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# Looking Back and Forward: From the Net Generation to Knowledge in Education

**Abstract.** The development of digital technologies and the Internet has changed modern society. Concepts such as “network society” and “Net Generation” are key concepts describing this development. In educational research, this development, in particular the use of new technologies by children and young adults, has created high expectations about changes in education. These expectations encompass the ideals of a transformation of learning in schools and a transition to student-centered forms of learning, guided by new concepts of knowledge in education. This article takes up these claims, pointing out that they are based on normative ideals and generalizations, which ignore the fact that the use of ICT is formed by pedagogical practices in education. Using the results of my earlier research, this article argues that ICT research should focus on these knowledge practices as well as on the organizational principles they are based on. These principles, here expressed as inherent knowledge-knower structures and specialized codes, are factors that can shed light on different forms of learning, knowledge building, and the use of ICT in education.

**Keywords:** Net Generation, new media, ICT in education, knowledge practices, knowledge-knower structures, specialized codes

## Introduction

While the media are a product of modern society, they also exert considerable influence on society and its individuals. The media are responsible

for courses of development and for societal events that would not have happened without those media. The growth of media, from the invention of the printing press in the 15th century to today's global communication networks, have created new forms of dissemination of information and of communication (Thompson, 2001). Both old and new media raise questions that have kept media sociologists occupied for a considerable time. Media institutions create entertainment and information with a symbolic content, which is interpreted by receivers, situated in particular contexts, again leading to new forms of mediated actions. In my earlier work, I have focused on the interaction between media and citizens, in particular the interaction between media and social and political agents (Bratland, 2000a; Bratland, 2000b; Bratland, 2010a).

With the development of the new media, broadband, and the Internet, my research has taken a new direction. This development has been described as a digital revolution, where the new media are ubiquitous. In recent years, I have been interested in how children and young adults use digital media in their everyday life and in school. Today's children and young adults are called the Net Generation and are assumed to be on the forefront when it comes to exploring new digital territories. The Norwegian school reform, Knowledge Promotion (LK06) has made digital media a part of school education. This development has presented schools and teachers with many new challenges and has made it necessary to redefine and specify concepts such as role, relation, learning, knowledge, and competence in school. Through educational reforms and institutional initiatives, digital media and Internet-related technologies have become a part of both school and higher education. My research covers several problem areas, presented here as:

- Phase 1. What are the characteristics of the new digital media and what effects does the new technology have on today's children and young adults? What are the implications of these effects on education and in what digital state is school today?
- Phase 2. What are similarities and differences in terms of everyday practices and educational practices when it comes to using technology? What role does technology play, and what should children and young adults learn in their formal education? How can the study of knowledge practices in education provide new

insights about the use of ICT, learning, and the various forms of knowledge building in education?

This article will provide an overview of my research, giving some answers to those questions. These questions, particularly linked to phase one, correspond to a large degree to educational research, in particular research on the use of ICT in education. My research contributes to a growing interdisciplinary field, providing new insight into technologies and their use by children and young adults. In this multi-faceted field, the concepts of *Digital Natives* (Prensky, 2001, 2009) and *Net Generation* (Tapscott, 1998, 2009) are central. My work of phase two is characterized by the growing insight that there are limitations and faults in educational research. The questions of phase two focus on formal education and on what differentiates it from technology-assisted learning processes in daily life. Knowledge practices and knowledge in formal education is markedly different from learning in informal contexts (Bernstein, 2000), and experiential knowledge or skills acquired outside of formal education cannot simply be transferred to it. Formal education is a separate field, with its own structures that partly determine the way of learning, knowledge practices, and the use of technology.

## Digital Media, Net Generation, and Education

The digital revolution has changed modern society. Today's society, which has been called a network society (Castells, 1996), has created new digital practices, new mediated forms of culture, providing new forms of communication and interaction. The development of digital technology and the Internet has created a Net Generation (Tapscott, 1998), where the use of computers, tablet computers, and mobile phones become a part of everyday life. This development also led to educational reforms, implementing technologies in the system of education. The Norwegian school reform Knowledge Promotion (LK06) has made the use of digital media a permanent part of school education. The interaction of children and young adults with digital technology, both at home and at school, has created a new field of research with new research questions. These questions are driven by the will to understand the new technologies, in

particular how they can contribute to educational change. Special emphasis has been directed on the digital practices of children and young adults and on how they use the technology in their spare time and in education. The development of digital technology, in particular the fact that children and young adults are its most active users, has raised hope that the technology could be able to instigate a renewal of formal education. This expectation implies the hope that the technology will create new and better forms of learning in school (Selwyn, 2011). My work has touched several of those questions, in particular in a discussion about whether and how digital technology can renew education.

In the article "Homo sapiens 2.0" (Bratland, 2009), I discuss some cultural and social consequences of the new technology. The article takes up the debate about the Web 2 technology and argues that social media create new forms of action and interaction, facilitating new possibilities for learning and identity creation. This does not imply that the use of technology is free of negative consequences, but the claim that the technology has created "the most stupid generation in history" (Bauerlein, 1998) or that the Internet has considerably negative results on individuals and local communities (Bollier, 1995; Shapiro & Leone, 1999) are based on cultural standards established in a society marked by face-to-face communication in a shared locality. When the critique is based on a set of standards from an earlier society with old media, it becomes difficult to trace implications and possibilities regarding the use of new digital media. The chapter "Agents, new media, and post-traditional society" (Bratland, 2010b) follows up this topic and discusses what is new about the new media. The article claims that the new media, in comparison with the old media, are marked by having active users who participate in a multitude of networks and interactions. The article argues that technology and the changes it engenders must be seen in the context that technology forms part of broader mechanisms of change in modern society. I analyze the interaction between the local life of the agents and their online practices and see these practices with the background of processes moving towards a "post-traditional society" (Giddens, 1994), where individuals develop new forms of reflexivity, which can be related to the rise of new types of risk (Beck, 1992). I argue that the self has become a reflexive project in the network society, involved in learning and identity-creating processes, supported by easy access to mediated symbolic materials and practices

in various networks. In this way technology participates in the creation of a Net Generation (Tapscott, 1998), marked by new forms of interaction, communication, and learning processes. I conclude the chapter with a discussion about what the changed conditions for learning and self-improvement mean for the system of education and for school.

With the school reform Knowledge Promotion (LK06), Norwegian authorities have launched an ambitious plan for teaching the use of digital media in education. The reform defines the use of digital tools as a fundamental skill, in line with reading, writing, and mathematics. In this model, digital competence and ICT are understood as functional aspects and as the mastering of technology. In the article "Digital literacy in school: Functional or critical resource?" (Bratland, 2010c), I discuss whether literacy can be understood as a technical skill independent of context. I conclude that this definition is too narrow, unduly limiting the use of ICT in education for children and young adults. The link between the digital practices of children and young adults outside education and inside school is the topic of the article "The knowledge society and future competence formation: Can schools develop the digital competence of the Net Generation?" (Bratland, 2012a). Here I show that there is a gap between the school's definition of digital competence as expressed in the Norwegian school reform Knowledge Promotion (LK06) on the one hand and how children and young adults communicate and produce digital content on the other. Even though this reform aims at providing children and young adults with forms of competences, they will need in the knowledge society, the article points out that Knowledge Promotion, with its technical definition of digital competence is the wrong response to this challenge. The article argues that school, in its effort to shape future competences, should base this effort in the digital competence that the Net Generation already has developed. With a starting point in my own research (Bratland, 2012b; Bratland, 2012c) as well as the contributions of others (Buchingham & Willett, 2006; Livingstone & Boper, 2008; Ito et al., 2009; Drotner & Schrøder, 2010), the article recommends to focus on young people's forms of competence and skills that have been developed outside education, with practices linked to digital content construction.

The question of how young people's digital competence can be used in formal education is crucial. The article "Digital media, knowledge and learning at school" (Bratland, 2012b) takes up this question and dis-

cusses the gap between the digital practices of the Net Generation and the school's concept of knowledge. There is an epistemological gap between the Net Generation's context-based form of knowledge production and the school's theoretical concept of knowledge. The article raises the question of whether it is possible to combine those forms of knowledge and advances a broader concept of knowledge in school. Digital technology has updated Ryles' (1973) well-known dichotomy of "knowing that" and "knowing how." In the ICT-school, providing access to computers and broadband Internet, it has become more important with "knowing how." Education should encompass the subjects' propositional knowledge as well as procedural forms of knowledge, enabling students to find, sort, and use information found on the Internet in the context of school. These two different forms of knowledge are important in formal education, but if the Net Generation's forms of skills and digital competences are supposed to be applied in school, their personal and context-based forms of knowledge should have a place in school. In order to merge these different forms of knowledge, the article introduces the term "orientation knowledge" (Molander, 1996). This concept encompasses three different forms of knowledge and can thus legitimate a broader concept of knowledge in school, leaving space for the Net Generation's construction of digital knowledge. An alternative account is given in the chapter "Meaning making, context and learning with digital media. A contextualized approach to digital literacies in schools" (Bratland, 2012c). Authorities in many countries have in recent years established a number of initiatives to introduce ICT and digital literacy as a major part of school-based learning. In the same way as the Norwegian school reform Knowledge Promotion (LK06), in many countries there is much emphasis on functional aspects and on the mastery of technology. The article aims at developing a nuanced understanding of the challenges linked to the use of digital technology and to the development of digital literacy in schools. In the article, I argue for an expanded contextual approach to the pupil's meaning-creating forms of literacies in school. In order to understand how digital media can be used as learning resources and how digital literacy can be developed in school, one has to take a closer look at the context of contemporary children and young adults. My own case study examines the social and semiotic aspects of pupils' meaning creation in school, and discusses how

the pupils' practices of literacy foreshadow the development of a school for the digital age.

## **Digital Media, Knowledge, and Education**

The contributions that are mentioned above are marked by a sense of optimism, an expectation that changes the new technologies have brought to society, including the experiences of young users, their skills, and forms of competence, can be transferred relatively easily to education. This optimism, shared by a large portion of the ICT-driven educational research, encompasses expectations that technology, including the use of new media in education, will contribute to considerable changes in school and ultimately in the entire sector of education (Selwyn, 2011). The contributions in this part aim at a more nuanced approach. This part, labeled as phase two, focuses on formal education and starts with the assumption that learning with technology in school is quite different from learning in informal contexts in everyday life. Formal education forms a separate field, with its own structures and practices, leading to limitations and to opportunities regarding the use of ICT in education. These structures and the knowledge practices that form education are the topic of a closer investigation in the contributions below.

The introduction of technology has only to a small degree changed school, in terms of both teaching and learning. The article "ICT, great expectations, and realities: Is change from below an alternative?" (Bratland, 2013) paints a picture of the gap between the expectations of educational research and the realities linked to the use of ICT in education. Research has shown that ICT only leads to superficial changes and that technology foremost supports established pedagogical practices. This research shows that changes with regard to using new technology in education are hard to implement and depend on cultural and social conditions and systems. This approach creates an awareness that the use of technology will always be formed by social and contextual factors (Wajcman, 2008). Formal education has a social structure (Giddens, 1984) that the top-down implementation of technology in education did not manage to change. The article points out the alternative could consist in local bottom-up



initiatives, where teachers and students create a larger space of action, with more use of ICT in education.

Knowledge is a key category of education, structuring the field. Regarding the introduction of ICT in education, several education researchers have demanded that digitalization must be accompanied by a new concept of knowledge in school and education (Østerud, 2004; Lanksheare & Knobel, 2003). The article "ICT, knowledge, and knowledge blindness: What kind of knowledge should students have access to in their education?" (Bratland, 2014) examines the arguments that support this demand. The article refers to the Norwegian curriculum Knowledge Promotion (LK06) and elaborates on the concepts of learning and knowledge as they are used in ICT research. With a starting point in Bernstein's theory (1990, 2000), the article argues that many contributions in the field of ICT research fail to differentiate between everyday knowledge and school knowledge. The article argues that the use of ICT cannot be seen independently from what type of knowledge students should have access to in education. This topic is further discussed in the chapter "Knowledge, information and ICT: Does digital media require a new concept of knowledge in education?" (Bratland, 2016). This chapter discusses the arguments used for making this claim and analyzes the new forms of knowledge that are supposed to replace theoretical and specialized knowledge in education. The introduction of an extended concept of knowledge has been labeled a "digital epistemology" (Lanksheare & Knobel, 2003) and "performative knowledge" (Østerud, 2004). The new concept of knowledge, unilaterally favoring skills and competences, has been realized in today's neoliberal educational reforms. The contributions from ICT-research have provided those reforms with a pedagogical justification, assuming that future education will no longer be concerned with truth, reliability, and objectivity. Instead, a postmodern epistemology is used to develop the students' ability to apply their knowledge and skills practically in a realistic setting. The chapter takes up some of the theoretical and empirical soft spots that are incorporated into this position, and argues that such an education in the best case will provide students with a fragmented and local form of knowledge that has little value outside this context.

This topic is discussed further in the article "Knowledge building, curriculum, and knowledge: How to promote subject-specific use of ICT

in school?” (Bratland, 2015). Several reports show that non-academic use of ICT in education is a considerable problem. Norwegian ICT-research sees this problem in connection with the lack of subject-specific use of ICT in education. Several contributions relate this term to Scardamalia and Bereiter’s (2006) theory of knowledge building (Krumsvik, 2009; Erstad, 2010). The assumption here is that a stronger focus on the students’ own knowledge building will strengthen the subject-specific use of ICT in education. The article discusses this claim and points at a number of problems that this premise presents. Even if students find solutions for given problems and tasks in school, such solutions will tend to have a local and context-dependent character. A subject-specific use of ICT must mean that students gain access to general knowledge in education. The use of ICT in itself does not lead to school knowledge, and the article argues that the term subject-specific use of ICT requires a curriculum that sees specialized knowledge as the center of education.

Many contributions in ICT-research assume that digital technology in education will require a transition towards more student-centered learning forms, and the article “Knowledge building and ICT in subjects: How to make knowledge practices more central in educational ICT-research?” (Bratland, 2016a) discusses this assumption. The article stresses that there is little empirical research supporting this demand, in particular in relation to the effects of ICT in education. On the other hand, many contributions show that the use of ICT is being formed by established pedagogical practices. The article argues that those knowledge practices, which are linked to specific knower-knowledge structures and to specialized codes (Bernstein, 2000; Maton, 2014), should receive more attention in educational ICT-research. These structures underlying the pedagogical practices will determine the character of learning and knowledge building in specific subjects and programs.

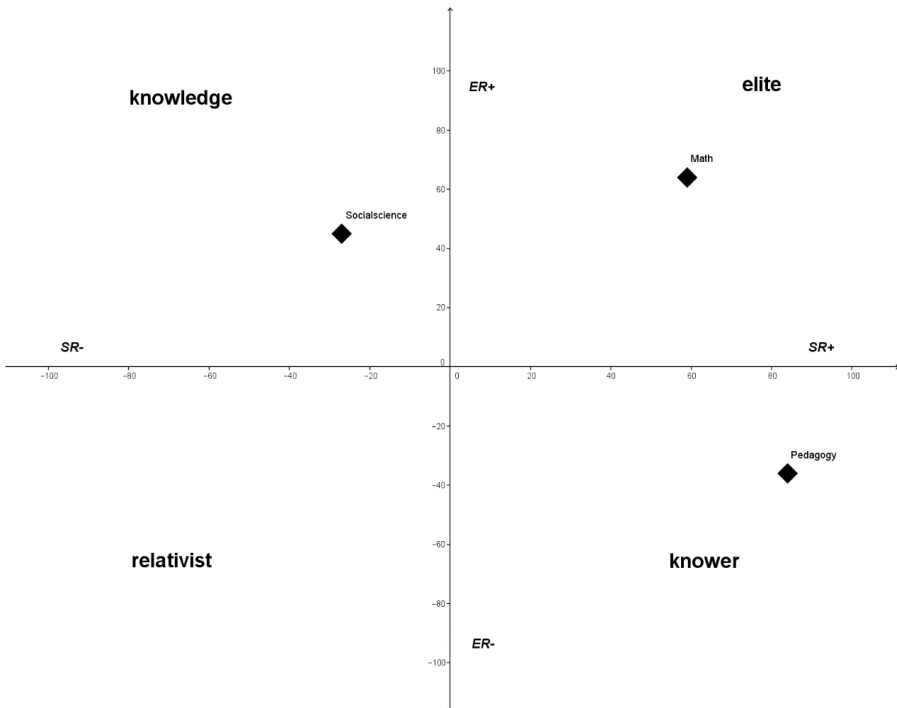
## **Analyzing Knowledge Practices and the Use of ICT in Education**

The article “The rules of the games: What role do specialized codes in the subjects play for the use of ICT in education?” (Bratland, 2016b) takes a closer look at this connection. Maton’s (2014) developed his legitima-

tion code theory (LCT) to study the principles underlying knowledge practices in education. LCT encompasses several dimensions. One of these dimensions, specialized codes, comprise *epistemic relations* (ER+,-) between knowledge practices and their objects (educational knowledge structures) on the one hand, and *social relations* (SR+,-) between knowledge practices and their actors (educational knower structures) on the other. In education or in a subject, these relations will determine what kind of knowledge will be understood as being legitimate, and who can produce legitimate social relations. Knowledge practices in education will reflect these relations to a varying degree and generate a set of specialized codes: *knowledge codes* (ER+, SR-), *knower codes* (ER-, SR-), *elite codes* (ER+, SR+), and *relativist codes*. With a background in this theory, I conducted a case study with students of three subjects in teacher education at Nord University, Norway (Bratland, 2016c). The study contains interviews with teachers and a questionnaire. Students were asked about what it needed to become good in the subjects social science, mathematics, and pedagogy. Results varied considerably and showed that social science has a relatively high score of “knowledge” (45%) but a lower one for “talent” and for “experience/practice” (27%). Pedagogy has a lower score of “knowledge” (37%) but a high score of “experience/practice” (84%). Mathematics has a low score for “practice” but a high score for “talent” (59%) and “knowledge” (64%). These results were subsequently translated into a model for specialized codes.

This figure shows that knowledge practices in the various subjects are regulated by different specialized codes. For students, this means that progress in the subject will be linked to the question of whether they have understood the codes that are specific for the subject. These codes unveil the relation between epistemic relations and social relations in a subject. Students perceive social science as being marked by a strong role of specialized knowledge about objects and phenomena, while experience/practice has a weaker position. This means that epistemic relations (ER+) in the subject are stronger than the social relations (SR-). In pedagogy, it is the other way around. Pedagogy is marked by a knower code, which means that social relations (SR+) are strong in the subject. Here the qualities of the knowing subject are crucial, which means that there is a strong focus on experience/practice in the subject. Mathematics has an elite code, where both natural talent and specialized knowledge are

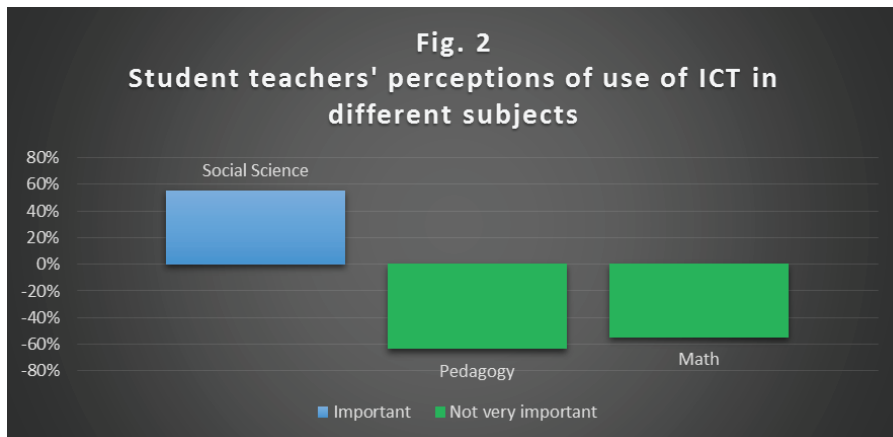
strong. In this subject both social relations (SR+) and epistemic relations (ER+) are strong.



**Figure 1: Student teachers' perceptions of specialized codes**

*Source: own research*

Knowledge practices are linked to the codes that dominate the subject or the educational program. Knowledge practices have effects and determine teaching, learning, and the use of ICT in different subjects and programs. Different subjects are based on different organizational principles regulating the use of ICT in education. My own study showed a clear link between the specialized codes of a subject, knowledge practices, and the use of ICT:



*Source: own research*

When students in the Norwegian teacher education were asked how important ICT is for the production of meaning and knowledge, they regard it as being important in social science, but not very important in pedagogy and mathematics. This result can be explained with specialized codes and the knowledge-knower structures that characterize these subjects of teacher education. Social science has a knowledge code (ER+, SR-), and the use of ICT can be explained with a combination of horizontal knowledge structures and weak knower structures. In this subject, there often are different theories giving different explanations for the same phenomenon or object. ICT is here used as a source of information and for debating explanations and interpretations of the social environment. Mathematics has an elite code (ER+, SR-), with natural talent and specialized knowledge being important. Even though talent has a strong position, the subject is dominated by epistemic relations. Mathematics is a subject with horizontal knowledge structure, combined with a strong grammar. In the subject, technology is used for calculations and for presenting mathematical relations and proofs, for example by using a table for presenting graphs and statistics. Pedagogy has a knower code (ER-, SR+). The subject is dominated by social relations, while epistemic relations are weak. Pedagogy has a strong knower structure with a clear emphasis on practice and experience. The use of ICT is limited and is formed by the pedagogical practice in the subject.

## Conclusion

In ICT-research, it has been assumed that the ability of children and young adults will be central for the development of future education. Concepts such as the network society (Castells, 1996) the Net Generation (Tapscott, 1998) and digital natives (Prensky, 2001) are part of an emergent field of research and are the basis for the common assumption, taking as a condition that the digitization of education must be consistent with the way technology is used in society. In particular, the use of technology by the Net Generation has received an elevated status. Tapscott (1998) and Prensky (2001) have provided striking portraits and descriptions of the new skills and of the new competences acquired by young “screenagers.” Young people’s use of the new media, their forms of interaction, cooperation, and sharing and construction of digital content are assumed to foreshadow future knowledge society. In ICT-driven educational research, these visionary accounts have created much research activity, describing implications for school and demanding considerable changes of education. These are demands for thorough changes of teaching, methods, and content in schools (Selwyn, 2011). It has been claimed that digital technology should lead a transformation of education from instructionalism to more student-centered forms of learning, with increased emphasis on the students’ own digital forms of competence and digital content construction. In a similar vein, it has been claimed that the development of the Internet and digital media will require a new concept of knowledge in school (Østerud, 2004; Erstad, 2010). The argument here is that the technology changes the epistemological conditions for knowledge in education. This is an attractive claim with many proponents. However, the problem with this claim is that it is largely based on normative ideals and on generalizations with an insufficient empirical base. This claim ignores that learning with technology in everyday life has a character that cannot automatically be transferred to formal education. Formal education is a field of its own, with its own knowledge practices and structures. Research has shown that the implementation of technology only leads to superficial changes in education (Cuban, 2001; Hatlevik et al., 2009). The technology does not promote fundamental changes in education but is a tool, whose use is being shaped by practices and structures that are

present in a subject or an educational program. The use of technology is formed by pedagogical practices in education, and the article argues that ICT-research should direct its attention to these knowledge practices and their organization principles. This would make it possible to explain variations regarding the use of ICT in education. Such an approach allows to overcome knowledge blindness in ICT-research, where knowing is confused with knowledge, something that leads to the false dichotomy between teacher-centered and student-centered forms of learning.

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