically, in relation to fostering students' sense of digital agency. Second, understanding how the development of students' sense of digital agency is distributed among settings and ideational preference constructions is useful for pedagogical planning and practices in the digital age. Third, the findings can indicate how the current use of online access in participating schools is associated with students' sense of digital agency and thus provide a basis for problematizing the sometimes exaggerated claims of educational uses of digital technology (Selwin, 2016). Finally, the findings can inform the debate regarding equity of digital practices in school. The use of digital media for non-academic purposes at school (see e.g. Selwin, 2009) is not evenly distributed among students, and this use might influence some students more than others. This phenomenon deserves attention, and our findings shed light on how deeply entrenched students' preference constructions truly are.

Research on influences on agency in online learning

Numerous studies on information and communications technology (ICT) in education assume that students' sense of agency in learning is enhanced by the use of digital technologies. Even though student agency is typically not the research focus, the achievement of agency is presented as an assumed characteristic of self-directed activities, such as searching online, gaming, and new media practices in general. For example, Ito (2010) stated that "looking around online and fortuitous searching can be a self-directed activity that provides young people with a sense of agency" (p. 57); "these forms of gaming represent opportunities to experience collective action and to exercise agency and political will" (p. 220); and "new media practices are becoming the vehicle for some youth to exercise more agency in defining the terms of their own work practices" (p. 301).

Kumpulainen et al. (2009, p. 32) argued that in school contexts, technology can promote student agency when students are allowed to use the digital knowledge they acquire outside school for school purposes:

Outside the classroom, the students have better chances to display their own know-how, which would not necessarily come to its own in the classroom. Children learn things like the use of new technology considerably quicker than adults do, and it pays to make use of this situation by bringing laptops, cell phones, Internet tablets, and other easily usable gadgets into play. Children are also quick to learn and develop new ways of piggybacking technology, so the use of gadgets is an excellent way of highlighting children's own expertise and agency.

Kumpulainen et al. (2009) argued that the fact that young people tend to be more digitally competent than their elders can be used pedagogically to strengthen student engagement in school learning, while school learning can provide much-needed direction for students' informal online learning efforts. Similarly, Barron (2006) maintained that it is important to look within and across settings to understand which factors influence students' digital fluency. She concludes, however, that "we have little information on synergies between participation in technologically mediated informal learning activities and more formal educational environments and the conditions that make boundary-crossing activities possible" (p. 198).

In a particularly relevant empirical study, van Deursen, van Dijk, and Peters (2011) explored the effects of gender, age, attained educational level, Internet experience, and level of Internet use on medium- and content-related Internet skills. Medium-related Internet skills refer to a basic set of skills in using Internet technology (derived from concepts such as instrumental skills, technological competence, technological literacy, and technical proficiency). Content-related Internet skills refer to a capacity to use the Internet strategically as a means of reaching particular goals, such as fulfilling information needs. By analyzing medium- and content-related Internet skills separately, the authors showed that age is negatively associated with medium-related skills but is positively associated with content-related skills. Thus, regarding content, older generations perform better than youth, whereas youth outperform older users in possessing the technical skills necessary to effectively navigate the Internet. The authors also found that educational attainment seems significant for medium- and content-related Internet skills, and they commented that this finding “contrasts somewhat with other research that claims that people learn digital skills more in practice than in formal educational settings” (van Deursen et al., 2011, p. 125). Similarly, the results revealed that Internet experience contributes only to medium-related skills, as the authors found that “content-related skills do not grow with years of Internet experience and the number of hours spent online weekly” (p. 125).

Various concepts denote the ability to navigate digital and information environments for finding, evaluating, and accepting or rejecting information—for example, digital literacy, media literacy, information literacy, digital fluency, digital competence, and digital skills, among others (Miller & Bartlett, 2012). These concepts are based on definitions that in one way or another combine technical aspects, intellectual capabilities, and substantial uses of digital technologies. Although technical expertise dominated early conceptualizations, more recent definition efforts emphasized the intellectual and substantial issues. For example, van Deursen and van Dijk (2009) noted that there is not enough empirical data to validate the structures and content of various definitions of digital competences or skills. Instead, the authors highlighted four research directions:

1. Operation of digital media
2. Uses of specific media and the formal structures on which they are built (e.g., the Internet offers hyperlinks)
3. Content provided by digital media with a focus on information search behavior
4. Personal goals and benefits for using digital media, that is, strategic skills.

Van Deursen and van Dijk (2009) commented that the strategic skills for achieving personal goals and benefits have never been measured. We maintain that the fourth dimension corresponds closely with the conceptualization of student agency in online learning we use in this paper, because agency implies the strategic self- and goal-directed utilization of digital resources for specific personal purposes. The current study thus tries in a modest way to fill the research gap identified by van Deursen and van Dijk (2009) by exploring how two different student preference constructions, online culture versus school culture, as well as the time spent online in class, contribute to students’ sense of agency in online learning. To our knowledge, no one has carried out systematic empirical research on the nature of these relationships.

Background

Before we turn to the theoretical framework, a brief comment on the role of digital media in the lives of Nordic youth is necessary, along with a brief glance at some of the main features of the educational systems in Norway, Sweden, and Finland—commonly referred to as the Nordic model of education (Blossing, Imsen, & Moos, 2014).

As previously explained, digital media are ubiquitous in the lives of Nordic youth (Roth & Erstad, 2013). Increasing portions of their lives are spent consuming, producing, and interacting with or through digital media (Westlund & Bjur, 2014). Ito (2010) claimed that these tendencies are transnational and that they are associated with friendship and interest-driven genres of participation for the purpose of “hanging out,” “messaging around,” or “geeking out.” Large-scale studies show that Nordic youth are among the most digitized demographic group in the world and that they perceive themselves as having advanced digital skills (Fraillon et al., 2013). Castells (2010) coined the term “networked individualism” to describe the way social relationships are organized in the age of pervasive connectivity. With their extensive access, use, and self-confidence regarding these media, Nordic youth seem to epitomize “networked individualism.” Accordingly, “networked,” “connected,” “individualized,” and “creative” are key terms used to characterize the networked generation’s emerging digital identity (Loveless & Williamson, 2013; Rose, 1996; Selwin, 2014; Tapscott, 1999). However, research indicates that procrastination also belongs among these key characterizations pertaining to Nordic youth (Elstad, Arnesen, & Christophersen, 2016). Buckingham and Willett (2013) argued that these transnational trends may contribute to a greater convergence of youth cultures. Thus, it is likely that these trends also influence how young people perceive learning and the role of formal schooling in their lives, as well as how youth perceive the relationship between their informal online learning experiences and formal education.

The present study focuses on 15- to 17-year-olds in urban areas of Norway, Sweden, and Finland. From a European perspective, these countries form an interesting enclave, as all three represent Nordic welfare societies that emphasize strong public institutions, as well as self-determination and rights for young people. In terms of educational systems, the three countries still champion ideals of social cohesion, equal opportunity, and egalitarian values, the main tenets of the so-called Nordic model of education, at least at the rhetorical level (Blossing et al., 2014). In addition, the structural features of these societies are comparable—for example, nine or ten years of universal compulsory schooling and a relatively moderate proportion of private schools.

However, there are also notable differences between schooling in Norway, Sweden, and Finland. Finnish learners have performed within the top range of school achievement among OECD countries (though now in a slight decline), while Norwegian and Swedish learners have shown mediocre performances (OECD, 2015). Some commentators attribute this difference to the high status of teachers in Finnish society (Sahlberg, 2014), which gives Finnish teachers a stronger position of authority while conducting their work (OECD, 2015), and the correspondingly low status of teachers in Swedish and Norwegian society. Another difference is the degree to which computers are used in schools: Finnish learners use computers less frequently than Swedish or Norwegian learners (European Commission, 2013). The present study examines the age range (15–17 years) at which young people in Norway, Sweden, and Finland need to make key decisions about the type of higher education that they are going to undertake. At this stage, young people are first sorted into grades or streams, in accordance with the Nordic educational model (Antikainen, 2006). In Nordic welfare communities, upper secondary education is regarded as a right (Blossing et al., 2014), while the opportunities for 15- to 17-year-olds to enter the workplace are limited.

Despite some signs of reform, the traditional school model remains an important premise for the Nordic design of the institutional arrangement we call schooling (Blossing et al., 2014). To be effective, the traditional model depends on learner socialization; that is, the learner needs to accept, or at least adhere to, the school’s values. Arguably, this socialization, in turn, legitimizes the teacher’s authority and the

tasks that the school assigns. However, this traditional school model accommodates a continuum of differences. In Norway and Sweden, national authorities have, to a large extent, implemented a policy of promoting learners' acquisition of knowledge and skills in the academic areas covered by large-scale international surveys, for instance, by introducing national tests in these subjects (Blossing et al., 2014). Thus, these large-scale international comparative achievement studies have influenced the structure of traditional academic school subjects, such as mathematics and science, but also reading literacy. To strengthen learning results, Swedish and Norwegian authorities have asked teachers to increase the learning intensity in traditional subjects at school (Blossing et al., 2014). Therefore, the increased learning intensity and the growing importance of traditional subjects have widened the gap between learners' personal fields of interest and the content offered in schools. Some scholars (e.g., Erstad & Sefton-Green, 2013) have entertained the hope that the use of computers could bridge young learners' interests and school content. Finnish learners also experience this gap (Hakkarainen et al., 2000; Hietajärvi, Tuominen-Soini, Hakkarainen, Salmela-Aro, & Lonka, 2015), even though the Finnish educational authorities have followed a different approach than their Norwegian and Swedish counterparts (Sahlberg, 2014).

Theoretical framework

We draw upon an analytical approach that first requires constructing a model of the social relationships to be analyzed. The analytical model includes the elements we believe is important. As there is no established consensus on the explanatory frameworks or social mechanisms that account for students' sense of agency in online learning, our theoretical framework consists of what we consider plausible factors and salient relationships based on theoretical presumptions, previous research, and professional experience. The target of analysis then becomes the structural equation model (SEM) that we construct, not the reality that the model is intended to explain.

The model we use is shown in Figure 1, and it includes the following six constructs:

1. Time spent online at school, that is, the time students report that they spend online during an average school day.
2. School culture, that is, a student preference construction characterized by the acceptance of institutionalized schooling as students currently experience it.
3. Online culture, that is, a student preference construction characterized by an emphasis on self-determination in learning content, processes, and aims induced by online access and experience.
4. Agency in online learning, that is, students' experiences of being able to use online resources in a goal-directed manner to achieve learning goals.
5. Attitudes, that is, students' views regarding which of the two learning arenas (school or online) is most conducive for developing good attitudes, such as honesty and respect for others.
6. School associations, that is, students' views regarding the extent to which students associate their schooling with engaged participation and meaningful content, for example.

In Figure 1, the arrows indicate expectations of relationships, while the double-headed arrows suggest indeterminate associations.

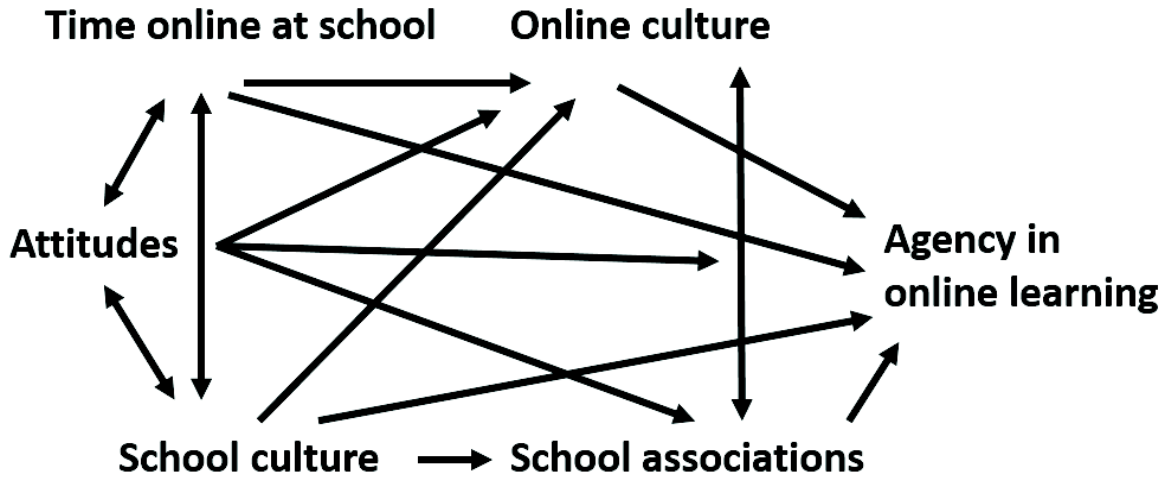


Figure 1. Theoretical model of the antecedents of agency in online learning.

Our main line of exploration, however, concerns the targeted antecedents for agency in online learning, namely, school culture, online culture, and time online at school, as shown in Figure 2.

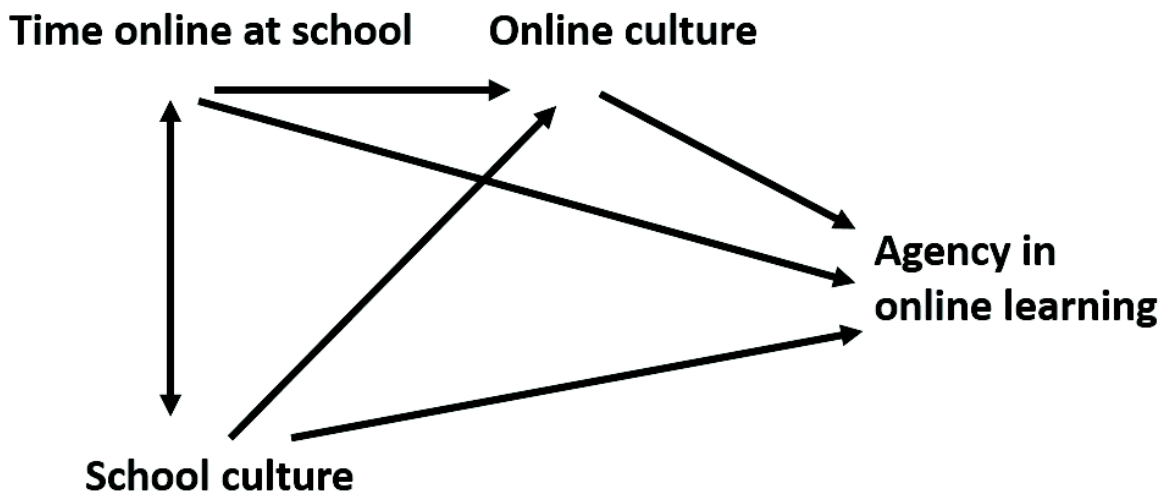


Figure 2. Theoretical model of primary antecedents of agency in online learning.

The relationships between attitudes and school associations and the other constructs are of secondary concern in this paper (see Figure 3). Their main function here is the extent to which the empirical associations support or contradict the main line of exploration concerning the targeted antecedents for agency in online learning. Thus, in addition to being an integral part of the overall model, the relationships between attitudes and school associations and the other constructs also are means of validation.

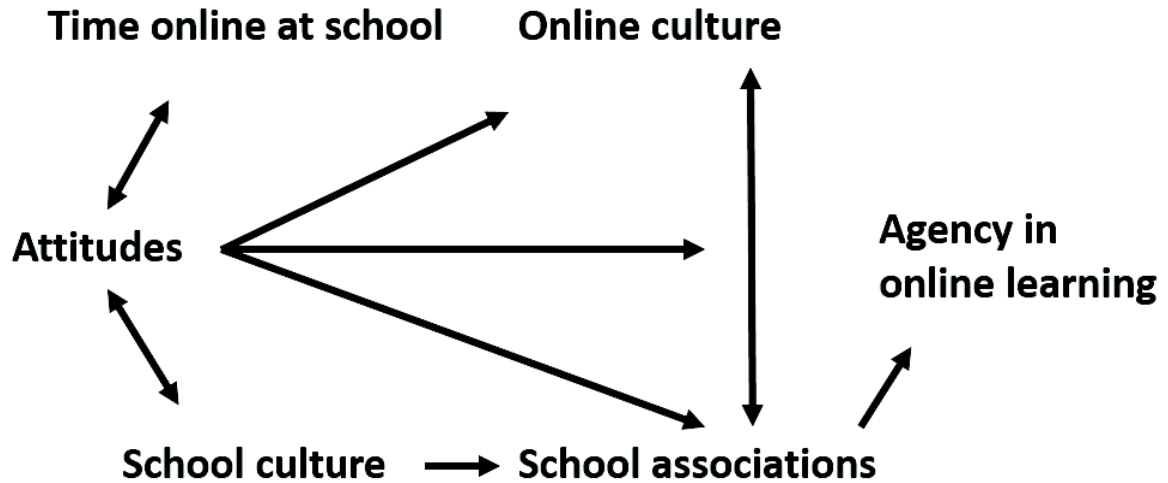


Figure 3. Theoretical model of secondary antecedents of agency in online learning.

We model a strictly limited part of the social reality, and the process of including or excluding factors, that is, deciding which are essential, is theoretically informed. Above, we argued that agency in online learning is an important issue for learning in the 21st century, as reflected in various international and national policy documents. When considering potential sources of influence on students' digital agency, we draw on lessons from the learning ecology approach and connected learning; that is, we use some of the ideas developed within these frames while not fully embracing the more radical definitions of learning found in this literature. For example, connectivists (Siemens, 2004, p. 6) claimed that “[t]he pipe is more important than the content within the pipe. Our ability to learn what we need for tomorrow is more important than what we know today. (...). [L]earning is no longer an internal, individualistic activity.” What we borrow from this literature, however, is the increased focus on the interplay between contexts (informal, non-formal, and formal) and the learning trajectories for developing students' understanding and expertise. Barron's (2006) explication of the poly-contextual (Arnesen, Elstad, Salomon, & Vavik, 2016) trajectories of “tech wiz” kids' learning, in particular, influences our thinking.

In a learning ecology–inspired model of the processes of and contexts for students' digital literacy practices, Sefton-Green, Marsh, Erstad, and Flewitt's (2016) stated that practices are shaped by social contexts at the micro-, meso-, and macro-levels, and that the specific contexts shape the meaning children themselves ascribe to their digital practices. When considering how young people develop agency in online learning, we accept the idea that contextual influences are important. Young people do not act in isolation; instead, they draw on their communities' ways of seeing, talking, and framing experiences. Thus, participating in online culture can influence how young people see and talk about formal schooling and potentially alter how they view the interplay between their informal online learning experiences and the purposes, processes, and content they encounter at school. However, at the same time, in line with a moderate methodological individualism, we assume that these contextual influences shape learning through individual students' interpretation of these influences, that is, that intentional states of individual actors drive individual actions that help explain social phenomena. For the purposes of our model, we assume that students' experiences of participating in formal schooling versus informal online learning influence students' preferences: That is, some students lean more toward self-direction and individual autonomy in choosing their learning content, processes, and aims, while others lean more toward institutionally

organized support. However, the concepts are analytically separate. Theoretically, then, *we expect that the more technologically oriented online culture exerts a strong influence on students' sense of agency in online learning, while the schooling-oriented school culture is unrelated to students' digital agency.*

Many schools in this study attempt to bridge the alleged gap between schooling and students' online life-worlds in different ways. The first step is often to introduce increased online access in classrooms. Theoretically, then, increased online access at school can be seen as an effort to introduce attributes of online culture into the dominant school culture, depending, of course, on the nature of the implementation. Based on this increased access, *we expect that time online at school exerts a medium influence on students' sense of agency in online learning, that is, somewhere between the anticipated strong influence of online culture and the unrelated nature of school culture.*

The model includes two other constructs, attitudes and school associations. Attitudes refer to whether students deem online culture or school culture more conducive to promoting good attitudes. The higher the value for attitudes, the stronger the student believes in online learning compared to formal learning. Theoretically, then, *we expect a positive relationship between attitudes and online culture and sense of agency in online learning, and we expect a negative relationship between attitudes and school culture.*

The construct of school associations is intended to tap into students' formal learning experiences. Higher values for school associations indicate more positive experiences with formal schooling. Theoretically, then, *we expect that school associations are unrelated to agency in online learning but are positively related to school culture and negatively related to online culture.*

One critique of the learning ecology approach suggests that it highlights balance, harmony, and coherence, while obscuring relationships of tension, conflict, and contradictions. Carrington (2013, p. 209) stated that “an ecological framing looks to find a contributory role for all components.” We address this challenge by creating a theoretical model that is based on assumptions of interplay between formal, informal, and non-formal contexts, but that is disentangled from assumptions of harmony. This opens up the possibility of discovering empirical relationships characterized by conflict, as well as by coherence.

In addition to the theoretical bases for the hypothesized relationships included in the model, we use Ito's (2010) terms for young people's engagement in online activities as an analytical lens for interpreting the empirical results. As mentioned previously, Ito (2010) distinguished between interest-driven and friendship-driven genres of online participation for the purposes of either “hanging out,” “messing around,” or “geeking out.” Friendship-driven practices refer to “dominant and mainstream practices of youth as they go about their day-to-day negotiations with friends and peers” (Ito, 2010, p. 16), and interest-driven practices are what young people “describe as the domain of the geeks, freaks, musicians, artists, and dorks – the kids who are identified as smart, different, or creative, who generally exist at the margins of teen social worlds” (Ito, 2010, p. 16). Facebook and similar social media sites are emblematic of friendship-driven practices, while interest-driven practices are more often linked to sites devoted to gaming, media production, and other specialized interests.

Methods

Sample

This empirical study used a survey administered to students at 60 secondary and upper secondary schools in Norway (20 schools), Sweden (16 schools), and Finland (24

schools) in February and March 2013. In all three countries, we chose schools located in or near urban areas, as urban youth are more likely to have full broadband access and thus, have more opportunity to engage in the full spectrum of online activity and develop similar digital habits. A total of 3400 students in general study programs participated voluntarily. The final analysis included 3045 learners, after we excluded cases with missing values. None of the learners who were present for the survey administration declined to participate.

Instruments

Learners answered questions about various aspects of schooling and school propositions. A classical test theoretical paradigm was followed, in which psychological constructs and items (see Table 1) were contextualized through a set of individual questions given to the learners. The learners were asked to respond to questions using a 6-point Likert-scale with alternative response choices: Strongly disagree (1), Disagree (2), More disagree than agree (3), More agree than disagree (4), Agree (5), and Strongly agree (6). The construct used for time online at school (ICT) was an exception in that it was based on the number of hours the respondents reported being online during a typical school day.

Table 1. Model constructs, indicators, and residuals.

Concepts and indicators	Abbreviation	Residual
Sense of agency in online learning	ag_1	Eag
<i>Online experiences strengthen my ability to participate in discussions</i>	v20	e20
<i>The net helps me develop good study habits</i>	v21	e21
<i>My thoughts and opinions are taken seriously online</i>	v22	e22
<i>The net enables me to understand the world around me better</i>	v27	e27
Online culture	net_1	Ene
<i>I would prefer to learn where and whenever it suits me, rather than in school according to a common curriculum</i>	v29	e29
<i>School learning is of minor importance for my future life</i>	v31	e31
<i>Come to think of it, the Internet is now more important than school</i>	v32	e32
School associations	pse_1	Eps
<i>Meaningful content</i>	v70	e70
<i>Learning</i>	v72	e72
<i>Engaged participation</i>	v73	e73
Attitudes	att_1	

<i>Respect for others</i>	v58	e58
<i>Honesty</i>	v59	e59
<i>Good behavior</i>	v60	e60
School culture	val_1	
<i>I hate school (reversed)</i>	v02r	e02
<i>I enjoy school learning</i>	v05	e05
Time online at school	ict	Eict
<i>How many hours per day do you spend online at school?</i>	ict	Eict

Analysis

The analyses were conducted using SPSS and AMOS. Cronbach's alpha was used to assess the reliability of the indicators for each subscale. Alpha coefficients of .65 or higher are usually considered acceptable (Nunnally, 1967). In Table 2, we present the Cronbach alpha for each construct, for the total sample (Nordic) and each country. These results strengthen the case for operating with a single category for all participating Nordic students.

Table 2. The Cronbach alpha for each construct.

Construct	Item no.	Finland	Sweden	Norway	Nordic
Attitudes, att_1	3	.86	.85	.85	.85
School culture, val_1	2	.72	.66	.71	.68
Online culture, net_1	3	.72	.70	.74	.71
School associations, pse_1	3	.73	.84	.82	.81
Sense of agency, ag_1	4	.67	.70	.71	.70

Confirmatory factor analysis (CFA) was used to assess the factor structure. The assessments were based on the p values (p -kji) for the chi-square statistic (kji-kvdrat), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the goodness of fit index (GFI). The standard criteria of $p < .05$, RMSEA $< .05$ and GFI and CFI $> .95$ were used to determine good fit (Kline, 2005). The model's fit indices are acceptable: RMSEA = .035, GFI = .983, and CFI = .978.

In Table 3, we present descriptive findings (mean and standard deviation (SD)) for each indicator for the total sample and for each country separately. The small variation in results between Norway, Sweden, and Finland supports our decision to refer only to Nordic learners. We comment on the descriptive results in more detail in the Results section.

Table 3. Descriptive findings for indicators used in the analysis.

Indicators	Total, N = 3045		Finland, n = 479		Norway, n = 1058		Sweden, n = 1508	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
v58	2.31	1.18	2.15	1.07	2.41	1.27	2.30	1.15
v59	2.27	1.18	2.01	1.01	2.38	1.26	2.27	1.16
v60	2.06	1.08	1.91	1.00	2.12	1.11	2.07	1.07
v05	4.04	1.10	4.09	1.08	3.85	1.13	4.15	1.05
v02r	4.48	1.25	4.33	1.28	4.58	1.26	4.45	1.22
v70	4.04	1.13	3.50	1.11	4.23	1.10	4.09	1.09
v72	4.51	1.06	4.45	1.01	4.59	1.07	4.48	1.06
v73	3.98	1.10	3.81	1.19	4.03	1.10	3.99	1.06
v29	1.96	1.04	2.18	1.07	1.81	1.02	1.99	1.03
v31	2.00	1.13	2.05	1.12	2.00	1.19	1.98	1.08
v32	2.58	1.37	2.78	1.39	2.24	1.33	2.74	1.34
v20	3.39	1.32	3.23	1.29	3.40	1.40	3.44	1.27
v21	3.04	1.18	3.13	1.14	3.01	1.24	3.03	1.15
v22	3.08	1.19	3.16	1.16	3.10	1.22	3.03	1.18
v27	4.35	1.16	4.26	1.18	4.47	1.13	4.30	1.17
ict	3.49	1.43	3.18	1.41	3.67	1.42	3.46	1.43

The empirical findings relevant to the research questions are presented in the SEM model in Figure 4. We comment on these findings in more detail in the Results section.

Figure 4. Antecedents to agency in informal online learning. The total sample is 3045. Associations between ene and eps. Abbreviations: ag_I = Sense of agency in informal online learning, net_I = Online culture (the learners' preferences inscribed in terms of free choice and self-actualisation), att_I = Attitudes induced by the Internet, val_I = School culture (valuing schools as an institution), pse_I = School associations (perceived characteristics of the school), ict = time spent online at school.

In Figure 5, we present the analyses conducted to show the extent to which the construct of online culture is associated with gender and socioeconomic status (SES; measured as the reported number of books in the home).

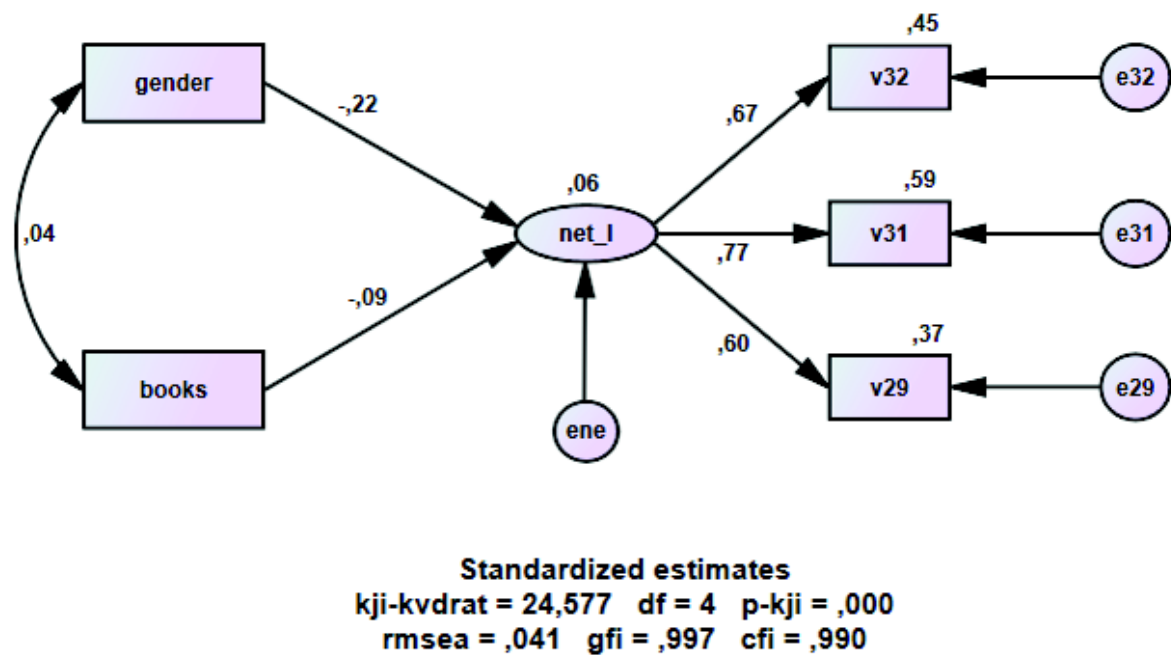


Figure 5. The associations between online culture (net_I) and (1) gender (binary variable where girls = 0 and boys = 1) and (2) the reported number of books at home.

Figure 5 shows that the association between gender and the construct of online culture is negative ($b_{\text{gender} \rightarrow \text{net}_I} = -.22$); in other words, boys value online culture more than girls. The figure also shows that the reported number of books in the house is not statistically significantly related to online culture. However, the extent to which the reported number of books in the home measures SES is debatable. Still, the results indicate that online culture is not associated with a particular SES group but is more strongly associated with boys than with girls.¹ The fit indices in Figure 5 are acceptable: RMSEA = .041, GFI = .997, and CFI = .990.

Results

Our primary research objective was to determine how the students' preference constructions about learning, school culture and online culture, are related to students' sense of agency in informal online learning. We also wanted to see how schools' current efforts to bridge the alleged gap between young people's digital-life worlds and students' formal education by providing time online at school is associated with students' sense of digital agency.

Figure 4 shows that the relationship between online culture and digital agency is large and positive ($b_{\text{net}_I \rightarrow \text{ag}_I} = .49$). This result aligns with our theoretically based expectations. It indicates that the more students harbor online cultural learning preferences, the more the sense of agency the students experience in informal online learning. Figure 4 also shows a medium-large and positive ($b_{\text{val}_I \rightarrow \text{ag}_I} = .27$) relationship between school culture and digital agency. This result is not in line with our theoretical expectations, as it indicates that the more students identify with formal schooling, the stronger their sense of agency in informal online learning. Regarding the relationship between the two preference constructions, Figure 4 shows a large and negative path coefficient ($b_{\text{val}_I \rightarrow \text{net}_I}$

= -.56). This means that even though both contribute to explaining students' sense of digital agency, the internal relationship is statistically significantly negative; that is, the more students identify with online culture, the less they identify with school culture. In other words, the two constructs are neither synergistically nor independently related but are strongly antagonistically related. The fact that the constructs simultaneously contribute positively to a sense of digital agency indicates that their contribution is due to mediating factors not included in the model, for example, technical expertise in the case of online culture and substantial expertise in the case of school culture.

In terms of schools' efforts to include online culture in the dominant school culture by providing time online at school, Figure 4 shows time online at school has a medium and positive relationship with students' digital agency ($b_{[ict \square ag]} = .23$). This result is in line with our theoretical expectations, and it suggests that the more students spend time online at school, the more the sense of agency they experience in informal online learning. The relationship with school culture, however, is medium and negative ($b_{[gender \square net]} = -.21$). The result suggests that the more time students spend online at school, the less they appreciate their schooling. This result seems to suggest that providing more time online does not necessarily have a positive motivational impact on formal educational practices. Instead, Figure 4 shows a small but positive relationship with online culture ($b_{[ict \square net]} = .10$), that is, a preference for self-determination in learning aims, processes, and content.

Our secondary research objective was to see how students' experiences in developing good attitudes either online or at school are associated with the other constructs. This objective aims to understand how students' views of school characteristics (e.g., engaged participation) are related to the other constructs. These empirical results are shown in Figure 4.

A higher score for the attitudes construct indicates a stronger belief in the efficacy of online learning in promoting good attitudes, whereas a lower score indicates a stronger belief in the efficacy of formal schooling in promoting good attitudes. Figure 4 shows a medium-large and positive association between attitudes (abbreviated att) and time online at school ($b_{[att \square ict]} = .22$), online culture ($b_{[att \square net]} = .19$), and agency in online learning ($b_{[att \square ag]} = .23$). In other words, the more students experience that their online activities promote good attitudes, the more the students (1) spend time online at school, (2) the more they prefer self-determination in learning content, processes, and goals, and (3) the stronger the students' sense of agency in online learning. Furthermore, Figure 4 shows a medium-to-large and negative relationship between attitudes and school associations ($b_{[att \square pse]} = -.15$) and school culture ($b_{[att \square val]} = -.41$). That is, the more students think that online activities promote the development of good attitudes, the less students have positive associations with formal schooling, and more specifically, the less students appreciate their formal schooling.

Because higher scores for school associations suggest that the students associate formal schooling with positive qualities, such as engaged participation and learning a lot, the large and positive relationship ($b_{[val \square pse]} = .58$) with school culture is in line with our theoretical expectations. The medium-large and positive relationship between school associations and agency in informal online learning ($b_{[pse \square ag]} = .17$) and the medium and negative relationship between school associations and online culture ($b_{[val \square ict]} = -.21$) were anticipated based on our theoretical assumptions. There seems to be a strong link between liking formal schooling and associating schooling with positive attributes, such as learning a lot and engaged participation. The link between school associations and agency in online learning is weaker but still positive. Again, we see that the more students associate something good with formal schooling, the less they embrace online culture.

Overall, the results for the secondary relationships seem to corroborate the results for the primary relationships. That is, both preference constructions contribute to students' sense of agency in informal online learning, and the preference constructions are markedly antagonistically related.

Discussion and conclusion

This study primarily aimed to explore antecedents of students' sense of agency in online learning activities. The three main antecedents we targeted were school culture, online culture, and time spent online at school. The importance of exploring these constructs' contributions rests in the antecedents' centrality to students' lives, not only in terms of the large amount of time students spend interacting in these arenas but also due to the constructs' role as all-encompassing frames of reference in terms of students' meaning-making processes. Understanding students' preference constructions and beliefs regarding formal and informal learning processes is particularly significant if we are to enable and facilitate educationally desirable synergy effects and avoid troubling inconsistencies and mutually reinforcing contradictions. If we want to revitalize institutionalized schooling, unintended *devitalizing* effects might occur if our strategy is to introduce into the dominant school culture a competing online culture characterized by an emphasis on self-determination in learning content, processes, and aims. We argue that formal schooling's efforts to capitalize on students' informal learning experiences through introducing more net-based activities in class might bolster digital agency through improved technical expertise (medium-related online skills). However, this activity may simultaneously de-privilege institutionalized schooling and the acquisition of substantial knowledge that arguably is required for the development of content-related online skills.

First, we found that all three main antecedents are positively related to students' sense of agency in online learning. For online culture and time spent online at school, the results are in line with our expectations based on previous research and theoretical assumptions. It makes sense that a preference for self-determination in learning aims, processes, and content that Internet access opens up would go hand in hand with a sense of digital agency, that is, feeling confident that one is able to utilize the online space for learning purposes. In fact, one might argue that it takes a lot of confidence to prefer independent online learning to the relative safety of attending institutionalized schooling. As for the other finding (that an increase in time spent online at school is positively associated with agency), it might seem that the effort to introduce digital technology in schools has succeeded in terms of students' confidence in using digital technology for learning purposes. However, this interpretation relies on the premise that the relationship is causal; that is, increases in time spent online cause the effect of a heightened sense of digital agency. If, instead, this is an instance of reverse causality, that is, students with a higher sense of agency in online learning spend more time online at school when offered the opportunity, then an increase in the availability of digital learning opportunities does not increase students' sense of agency; it only increases the time spent online by the most agentic students. We will look more closely at this possibility after discussing the other findings.

The third positive relationship concerns school culture and agency in online learning. Based on previous research and theory, we anticipated the two factors would be unrelated. We did not expect that an appreciation of formal schooling and school learning would align with students' sense of agency in informal online learning to such a degree, that is, a medium-sized path coefficient ($b_{[val \square ag]} = .27$). Still, the finding makes sense when we consider that agency in online learning is not only about medium-related

skills (i.e., the ability to adequately navigate online learning spaces) but also about content-related skills related to substantive issues. If we propose that a sense of online confidence is influenced by medium- and content-related skills, then the impact of the knowledge acquisition and the understanding developed within the frames of formal schooling might increase students' online agency. If this is a matter of reversed causality, then a higher sense of online agency indicates a greater appreciation for schooling. This does not seem to be an equally convincing explanation, because, as far as we can see, there is no obvious candidate for a process through which digital agency would affect appreciation for schooling. Given that the causal direction is as hypothesized (i.e., from appreciation for schooling to online agency), we have reason to doubt the connectivist claim that in the digital age, knowledge is not an individual possession but an individual's access to a network. The claim that the pipe is more important than the content of the pipe rests on the assumption that previous knowledge is not involved in the process of accessing new knowledge, that is, that it is possible to know what to look for without depending on previous knowledge. The study results suggest that appreciation for school learning goes hand in hand with a sense of digital agency, and we maintain that this can be reasonably accounted for by an increase in content-related Internet skills. This does not mean that we subscribe to a narrow individualist view of knowledge, but that through formal schooling, students receive access to a type of specialized and abstract discourse that is conducive for competent participation in a range of situations, including online arenas.

In addition to exploring the relationships between the three constructs and agency in online learning, we set out to understand how the two preference constructions of school culture and online culture relate to each other. Given that we found that both constructs are positively related to agency in online learning, we would expect that the associations between them would be only slightly negative. However, we found a very large and negative association between the two constructs. It was so large that they can be described as mutually contradictory and distinct categories. As we discussed above, there is a possibility that technical aspects of Internet skills mediate the relationship between online culture and digital agency, while substantive online skills mediate the relationship between school culture and digital agency. The plausibility of this inference is strengthened by the large size of the internal relationship between online and school culture. The negative relationship means that the more a student subscribes to online culture, the less he or she appreciates formal schooling and school learning as he or she currently experiences it. This impression of a conflict is strengthened and corroborated by the empirical findings pertaining to the secondary constructs of attitudes and school associations, for example, by showing a negative relationship between school associations and online culture ($b_{[val\ \text{ict}]} = -.21$) but a large and positive relationship between school associations and school culture ($b_{[val\ \text{pse}]} = .58$).

The extent to which this conflict is present in the student community and within individual students' frames of reference is an empirical issue. The dynamics of such a conflict are a subject for future research. This study is not longitudinal and does not address the temporal dynamics of the conflict apparent in these results, and we are careful not to draw strong conclusions based on a single study. However, if our finding is an empirical expression of the developing dynamics of a mutually reinforcing contradiction within individual students' frames of reference regarding meaning-making, learning, and educational processes, this is something that educational authorities must take seriously. From this perspective, our finding that the time spent online at school is positively related to online culture ($b_{[ict\ \text{net}]} = .10$) and negatively related to school culture ($b_{[val\ \text{ict}]} = -.21$) might suggest that schools' current efforts to increase the relevance of formal schooling by providing increased online access is misplaced. In other words, this

effort by schools might have the unforeseen and politically undesirable side effect of undermining rather than enhancing students' appreciation for school and school learning. If the aim is to revitalize institutionalized schooling, then unintended *devitalizing* effects might occur if the strategy involves the introduction into the dominant school culture of a competing online culture characterized by an emphasis on self-determination in learning content, processes, and aims. Understanding students' preference constructions and beliefs regarding formal and informal learning processes is particularly significant if we are to enable and facilitate educationally desirable synergy effects and avoid troubling inconsistencies and mutually reinforcing contradictions. We argue that formal schooling's efforts to capitalize on students' informal learning experiences through introducing more net-based activities in class might bolster digital agency through improved technical expertise (medium-related online skills). However, it may simultaneously serve to de-privilege institutionalized schooling and limit students' access to a specialized and abstract discourse that is conducive for competent participation in and strategic use of online arenas (content-related online skills).

The limitations of this cross-sectional, questionnaire-based, "snapshot" research contribution are well documented. We acknowledge these limitations and argue that they can serve as points of departure for future research. First, conceptual studies are required to improve construct validity and as a basis for more comprehensive SEMs, including pertinent moderating and mediating variables. Second, we need longitudinal, experimental, and case studies to improve causal inferences (internal validity) by determining not just whether the relationships are causal but how and why causal chains and constellations produce the identified effects. Third, improvements in external validity are called for by conducting comparative research on randomized groups enabling statistical generalization, and carrying out similar research at different locations, people and contexts. Fourth, we need qualitative studies that aim for analytical generalization based on theorization of operating causal mechanisms in context.

Acknowledgments: This research project was funded by a grant (218245) from the Norwegian Research Council.

Conflicts of interest: The authors declare no conflict of interest. The study sponsors had no role in the design of the study; in the collection, analyses, or interpretation of the data; in the writing of the manuscript; or in the decision to publish the results.

References

- Antikainen, A. (2006). In search of the Nordic model in education. *Scandinavian Journal of Educational Research*, 50(3), 229–243.
- Arnesen, T., Elstad, E., Salomon, G., & Vavik, L. (2016). Educational technology and polycontextual bridging: An introduction. In E. Elstad (Ed.), *Educational technology and polycontextual bridging* (pp. 3–15). Rotterdam, the Netherlands: Sense.
- Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology perspective. *Human Development*, 49(4), 193–224.
- Blossing, U., Imsen, G., & Moos, L. (2014). Schools for all: A Nordic model. In U. Blossing, G. Imsen, & L. Moos (Eds.), *The Nordic education model: School for all encounters neo-liberal policy* (pp. 231–239). Amsterdam, the Netherlands: Springer.
- Buckingham, D., & Willett, R. (2013). *Digital generations: Children, young people, and the new media*. London, England: Routledge.
- Carrington, V. (2013). An argument for assemblage theory: Integrated spaces, mobility and polycentricity. In A. Burke & J. Marsh (Eds.), *Children's virtual play worlds: Culture, learning and participation* (pp. 200–216). New York, NY: Lang.
- Castells, M. (2010). *The power of identity*. Oxford, England: Wiley & Sons.
- Elstad, E., Arnesen, T., & Christophersen, K. A. (2016). Antecedents of pupils' self-regulatory strength in technology-filled school environments. *International Journal of Learning, Teaching and Educational Research*, 15(3), 218–241.
- Erstad, O., & Sefton-Green, J. (2013). *Identity, community, and learning lives in the digital age*. Cambridge, England: Cambridge University Press.
- European Commission. (2013). *Survey of schools: ICT in education*. Retrieved from <https://ec.europa.eu/digital-single-market/en/survey-schools-ict-education>. doi:10.2759/94499
- Frailon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2013). *Preparing for life in a digital age: The IEA international computer and information literacy study*. London, England: Springer.
- Green, H., & Hannon, C. (2007). *Their space: Education for a digital generation*. London, England: Demos.
- Greenhow, C., & Lewin, C. (2015). Social media and education: Reconceptualizing the boundaries of formal and informal learning. *Learning, Media and Technology*, 41(1), 6–30.
- Hakkarainen, K., Ilomäki, L., Lipponen, L., Muukkonen, H., Rahikainen, M., Tuominen, T., . . . & Lehtinen, E. (2000). Students' skills and practices of using ICT: Results of a national assessment in Finland. *Computers & Education*, 34(2), 103–117.
- Hietajarvi, L., Tuominen-Soini, H., Hakkarainen, K., Salmela-Aro, K., & Lonka, K. (2015). Is student motivation related to socio-digital participation? A person-oriented approach. *Procedia-Social and Behavioral Sciences*, 171, 1156–1167.
- Ito, M. (2010). *Hanging out, messing around, and geeking out: Kids living and learning with new media*. Cambridge, MA: MIT Press.
- Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robison, A. J. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. Cambridge, MA: MIT Press.
- Krumsvik, R. J. (2011). Digital competence in the Norwegian teacher education and schools. *Högere Utbildning*, 1(1), 39–51.

- Kumpulainen, K., Krokfors, L., Lipponen, L., Tissari, V., Hilppö, J., & Rajala, A. (2009). *Learning bridges – Toward participatory learning*. Helsinki, Finland: HELDA: The Digital Repository of University of Helsinki.
- Kunnskapsdepartementet [Department of Education]. (2006). *Læreplanverket til Kunnskapsløftet [Knowledge Promotion Curriculum]*. Oslo, Norway: Kunnskapsdepartementet .
- Loveless, A., & Williamson, B. (2013). *Learning identities in a digital age-rethinking creativity, education and technology*. London, England: Routledge.
- Miller, C., & Bartlett, J. (2012). “Digital fluency”: Towards young people’s critical use of the Internet. *Journal of Information Literacy*, 6(2), 35–55.
- Nunnally, J. C. (1967). *Psychometric theory*. New York, NY: McGraw-Hill.
- Organisation for Economic Cooperation and Development. (2015). *Students, computers and learning. Making the connection*. Paris, France: Author.
- Rose, N. (1996). *Inventing our selves: Psychology, power, and personhood*. Cambridge, England: Cambridge University Press.
- Roth, S., & Erstad, O. (2013). Networked lives for learning: digital media and young people across formal and informal contexts. In G. Trentin & M. Repetto (Eds.), *Using network and mobile technology to bridge formal and informal learning* (pp. 119–152). Oxford, England: Chandos.
- Rychen, D. S., & Hersh, L. (2001). *Defining and selecting key competencies*. Cambridge, MA: Hogrefe & Huber.
- Sahlberg, P. (2014). *Finnish lessons 2.0: What can the world learn from educational change in Finland?* New York, NY: Teachers College Press.
- Salomon, G. (2016). It’s not just the tool but the educational rationale that counts. In E. Elstad (Ed.), *Educational technology and polycontextual bridging* (pp. 149–161). Rotterdam, the Netherlands: Sense.
- Sefton-Green, J., Marsh, J., Erstad, O., & Flewitt, R. (2016). *Establishing a research agenda for the digital literacy practices of young children: A white paper for COST action*. Brussels, Belgium: Cost Action. Retrieved from <http://digilitey.eu>
- Selwin, N. (2009). Faceworking: Exploring students’ education-related use of Facebook. *Learning, Media and Technology*, 34(2), 157–174.
- Selwin, N. (2014). *Distrusting educational technology. Critical questions or changing times*. New York, NY: Routledge.
- Selwin, N. (2016). Minding our language: Why education and technology is full of bullshit ... and what might be done about it. *Learning, Media and Technology*, 41(3), 437–443.
- Siemens, G. (2004). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1). Retrieved from <http://er.dut.ac.za/handle/123456789/69>
- Tapscott, D. (1999). Educating the Net generation. *Educational Leadership*, 56(5), 6–11.
- Van Deursen, A. J., & Van Dijk, J. A. (2009). Using the Internet: Skill-related problems in users’ online behavior. *Interacting with Computers*, 21(5-6), 393–402.
- Van Deursen, A. J., van Dijk, J. A., & Peters, O. (2011). Rethinking Internet skills: The contribution of gender, age, education, Internet experience, and hours online to medium- and content-related Internet skills. *Poetics*, 39(2), 125–144.
- Warschauer, M., & Matuchiank, T. (2010). New technology and digital worlds: Analyzing evidence of equity, use and outcomes. *Review of Research in Education*, 34(1), 179–225.

Westlund, O., & Bjur, J. (2014). Media life of the young. *Young*, 22(1), 21–41.

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ⁱ Finally, we conducted an analysis to check whether there is an empirical connection between sense of agency in online learning and learners' grades in Mathematics and in English as a Foreign Language (EFL) but found no empirical connection. The correlation coefficient between sense of agency in online learning and self-reported Mathematics grades was -0.012, and between sense of agency in online learning and self-reported EFL grades -0.001.