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KNOWLEDGE BUILDING, CURRICULUM, AND KNOWLEDGE: HOW TO PROMOTE SUBJECT-SPECIFIC USE OF ICT IN SCHOOL?

Abstract

Several studies show that there is a growing resistance against the use of ICT in school. This article takes up the question of whether this resistance is an expression of a more fundamental knowledge problem, which can illuminate some assumptions about a subject-specific use of ICT in education. The article discusses the term *knowledge building* and points out that a subject-specific use of ICT in schools should provide students with access to general knowledge. This aim implies that the use of ICT in school should be regulated by knowledge structures different from those dominating the neoliberal school today. The article argues for a new school curriculum, based on a social and realistic concept of knowledge.

Keywords: curriculum, knowledge building, social and realistic knowledge, school knowledge, subject-specific use of ICT.

Introduction

The current neoliberal school reforms have paved the way for an extensive use of ICT in school. This development, which is part of an international trend, has created a number of new challenges. While earlier there was a certain enthusiasm linked to the use of ICT in school, today this enthusiasm has been replaced by a growing skepticism among teachers and students. Various recent studies show a growing resistance towards the use of ICT in education. In Norway, 45.5% of high school students respond affirmatively that they spend too much time doing “non-academic things” during school hours, while

43.8% of students in Norwegian schools believe that computers/tablets steal the time they need to study school subjects (*Monitor Skole*, 2013).

The fact that ICT does not automatically result in learning but is instead perceived as a factor of distraction in a classroom is a commonly known phenomenon among researchers. While some researchers blame technology as such (T. Oppenheimer, 2004, T. Brabazon, 2002), others point out the need for a more subject-oriented use of ICT in school (O. Erstad, 2010, pp. 113-114; R.J. Krumsvik, 2009, pp. 227-254). In Norway, the growing resistance against ICT in education is seen in connection with a lack of *subject-specific use of ICT* in education (R.J. Krumsvik, 2009). Many research reports show that an extensive use of computers with free access to the Internet leads to a situation where entertainment, games, and social media receive more attention than the subject-specific teaching in a classroom (L. Vavik, 2013). The introduction of ICT in school, where students have free access to the Internet, has created a situation where the subject-specific use of ICT has become a major challenge for teachers.

In Norway, the term *subject-specific use of ICT* has been related to knowledge building; it is assumed that a stronger focus on knowledge building in education would lead to a more subject-specific use of ICT in education. In the article, I discuss this assumption in light of Marlene Scardamalia and Carl Bereiter's theory about knowledge building (2006, pp. 97-115), demonstrating why their theory does not lead to school knowledge. I argue that a subject-specific use of ICT in education requires a school whose aim is to provide students with access to general knowledge. Finally, I discuss what kind of curriculum could be suitable for reaching this aim and argue for a social and realistic concept of knowledge in education (R. Moore, K. Maton, 2010; M.F.D. Young, 2008; R. Moore, 2009).

Knowledge building: local or general knowledge?

As mentioned above, there is an increasing resistance against the use of digital media in education. The widespread introduction of digital media in the Norwegian school has created considerable challenges, and a number of Norwegian ICT-researchers have pointed out the need for a more subject-specific use of ICT in school (O. Erstad, 2010; R.J. Krumsvik, 2009). It is not clear what the term *subject-specific use of ICT* means in education, but according to R.J. Krumsvik (2009, p. 240), it refers to the building of knowledge, learning, and education. The assumption here is that a stronger focus on students'

knowledge building can support the ICT-assisted teaching of subjects in schools. The term knowledge building has been developed by Canadian researchers, Marlene Scardamalia and Carl Bereiter (M. Scardamalia, C. Bereiter, 2006, pp. 97-115; C. Bereiter, M. Scardamalia, 2003, pp. 73-78; M. Scardamalia, 2002, pp. 76-98; C. Bereiter, 1994, pp. 3-12; C. Bereiter et al., 1997, pp. 329-340). The aim of their theory is to give knowledge a central place in education. Similar to many ICT-researchers, M. Scardamalia and C. Bereiter argue that school teaching is not sufficiently focused on standards in the school subjects. According to M. Scardamalia and C. Bereiter, this problem is linked to what they call “shallow constructivism” and a belief in knowledge as objective truth (M. Scardamalia, 2002, pp. 76-98; C. Bereiter, 1994, pp. 3-12; C. Bereiter et al., 1997, pp. 329-340). This theory about knowledge building implies a radical programme: “Like the Copernican Revolution, the change from an activity-centered to an idea-centered view of education has an all-or-none character” (M. Scardamalia, 2002, p. 83). Knowledge building is an attempt towards reorientation of school teaching, where ideas, concepts, and theories are placed in the centre of education. This may appear to be commonplace, but the truly radical element is the new role of students in education; they are equipped with a capacity to solve knowledge problems and improve ideas and theories, in short, to drive the scientific or “progressive” discourse forward (C. Bereiter, 1994).

M. Scardamalia and C. Bereiter’s theory of knowledge building, where student play a central role to spur the progressive discourse, requires a new concept of knowledge in education. The concept of knowledge in the national curriculum has traditionally been linked to specialized knowledge produced by university research. This research requires particular methodical procedures and is based on standards of objectivity and truth. According to M. Scardamalia and C. Bereiter, such standards are incompatible with a programme of knowledge building in education. It is assumed that knowledge building in education can only be realized on an alternative epistemological basis. C. Bereiter finds this alternative basis in the postmodern critique of traditional science: “There is no objective standpoint” (1994, p. 4).

According to this postmodern position, objective knowledge cannot form the foundation for education or knowledge building in schools. The postmodern critique rejects, in similar ways as the earlier anti-positivistic movement, the possibility of defending an objective concept of knowledge. On the background of this critique, C. Bereiter develops a new epistemological foundation for the theory of knowledge building in education. According to C. Bereiter science can manage without objectivity since science is about

developing theories, not about objectivity. This addition to the postmodern position opens up for giving students the task to drive the scientific and progressive discourse into the future (1994, p. 4).

With this theoretical foundation M. Scardamalia and C. Bereiter assume that knowledge building can gain a central position in school. In order to reach this goal, they have developed a digital platform, Knowledge Forum, with the intention to engage students collectively in solving of knowledge problems. The solutions of knowledge problems that different student groups come up with can be understood as a contribution to the progressive discourse. In order to avoid pure subjectivism or relativism, C. Bereiter (1994) emphasizes that the critique of proposed solutions should lead to a consensus about what is the best theory or the best solution. In these cases, one sees the development of the knowledge discourse. The explanation, according to C. Bereiter is that “progress can only be claimed for particulars” (1994, p. 6). Here C. Bereiter turns back to the postmodern concept of knowledge i.e. knowledge requirements are not primarily taken care of by specialists, but their voice is just one of many voices. Only participants are able to evaluate what is the best theory, or the best answer to a knowledge problem discussed in class.

There are many objections against this theory of knowledge building, not only when it comes to the question of knowledge itself. Even if students manage to find solutions for their knowledge problems, and if those solutions are supposed to be better than the students’ earlier understanding, this knowledge will still be local and context-dependent. Their learning may be in accordance with a constructivist perspective, but the students’ contributions will certainly not count as development of academic theories. It is unclear to which degree this version of knowledge building leads to cognitive development in the form of new conceptual understanding. A Norwegian study of knowledge building, which used M. Scardamalia and C. Bereiter’s digital platform Knowledge Forum concluded:

Our major finding is that too few students use higher order skills as part of their learning activities. This confirms the findings reported in many international studies. Students and teachers have a tendency to place more importance on solving the task than on the domain concepts to be learned. Students need to employ higher order skills when dealing with knowledge building in complex and conceptually-oriented environments in order to go beyond fact finding. This is an important area for future research (B. Wasson, S. Ludviksen, 2003, p. 11).

Knowledge building of M. Scardamalia and C. Bereiter's stripe will neither lead to students' concept development nor to the development of new knowledge. The great shift, which M. Scardamalia announced, has not been realized with this kind of knowledge building in education. Even though students are enabled to find a set of facts and solutions to particular problems, this activity does not automatically provide insight into the specialized knowledge that is established in the intellectual fields. This knowledge, today found in the disciplines, is expressed in different languages and conceptual universes, using concepts that have special relations to other concepts and theories (B. Bernstein, 1990). Knowledge building in the sense of M. Scardamalia and C. Bereiter does not provide students with access to this knowledge. To the contrary, "objective knowledge" is presented as a contradiction in terms or as an obstacle for knowledge building in education. The result is an education providing students above all with access to local and context-dependent knowledge. It is a paradox that a pedagogical approach, which focus on knowledge and students' knowledge building, leads to such a result. M. Scardamalia's announcement of an educational revolution with knowledge in its centre, thus, is in jeopardy to turn into a cliché. In many ways M. Scardamalia and C. Bereiter's model of knowledge building is a continuation of the current trend towards a school without general knowledge. The activity school, learn-to-learn-school, and the skills and competence-school represent different variants of this problem of a school that does not provide students with "powerful knowledge" (M.F.D. Young, 2009, pp. 11-18).

This does not mean that knowledge building per se is a bad idea, but the concept needs the new theoretical foundation that provides students with access to general knowledge. This requires to reject the postmodern position, and to replace it with a theory of knowledge that retains objectivity and truth as central standards of education. Information technology does not differentiate between entertainment, everyday-knowledge, and school knowledge. Therefore, ICT in education needs a robust epistemic framework. In this perspective, it is not technology as such that is the problem, but it can be argued that the non-subject use of technology in education is related to an unclear concept of knowledge in the neoliberal school.

Is digital technology the problem, or is the resistance against ICT a symptom of a more fundamental problem of knowledge?

As mentioned in the introduction, there is a growing resistance among students and teachers against the use of ICT in education. Several studies indicate that ICT is seen as a factor preventing the learning of real knowledge in education. The question can be asked whether it is digital technology itself that is the problem or whether the non-subject-related use of ICT in education is an expression of a more fundamental problem of knowledge.

The debate about digital technology in education is by no means new. Typical positions in the debate are technological optimism, technological pessimism, and a social-shaping approach to technology (N. Selwyn, 2011; E. Bratland, 2013, pp. 39-50). The optimists claim that technology as such is an asset that will have positive influence on education (S. Woolgar, 2002; N. Gane, 2005, pp. 471-476). The pessimists, on the other hand, point to the negative effects, including an absence of learning and a lack of knowledge in education (T. Oppenheimer, 2004; T. Brabazon, 2002). The social shaping perspective (D. MacKenzie, J. Wajcman, 1999) claims that an understanding of technology and its effects depends on its use and the social context. This perspective focuses on how technology is used in education, as well as on the frameworks and curricula that regulate the use of ICT in school.

In a social shaping perspective, it becomes clear that the non-academic or non-subject-related use of ICT cannot primarily be blamed on technology itself, but can be localized in the frameworks established by the national curriculum. These frameworks influence the teaching practice, even though not in a deterministic way. The national curriculum can be seen as a pedagogical tool, aimed at a recontextualization of existing “knowledge structures” in education (B. Bernstein, 2000). Knowledge structures in the traditional school were based on discipline knowledge, produced by specialists in intellectual fields. In the past forty years this school model has been challenged by currents of social and pedagogical constructivism, and recently by so-called neoliberal school reforms. Both models are a result of political reforms, where aims defined by politicians, not education researchers or teachers, are becoming increasingly more important in school. Both models are variants of the understanding of knowledge from the perspective of constructivist and social categories. In general, those models can be described as variants of school where general discipline-based knowledge no longer is central.

Knowledge Promotion (LK 06) is the name of the most recent curricular reform in Norway, a reform that implies an extended concept of knowledge,

where knowledge aims are replaced with competence aims (G. Imsen, 2012). In this reform, competence is understood as a basic skill, and knowledge as something that can be applied at work or in lifelong learning (NOU, 2003). Knowledge Promotion is a reform supplying school with new content, in accordance with the neoliberal vision of the *knowledge society* (E. Bratland, 2015). According to this vision, school should contribute to the education of new knowledge workers, in a society where the professional life and knowledge change rapidly, and where young people will need to apply knowledge in particular contexts (S. Østerud, 2004).

The subject-related use of ICT in school requires an education whose aim is to provide students with access to general knowledge. However, when the authorities introduce an unclear concept of knowledge through their reforms and focus on 21st century skills and competences, it becomes difficult to maintain the standard of subject-related use of ICT in school. The neoliberal school reforms dissolve the links between everyday-knowledge and school knowledge. This results in a school where skills and the testing of skills, reading, writing, and math through PISA and national tests have become the fundamental expression for the level of knowledge at school (E. Bratland, 2015). The implementation of digital technology in Norwegian schools has so far supported the same tendencies, including the transition to a school lacking a clear concept of knowledge.

Knowledge Promotion (LK 06), was received well by Norwegian ICT-researchers. Many of them have pointed out that we need a new concept of knowledge in school (S. Østerud, 2004; O. Erstad, 2010), in line with the new digital conditions of knowledge. It is assumed that the Internet and digital technology have created a new situation challenging the traditional base of knowledge. According to these researchers, knowledge should no longer be transmitted in school by teachers, but instead should be understood as an action competence, an ability to use digital tools in particular contexts. Students are supposed to develop the ability to act competently, to find information, and to apply it in a relevant manner. This focus on application and on practical use of ICT in a framework marked by its stress of skills and competence has a disadvantage. This ICT-school provides students above all with access to context-dependent knowledge, based on facts and information they manage to find and to process in a given situation. However, facts are not knowledge, and facts do not lead to cognitive development. Information and facts are fragmentary elements that create meaning only when seen in the context of the theories and concepts of a subject.

While digital media and the Internet can be distractions in school, they are not in themselves opposed to subject-related teaching. Therefore, cumulative knowledge building, which educational technology can be a part of, requires a curriculum with the aim to provide students with “powerful knowledge” (M.F.D. Young, 2009, pp. 11-18). Knowledge Promotion (LK 06), however, leads away from this goal. When ICT is introduced in a school where the main emphasis is placed on basic skills as well as competences useful for future employers, the result is a school marked by local, fragmented, and segmented forms of knowledge building.

Knowledge and curriculum: do we have to return to traditional education?

Education and school are fields that have received an ever growing attention from the authorities during the last decade, resulting in a number of school reforms in many countries. Curricula are central for those reforms and provide us with an image of the shifting ideas and currents in research and educational policies. They provide a good insight into typical contemporary conceptions about what students should learn, and what kind of knowledge students should have access to. Epistemologically, there are two main models that characterize newer school history:

– On the one hand, there is the *traditional curriculum*, understanding knowledge as a given, seen from an absolute or positivist position. Knowledge in school has a ready-made content, with roots in university disciplines.

– On the other hand, there is the *progressive curriculum*, understanding knowledge as a social category of one form or another. Knowledge is understood as socially constructed in a local setting. The neoliberal variant in particular emphasizes basic skills and competences, as well as practical application of knowledge in particular contexts (see: M.F.D. Young et. al., 2014).

The progressive curriculum can be seen as a reaction to traditional education, which was seen as authoritarian, asocial, and with a positivistic and objective concept of knowledge. During the 1970s the leading representatives of knowledge sociology increasingly criticize the concept of knowledge in traditional education (L. Monsen, 1978; B.U. Engelsen, 2003). It was claimed that all knowledge has a social character, and that research is not independent of values and social contexts. The critique of traditional education and of science’s concept of objective knowledge originated from constructivism, standpoint theories such as Marxism and feminism, and later from

postmodernism (R. Moore, 2009). Although these currents are quite different, they have in common that they assume the social character of knowledge: Knowledge is always context-dependent and local, and it is determined by class, gender, and power relations in society (M.F.D. Young, 1971; S. Bowles, H. Gintis, 1976). Educational research charged traditional education for being a cram school with an elitist concept of knowledge (M. Haavelsrud, 1997), which only to a limited extent leads to learning. This school is characterized by “one-way transmission of an undebatable inventory of knowledge from an omniscient teacher to passive but nevertheless receptive students” (S. Østerud, 2004, p. 172; all translations are mine). It was assumed that this school to a large degree favors affluent students with the right class background and address (G. Hernes, 1974; P. Bourdieu, J.C. Passeron, 1990).

In Norway, this critique found a sympathetic ear among politicians, resulting in a reform movement based on progressivism and reform pedagogy. The curriculum, called the 1987 Pattern Plan (M87), represented the peak of this development. The plan was based on the assumption that the concept of knowledge in traditional education to a large degree conflicted with the students’ concept of reality, created through their experiences in their everyday life (B.U. Engelsen, 2003). Therefore, in this curriculum general teaching materials were complemented with local plans and local study materials, to reflect the multiple approaches to knowledge that existed in the local community. With this plan, social and experience-based local knowledge was given an important role in school.

Not long after the introduction of M87, the plan was subjected to growing criticism (B.U. Engelsen, 2003). The critique aimed mainly at the consequences of a locally-oriented school and the concept of knowledge the curriculum was based on. The critique was inspired by the international debate about education and cultural transfer. The critics of pedagogical reform and school with a strong focus on social and local knowledge found important arguments in E.D. Hirsch’s book *Cultural Literacy: What Every American Needs to Know* (1987). In this book, the critics found an almost ready-made solution for educational problems. School should provide all students with access to a common content, with a focus on basic knowledge, cultural heritage, and traditional values. Teachers, who according to M87 should work in teams and supervise students learning, are now becoming authority figures in their subjects. These principles of the 1997 curriculum (L97), was accompanied with a detailed description of knowledge aims in the subjects, which in research were perceived as a return to a traditional concept of school knowledge (S. Østerud, 2004). In 2006, the former centrist/right-wing government introduced the

curricular reform Knowledge Promotion (LK 06). In this reform, the concept of knowledge was given a new content, with a special focus on skills and competences. In spite of its name, this curriculum represents a turning away from traditional education. The curriculum tones down general knowledge and makes reading, writing, and math skills a central concern of the school. As mentioned, knowledge in this educational model should be applied and practical, and education should prepare students for life in the knowledge society. Knowledge Promotion (LK 06) forms part of an international neoliberal wave of reforms in many countries where context-dependent knowledge is combined with so-called 21st century skills and competences.

If we want to strengthen the subject-specific use of ICT in education, where students are provided with access to general knowledge, the traditional curriculum appears to be the obvious choice. Progressive school reforms, either in its reform-pedagogical or in its neoliberal variant, gives general knowledge low priority. The progressive curriculum does not lead to subject-specific use of ICT but rather fosters the trend towards a school without any real knowledge. On the other hand, the critics of traditional curricula have a point: knowledge is produced by researchers with values, opinions, and interests placed in specific contexts. Therefore, knowledge will always have a social character. The question is whether it is possible to overcome this either/or thinking, when we either must acknowledge that knowledge has a social character or insist on the objectivity of knowledge. In my view, it is possible to overcome this epistemological dilemma, but the prerequisite is a theory of knowledge that accepts the social character of knowledge without discarding objectivity and truth. The social and realistic theory of knowledge established in the last years (R. Moore, K. Maton, 2010; M.F.D. Young, 2008; R. Moore, 2009), shows that the social character of knowledge is not opposed to the idea of objective knowledge. Instead, it can be argued that the social aspect is a prerequisite for the objectivity of knowledge in intellectual fields. According to R. Moore, a social and realistic theory of knowledge is based on three assumptions:

a) that knowledge is socially produced, b) that knowledge is objectively real in the sense that it is 'about' something other than itself (*contra* constructionism and discourse theory) and that this other (the real, both natural and social) provides the possibility of an independent test of knowledge claims, and c) that this 'testing' take place within the work of intellectual communities in the form of endless debate and contestations, innovation and creativity that is structures in a particular mode of sociality that is extensive in time and space (2009, p. 136).

It is the intellectual communities with their specialized knowledge and mechanism for testing new knowledge claims that provide knowledge with its general and context-transcendent character. In contrast to the concept of knowledge in traditional education, this knowledge does not claim to be absolute or asocial, but has a preliminary character open for critique and revision.

A curriculum based on a social and realistic concept of knowledge would place general knowledge into the centre of education. At the same time, it would acknowledge that all knowledge is social and preliminary, and that knowledge is not a given but can change in content (what the traditional concept denies). Moreover, a social and realistic concept of knowledge in education would limit the over-stressing of student-centered forms of learning, activities linked to learning, and the one-sided adoration of 21st century skills. A social and realistic concept of knowledge would provide a new meaning for M. Scardamalia and C. Bereiter's concept of knowledge building (2006), and claim that the concepts and theories of a subject are prerequisite for the students' cumulative learning. For teachers the curriculum, as well as the theories and concepts of the subjects, would be the primary resource enabling students to acquire general knowledge, including insights beyond their everyday-knowledge. In class, the concepts should be related to the contexts of the students, to the facts that fill them with meaning, and to activities that make it possible to acquire the concepts and theories of the subject. There is reason to believe that digital technology can support such forms of teaching and, thus, contribute to the subject-specific use of ICT in school.

Conclusion

In today's neoliberal school the non-subject-related use of ICT poses a considerable challenge. Researchers have reacted to this challenge by proposing a more subject-specific use of ICT, with students' knowledge building in school as the central element. The theory of knowledge building in education has been developed by M. Scardamalia and C. Bereiter (2006), and this article discusses whether their theory will lead to a stronger subject-specific use of ICT in education. The article presents their theory, and I conclude that knowledge building based on postmodern premises leads to a local and context-dependent type of knowledge in education. The article argues that a subject-specific use of ICT in education should provide students with access to general knowledge, and points out that the neoliberal school leads away from this goal. ICT in education has been introduced into a school without

a robust epistemological framework. The use of ICT in education does not by itself lead to school knowledge, and there are indications that the subject-specific use of ICT presupposes a curriculum that places 'powerful knowledge' into the center of education. The article analyzes the Norwegian school curricula during the last decades and argues for an alternative curriculum based on a social and realistic concept of knowledge.

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