Nordic Journal of Digital Literacy

Jubileumsnummer 2006–2016

www.idunn.no/dk

Nordic Journal of Digital Literacy (NJDL) is aimed at researchers, school authorities, school leaders in primary and secondary schools, teachers in primary and secondary education, at colleges and universities, and others concerned with education and ICT.

The journal contains peer-reviewed articles, conference papers, debates and commentaries, software and book reviews. Through dissemination of national and international research, the journal contributes to the debate on education policy. The journal aims at creating a platform for the critical analysis of digital literacy and competence, and the use of ICT in educational context. Moreover the aim is to stimulate dialogue between different participants in the field. Upon reception, the editor evaluates all submissions. After editor screening, approved contributions are sent to at least two anonymous international reviewers.

Nordic Journal of Digital Literacy has a focus on articles that deal thematically with digital literacy and the use of ICT in educational settings. Papers can among others be targeted on the following themes:

– ICT use and innovation in education
– Theoretical, methodological and practical challenges around the use of ICT in education
– ICT in subjects (didactic context)
– Evaluation and development
– Learners’ work and learners’ ICT skills
– Teachers, teacher education and classroom management
– Lifelong learning

EDITOR
Morten Søby

EDITORIAL ASSISTANT
Marijana Kelentric
Vidar Bergethon Holm

ASSOCIATE EDITORS
Karoline Tømte
Ove Edvard Hatlevik
Gréta Björk Guðmundsdóttir
Trine Kofoed

EDITORIAL BOARD
 Claire Bélisle
Alain Breuleux
Kirsten Drotner
Ola Erstad
Keri Facer
Annita Fjuk
Patrik Hernwall

Michael Hoechsmann
Solveig Jakobsdöttir
Michele Knobel
Colin Lankshear
Sanna Järvelä
Nancy Law
Angela McFarlane
Roger Säljö
Marlene Scardamalia
Birgitte Holm Sørensen
Barbara Wasson
Patricia Wastiau

Design and typeset: Laboremus Sandefjord AS
ISSN online: 1891-943X

The journal is published in collaboration with the Norwegian Centre for ICT in Education
© Scandinavian University Press / Universitetsforlaget 2015
ARTICLES

Digital competence – a password to a new interdisciplinary field . . . . PAGE 4
  Morten Søby

Digital Literacy and Digital Literacies: . . . . PAGE 8
  Colin Lankshear
  Michele Knobel

Defining digital literacy . . . . PAGE 21
  David Buckingham

The role of media in developing literacies and cultural techniques . . . . PAGE 35
  Barbara Gentikow

Om bruk av digitale mapper på to grunnskoler . . . . PAGE 53
  Berit Bratholm

Challenging educational expectations of the social web: a web 2.0 far? . . . . PAGE 72
  Neil Selwyn

Educating the Digital Generation . . . . PAGE 85
  Ola Erstad

Uptake and Use of Digital Technologies in Primary and Secondary Schools . . . . PAGE 103
  Anders D. Olofsson
  J. Ola Lindberg
  Göran Fransson
  Trond Eiliv Hauge

Digital Literacy in Upper Secondary School . . . . PAGE 122
  Marte Blikstad-Balas

Educating Teachers for the New Millennium? . . . . PAGE 138
  Cathrine Edelhard Tømte

Appropriation of Digital Competence in Teacher Education . . . . PAGE 155
  Elen Instefjord

Guidelines and Regulations for Teaching Digital Competence in Schools and Teacher Education:
  A Weak Link? . . . . PAGE 172
  Bård Ketil Engen
  Tonje Hilde Giæver
  Louise Mifsud
Digital competence – a password to a new interdisciplinary field

Morten Søby

All technology, beginning with writing considered as a techne, is an artefact allowing its users to stock more information, to improve their competence and optimize their performances.

Jean-François Lyotard

Welcome to the 10th anniversary edition of Nordic Journal of Digital Literacy. The editors have selected articles from each volume since 2006. The articles reflect the journal’s development and history. The field of digital competence is interdisciplinary, which has been challenging. Since the beginning of 2006, we have worked to develop a network between the editorial board, authors and peer reviewers. We have succeeded! Step by step NJDL have developed and created knowledge based on digital competence and learning.

Digital competence is a multimodal and complex concept constantly changing with the development of digital media. Media development is multidisciplinary by its very nature. In the space of only ten years, digital competence has established itself as a key concept in educational policy and research. This editorial introduction will touch upon the history of the concept that has emerged from the tension between educational policy and educational research.

Over the last ten years, the term digital competence has set the agenda for innovation, education and pedagogy. The concept has had a double function as an agenda setter. On the one hand, it is the principal policy concept in innovation policy and in educational reform. On the other hand, the concept has become an objective in the development of schools and in practical pedagogy. Educationalists are now working on anchoring digital competence in theories for learning and media development and further developing the concept. The term digital competence has been something akin to a password into new fields politically as well as pedagogically.

From the classical period until today, intellectual trends have had their institutions: the courts, the salons, the newspapers and the journals. It is in such institutions that new concepts and terms are set in circulation, with great speed and motion. New terms sum up the present time, crystallise trends and create new ideas and visions. Such terms make it possible, for a time, for users to create for
themselves a separate discussion area. Some terms can function as the word in vogue of the moment and live a short life as a buzzword. Other terms can create a lasting trend and function as passwords to a new field. Passwords generate ideas, contribute new ways of thinking and provide access to discussions. Digital competence may be the password into a new multi-disciplinary research area, the guide in a process of lifelong learning and to objectives in educational policy.

In the first issue of NJDL in 1986, I made the following reflection: Digital competence can be seen as a concept whose status is «essentially contested» (Connolly 1993). It has a vague conceptual core or essence that is subject to discussion on a fundamental level. Much in the same way as with the word «democracy», several participants will join discussions and efforts to define the concept of digital competence. A discussion on digital competence may take place along three dimensions. Firstly, it is about appraisal or values. Secondly, there is a complex span between skills and knowledge and formative education Thirdly, there is an openness that creates potential for several possible interpretations and areas of use.

LOOKING BACK

The discussion of the terms digital skills, digital literacy and digital competence are numerous and complex. Use of the various terms in policy documents on educational policies shows that there is an on-going debate and different interpretations within both educational science and politics.

Digital competence has established itself as a collective term for understanding the complex relationships between individuals, organisations, ICT and society. The concept is increasingly central to research, educational policy, learning and public debate.

NJDL is based on a thesis that today there is an untapped potential for learning related to professional and educational use of digital media. This means that digital media are not utilized optimally in learning situations today. In the next few years, the development of digital media will create new opportunities and barriers for implementation and innovation in learning. Consequently, it is a challenge to develop theoretical, empirical, experimental and development-oriented research that can follow and create conditions for the development of digital media.

In a historical perspective, technology is often perceived as a threat before it is incorporated into culture. In cultures based on the spoken word, writing has often been regarded with scepticism and characterised as unnatural and inhuman. Plato (The Phaedrus dialogue) feared that writing would be produced outside of consciousness and destroy the memory. Since then, the art of writing has become completely natural to us. Gutenberg’s controversial printing press
has been implemented in today’s schools. Book print is natural within the schools and is no longer viewed as technology.

However, Ong (1982) shows in Morality and Literacy that writing and books are also technology: «Technologies are not mere exterior aids but also interior transformations of consciousness [...] Writing heightens consciousness. Alienation from a natural milieu can be good for us and indeed is in many ways essential for full human life» (Ong 1982:82). According to Ong, writing has become interiorized; in other words, we find it difficult to view writing as technology. There is a close connection between the philosophy of the Enlightenment and printing techniques.

In parts of education, culture and technology are separate. Technology becomes a factor that estranges and dehumanises while the classroom, the book and the curriculum are the neutral representatives of the cultural inheritance. In teacher education’s hidden curriculum, culture is defined as the sum of all the functions and values which oppose technology. Still many educational institutions base their arguments upon the close connection that exists between the philosophy of enlightenment and printing technology. For instance, by viewing a book’s script as natural – something which has lost its technical character – education has forgotten how technology and culture are interwoven. The book may be characterised as the first teaching machine and the first mass-produced commodity.

Many classrooms are still characterised by the attitude that it is pedagogically correct for children to learn to write using a pencil rather than a keyboard and word processing or digital media. The basis for established pedagogical theory and practice is still anchored in oral and written culture. For example, in viewing a book’s print as «natural» – something that has lost its technical character – we forget how technology and culture are interwoven.

At the same time, the Internet is a part of children’s and young people’s upbringing. Leadership in the use of educational technology requires a map and a compass to guide decision-making and action plans. To be truly useful, such roadmaps need to strike a delicate balance: they must incorporate a contextual understanding of real-world technologies, but remain grounded in pedagogical frameworks that guide their application.

Development of digital competence provides children and adolescents with a more varied range of forms of learning, more content resources and often a more stimulating learning environment – and thus with a potential for better and deeper learning. In the schools of the future, students will use digital media innovatively and with confidence to develop the skills they will need as individuals, professionals and interactive participants. A digital culture for learning presupposes involvement, the ability to think critically, cooperation and creative problem-solving: a culture of sharing.
We need to consider the introduction and implementation of technologies in learning in relation to the dynamics, evolution and needs of learning systems in further discussion. Learning takes place in a complex ecosystem where one must be aware of technology trends, but at the same time not become too technology driven. Thus, technologies become inseparable from their affordances and impact on learning. Furthermore, education is understood in a holistic manner. From this perspective, policy making should not be «bewitched» by fashionable technologies, or risk massive cyclical investments in different kinds of technologies that have little effect on developing better teaching and learning practises and outcomes. A systemic approach to school innovation is inspired by technology and driven by pedagogy.

REFERENCES

Digital Literacy and Digital Literacies: Policy, Pedagogy and Research Considerations for Education

Colin Lankshear
Adjunct Professor, James Cook University, Australia
c.lankshear@yahoo.com

Michele Knobel
Professor, Montclair State University, USA
knobelm@mail.montclair.edu

ABSTRACT

«Digital literacy» is increasingly being identified as a formal educational goal. While mainstream definitions vary in detail, the scope and meaning of digital literacy are rarely seen as problematic. This paper argues that typical mainstream accounts of digital literacy are seriously flawed. Rather than conceiving digital literacy as some unitary phenomenon it is better to think in terms of diverse digital literacies. The paper concludes by identifying some implications of this argument for educational policy, pedagogy and research.

Key words
digital literacy, literacies, sociocultural, social practice, blogs, fanfic

DEFINING DIGITAL LITERACY

Definitions of digital literacy are of two main kinds: conceptual definitions and standardized sets of operations intended to provide national and international normalizations of digital literacy. We will briefly survey examples of both kinds.
(a) Typical conceptual definitions of «digital literacy»

Richard Lanham (1995: 198) claims that «literacy» has extended its semantic reach from meaning «the ability to read and write» to now meaning «the ability to understand information however presented.» He emphasizes the multimedi-ated nature of digital information, and argues that to be digitally literate involves «being skilled at deciphering complex images and sounds as well as the syntactical subtleties of words» (Lanham 1995: 200). Digitally literate people are «quick on [their] feet in moving from one kind of medium to another … know what kinds of expression fit what kinds of knowledge and become skilled at presenting [their] information in the medium that [their] audience will find easiest to understand» (ibid.). Digital literacy enables us to match the medium we use to the kind of information we are presenting and to the audience we are presenting it to.

Paul Gilster defines digital literacy as «the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers» and, particularly, through the medium of the Internet (Gilster, in Pool 1997: 6). He emphasizes what he sees as inherent differences between digital information media and conventional print media. Digital literacy involves «adapting our skills to an evocative new medium, [and] our experience of the Internet will be determined by how we master its core competencies» (ibid.). These competencies are not merely «operational» or «technical» competencies, however. Digital literacy involves «mastering ideas, not keystrokes» (ibid.). Gilster identifies four key digital literacy competencies: knowledge assembly, evaluating information content, searching the Internet, and navigating hypertext. He describes each at length in his book, Digital Literacy (Gilster 1997). Gilster claims we need to teach and learn «how to use the Web properly and how to be critical» and that «we all need to learn that skill» (Gilster, in Pool 1997: 8). Citing the familiar image of students using the Internet to find information that they simply cut and paste into a «cobbled-together collection of quotes or multimedia items,» Gilster argues that we need to teach students «how to assimilate the information, evaluate it, and then reintegrate it» (in Pool 1997: 9).

(b) Some typical «standardized operationalizations» of digital literacy

«Standardized operationalizations» refer to attempts to operationalize what is involved in being «digitally literate» in terms of certain tasks, performances, demonstrations of skills, etc., and to render these as a standard set for general adoption. Some are little more than codifications of sets of specific operations at the level Gilster refers to as «keystrokes.» Others are closer to Gilster’s idea of «concern with meanings.»

Toward the «keystroke» end of the spectrum is the approach of the Global Digital Literacy Council (GDLC). One of the Council’s core objectives is to «review and update the Digital Literacy Standards based on input from subject matter experts worldwide.» (gdlcouncil.org) Current GDLC standards are
reflected in the Internet and Computing Core Certification (IC³) program provided by Certiport (certiport.com). This covers Computing Fundamentals, Key Applications, and Living Online. The Computing Fundamentals test items involve tasks like asking learners to click on all the «output devices» from a list containing items like joystick, monitor, speakers, keyboard, etc.; to choose among four items (one thousand, one million, one billion, one trillion) for the number of bytes in a megabyte; to create a new folder on the C drive within a simulated file manager; and to match «operating system,» «application» and «utility program» to three provided definitions. The items testing Key Applications use a range of simulations and ask learners to insert content from the clipboard at the designated insertion point, and exit Word without using the close box. Items assessing knowledge and skills related to Living Online use simulations to have respondents enter a subject in an email message and send the message, go to a specified address on a web page, and locate the history of sites visited in a web browser.

Toward the «concern with meaning» end of a spectrum is an operationalization developed by the US Educational Testing Service for higher education environments. According to the ETS, digital literacy is «the ability to use digital technology, communication tools and/or networks appropriately to solve information problems in order to function in an information society,» (ets.org) and comprises

the ability to use technology as a tool to research, organize, evaluate, and communicate information, and the possession of a fundamental understanding of the ethical/legal issues surrounding the access and use of information. (ibid.)

The ETS operationalization comprises 12–15 real time tasks that are «scenario-based» (for examples of tasks see <ets.org/Media/Tests/ICT_Literacy/pdf/ict_literacy_task_matrix.pdf>). Tasks include subject matter from the areas of humanities, natural science, social studies, popular culture and practical affairs, and use a generic version of one or more of 12 named ICT tools (e.g., a word processor, presentation software, a web browser, an email client). Test takers perform a range of «information management tasks,» including «extracting information from a database, developing a spreadsheet, or composing an e-mail based on research findings.» The seven competencies are: Define, Access, Manage, Integrate, Evaluate, Create and Communicate.

**KEY FEATURES OF MAINSTREAM DEFINITIONS OF DIGITAL LITERACY**

There are many other conceptual definitions and standardized operationalizations of digital literacy than those sketched here. Our examples are typical, however, and they exemplify what we think are three key features of mainstream accounts of digital literacy.
First, they confine «digital literacy» to roles concerned with information. This tendency is well illustrated by the ETS operationalization, where potentially expansive competencies like «Create» and «Communicate» are described purely in terms of information.

Create: The ability to generate information by adapting, applying, designing or inventing information in ICT environments.

Communicate: The ability to communicate information properly in its context of use for ICT environments. This includes the ability to gear electronic information for a particular audience and to communicate knowledge in the appropriate venue. (ets.org/Media/ests/ICT_Literacy/pdf/ict_literacy_task_matrix.pdf)

Second, typical definitions of digital literacy conflate interaction with information with epistemic engagement with information. Digital literacy involves interacting with information, and interacting with information is about assessing its truth (or validity), credibility, reliability and so on. Digital literacy is constructed in what we might call «truthcentric» ways, and as some kind of defence against being manipulated, improperly persuaded, or duped. It is invested with values and orientations associated with liberal and «critical» conceptions of media awareness and the like.

Third, most definitions construct digital literacy as an «It» – as some kind of a «thing»: a capacity or ability, a skill (or set of skills), or «master competency» (composed of more specific competencies and dispositions). It is something you «have,» or lack, and anyone who lacks it «needs» to get it. Accounts differ about what is actually «in» this thing. Some accounts include respect for property rights as a necessary facet. Others do not. Some accounts insist on «Internet safety» while others are satisfied with the ability to discriminate credibility of (re)sources. Such differences aside, the assumption is that when people have this «thing» they can handle information effectively and use it to consume and produce information in all kinds of settings and roles – as private citizens, workers, parents, teachers, learners.

As has been claimed for conventional literacy, digital literacy is seen to have causal efficacy, to generate outcomes in the world. For example, a digitally literate population will function better in a knowledge economy and be better equipped to promote their best interests and those of others who depend upon them. When one «has» digital literacy good things can happen; when one lacks digital literacy one is vulnerable and undesirable things can happen.

CRITIQUE OF «DIGITAL LITERACY»

There are three strong grounds for rejecting mainstream approaches to conceptualizing and defining digital literacy.
First, outside of a purely technical definition of information (as «anything transmitted in a signal that is not noise»), text-mediated interactions like communicating and relating cannot be reduced to transmitting and receiving information. To define digital literacy purely or predominantly in terms of interacting with information distorts social practice and human intent (cf., Schrage 2001).

Second, we dispute a truthcentric stance toward information in the digisphere, and the way the ideals of «credibility» and «validity» are rendered in terms of conventional norms of epistemic authority that we associate with academic veracity. We are not saying these are not important. Rather, we are saying that defining digital literacy in such delimiting ways by fiat needs to be seen for what it is: namely, an artificial and arbitrary constriction, with deep modernist trappings. Much of what many people are doing with information on the Internet does not bespeak concerns for truth or about being manipulated or duped. Instead, information increasingly becomes a resource for participation in affinity practices where concerns about «truth» and manipulation risks are replaced by concerns for social relations and participation. For example, a blogger cited by Dana Cammack (2005) invited her readers to post «memories» of time spent with her that were complete fabrications. The resulting list of invented memories was clearly much more about signaling current friendships and alliances than about «truth» or «reality.»

Third, conceiving digital literacy as some kind of «thing» – an «It» – is misguided, and open to the critique sociocultural theorists have advanced against the prevailing tendency to conceive conventional (alphabetic/print) literacy as an autonomous entity. According to what sociocultural theorists call the «autonomous» model of literacy (Street 1984), literacy consists in a skill, tool, technique, or set of (mainly cognitive) competencies that can be applied in diverse contexts and put of a range of uses and applications. Western alphabetic literacy is seen to comprise mastery of letters and phonemes such that one can encode and decode print. Armed with this «capacity,» people apply a «neutral» technology in different ways and for different purposes. Within this model «literacy» refers to abstracted «skills» or «techniques» – mastery of the technology of alphabetic text/print – and learners are taught to encode and decode as preparation for reading and writing in diverse settings.

This autonomous model resonates with the different accounts of digital literacy described above. «Digital literacy» consists in so many lists of abstracted skills and techniques that a proficient person can «do.» Once they «have» these «skills» they can use them purposefully at work, at home, at school, etc., and function «competently.» Courses are created to teach learners these tools/techniques/skills, and certify them when they are finished. (This logic is almost the exact reverse of what young people do when they set about learning how to play an online game and become part of an online gaming community.)
Sociocultural critique of the autonomous model of literacy does not deny that social practices of reading and writing involve elements of skill and technique. Clearly, they do. The point is, however, that these «skills» and «techniques» take on very different forms when embedded in different social practices involving different purposes and where different kinds of meaning are at stake. Moreover, the skills and techniques of decoding and encoding do not help very much on their own with explicating «reading» and «writing». This is because reading and writing are always «reading and writing with meaning» and this meaning is not primarily, or even substantially, a function of some «skill» or «technique» that might be called «comprehension.» It is predominantly a function of social practice, social context, and Discourse (Gee 2004).

From a sociocultural perspective, there is not just literacy. Rather, there are very many qualitatively different social practices of reading and writing, and many different conceptions of what is involved in reading and writing. There are very many cultural ways in which people read and write. Individuals move in and out of multiple ways of reading and writing. In other words, there are very many literacies. This is what Brian Street (1984: 1) means when he says that the word «literacy» should be understood as «a shorthand for the social practices and conceptions of reading and writing.» Writing a doctoral thesis is a radically different practice from writing a shopping list. The element they seem to have in common – encoding text – is the least important consideration. To think of these practices as different manifestations of some «thing» called literacy is like thinking of building a bridge and building a warehouse as different manifestations of mixing cement.

The same applies to «Internet searching.» To think of online searching to do a scholarly literature review and searching online for a recipe to mix a margarita as different manifestations of keying words into a search engine is to miss almost all of what is important to different social practices of online searching.

This argument has crucial implications for «digital literacy.» It means we should think of «digital literacy» not as something unitary, and certainly not as some finite «competency» or «skill» – or even as a set of competencies or skills. Rather, it means we should think of «digital literacy» as shorthand for the myriad social practices and conceptions of engaging in meaning making mediated by texts that are produced, received, distributed, exchanged etc., via digital codification. Digital literacy is really digital literacies. Indeed, each of the «things» that is named from an «It» perspective as a discrete «skill» splinters into multiple social practices. There are many different social practices and conceptions of searching, of navigating links, of evaluating credibility of sources, of «posting,» and so on. These vary according to how people «identify» themselves: that is, according to the values they have, the social groups they relate to, the affinities they invest in and attach themselves to, the purposes they see themselves pursuing, the kinds of images they seek to project, and so on.
DIGITAL LITERACIES IN EVERYDAY LIFE

In this section we illustrate our argument by brief reference to weblogging and fan fiction writing. It will soon become apparent that even digital literacies falling under one name, like «blogging» or «fanfiction,» are profoundly multiple. The names do not each refer to a unitary digital literacy. The social practices of any two bloggers may seem as different from each other as writing an academic paper is from emailing a parent, spouse or sibling.

(a) Weblogs/blogging

A weblog – or «blog» – is «a website that is up-dated frequently, with new material posted at the top of the page» (Blood 2002: 12). Blogs began in the early 1990s as websites that listed annotated hyperlinks to other websites containing interesting, curious, hilarious or otherwise noteworthy content recommended by the publisher of the weblog. Early blog publishers – «bloggers» – tended to be computing «insiders» because some knowledge of webpage and hyperlink coding was needed to post material to the Internet. Since 1999, however, easily-used weblog publishing tools and readily available web hosting have spawned a new mass generation of bloggers that is much more diverse than the original blogging generation. On 7 October, 2005, the weblog search engine Technorati.com claimed to be searching 19 million weblogs worldwide. Many bloggers use weblogs as a medium more like regularly updated journals than indices of hyperlinks, and postings can document anything and everything from what the blogger had for lunch that day; movie and music reviews; descriptions of shopping trips; through to latest illustrations completed by the blogger for offline texts; and the like. Posts may combine photographs and other graphics along with text, hypertext and audio. Weblogs are largely interest-driven and many weblogging practices are primarily concerned with creating social alliances (Blood 2002). Some bloggers update several times a day, while others may update every few days, once a week, or even less regularly.

Blogs are created and maintained for diverse purposes and as part of diverse social practices. These include, but are far from exhausted by (combinations of) the following: as personal diaries/journals; to provide alternative accounts of events and other phenomena to those of mainstream media as part of a citizen journalist practice; to critique mainstream broadcasting of news events as part of a «news watch» affinity space; to sell products or distribute corporate news as part of commercial practice; to express personal opinions as part of one’s alliance with particular points-of-view or perspectives; to archive memories (e.g., photo blogs, audio blogs, video blogs); to parody other blogs and other media; to augment fanfiction writing or drawing; to archive or index profession-related materials (e.g., hyperlinks to relevant policy documents and news reports etc.); to augment hobbies and pastimes (e.g., collecting items, techno-gadgetry, genealogy studies, sport); to notify fans of popular culture events and information (like band tour dates, author readings and book events, art and design world developments), and so on. The sheer diversity of weblogs
This article is published in Nordic Journal of Digital Literacy, 2006–2016.

and weblogging practices cautions against conceiving blogging as a specific singular digital literacy.

(b) Fanfiction

In fanfiction – or «fanfic» to aficionados – devotees of a television show, movie, book, video game etc. write stories (or songs, poems, or create drawings) about its characters. In the main, fanfictions chronicle alternate adventures, mishaps or even alternate histories/futures for main characters, relocate main characters to a new universe altogether, fill in plot holes, or realize relationships between characters that were only hinted at, if that, on screen, and so on. Fanfiction writing practices have really come into their own as distinct, recognized social practices since the advent of serialized television shows like «Star Trek.» This began in 1966 and rapidly gained a cult following of fan fiction writers who distributed their narratives at Star Trek fan conventions, fan club meetings, or via postal mail. Since then, fans of any number of popular media texts have generated countless volumes of fanfic writing in a range of forms and media.

The Internet has played a prominent role in the proliferation of fanfic writing and has enabled more people than ever before to actively participate in contributing and critiquing fanfic. A Google.com search in October 2005 for the term «fan fiction» returned 3,700,000 hits, which can be read as a barometer of the popularity of this practice online. Fanfic itself can be classified into a number of different types. These include, for example, «in-canon» writing, which maintains as much of the original media text as possible; «crossovers,» where characters from two different media texts (e.g., from a video game and a movie) are brought together in a new story; «(relation)shipper» narratives, that focus on establishing or exploring an intimate relationship between two characters (this includes heterosexual and homoerotic or homosexual relationships); «alternative universe» stories, where the characters from an original text are transposed into an entirely new or different «world»; and «self insert» fanfic, where the writer inserts herself as a recognizable character into the narrative.

Most fanfic writers value good quality writing, which for them includes well-developed characters, engaging and logical plotlines, and good grammar and spelling. For example, many fan-produced online guides to writing good fanfic stories warn writers of falling victim to the «Mary Sue» syndrome. «Mary Sue» (along with her male counterpart) is a character who embodies the author’s all-too-charming-and-perfect alter ego, and as such, tends to dominate the entire story and squeeze the lifeblood out of it.

Online fanfic writing groups come in a variety of forms, but perhaps the most common is the searchable archive-plus-discussion board format typified by Fanfiction.net. Fanfiction.net hosts tens of thousands of fanfics, which are organized into 8 categories (i.e., Anime, Book, Movie, Cartoon, Comic, Game,
Television Show, and Miscellaneous). At the start of October, 2005, for example, clicking on the sub-category entry for *Inuyasha* – a popular anime television series – takes the reader to a listing of 51,788 fanfic narratives based on this series. Clicking on any one of these listed narrative opens a fan-produced text, with many of these texts running into multiple chapters. Once a particular story has been accessed it is possible to read all of the reviews posted for this story. The stories themselves can become serialized, with chapters written over the course of a number of years and each new chapter or installment often responds to reviewer feedback and suggestions for future storyline or character developments. In this way, fanfiction writing online is often a highly collaborative act.

Collaborative writing seems to be especially prized among adolescent female writers in particular, who often draft or rehearse written stories via role-plays and plot discussions conducted using instant messaging or blogs (cf., Black 2006; Thomas 2005). Fans writing fiction based on a favourite movie, book, television series, or video game are not only prolonging the pleasure they obtain from these original media texts, but also actively writing themselves into the picture by appropriating characters, motivations, and settings, and shaping these within personally interesting and satisfying narratives. In short, fanfic is more than simply «writing stories.» The kind of collaborative appropriations found in fanfic practices clearly challenge the commercial media’s hold over everyday textual narratives (Jenkins 1992).

**WHAT IS CENTRAL TO «DIGITAL LITERACY» IS MARGINAL IN DIGITAL LITERACIES**

One major implication of focusing on digital literacies as social practices of reading and writing (keying, imaging, etc.) is that «the digits» – in the sense of knowing how to «operate» bits of hardware and software – are in most cases the least part of what the social practices involve. Most of what participants bring to digital literacy practices are cultural and critical «ways of doing things» rather than «operational» techniques (Lankshear & Snyder 2001). If we look, for example, to award winning weblogs like Ernie Hsiung’s *little. yellow.different* or *BoingBoing.com* it is obvious that most of what constitutes these blogs and their success are the cultural/aesthetic/literary «ways» and «experiences» their creators bring to the blogosphere. Someone like an Ernie Hsiung could very quickly and easily acquire – or hire – the operational facility needed to publish their point of view, «take» on life, humour and style in weblog format. The value lies in the point of view and style almost infinitely more than in the operational aspect.

Such ideas are well understood by young people who are digitally literate in the social practice sense we advocate here. Two examples from online interviews with adolescent «insiders» to online role-playing communities (Thomas 2005) affirm our point.
In the first, a 14 year old male informant speaking in role as Percirion (President of the United Federation of the Planets) provides insights into his experiences of digital literacy instruction from an «It» perspective, while a second young informant (Hobbitness) «looks» on:

President Percirion (UFP): My school is most certainly teaching us about Technology …
We have a «Computer lab» with enough electricity flowing through it to power a small African country
Anya [researcher]: so what computer skills / knowledge are you getting at your school perc?
President Percirion (UFP): Typing ... I’m a 42-words-per-min typer
President Percirion (UFP): How to Use the Internet … How Not To Use the Internet
Hobbitness: lol
Anya: but you already know ... laugh really? they’re giving you rules?
President Percirion (UFP): We usually ... have free reign on the Internet
President Percirion (UFP): But there’s a boundary
Anya:†††††††††††† yes?
President Percirion (UFP): This is where the powerful Imagination kicks in
Anya: tell tell
President Percirion (UFP): «Inappropriate material», so to speak
President Percirion (UFP): And we’re also learning how to use various computer systems … which I am sure will be out of date by the time we leave
Anya: what various computer systems?
President Percirion (UFP): Excel, Word, More Excel, Office
Hobbitness: aha
President Percirion (UFP): Powerpoint
Hobbitness: *haha
Anya: ahhh ok

(Data provided as personal communication by Angela Thomas, March 2005)

Percirion and Hobbitness participate in an online role-playing community, the Gathering of the Elves. It was created by a young girl named Elianna, who spoke at length about the purposes, motivations and processes involved in instigating the community and administering the site (sindalindewen.proboards30.com). In this second example, Elianna affirms our view about «the digits» being the least part of digital literacies.

When I expressed admiration for her achievement, [Elianna] humbly deflected my praise to the team of friends who assisted her in administering the site. She identified each friend, telling me their particular area of expertise, and what they had contributed to the site. She claimed she just thought of the idea to create the community and it was easy because her friends
helped her to develop it. She didn’t see anything remarkable at all in what she was doing, labelling it as «just a game», «a bit of fun». When I pointed out all of the processes she had worked through to set up the community, she dismissed it, saying «… nah, it's easy ... you just mess around for a bit and you get it ... You just have to figure out which «button» works which part lol … and yeah, just about ... most of it you have to change back and forth, and it's like, ok, so this one changes this and that one changes that, and you just kept messing with it til you work it out» (Thomas 2005: 29).

SOME POLICY, PEDAGOGY AND RESEARCH CONSIDERATIONS

Our arguments suggest a range of considerations for people working in the policy, pedagogy and research areas of education. Some of these are as follows.

**Policy**

(i) Digital literacy should be problematized rather than taken as understood. Rather than operating from unproblematic conceptions of digital literacy as an «It,» we should view digital literacies in a larger frame that resists over-attending to operational techniques and skills and, instead, emphasizes mobilizing and building on what learners acquire and know from their wider cultural participation and affinities. Much evidence from literacy research indicates that constructions of literacy in terms of skills, content, and competencies predicated on functioning within everyday economic, administrative, and social routines can be profoundly disabling for those deemed not to be literate.

(ii) Policy makers should resist the temptation to make curriculum the default setting for providing access to digital literacy. Subsidized public and home-based access to digital technologies offering opportunities for wide-ranging exploration and experimentation, as well as access to «insider» expertise and support, are likely to be more effective in both the short and the long run.

(iii) It is important to recognize a much wider range of digital literacies that just those that are tied to information. It is also important to consider digitized popular cultural artifacts and pursuits – mobile phones, MP3 players, handheld games – as fruitful conduits to familiarity and proficiency with a broad range of digital literacies that are valued scholastically, culturally and economically (Facer & Furlong 2001).

**Pedagogy**

It is important to consider the extent to which the «digits» – the operational aspects – are the least part of what is involved in most digital literacies. While the role and complexity of the operational dimension will vary from one digital literacy to another we need always to consider potential costs involved in hostaging social contexts and practices to «skill teaching,» when it would be far
more effective to allow operational facility to emerge organically from immersion in uncompromised versions of social practices.

For school-based learning to provide a sound entrée to becoming digitally literate in insider or expert-like ways we recommend pedagogical approaches like that of the Knowledge Producing Schools initiative being developed on a project by project basis with schools by Chris Bigum, Leonie Rowen and associates (deakin.edu.au/education/lit/kps. See also, Lankshear & Knobel 2003).

Research

(i) In a period of deep and rapid change and innovation researchers need to seek productive balance between theory-driven and more «grounded» approaches to researching digital literacies. As new practices emerge it will not always be appropriate to try and understand them in terms of extant theory – indeed, often it will not be appropriate to do so. The trick is to know when to give new theory a chance to emerge from data. It is also important for researchers of digital literacies to «get out as often as possible» and investigate cultural fringes as matters of interest in their own right, and not with a view to seeking direct educational applications.

(ii) Current developments on the Internet reflected in talk about a transition from Web 1.0 to Web 2.0 mark changes in the constitution of social practices that call out to be researched carefully with an eye to understanding their implications for learning and expertise. We think that much of what is addressed in the name of digital literacy from the «It» perspective is grounded in Web 1.0. Yet, outside of formal «curricularized» learning contexts – in such spaces as online fanfic communities, the blogosphere, participation in Wikipedia, the open source movement, online gaming communities, and the like – people are absorbing and embracing the cultural logic of Web 2.0. The experience of disjuncture on the part of learners who invest informally in «Web 2.0» when faced with «Web 1.0» within formal settings of compulsory learning is debilitating, confusing and, ultimately, destructive. Research has much to contribute to resolving such tensions within pedagogical sites.

CONCLUSION

Digital literacies present significant challenges to policy, pedagogy, and research in relation to education. In our view, facing and meeting these challenges begins from ensuring that digital literacy does not become the post-typographic equivalent of functional literacy from the world of print. Accordingly, we think it is important to consider supporting research that tells us more about «how kids who grow up digital think and want to learn,» and the extent to which and ways in which current educational directions and emphases may negate such ways of thinking and desires for learning.
REFERENCES


Defining digital literacy

What do young people need to know about digital media?

David Buckingham
Emeritus Professor of Media and Communications, Loughborough University, UK, d.buckingham@lboro.ac.uk

ABSTRACT
This article offers a rationale for the notion of «digital literacy» in education. Pointing to some of the limitations of previous proposals in this field, it outlines a framework based on four key concepts drawn from media education. It applies these concepts to the World Wide Web and to computer games, and discusses the role of digital media production by students in developing digital literacy. The article emphasises the importance of developing critical approaches to digital media as a necessary prerequisite for using them as resources for learning.

Keywords
media literacy, digital literacy, media education

If you want to use television to teach somebody, you must first teach them how to use television.

(Umberto Eco, 1979)

Umberto Eco’s argument about the educational use of television can equally be applied to newer media. As Eco implies, media should not be regarded merely as teaching aids or tools for learning. Education about the media should be seen as an indispensable prerequisite for education with or through the media. Likewise, if we want to use the internet or computer games or other digital media to teach, we need to equip students to understand and to critique these media: we cannot regard them simply as neutral means of delivering information, and we should not use them in a merely functional or instrumental way.

My aim in this article is to identify some of the forms that this education might take, and some of the questions that it might raise. I argue for a particular definition of «digital literacy» that goes well beyond some of the approaches that are currently adopted in the field of information technology in education. Indeed, implicit in my argument is a view that new digital media can no longer be regarded simply as a matter of «information» or of «technology». This is particularly the case if we are seeking to develop more effective connections between children’s experiences of technology outside school and their experiences in the classroom.
With the growing convergence of media (which is driven by commercial forces as much as by technology), the boundaries between «information» and other media have become increasingly blurred. In most children’s leisure-time experiences, computers are much more than devices for information retrieval: they convey images and fantasies, provide opportunities for imaginative self-expression and play, and serve as a medium through which intimate personal relationships are conducted. These media cannot be adequately understood if we persist in regarding them simply as a matter of machines and techniques, or as «hardware» and «software». The internet, computer games, digital video, mobile phones and other contemporary technologies provide new ways of mediating and representing the world, and of communicating. Outside school, children are engaging with these media, not as technologies but as cultural forms. If educators wish to use these media in schools, they cannot afford to neglect these experiences: on the contrary, they need to provide students with means of understanding them. This is the function of what I am calling digital literacy.

MULTIPLE LITERACIES

Over the past twenty years, there have been many attempts to extend the notion of literacy beyond its original application to the medium of writing. As long ago as 1986, one of the leading British researchers in the field, Margaret Meek Spencer, introduced the notion of «emergent literacies» in describing young children’s media-related play (Spencer, 1986); and the call for attention to «new» or «multiple» literacies has been made by many authors over subsequent years (Bazalgette, 1988; Buckingham, 1993a; Tyner, 1998; and many others). We have seen extended discussions of visual literacy (e.g. Moore & Dwyer, 1994), television literacy (Buckingham, 1993b), cine-literacy (British Film Institute, 2000), and information literacy (Bruce, 1997). Exponents of the so-called New Literacy Studies have developed the notion of «multiliteracies», referring both to the social diversity of contemporary forms of literacy, and to the fact that new communications media require new forms of cultural and communicative competence (Cope & Kalantzis, 2000).

This proliferation of literacies may be fashionable, but it raises some significant questions. Popular discussions of «economic literacy», «emotional literacy» and even «spiritual literacy» seem to extend the application of the term to the point where any analogy to its original meaning (that is, in relation to written language) has been lost. «Literacy» comes to be used merely as a vague synonym for «competence», or even «skill». It is worth noting in this respect that such expressions may be specific to the English language. In some other languages, the equivalent term is more overtly tied to the notion of writing – as in the French word «alphabetisation»; while in other cases, «media literacy» is often translated into a more general term for skill or competence – as in the German «Medienkompetenz».
The term «literacy» clearly carries a degree of social status; and to use it in connection with other, lower status forms such as television, or in relation to newer media, is thus to make an implicit claim for the latter’s validity as objects of study. Yet as uses of the term multiply, the polemical value of such a claim – and its power to convince – is bound to decline. Thus, while recognizing the significance of visual and audio-visual media, some scholars challenge this extension of the term, arguing that «literacy» should continue to be confined to the realm of writing (Barton, 1994; Kress, 1997); while others dispute the idea that visual media require a process of cultural learning that is similar to the learning of written language (Messaris, 1994). The analogy between writing and visual or audio-visual media such as television or film may be useful at a general level, but it often falls down when we look more closely: it is possible to analyse broad categories such as narrative and representation across all these media, but it is much harder to sustain more specific analogies, for example between the film shot and the word, or the film sequence and the sentence (Buckingham, 1989).

Nevertheless, the use of the term «literacy» implies a broader form of education about media, that is not restricted to mechanical skills or narrow forms of functional competence. It suggests a more rounded, humanistic conception that is close to the German notion of «Bildung». So what are the possibilities and limitations of the notion of «digital literacy»? Is it just a fancy way of talking about how people learn to use digital technologies, or is it something broader than that? Indeed, do we really need yet another literacy?

TOWARDS DIGITAL LITERACY

The notion of digital literacy is not new. Indeed, arguments for «computer literacy» date back at least to the 1980s. Yet as Goodson and Mangan (1996) have pointed out, the term «computer literacy» is often poorly defined and delineated, both in terms of its overall aims and in terms of what it actually entails. As they suggest, rationales for computer literacy are often based on dubious assertions about the vocational relevance of computer skills, or about the inherent value of learning with computers, which have been widely challenged. In contemporary usage, digital (or computer) literacy often appears to amount to a minimal set of skills that will enable the user to operate effectively with software tools, or in performing basic information retrieval tasks. This is essentially a functional definition: it specifies the basic skills that are required to undertake particular operations, but it does not go very far beyond this.

For example, the British government has attempted to define and measure the ICT skills of the population alongside traditional literacy and numeracy as part of its Skills for Life survey (Williams et al., 2003). This survey defines these skills at two levels. Level 1 includes an understanding of common ICT terminology; the ability to use basic features of software tools such as word-processors and spreadsheets; and the ability to save data, copy and paste, manage
files, and standardise formats within documents. Level 2 includes the use of search engines and databases, and the ability to make more advanced use of software tools. In the 2003 survey, over half of the sample of adults was found to be at «entry level or below» (that is, not yet at Level 1) in terms of practical skills. Other research suggests that adults’ ability to use search engines for basic information retrieval, for example, is distinctly limited (Livingstone et al., 2005, pp. 23–24).

Another context in which the notion of digital literacy has arisen in recent years is in relation to online safety. For example, the European Commission’s «Safer Internet Action Plan» has emphasised the importance of internet literacy as a means for children to protect themselves against harmful content. Alongside the range of hotlines, filters and «awareness nodes», it has funded several educational projects designed to alert children to the dangers of online paedophiles and pornography – although in fact it is notable that many of these projects have adopted a significantly broader conception of internet literacy, that goes well beyond the narrow concern with safety. The «Educaunet» materials, for example, provide guidance on evaluating online sources and assessing one’s own information needs, as well as recognising the necessity and the pleasure of risk for young people (see www.educaunet.org).

Even so, most discussions of digital literacy remain primarily preoccupied with information – and therefore tend to neglect some of the broader cultural uses of the internet (not least by young people). To a large extent, the concern here is with promoting more efficient uses of the medium – for example, via the development of advanced search skills (or so-called «power searching») that will make it easier to locate relevant resources amid the proliferation of online material. Popular guides to digital literacy have begun to address the need to evaluate online content (e.g. Gilster, 1997; Warlick, 2005); yet these formulations still tend to focus on technical «know-how» that is relatively easy to acquire, and on skills that are likely to become obsolete fairly rapidly. Much of the discussion appears to assume that information can be assessed simply in terms of its factual accuracy. From this perspective, a digitally literate individual is one who can search efficiently, who compares a range of sources, and sorts authoritative from non-authoritative, and relevant from irrelevant, documents (Livingstone et al., 2005, p. 31). There is little recognition here of the symbolic or persuasive aspects of digital media, of the emotional dimensions of our uses and interpretations of these media, or indeed of aspects of digital media that exceed mere «information».

Bettina Fabos (2004) provides a useful review of such attempts to promote more critical evaluation of online content. In practice, she argues, evaluation «checklists» are often less than effective. Students may feel inadequate assessing sites when they are unfamiliar with the topics they cover; and they largely fail to apply these criteria, instead emphasising speedy access to information and appealing visual design. More to the point, however, such «web evaluation» approaches appear to presume that objective truth will eventually be achieved through a
process of diligent evaluation and comparison of sources. They imply that sites can be easily divided into those that are reliable, trustworthy and factual, and those that are biased and should be avoided. In practice, such approaches often discriminate against low-budget sites produced by individuals, and in favour of those whose high-end design features and institutional origins lend them an air of credibility. The alternative, as Fabos suggests, is to recognise that «bias» is unavoidable, and that information is inevitably «couched in ideology». Rather than seeking to determine the «true facts», students need to understand «how political, economic, and social context shapes all texts, how all texts can be adapted for different social purposes, and how no text is neutral or necessarily of 'higher quality' than another» (Fabos, 2004, p. 95).

As this implies, digital literacy is much more than a functional matter of learning how to use a computer and a keyboard, or how to do online searches. Of course, it needs to begin with some of the «basics». In relation to the internet, for example, children need to learn how to locate and select material – how to use browsers, hyperlinks and search engines, and so on. But to stop there is to confine digital literacy to a form of instrumental or functional literacy. The skills that children need in relation to digital media are not confined to those of information retrieval. As with print, they also need to be able to evaluate and use information critically if they are to transform it into knowledge. This means asking questions about the sources of that information, the interests of its producers, and the ways in which it represents the world; and understanding how these technological developments are related to broader social, political and economic forces.

MEDIA LITERACY GOES ONLINE

This more critical notion of literacy has been developed over many years in the field of media education; and in this respect, I would argue that we need to extend approaches developed by media educators to encompass digital media. There are four broad conceptual aspects that are generally regarded as essential components of media literacy (see Buckingham, 2003). While digital media clearly raise new questions, and require new methods of investigation, this basic conceptual framework continues to provide a useful means of mapping the field:

Representation. Like all media, digital media represent the world, rather than simply reflect it. They offer particular interpretations and selections of reality, which inevitably embody implicit values and ideologies. Informed users of media need to be able to evaluate the material they encounter, for example by assessing the motivations of those who created it and by comparing it with other sources, including their own direct experience. In the case of information texts, this means addressing questions about authority, reliability and bias; and it also necessarily invokes broader questions about whose voices are heard and whose viewpoints are represented, and whose are not.
**Language.** A truly literate individual is able not only to use language, but also to understand how it works. This is partly a matter of understanding the «grammar» of particular forms of communication; but it also involves an awareness of the broader codes and conventions of particular genres. This means acquiring analytical skills, and a meta-language for describing how language functions. Digital literacy must therefore involve a systematic awareness of how digital media are constructed, and of the unique «rhetorics» of interactive communication: in the case of the web, for example, this would include understanding how sites are designed and structured, and the rhetorical functions of links between sites (cf. Burbules & Callister, 2000, pp. 85–90).

**Production.** Literacy also involves understanding who is communicating to whom, and why. In the context of digital media, young people need to be aware of the growing importance of commercial influences – particularly as these are often invisible to the user. There is a «safety» aspect to this: children need to know when they are being targeted by commercial appeals, and how the information they provide can be used by commercial corporations. But digital literacy also involves a broader awareness of the global role of advertising, promotion and sponsorship, and how they influence the nature of the information that is available in the first place. Of course, this awareness should also extend to non-commercial sources and interest groups, who are increasingly using the web as a means of persuasion and influence.

**Audience.** Finally, literacy also involves an awareness of one’s own position as an audience (reader or user). This means understanding how media are targeted at audiences, and how different audiences use and respond to them. In the case of the internet, this entails an awareness of the ways in which users gain access to sites, how they are addressed and guided (or encouraged to navigate), and how information is gathered about them. It also means recognising the very diverse ways in which the medium is utilised, for example by different social groups, and reflecting on how it is used in everyday life – and indeed how it might be used differently. (In some respects, of course, the term «audience» (which is easily applied to «older» media) fails to do justice to the interactivity of the internet – although substitute terms are no more satisfactory (Livingstone, 2004)).

**CASE 1: WEB LITERACY**

How might these broad approaches be applied specifically to studying the World Wide Web? Figure 1 indicates some of the issues that might be addressed here, and is adapted from Buckingham (2003). It incorporates several of the key concerns of the «web evaluation» approaches discussed above, but sets these within a broader context. (Different issues would undoubtedly need to be explored in relation to other uses of the internet, such as e-mail, instant messaging or blogging.)
In my view, this approach is significantly more comprehensive and more rigorous than most existing approaches to «internet literacy». It incorporates questions about bias and reliability, but sets these within a broader concern with representation. This in turn is related to a systematic analysis of the «grammar» or «rhetoric» of online communications, that includes visual as well as verbal dimensions; and to an account of the commercial and institutional interests at stake. The approach also entails a reflexive understanding of how these factors impact on the user – how users are targeted and invited to participate, what they actually do with the medium, and what they find meaningful and pleasurable. I would argue that this approach moves well beyond a
narrow concern with «information» and a simplistic approach to evaluation that sees it merely in terms of truth and falsity.

**CASE 2: GAME LITERACY**

The approach outlined here is not only applicable to «information» media. In principle, it can also be applied to other aspects of digital media, including «fictional» media such as computer and video games. Of course, there is a growing interest in using computer games in education; but here again, most proposals implicitly conceive of games as a neutral «teaching aid». In line with Eco’s argument about television, I would argue that we also need to be teaching young people about games as a cultural form – and that this is a necessary prerequisite for using games in order to teach other curriculum areas.

To date, most proposals for teaching about games in schools have been developed by teachers of English or language arts (e.g. Beavis, 1998). As such, these proposals tend to emphasise the aspects of games that fit most easily with English teachers’ traditional literary concerns, for example with narrative or the construction of character. In terms of our four-part framework, the emphasis is on language and to some extent on representation; but there is little engagement with the more sociological issues to do with production and audience that are important concerns for media teachers.

Equally significantly, this quasi-literary approach can lead to a rather partial account of the textual dimensions of games – which itself raises significant issues about the definition of «game literacy». Clearly, there are many elements that games share with other representational or signifying systems. On one level, this is a manifestation of the convergence that increasingly characterises contemporary media: games draw upon books and movies, and vice-versa, to the point where the identity of the «original» text is often obscure. Users (players, readers, viewers) must transfer some of their understandings across and between these media, and to this extent it makes sense to talk about «literacies» that operate – and are developed – across media (Mackey, 2002). However, analysing games simply in terms of these representational dimensions produces at best a partial account. For example, characters in games function both in the traditional way as representations of human (or indeed non-human) «types», and as points of access to the action; but the crucial difference is that they can be manipulated, and in some instances positively changed, by the player. This points to the necessary interpenetration of the representational and the ludic dimensions of games – that is, the aspects that make games playable (Carr et al., 2006).

So is there also a «literacy» that applies to the ludic dimension of games? There is a growing literature, both in the field of game design and in academic research, that seeks to identify basic generative and classificatory principles in this respect (e.g. Salen & Zimmerman, 2003). This kind of analysis focuses on
issues such as how games manage time and space, the «economies», goals and obstacles of games, and issues such as rules and conditionality. It is these ludic aspects that distinguish games from movies or books, for example. However, these elements are not separate from, or opposed to, the representational elements; and any account of «game literacy» needs to address both the elements that games have in common with other media and the elements that are specific to games (whether or not they are played on a computer).

As this implies, the analysis of games requires new and distinctive methods that cannot simply be transferred from other media – although this is equally the case when we compare television and books, for example. While some elements are shared across these media, others are distinctive to a specific medium; and hence we need to talk both in terms of a more general «media literacy» and in terms of specific «media literacies», in the plural. Furthermore, developing «game literacy» also needs to address the aspects of production and audience – although here again, the term «audience» seems an inadequate means of describing the interactive nature of play. Figure 2 summarises some of the key issues to be addressed in applying the media literacy framework to computer games, and draws on some other recent work in this field (Burn, 2004; Oram & Newman, 2006).

FIGURE 2 – COMPUTER GAMES: ISSUES FOR STUDY

<table>
<thead>
<tr>
<th>REPRESENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>– How games lay claim to «realism», for example in their use of graphics, sounds and verbal language.</td>
</tr>
<tr>
<td>– The construction and manipulation of game «characters».</td>
</tr>
<tr>
<td>– The representations of specific social groups, for instance in terms of gender and ethnicity.</td>
</tr>
<tr>
<td>– The nature of game «worlds» and their relationship to real worlds (for example, in terms of history, geography and physics).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>– The functions of verbal language (audio and written text), still and moving images, sounds and music.</td>
</tr>
<tr>
<td>– The distinctive codes and conventions of different game genres, including the kinds of interactivity – or «playability» – that they offer.</td>
</tr>
<tr>
<td>– How different game genres manage space and time (that is, narrative), and how they position the player.</td>
</tr>
<tr>
<td>– The ludic dimensions of games – rules, economies, objectives, obstacles, and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>– The «authorship» of games, and the distinctive styles of graphic artists and game designers.</td>
</tr>
<tr>
<td>– The technologies and software that are used to create games, and the professional practices of game companies.</td>
</tr>
<tr>
<td>– The commercial structure of the games industry (developers, publishers, marketers), and the role of globalisation.</td>
</tr>
<tr>
<td>– The relationships between games and other media such as television, books and movies, and the role of franchising and licensing.</td>
</tr>
</tbody>
</table>
The digital literacy «recipe» outlined here is intended only as a brief indication of the possibilities: more detailed proposals for classroom practice can be found elsewhere (e.g. Burn & Durran, in press; MacDougall, 2006). Obviously, these suggestions will vary according to the needs and interests of the students; although it should be possible to address the general conceptual issues at any level. Nevertheless, it should be apparent that approaching digital media through media education is about much more than simply «accessing» these media, or using them as tools for learning: on the contrary, it means developing a much broader critical understanding, which addresses the textual characteristics of media alongside their social, economic and cultural implications.

**«WRITING» DIGITAL MEDIA**

Finally, it is important to recognise that these critical understandings can and should be developed through the experience of media production, and not merely through critical analysis. Media literacy involves «writing» the media as well as «reading» them; and here again, digital technology presents some
important new challenges and possibilities. The growing accessibility of this technology means that quite young children can easily produce multimedia texts, and even interactive hypermedia – and increasing numbers of children have access to such technology in their homes. Indeed, new media are a key aspect of the much more participatory media culture that is now emerging – in the form of blogging, social networking, game-making, small-scale video production, podcasting, social software, and so on (Jenkins, 2006).

Growing numbers of teachers have sought to harness the productive possibilities of these media, albeit in quite limited ways. As with older media (Lorac & Weiss, 1981), many teachers are using multimedia authoring packages as a means of assisting subject learning in a range of curriculum areas. Here, students produce their own multimedia texts in the form of websites or CD-ROMs, often combining written text, visual images, simple animation, audio and video material. Vivi Lachs (2000), for example, describes a range of production activities undertaken with primary school students in learning about science, geography or history. These projects generally involve children «representing» their learning for an audience of younger children in the form of multimedia teaching materials or websites. Yet although the children’s productions frequently draw on elements of popular culture (such as computer games), the content of the productions is primarily factual and informational – resulting in a form of «edutainment».

Other potential uses of digital media have emerged from arts education. These projects often involve the participation of «digital artists» external to the school, and their primary emphasis is on the use of the media for self-expression and creative exploration. The implicit model here is that of the avant-garde multimedia art work, although (here again) students tend to «import» elements of popular culture. Rebecca Sinker (1999), for example, describes an online multimedia project which set out to develop links between an infant school and its community. The project was intended to mark the school’s centenary, and to offer the children opportunities «to investigate their own families, community, histories and experiences, exploring changes and celebrating diversity». Using multimedia authoring software, the project brought together photography, video, drawing, story-telling, digital imaging, sound and text. Perhaps most significantly, the results of the project (in the form of a website) were available to a much wider audience than would normally have been the case with children’s work.

These approaches are certainly interesting and productive; but there are two factors that distinguish them from the use of digital production in the context of media education. Firstly, media education is generally characterised by an explicit focus on popular culture – or at least on engaging with students’ everyday experiences of digital media, rather than attempting to impose an alien «artistic» or «educational» practice. In the case of the internet, this means recognising that most young people’s uses of the medium are not primarily «educational», at least in the narrow sense. Teachers need to recognise that young
people’s uses of the internet are intimately connected with their other media enthusiasms – and that this is bound to be reflected in the texts they produce.

Secondly, there is the element of theoretical reflection – the dynamic relationship between making and critical understanding that is crucial to the development of «critical literacy». In the context of media education, the aim is not primarily to develop technical skills, or to promote «self-expression», but to encourage a more systematic understanding of how the media work, and hence to promote more reflective ways of using them. In this latter respect, media education directly challenges the instrumental use of media production as a transparent or neutral «teaching aid». In fact, these digital tools can enable students to conceptualise the activity of production in much more powerful ways than was possible with analogue media. For example, when it comes to video production, digital technology can make overt and visible some key aspects of the production process that often remain «locked away» when using analogue technologies. This is particularly apparent at the point of editing, where complex questions about the selection, manipulation and combination of images (and, in the case of video, of sounds) can be addressed in a much more accessible way. In the process, the boundaries between critical analysis and practical production – or between «theory» and «practice» – are becoming increasingly blurred (see Burn & Durran, 2006).

CONCLUSION

The kinds of work I have referred to in this article are by no means new. On the contrary, they draw on an existing practice in schools that has a long history (see Buckingham, 2003). As in any other area of education, there is both good and bad practice in media education; and there is currently an alarming shortage of specialist trained media teachers. Nevertheless, it is clear that effective media education depends upon teachers recognising and respecting the knowledge students already possess about these media – while also acknowledging that there are limitations to that knowledge, which teachers need to address.

I have argued here for an extension of media literacy principles to digital texts. This certainly entails some adaptation in how we think about media literacy – in its conceptual apparatus, and its methods of study (for example, in how we think about «audiences», or how we address the medium of games). Nevertheless, the media literacy model puts issues on the agenda that are typically ignored or marginalised in thinking about technology in education – and particularly in the school subject of ICT. Media literacy provides a means of connecting classroom uses of technology with the «techno-popular culture» that increasingly suffuses children’s leisure time – and it does so in a critical, rather than a celebratory way. It raises critical questions that most approaches to information technology in education fail to address, and thereby moves decisively beyond a merely instrumental use of technology.
Ultimately, however, my argument here is much broader than simply a call for media education. The metaphor of literacy – while not without its problems – provides one means of imagining a more coherent, and ambitious, approach. The increasing convergence of contemporary media means that we need to be addressing the skills and competencies – the multiple literacies – that are required by the whole range of contemporary forms of communication. Rather than simply adding media or digital literacy to the curriculum menu, or hiving off information and communication technology into a separate school subject, we need a much broader reconceptualisation of what we mean by literacy in a world that is increasingly dominated by electronic media.

REFERENCES


The role of media in developing literacies and cultural techniques

Barbara Gentikow
Department of Information Science and Media Studies, University of Bergen (UiB)

ABSTRACT

Not only new media demand new skills and contribute to cultural and social changes. The main purpose of this article is to present two theoretical approaches which look at how both traditional and new media (print, electronic and digital media) can function in terms of contributing to the development of (new) literacies and (new) cultural techniques. It is an ambitious project, trying to combine two relatively different theoretical approaches, each of considerable complexity.

Key words
media, literacy, technology, cultural techniques

The use of media, like books, newspapers, radio or television, is habitualized to such a degree that we hardly think about the fact that we have learned to use them. Even less do we think about the cultural and social consequences of their introduction. However, when it comes to new, digital and convergent media, many of us underline how important it is to learn their use and which far-reaching «effects» they have; it is not unusual to talk about «revolutions» in relation to new media. If we look again it is evident that all media contribute to the development of new skills, influence our relationship with the outside world and have a transformative impact on culture and society at large. This is a relatively new, materialistic approach which deserves more attention.

The focus of this article is on how media can function in terms of contributing to the development of (new) literacies and (new) cultural techniques. It is an ambitious project, trying to combine two relatively different theoretical approaches, each of considerable complexity. One of these theories is relatively well-known, under the label of media literacy, but it is problematic because of its broad, interdisciplinary scope encompassing both the micro level of acquir-

1. This term will subsequently be used in quotation marks or be avoided because it is associated with technological determinism. I use a concept of potential consequences or action possibilities, which I will come back to in the last section.
The theories which are at stake here have at least some common denominators. The notion of both media literacy and media as cultural techniques refers to communicative practices and their mental, social and cultural implications. Thus, the approaches are basically interested in communication as social and cultural practices. They imply a broad conception of media as being tools and technologies which constitute special techniques and competences by using them, with specific user interfaces and «effects» on cognition, knowledge, memory, mental structures and socio-cultural shifts.

The following text will try to present some of the core ideas of the two approaches and point at intersections between them. In the case of the cultural-technique-approach this presentation has the character of an introduction since it is quite unknown in Norwegian academia so far. In one way it is currently less developed than the literacy-approach. The outline, incomplete as it is, will at best inspire questions, provoke debate and promote further exploration of the field.

APPROACHES TO MEDIA LITERACY

A definition of «media literacy» is both easy and complicated, depending on how broadly the term is perceived. Literally, and in a narrow sense, literacy means the ability to read and write texts. Literacy in this sense is a counterpart to orality, as the mastering of oral speech. Since writing and reading is a fundamental part of media literacy, probably more important or at least more widespread today than ever before, this narrow sense of the term is still relevant.3

Beyond this narrow or original definition, literacy has further dimensions:

1. It also means the mastering of a nation’s cultural canon. A literate person was familiar with high culture; «those marked as ‘literate’ are well read in what usually consists of selected canonical works of literature» and they had the «ability to write ‘polite’, ‘proper’, and/or ‘polished’ essays» (Frechette, 2002).

2. Literacy in a pedagogical, psychological and partly cognitive perspective is not the focus of this presentation; my main interest is the relevance of the literacy and cultural technique-approach for media studies.

3. A professorship has recently been established in literacy studies, «lesevitenskap», studies in textual production and reception, at the new university of Stavanger, Norway. The first incumbent of this chair was Bjørn K. Nicolaysen (see Nicolaysen, 1991, 2005).
Thus, a literate person is not only able to read and write, but has a high cultural and social education, while an illiterate is an analphabetic in both a literal and metaphorical sense. Hence, the term literacy is often associated with both education and «Bildung».  

(2) Media literacy also goes beyond textual literacy. Joshua Meyrowitz offers a useful, multiple definition of media literacy as being (a) content literacy, concerning the ability to understand and analyse a mediated text or other kinds of messages, (b) «media grammar literacy», meaning the ability to «read» for example the visual language of a film, with cuts, zooms, fades and the like, and (c) medium literacy, underlining the understanding of the (technological) functions of a medium both on a micro and macro level (Meyrowitz, 1998). Content literacy is the focus of interest in both media pedagogy and media studies (at least in Norway); one of the most well-known scholars in this respect is James W. Potter. It is far from being unimportant, on the contrary: new digital representations like hypertexts need new textual competences. However, literacy should not be reduced to the mastering of verbal and visual texts. Like Meyrowitz, I extend it to a kind of media-technological literacy, or a literacy which concerns both the understanding of a message and the meaning of the specific mediating function of the medium itself.

Technological implications of media literacy manifest themselves quite clearly in historical changes of media development. The most traditional way of conceiving these changes of literacy is in two steps, from orality (speech) to literacy (written verbal texts), to audiovisual competences (film, radio, television). Digital literacy is the most recent phenomenon and field of research. Some see it as part of audiovisual literacy, some claim that digital literacy is more than a variant of competences learned by analogue electronic media. The distinctions I have chosen are between the following three types of media and the respective competences they constitute: print culture, including written verbal expressions and images, electronic literacy and digital literacy.

An advantage of this distinction is that it refers quite strictly to different technological characteristics, in terms of different ways of processing, storing and presenting information. As a consequence, it shows that the content which is

---
4. See, for example, Søby (2003) and Buckingham (2006). This extension has a parallel in two concepts of rhetoric (which has strong relations to literacy). In a narrow sense, rhetoric is the art of speaking well, predominantly by mastering the elocution part of speech as a technique of persuading. In a broader sense, or as a kind of «maximum rhetoric» (Johannesen 1987) it also covers the notion of Bildung and humanitas, in terms of communicative proficiencies which also always include broader intellectual and social competences (Andersen 1995, 1999).

5. Potter talks about media literacy as «a generic set of skills that underlies our ability to process any type of media message» (Potter, 1998, p. 5). Another quote: «The purpose of media literacy is to give us more control over interpretation» (Potter, 1998, p. 9). The book itself is about more aspects of media (e.g. economy, ownership, media effects) but does not explicitly include what Meyrowitz calls «media grammar literacy» and even excludes «medium literacy» (for example, in terms of mastering interfaces).
mediated takes different forms, or it clarifies that technology not only transport content, but also transforms it.

Print culture: verbal and pictorial literacy

Literacy originally meant the ability to read and write texts, in terms of understanding and composing letters of the alphabet. Thus, literacy is linked to handwritten and typographic culture. Primary cultures are oral; they can be called preliterate, without being inferior. Both are highly structured verbal performances, with orality as a primary and literacy as a secondary «modelling system».

Some of the most well-known works on literacy deal with the changes from oral to print culture. Different in scope and direction, they claim that the basis of these changes was the invention of the (Greek) alphabet, and that the main consequences of written language were stored memory, systematic thinking and the development of science. At least some of them extend the implications of literacy also to the development of systems of administration, of state-building and democracy. Alleged relations between the mastery of written language and democracy still prevail, not least with UNESCO’s support of the eradication of illiteracy as a crucial means of development.

Before the introduction of elementary schools for everyone, reading and writing were exclusive proficiencies for educated people. People who were not literate were illiterate in the strictest sense, but they mastered a specific form of literacy as well: they could «read» pictures. This is overlooked in most works about literacy, mainly because of the strong focus on the alphabet as the basis of literacy. An example is Olson who (in his work The world on paper, 1994) rightly criticizes the overstatement of reading and writing as direct causes for social progress, but does not include the many popular illustrated texts which have existed from the beginning of the printed press. A rich mass-distributed visual media culture besides printed verbal texts has contributed to what one could call visual or pictorial literacy. Thus, even illiterate people were able to at least basically understand, for example, early block-printed illustrated books, illustrated leaflets and «Bilderbogen», calendars, ABC-books and other types of illustrated printed material available in many European countries from ca. 1550.

---

6. In Western societies like Norway; ancient Greece was the most well-known nation with a developed alphabet, but far from all cultures use the alphabet as the basis of writing.
This inclusion of visual literacy is controversial. Even the term visual literacy is contested. Paul Messaris, for example, announces that visual «literacy» is a conceptual problem, by putting it into quotation marks (Messaris, 1994), and I agree with him in as far as images and verbal language are so different that a simple analogy between understanding verbal and pictorial expressions has to be refused. On the other hand, there are at least three reasons for including visual «literacy»:

(1) Writing letters of the alphabet, drawing and printing images on paper are systems of notation. (2) Images may look natural, that is to say they seem to be easy to understand. However, they are artefacts, following specific cultural conventions (like the central perspective and other structural and formal devices), aiming at specific goals and representing specific ideological views of the world. Thus, the «reading» of pictures has to be learned, and we know that it is learned. One of the most crucial tasks may exactly be the «detection» of the «artifice» of seemingly natural images (Messaris, 1994, p. 138ff.).
(3) The construction of a polarization between an old (and good) age of typography, dominated by logos (language and rational argumentation) and a new (bad) age of visual culture (above all television), dominated by irrationality, emotions and entertainment\(^{10}\) is not correct in a historical perspective. History does not give evidence for a united early verbal print culture, but for a class-divided verbal and pictorial «world on paper».

**Electronic media: visual and secondary oral «literacy»**

The advent of mass media which were not based on print culture opened up new worlds to even more people. Mass media operating with pictures and sound, most typically film and television, gave really large parts of the population (like immigrants with insufficient mastery of the national language) access to media culture. Today electronic mass media provide access to information and entertainment to all those parts of the population which are less proficient in logos-dominated verbal argumentation. This effect has been welcomed as being democratizing, precisely because of the «low literacy barrier» of the mass media (Newhagen & Bucy, 2004, p. 7) which provides egalitarian access. On the other hand, and in a more spectacular way, it has been criticized for «dumbing down the masses», as suggested by Postman (1985).

Electronic media have introduced «an age of ‘secondary orality’, the orality of telephones, radio and television» (Ong, [1982] 1991, p. 3), whereas, vice versa, recent media like the mobile phone (with SMS-functions) have added writing to formerly oral forms of communication. There is still much to be done in this field, in terms of a definition of a kind of «aural» literacy, including non-verbal sounds. Like images, sounds seem to be natural, but as medi-

---

10. The most famous of these constructs is made by Postman (1985).
11. Postman is far from the only one to start the history of literacy with verbal texts. Kress (2003) describes the development of literacy with two moves: from writing to image, and from book to screen. Or from «the world told» to «the world shown».
ated sounds they are artificial, conditioned by, for example, the quality of microphones, studio sound, outdoor sound production and digitally produced sounds.

Audiovisual media have also provided new impulses for the exploration of visual expression, analysing and theorising «visual culture» and «visual literacy». Moving pictures establish new kinds of visual persuasion, compared to still images, for example, by juxtaposing shots and constructing visual narratives. Together with sound, they resemble reality more than still images; thus they demand even higher skills in order to «read» their artificiality. Predominantly television is easy to be misinterpreted as not demanding any kind of mental skills. Critics of this, scholars like David Buckingham, have argued for the existence and making of a «television literacy» (Buckingham 1989, 1993, 2006). More generally, verbal texts, images and sounds which converge in electronic media, both demand and facilitate «communication multiliteracies» (Tyner, 1998, p. 113). This is even more characteristic for digital media.

Digital literacy

While quite a few scholars would deny or at least doubt that electronic mass media culture needs literacy, all of them would agree that the ongoing processes of digital culture demand learning new skills and techniques. A short search under the keyword «digital literacy» shows a huge amount of publications from just the last 5 years. An obvious indication for the importance of this new form of literacy is also the fact that both elementary and secondary schools focus heavily on education for the digital age, both by informing about ICT and by providing digital education, in terms of, for example, e-learning. Curricula are based increasingly on digital competences; learning is thus conceived of as the learning of a kind of «ITC-ABC».

Some might claim that digital literacy is not a really new proficiency since it is heavily based on the old techniques of reading and writing. Textual expressions are thus only remediated. Others claim that digital literacy is (far) more than the combination or sum of previous forms of literacy. Søby, among others, calls it the fourth basic literacy, after reading, writing and counting (Søby, 2003). Accordingly, narrower and broader definitions of digital literacy exist, as we have seen in the case of more general literacy. Digital literacy is often defined quite instrumentally, as «using digital technology, communications tools and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society. The … definition reflects the notion

12. Concerning school politics in Norway, see Søby, 2003 and 2006. He claims that «Norway is the first country in the world with a curriculum based on digital competences» (Søby, 2006, p. 3), but criticizes at the same time the fact that there is a serious discrepancy between visions and the real situation in schools.
of ICT literacy as a continuum... from daily life skills to the transformative benefits of ICT proficiency».

David Buckingham suggests a definition which goes well beyond functionalist approaches. For him, the fundamental prerequisite of digital literacy is the development of critical approaches to digital media. Children/people have to understand that media offer particular selections and interpretations of reality, learn that media use specific rhetoric (e.g. the promise of interactive communication), be aware of «who is communicating to whom and why» and be aware of their own position as readers or users (Buckingham, 2006, p. 267–268). A particularly interesting aspect of Buckingham’s arguments is that he underlines the cultural and social implications of (digital) media: they are far from just being technologies and machines, mediating information – they are cultural forms (Buckingham, 2006, p. 264).

In the same vein, he refuses the definition of literacy as competences or even mechanical skills and suggests «a more rounded, humanistic conception that is close to the German notion of ‘Bildung’» (Buckingham 2006, p. 265).

Di Sessa also proposes a «maximized» definition of digital literacy, refusing the notion of «computer literacy» as «having enough keyboard and mouse skills to make a few interesting things happen in a few standard operations». This is «as if being able to decode, haltingly, a few ‘typical’ words could count as textual literacy». Instead, the author claims a much more encompassing «computational literacy» which «will allow civilization to think and do things that will be new to us in the same way that the modern literate society would be almost incomprehensible to pre-literate cultures» (Di Sessa, 2000, p. 4–5).

Despite these broad implications of digital literacy, the debate about it typically foregrounds the importance of technological skills. This is, in a way, a reduction. However, the focus on technology is important as well. It has been a blind spot in not least large areas of media research so far. In retrospect it is more evident than ever before that not only digital technology is a technology: all media are technological, as tools and as technology-based systems of information and communication.

### TECHNOLOGICAL AND TOOL LITERACY

The crucial role of media technology and the necessity to master it is not a new discovery; Ong characterises written texts as a «technologizing of the word» (Ong, [1991] 1992). Even handwriting, not only typography, is «a technology, calling for the use of tools and other equipment: styli, brushes or pens, carefully prepared surfaces such as paper, animal skins and strips of wood, as well

---

14. This is quite close to Raymond Williams’ groundbreaking work on television as «technology and cultural form» (Williams, [1975] 1990).
as inks and paints...» (Ong, [1981] 1992, p. 81f.). Correspondingly, «writing is completely artificial» (p. 82), and written texts are artefacts. Also Innis and McLuhan have focused on meanings of media far beyond their textual messages: Innis by analysing historical development influenced by changing materialities of communication (Innis, 1951), McLuhan by his famous statement that «the medium is the message» and by his conception of media as «extensions of man» (McLuhan, [1964] 1999). The core of both scholars’ work is the question of how changing media materialities and technologies have changed both our perceptions of the world and the entire social and cultural order of societies.

Scholars like Roger Säljö (1999) and Svein Østerud (2004) have proposed the term tool literacy for characterizing this aspect of literacy. Tools can be both material and concrete devices, for example, a pencil, and symbolic systems like the alphabet or the central perspective. Not least, McLuhan conceives of media as tools, claiming that «we shape our tools, and thereafter our tools shape us» (McLuhan, [1964] 1999: XI). McLuhan is also one of those who talk of media as prostheses, in terms of an extension of man’s physical and mental capacities. Media extend specifically our natural senses and our perception of time and space. This notion is also shared by scholars in the field of «cultural techniques». They underline an important detail: media are different from traditional tools and machines which make work more effective. They contribute to «the creation of artificial worlds which enable new experiences and operations which were not accessible without [them]» (Krämer, 1998, p. 17).

It is not commonly accepted that we need technological literacy, or tool literacy, when we use media. As mentioned before, at least traditional mass media seem to be able to do without any kind of specific proficiency. However, one of the main reasons for their familiarity is that our techniques of using them have become automatised and habitualised. «In reality», all new media in history have demanded and constituted new competences, both in production and reception.

Media literacy as «an exercise of material intelligence»

One of the most fruitful concepts of media literacy so far, in my eyes, can be found in Andrea di Sessa’s Changing minds (2000). The crucial idea in this concept is the use of «tools» as well, but generalized to «external materials». What happens in the process of literacy is an «external extension» of the mind,
resulting in «an intelligence achieved cooperatively with external materials» (Di Sessa, 2000, p. 5). The approach conceives of «three pillars of literacy»: (1) material (alphabet, syntax, numbers, algebra, inscription forms), (2) mental or cognitive, (3) social. The description of the social dimension can stand as Di Sessa’s more general definition of literacy: «Literacy is the socially widespread deployment of skills and capabilities in a context of material support (that is, an exercise of material intelligence) to achieve valued intellectual ends» (Di Sessa, 2000, p. 19). It is not least the focus on materiality which makes this approach compatible with the second theoretical approach to be presented here: the notion of media as cultural techniques.

**THE NOTION OF MEDIA AS CULTURAL TECHNIQUES**

The approach to media as cultural techniques takes its point of departure in the identification of three basic cultural competences: reading, writing and counting. The inclusion of numbers and counting is an important issue; not all scholars of the literacy approach recognize this aspect of basic techniques.

The term *technique* is related to technology, without being synonymous. In a strict sense it refers to Greek tekhné, as means and methods to perform something, typically a piece of art or craft. It can also refer to social and cultural practices more generally. Media operate both in terms of techniques of production and techniques of reception or use, and both aspects have implications as cultural practices. The aspect of reception, or what media mediate in terms of (new) skills to be appropriated and developed by their users, and in terms of new experiences and knowledge, is quite close to the concept of literacy, presented broadly in the previous sections. Correspondingly, some scholars of the cultural technique approach refer to the same literature as the literacy tradition does; some of their «favourites» include Havelock, Innis, McLuhan, Ong, Goody, Eisenstein and Meyrowitz.

The term *cultural techniques* points to a programmatically broader concept than not least more restricted versions of the literacy approach. It is quite close to concepts like «print culture», «electronic culture», «digital culture», etc., articulated more or less explicitly by scholars who adhere to a «macro-version» of the literacy research tradition. «Print culture», for example, implies that printing, far beyond being a mere technology of producing and decoding printed material, transforms existing cultural forms into a new culture. Such cultural transformations typically have social impacts as well, on both individuals and societies at large. Thus, the approach to media as cultural techniques tries to understand the impacts of media technologies on human mind and socio-cultural development in a very broad sense.

One of the most important sources for developing the theory of cultural techniques is French anthropologist Marcel Mauss, who in his essay *Techniques du corps* (1936) presented the thesis that swimming is not natural behaviour, but
culturally conditioned: Different cultures practice different styles of swimming. This may sound far removed from media, but it expresses an important uncovering of seemingly natural behaviour as cultural or learned practices. It also clarifies the double-sided aspect of the concept: actions are both generated culturally and generate new socio-cultural practices.

An important aspect of research on the role of media as cultural techniques is being carried out at the «Hermann-von-Helmholtz Zentrum für Kulturtechnik» at the Humboldt University in Berlin. Its actual director, Jochen Brüning, is a mathematician and its most well-known representative is Friedrich Kittler who has a background in literary studies, aesthetics and informatics.

**Friedrich Kittler**

Combining a critical reading of the ideas of Innis and McLuhan with, among others, Lacan’s distinction between the symbolic and the real and Shannon’s mathematical communication model, Kittler examines the impacts of media technologies on ways of thinking and on cultural and social formations. He conceives of media as information and communication systems, with the fundamental functions of storage, processing and transmission of data.

Kittler is interested in both technological production, clearly fascinated by engineers and inventors of communication systems (like Gutenberg, Edison, Turing and Norbert Wiener) and cultural and social practices «caused» by technological innovations. Quite contrary to literacy theory which typically looks at the development of skills in a sense of progress, Kittler examines this development in a neutrally descriptive way which often gives rise to more gloomy perspectives. Like Paul Virilo (in *War and cinema*, 1989), he thus claims that the main source for the development of media technology is war. War is, if not the mother of all technologies, «at least the mother of all high speed information and communications technologies… Military and media history can be told, at least partly, as the story of a series of steps of escalation

17. See [http://www2.rz.hu-berlin.de/kulturtechnik/centrum.php](http://www2.rz.hu-berlin.de/kulturtechnik/centrum.php). Some scholars work at other universities in Berlin: Sybille Krämer at the Freie Universität, Norbert Bolz at the Technische Universität.
18. He has co-edited an anthology on «the mathematical roots of cultures»; see Brüning & Knobloch, 2005. Also Sibylle Krämer has published a book about the cultural history of systems of counting and calculating (Krämer, 1988).
19. This one-way sender-message-receiver model has been developed for describing communication in a «mathematical» or abstract sense, the receiver being, for example, a radio; as thus, it is still used in parts of information science. It does not work as a model for communication with humans as senders and receivers because (1) texts communicated by humans are not unambiguous signals, but typically polysemic and because (2) human reception is embedded in social and cultural contexts and is (3) characterized by participants with different motives and competences. Human receivers thus «decode» the «encoded» messages in quite different ways. See Stuart Hall’s seminal essay *Encoding and decoding* from 1973, reprinted in many later text books, predominantly in the British Cultural-Studies tradition.
Kittler’s account of media history is also somewhat different from the traditional narrative of a development from orality to literacy to electronic (and digital) media. Written culture is for him, with references to Lacan, a stage of symbolic representation while media which he calls technical, render «the real»; examples of the latter are the gramophone and film, with their «rendering» of «real» images and sounds (Kittler, [1986] 1999). In later debates he makes an interesting distinction between these technical media in terms of being analogue or digital: analogue technical media still have a relation to the senses, by «storing, processing and retracing physical effects such as light and sound waves… For the digital computer, such distinctions are mere surface phenomena… We are literally and metaphorically screened off from the inner workings of the computer, where everything (sounds, images and texts; data, addresses and commands) are reduced to binary digits» (Winthrop-Young & Gane, 2006, p. 11). In other words: digital media uncouple the media and the human senses, and, in a way, even media and the humane.

Kittler’s concept is also quite different from traditional literacy studies in at least one more respect: he strictly suspends the hermeneutic meanings of media texts; textual interpretations are, in his eyes, idealistic enterprises which systematically exclude the much more important aspects of mediation and, more generally, the «mediality» of texts.

This version of the role of media Kittler presents, not at least his sceptical stance towards progress due to media literacy, has been criticized as being cynical. However, it has also been characterized as being enlightening in the strict sense of the word: by liberating cultural history from idealism, moralism, interpretation of texts and discourse criticism, «putting it onto its media-technological feet» (Winthrop-Young & Maresch, 2006).

Kittler’s approach is controversial also because of its «cold» or even inhumane perspective, «beyond good and bad» (Nietzsche). For exactly the same reasons it has been praised as a revolution of the humanities: after Kittler «it is no longer possible to separate culture from technology, communication from channels, messages from technologically implemented codes» (Winthrop-Young & Maresch, 2006). Kittler’s approach is also criticised for its bias towards technological determinism, ascribing the subjects of media technology a rather passive role, more being acted upon than acting themselves. I will come back to this point in the last section.

20. Also Norbert Bolz underlines the relations between the development of media technologies and war. See Bolz 1993: 124ff.
Other scholars, not a school

The approach to media as cultural techniques is, as far as it is documented at
the time being, characterized more by individual voices than by coherent state-
ments of a school. But there are some overarching fields of interest and pre-
liminary findings which will be presented here briefly.

One of the few definitions of the term cultural techniques so far has been made
by Sybille Krämer and Horst Bredekamp: «Cultural techniques are (1) opera-
tive processes dealing with things and symbols which are based on (2) a disso-
ciation of the implicit ‘knowledge how’ from the explicit ‘knowledge that’. Thus,
they can (3) be understood as bodily habitualized and rutinized competen-
tces21 which have their effects in everyday dynamic practices, but at the
same time (4) can function as an aesthetic, material-technological basis for
scientific innovations and new theoretical devices» (Krämer & Bredekamp,
2003, p. 18). Related to media, these techniques do not primarily mediate texts,
but they establish perspectives of and give imaginary access to the world,
depending on the specific technological architectures and interfaces they
employ. Media always transform, with different materialities and functions.
Technological conditions like storing capacity, speed of processing, ways of
transferring signals, ways of using numerical systems, symbols and simul-
ations, etc., influence the users’ perception, ways of thinking and communica-
tive activities.

Some of the (mental and sociocultural) implications Krämer and other scholars
from this tradition lead our attention to are changes in our perception of and
relations to the world outside, cognitive and mental changes, changes in the
generation and forms of knowledge, and, as a more extreme consequence,
constructions of manipulated worlds of illusion. None of the works in this tradition
shares the typically optimistic notion of literacy in terms of progressive learn-
ing of new skills or techniques.

Media as technologies have decisive impacts on our perceptions of the world,
both as tools which expand sight and sound and as devices which give access
to information which cannot be accessed by natural perception. Thus, media
have had, from their beginning, magical qualities. However, this more roman-
tic aspect is overruled by the overload of perceptual simulations in modern
media societies. Perception is becoming increasingly dissociated from our
natural senses; modern life increasingly resembles a «flight on instruments, in
a cloud-covered sky where orientation is not provided by the world outside, but
by system-immanent control panels» (Bolz, 1993, p. 39).22

In a similar vein, «computer thinking» is taking over from the processing of
data by human brains. The precise and fast processing of huge amounts of data
by the computer is probably due to the fact that it operates in a closed system,

21. The second part of the quotation refers quite clearly to Mauss’ Techniques du corps.
while human brains produce «wild thinking», in an open system (Lämmert, 1998, p. 102). Thus, knowledge gained by experience tends to be overruled by mediated knowledge which is de-contextualized to a high degree. This may lead to an important cultural shift concerning the character of human knowledge (Lämmert, 1998, p. 103).

Today’s computers condition new ways of appropriating and storing knowledge, with new forms of knowledge as a consequence. We predominantly need to know systems for catalogizing and retrieving, or we have to learn processes rather than memorizing data. This establishes the mastery of search engines as a new cultural technique (Esposito 282, p. 291). Media function as storage technologies in different ways and thus constitute different techniques of memory. As external memories (instead of memories stored in human brains) they are more effective and lead, paradoxically enough, to oblivion: external archives allow us to forget things. As Plato noted, writing is damaging for memory (Esposito, 1998, p. 282f). Bolz compares a development from the linear world of writing (Gutenberg) to «facets of a mosaic» created by hypertexts (Bolz, 1993, p. 195), from «classifications and causalities» to «configurations» (Bolz, 1993, p. 201). Media do not only mediate knowledge, they design it as well.

Media manipulate the time axis (Krämer, 2006) and, more generally, notions of place and time. This has also been underlined by Innis, McLuhan and, most programmatically, by Meyrowitz (1985). More dramatically, media as technologies open the way for aspects of the world which cannot be seen or heard by natural perception. As a consequence, they are fundamentally manipulative; they offer a world of illusion (Schein) more than reality (Bolz 1991). Predominantly digital media, with their simulation possibilities, contribute to such worlds of illusion, but create at the same time new realities (Bolz, 1991, p. 117). «Our pictures of the world (Weltbilder) are transformed to worlds of pictures (Bilderwelten)» (Bolz, 1991, p. 123). These pictures are «without a symmetrical counterpart» or there is «nothing behind»; they are products of design and parts of an interface. Manipulation and illusion are not negative in this sense, the terms are merely descriptive. «Pictures constructed by alphanumerical pixels» are manipulations by nature (Bolz, 1993, p. 114). But they can be used ideologically, as a kind of perception management, for purposes of control and power.

This presentation of the cultural technique approach is far from exhaustive. However, instead of referring to more scholars and more findings, and making more critical interventions, the following sections will present some ideas about how to develop this approach further. They refer to a research project entitled New media as cultural techniques and fora for communicative action (2003–2007). The notion of media as fora for communicative action was inspired by

23. A collaboration between staff members from the Department of Media Studies and Information Science at the University of Bergen and the Faculty of Media and Journalism at Volda University College, Norway. The project was financed by the Norwegian Research Council. See http://www.kulturteknikker.hivolda.no.
the discourse theory of Jürgen Habermas, an approach which in some important respects is fundamentally different from that of the «Kittler school». The most important difference is the project’s normative turn from the description of (new) cultural techniques to the idea of developing «better» technologies and techniques. Very much against the denial of agency which characterizes much work in the cultural-technique tradition so far, the intention of this project was to point at possibilities relating to changing media architectures and interfaces, in terms of a kind of «cultural engineering», both in theory and practice.

Cultural engineering by constructing interfaces for «better communication»?

«If technologies really do impact on human perception and cognition, it can be argued that humans can construct specific technologies in order to shape specific patterns of cognition» (Nyre, 2004, p. 45). This can be translated to the possibility of actively trying to shape social and cultural practices by using media interfaces more generally. Thus, the design of platforms and interfaces is a decisive means of influencing what media can «do». Quite correspondingly, a scholar like Kathleen Tyner, engaged in media education projects, speaks in favour of not only learning «reading the world», but also «writing the world», as «an access to literacy in its most powerful forms» (Tyner, 1998, p. 4).

Democratic communication, for example, is far from being automatically created by interactive functions; quite specific functions have to be constructed which, for example, allow real dialogues and relevant forms of participation. Another example could be the problem that one of the most fundamental technological functions of interactive digital media is that the provider can identify the user, that is to say, the introduction of a new technique of supervision. We seem to have accepted this, as a kind of «collateral damage» of the digital age, but is this a function which is naturally embedded in the platform, or can it be changed? In any case, problems like these should be reflected in a critical discussion about «better platforms» (Nyre & Ala-Fossi, 2007).

«Old» and new cultural techniques in a digital, global media environment

There are quite a lot of challenges to research in the perspective of the approaches to media literacy and media as cultural techniques. The first is that more research needs to be carried out on «old» literacies and cultural techniques. The consequences of written culture have been quite exhaustively explored, but should be re-examined in the light of new platforms for written verbal culture and new techniques of writing, most typically in terms of word-processing. Secondly, the debate about «new» creative media use enabled by digitality could be enlightened by remembering that media literacy from its

24. See the sharp critique of «the myth of communicative action» made by Bolz, 1993, p. 59–79.
25. This practical part of the project was an experimental, talk-based Internet radio called Demostasjon. See http://www.demostasjon.net.
start had both «passive» and «active» or creative dimensions: writing is thus a very early form of «creative literacy».

Audiovisual literacy should be explored more extensively in terms of the specific mode of distribution and communicative architecture of these media. While print media enable one to go back and forth in a text, to jump over parts and re-read others, analogue electronic media, in terms of «moving images» and sounds, are ephemeral. They demand specific techniques or skills of reception which are still widely unexplored. Another aspect is the very specific way broadcasting constitutes audiences, and the changes of audiencehood in relation to changes in this one-way-communication system (Gentikow, 2007).

The mastery of late modern media environments demands multiple literacies, in terms of practical technological competences, traditional and new abilities to read and write, traditional and new pictorial literacy (due to the character of digital images), information literacy and communication literacy, etc. All of these competences also imply traditional and new social and cultural practices. As to digital literacy more specifically, it implies finding information, storing and retrieving material, orientation in huge amounts of data (browsing, scanning, navigating, using search engines), structuring and selecting information, making decisions, learning to decode multimodal texts, playing games and, not at least, communicating with others from traditional and mobile platforms. Other proficiencies may include file-sharing, as a highly interesting new social practice which, with its gift-economy, also «creates» new logics of economy. Not least, digital media enable many types of «creative literacy», like editing one’s own pictures, blogging and contributing to collective documents (like Wikipedia) and other user-generated content (with YouTube as the most well-known actual example).

All these activities go far beyond developing technical skills; they transform traditional knowledge, thinking and communication and social practices, as well as traditional roles of being audiences and/or users of media and information systems. Thus, digital media play a decisive role in constituting new cultural techniques and thus contribute to the shaping of culture and society at large.

The global dimension of these cultural and social practices is an important characteristic of digital literacy, or one of the most important new aspects of this new cultural technique. Recent research underlines the importance of learning global communication. The most interesting work, in my eyes, is carried out by scholars who, like Hawisher & Selfe (2000) refuse the notion of a culturally neutral «global village», but are aware of cultural contexts which result in different social and cultural practices.
«ARCHITECTURES OF COMMUNICATION» AND THE NOTION OF AGENCY

One of the main problems with the theory of literacy, and especially with the approach to media as cultural techniques, is their bias towards technological determinism. McLuhan has been heavily criticized for his overstatement of the effects of new media, mainly due to his tendency to support a (mono)causal confounding of media development with socio-cultural «revolutions» (Williams [1975] 1990). Kittler has also been criticized for being a «technological determinist» for, for example, quoting the opening line of his Grammophone, film, typewriter: «Media determine our situation» (Kittler [1986] 1999: XXXIX) and for pointing to the denial of human agency in his analysis of media influences. Also the cultural-engineering-approach which I present as an alternative to the Kittler-school’s «technological determinism» can be questioned for the same reason.

These problems can, at least partly, be dealt with by looking at media as different architectures of communication.26 These are physical and in a way fixed frames or paths of communication, but they do not determine one specific pattern of use. As structures, these architectures do not force themselves upon their users but, of course, influence how they can be used. They offer possible interactions or action possibilities which have to be realized. Their realization depends on both the technological resources and the capabilities of actors (partly achieved through past experiences), and their goals, values and beliefs.

Communicative architectures offered by different media thus both enable and limit certain ways of communication. The metaphor of architecture in relation to communication is predominantly applied to today’s computer and network structures. However, it reveals particularly interesting aspects when used for all kinds of media, including, for example, newspapers or books.

The notion of communicative architectures underlines the dialectical relationship between the existence of structures or frames for action, and the active role of users. One could talk of Spielräume for specific ways of acting upon specific action possibilities. Thus, (new) media literacies and (new) cultural techniques do not automatically spring from new media technologies but are products of user adaptations. Hence, it is not technology which develops literacies but people with (or without) experiences, with different intentions, in different situations.

26. See Holmes 2005, p. 20 and elsewhere. Also Kittler operates with the term architecture in relation to media, for example when talking about «hardware-architecture», «the architecture of computers», «standard architecture» etc; see Krämer, 1998, p. 128–130.
REFERENCES


This article is downloaded from www.idunn.no. © 2015 Author(s). This is an Open Access article distributed under the terms of the Creative Commons CC-BY-NC-SA 4.0 License (http://creativecommons.org/licenses/by-nc-sa/4.0/).
Om bruk av digitale mapper på to grunnskoler

Hvordan kan digitale mapper skape produktive læringssprosesser for elever?

Berit Bratholm
Associate Professor, Faculty of Humanities and Education, Department of Pedagogy, Buskerud and Vestfold University College
Berit.Bratholm@hbv.no

ABSTRACT

The subject of this article is our experience of working with digital portfolios in primary and lower secondary school. An important theoretical reference for this work has been Engle & Conant’s article about how productive academic engagement can be fostered by suitable learning conditions. The project is based on ethnographic methods. I present different factors which are important for successful interplay between teacher and pupils when working with digital portfolios.

key words
digital portfolio, productive academic engagement

INNLEDNING


Forskning knyttet til området digitale medier og læring, tyder i liten grad på at innføring av IKT i seg selv bidrar til fundamentale endringer i hvordan læringsarbeidet i skolen organiseres (Engelsen 2006; Lipponen 2002; Ludvigsen & Rasmussen 2005). Det synes likevel å herske stor enighet om at IKT kan bidra til produktive endringer når redskapene blir koplet til andre didaktiske endringsfaktorer som eksempelvis mapper. Her kan man i Norge spesielt vise til erfaringer og forskning knyttet til lærerutdanning (Dysthe & Engelsen...
OM BRUK AV DIGITALE MAPPER PÅ TO GRUNNSKOLER | BERIT BRATHOLM


Mitt overordnede forskningsspørsmål blir da: Hvordan og i hvilken grad kan lærere legge til rette for produktive læringsbetingelser i digitale mapper slik at elever opplever produktive læringsprosesser?

TEORETISK GRUNNLAG OG REFERANSPRAMME

Sentralt i undersøkelsens problemstilling står begrepet «produktive læringsprosesser» og at disse kan skapes i og med digitale mapper. Begrepet produktive læringsprosesser defineres som at «elevene i samarbeid med andre elever, lærere og andre ressurspersoner konstruerer kunnskap som oppleves relevant, og som er nødvendig for kunne møte muligheter og utfordringer som finnes i informasjonssamfunnet» (Larsen & Ludvigsen 2000:139).

I denne fremstillingen bygger jeg teoretisk på den utviklingsorienterte forskningstilnærmingen Fostering Communities of Learners (FCL), til tross for at

1. Forsøksarbeidet ble finansiert av Høykom skole http://bredband.prosjekt.hive.no
2. Takk til professor Sten R. Ludvigsen og førsteamanuensis Knut S. Engelsen, som begge har bidratt til konstruktiv veiledning.

- Problematizing: Students are encouraged to take on intellectual problems [...]
- Authority: Students are given authority in addressing such problems [...]
- Accountability: Students’ intellectual work is made accountable to others and to disciplinary norms [...]
- Resources: Students are provided with sufficient resources to do all of the above [...]

Modellen og disse fire prinsippene ovenfor er et verktøy for lærere til «a potentially fruitful way of thinking about how to foster productive disciplinary engagement in learning environments» (Engle & Conant 2002: 459). Gjennom modellen legger Engle og Conant vekt på lærerens kompetanse til å lede elevenes læringsprosesser i klassen. De fire prinsippene skal hjelpe læreren til å sekvensiere elevenes læringsarbeid. Læreren refleksjoner så over hvilke av de fire prinsippene som til enhver tid prioriteres i klassens faglige arbeid. Hos Engle og Conant er det et viktig poeng at læreren foretar en metarefleksjon over sin pedagogiske praksis i lys av modellens fire prinsipper. Som vi ser her, stiller Engle og Conant flere viktige kompetansekrav til læreren gjennom de fire prinsippene for at elevene skal kunne lykkes i sin skolefaglige utvikling.

læringsarbeidet inngår i læringsfellesskapet i klasserommet (intellectual stakeholder). Modellens fjerde prinsipp, «providing relevant resources», angår realiseringen av modellens tre prinsipper og å kunne se disse i sammenheng. Videre påpeker Engle og Conant at en nødvendig ressurs for å kunne realisere modellens fire prinsipper, er at elevene får tid til å fordype seg og har tilgjengelig all den informasjonen de skulle trene for å løse arbeidsoppgaven. Andre ressurser kan være av materiell og teknologisk karakter, så som at datamaskiner og programvare fungerer på en tilfredsstillende måte. Dette for at elevene skal kunne ha de beste forutsetninger for å oppleve en god læringsprosess og oppnå et godt læringsresultat.

De fire punktene hos Engle og Conant som inngår i begrepet produktive læringsbetingelser, er en relevant referanseramme for lærere når de skal planlegge undervisningen samt sette opp kompetansemål for elevene i fagene. Her oppfatter jeg kompetansebegrepet slik: Overordnet vil kompetansebegrepet her sees i lys av teorien om selvregulert læring som bygger på «troen på at man har de ressursene tilgjengelig som skal til for å lære og for å løse oppgaver på en effektiv måte» (Bråten 2005: 165–166). Begrepet kompetanse angår elevers ressurser til å tillegne seg kunnskap i fag, produsere kunnskap sammen med andre i de digitale mappene og reflektere over egne læringsprosesser. Engle og Conant fokuserer på produktive læringsbetingelser i klasserommet relatert til fagene litteratur og naturfag, uten direkte å knytte anvendelsen av IKT som et læremiddel inn mot forutsetninger for å skape læringsbetingelser. I min undersøkelse er begrepet «digitale mapper» sentralt, og hva legger jeg så i begrepet? I denne sammenheng bruker jeg Helen Barretts definisjon på digital mappe:

An electronic portfolio provides an environment where students can: collect their work in a digital archive; select specific pieces of work (hyperlink to artifacts) to highlight specific achievements; reflect on the learning demonstrated in the portfolio, in either text or multimedia form; set goals for future learning (or direction) to improve; and celebrate achievement through sharing this work with an audience, whether real or virtual. When used in formative, classroom-based assessment, teachers (and peers) can review the portfolio document and provide formative feedback to students on where they could improve (Barrett 2006: 1).

De digitale mappene blir et sted der elevene kan samle, velge ut og reflektere over sine arbeider. Videre inviterer den digitale mappen til, ifølge Barrett, å feire oppnåtte kompetansemål og læringsresultater. Hvilken forskningsbasert viden og pedagogiske erfaringer har vi så på dette feltet nasjonalt og internasjonalt?

TIDLIGERE FORSKNING

I studier om lærernes kompetanse i digitale læringsressurser, vektløgger flere forskere lærernes pedagogiske kompetanse som helt avgjørende for at elevene opplever produktive læringsprosesser i skolen (Ludvigsen, Rasmussen & Sol-

Ifølge Andresen skal pedagogisk bruk av IKT tilgodese vilkår og rammer for elevenes læring på en differeniserende måte, slik at gruppene lavt, middels og høyt presterende elever får tilpassede utfordringer i arbeidsoppgavene. Et annet sentralt poeng og pedagogisk fortrinn med digitale læringsressurser er at læreren kan etablere rammer og støttestrukturer for elevene i deres læringsarbeid. Differensierte arbeidsoppgaver publisert på Internett samt veiledning i hvordan elevene kan løse oppgavene sammen i sine åpne, digitale mapper, kan være et eksempel. Resultater fra en av delrapportene fra den nasjonale satsningen, PILOT, viser også at «de aller fleste lærerne og elevene helt til siste fase av prosjektet så på data som verktøy […] som elevene skulle beherske uten at bruken ble knyttet til læreprosessen i de øvrige fagene» (Vinje 2004: 91).


De siste årene har det blitt publisert artikler og bøker om pedagogiske erfaringer med digitale mapper i hele utdanningsløpet, nasjonalt og internasjonalt
OM BRUK AV DIGITALE MAPPER PÅ TO GRUNNSKOLER | BERIT BRATHOLM

(Bladet finnes ikke.)
før prinsippet med slike mapper, har man samtidig innført et prinsipp om åpenhet, kunnskapsdeling og samarbeid» (Otnes 2004b: 290). Til tross for at utviklingsprosjektet ved de to skolene som jeg omtaler her ble utarbeidet i et lukket system i Classfronter, var ideologien rundt prosjektet kunnskapsdeling, samarbeidslæring og åpenhet om arbeidene for alle prosjektets aktører. Av denne grunn vil de forskningsetiske argumenter i Otnes’ artikkell også ha sin gyldighet for min studie av elevers digitale mapper.


Fallgruvene ved å bruke etnografiske metoder kan være flere. Forsøkets design bygde på den forutsetning at digitale mapper skulle opprettes og ville kunne bidra til produktive læringsprosser. Som forsker bestemte jeg forskningsdesignet, selv om jeg lot skolene påvirke designet til en viss grad med hensyn til varigheten og innholdet av forsøkene. Jeg eide til syvende og sist forskningsdesignet, men i arbeidet med denne artikkelen har jeg også fortøpende vurdert hvilke data som skulle brukes i fremstillingen. Noen av forskningsresultatene kom imidlertid overraskende på meg. Forskningsdesignet og mine positive, entusiastiske holdninger til å anvende digitale mapper i læringsforløp, kan nok også til en viss grad ha påvirket forsøkets resultater.

**KONTEKST FOR UNDERSØKELSEN: PRESENTASJON AV SKOLENE**

Skolene fremstod som utviklingsorienterte med handlingsplaner for IKT. I læringsplattformen Classfronter opprettet elevene digitale mapper. Ved barneskolen var det inndret et eget datarom med datamaskiner for en hel klasse. På
ungdomsskolen var datamaskinene integrert og spredt i undervisningsrommene.


**Strukturen** i de digitale mappene var som følger: Elevene opprettet en digital mappe med arbeidsmappe. Alle deltakerne i klasserommene hadde innsyn i de andres mapper. Elevene utarbeidet ulike oppgaver, så som Power point-presentasjoner der tekst, lyd og bilde var sentrale elementer. På begge skoler kunne mappeoppgavene i de ulike formater være et felles møtested for gruppearbeid. Noen elever arbeidet alene i prosjektpериoden.

*Skole A – barneskolen.* Ledelsen pekte ut utviklingsorienterte lærere og skolens IKT-ansvarlige til å delta i dette forsøket, fordi ledelsen ønsket at lærere og elever skulle oppleve positive sider med digitale mapper – og at digitale mapper skulle bli et virkemiddel i å styrke elevenes digitale kompetanse.

*Skole B – ungdomsskolen.* Lærernes digitale kompetanse var et viktig kvalifikasjonskrav ved tilsetting på skolen. Ledelsen bestemte at 10. trinn skulle delta fordi trinnet hadde få elever, og fagmessig var timingen god for å delta i forsøket. Trinnleder for 10. trinn fikk prosjektansvaret for forsøket.

I tabell 1 viser jeg forsøkets organisering. I den første kolonnen har jeg stilt opp antall elever, elevenes alder, antall elevgrupper og lærere som deltok i forsøkene. Skolene A og B er først opp i den andre og tredje kolonnen for å vise likheter og forskjeller ved de to skolene.

<table>
<thead>
<tr>
<th>TABELL 1: FORSØKETS ORGANISERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skole A – Barneskolen</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Elever</td>
</tr>
<tr>
<td>Alder: elever</td>
</tr>
<tr>
<td>Elevgrupper</td>
</tr>
<tr>
<td>Lærere</td>
</tr>
<tr>
<td>Tema</td>
</tr>
<tr>
<td>Fag</td>
</tr>
<tr>
<td>Varighet</td>
</tr>
<tr>
<td>Digitale mapper</td>
</tr>
<tr>
<td>Presentasjon av prosjektarbeidet</td>
</tr>
</tbody>
</table>
RESULTATER AV UNDERSØKELSEN VED SKOLENE

De digitale mappene med arbeidsmapper var struktureret litt ved begge skolene. *Ved skole A, barneskolen*, var viktige pedagogiske tiltak for det første at lærerne utarbeidet definerte læringsmål med obligatoriske arbeidsoppgaver. De skulle publiseres i digitale mapper. Da elevene arbeidet med arbeidsoppgavene, var de aktive produsenter av nye kunnskaper. For det andre styrket de digitale mappene undervisningen, fordi det digitale nettverket lagde flere kontaktpunkter mellom elever, lærere og verdensveven. Utveksling av kunnskaper foregikk på kryss og tvers i klasserommet. Dette fortrinnet løftes frem også av Hauge et al. idet digitale nettverk kan være «potensial for å oppheve begrensninger i tid og rom» (Hauge et al. 2007: 16).


I hvilken grad opplevde elevene *produktive læringsprosesser* i de digitale mappene? Under prosjektets siste dag ved skole A, da elevene presenterte sine mapper for hverandre, kom det fram at mange hadde produsert langt mer enn hva som på forhånd var stilt opp som minimumskrav for perioden. Stolt kunne
elevene vise de digitale mappene til klassekamerater, lærere og foreldre. En gruppe oppsummurte sine erfaringer fra forsøket slik:

«Vi lærte av hverandre, og det er lettere å samarbeide på data. Vi ble bedre kjent med hverandre på fritiden». Utsagnet vitner om at elevene opplevde arbeidet i digitale mapper som et verktoy til å dele kunnskap og samarbeide om å skrive fagtekster. Dessuten uttrykte disse elevene at de «hadde det hyggelig sammen» når de «diskuterte og ble enige til slutt». Arbeidsformen på skolen ble også et sosialt foretak, idet elevene også var mer sammen på fritiden etter arbeidets avslutning. Nye relasjoner i klassemiljøet, herunder mellom gutter og jenter, ble utviklet.

I det følgende vil jeg i lys av Engle og Conant (2002) vise og drøfte hvorledes to digitale mapper kunne være et verktoy for at elevene opplevde produktive læringsprosesser. I tabell 2 har jeg i første kolonne satt opp de fire prinsippene hos Engle og Conant. I presentasjonen av innholdet i to gruppens elevproduksjoner i digitale mapper, en fra hver skole, tar jeg utgangspunkt i de fire prinsippene hos Engle og Conant.

**PROBLEMATISERING**

Skole A: Gruppen prioriterte innenfor arbeidsoppgavens ordlyd å presentere bilder av syv ulike sykler. Via Internett fikk gruppen utvidet sin forståelse av begrepet sykkel ved å laste ned bilder av ulike sykler som tandem, velociped og bmx. Bildene ga på en god måte begrepet et konkret og humoristisk inn-

---

**TABELL 2. TO ELEVPRODUKSJONER I DIGITALE MAPPER**

<table>
<thead>
<tr>
<th>Skole A</th>
<th>Skole B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analyse av elevarbeid</strong></td>
<td>Fredrik, André og Helge: «Trafikkregler og syklers». Power point 13 sider <a href="http://bredband.prosjekt.hive.no/documents/andremfl_000.ppt">http://bredband.prosjekt.hive.no/documents/andremfl_000.ppt</a></td>
</tr>
<tr>
<td><strong>Problematisering</strong></td>
<td>Obligatorisk oppgave med artikulerte læringsmål der elevene skulle utarbeide oppgavene i Word-dokument eller i Power point.</td>
</tr>
<tr>
<td>Ikke definerte dokumentasjonsformer i digitale formater. Romfartens historie, USA–Sovjet, Gagarin, Armstrong, Collins, Aldrin</td>
<td></td>
</tr>
<tr>
<td><strong>Autoritet</strong></td>
<td>Ulike sykler med syv bilder, sykkelregler, sykkelkilt.</td>
</tr>
<tr>
<td>Elevene definerte fokus og avgrensning for oppgaven.</td>
<td></td>
</tr>
<tr>
<td><strong>Ansvar</strong></td>
<td>Elevene samarbeidet om tolkning av oppgaven, utforming av oppgaven, skrivning av tekst og nedlasting av bilder. Digitale verktoy – dominerende aktivitetsformer?</td>
</tr>
<tr>
<td>Elevene tok ansvar innholdsmessig, teknologisk og prosessuelt for arbeidet</td>
<td></td>
</tr>
<tr>
<td><strong>Ressurser</strong></td>
<td>Gruppen fikk veiledning av lærer, prosjektleder og av medelever.</td>
</tr>
<tr>
<td>Gruppen hadde stor tilgang på teknologiske ressurser, uten spesiell pedagogisk støtte i innholdsprosessen.</td>
<td></td>
</tr>
</tbody>
</table>
Elevene fikk veiledning og støtte i innholds-prosessen av lærerne sine. Samspillet mellom elever i gruppen og gruppens samspill med lærerne i utføringen av den digitale mappen ble et fruktbart samarbeid.

Skole B: Elevene avgrenset selv temaet «Kampen om månen» og problemstillingen uten særlig innflytelse fra veilederen sin. De to elevene inspirerte hverandre til å definere sitt prosjekt videre. De så de mediespesifikke egenskapene ved de digitale mappene som et godt verktøy for utføringen av oppgaven.

AUTORITET

Skole A: På et selvstendig grunnlag ut fra arbeidsoppgavens læringsmål og ordlyd, utarbeidet gruppen en Power point-presentasjon bestående av egne tekster og bilder lastet ned fra Internett. Elevene benyttet sin autoritet til å bestemme innholdet gjennom å skape sin egen tekst i presentasjonen. Videre lagde de en tekst med sykkelregler over to sider.

OM BRUK AV DIGITALE MAPPER PÅ TO GRUNNSKOLER | BERIT BRATHOLM


Gagarin døde senere i ei flyulykke. I ettertid har man blitt klar over hvilke kjøngser russerne tok. Før Gagarins ferd hadde de testa det fem tonn tunge Vostok-romskippet syy ganger og fire ganger var det mislykka.

ANSVAR


RESSURSER


Skole B: Gruppene fikk noe veiledning underveis. De digitale mediene og den åpne arbeidsformen for arbeidsoppgavene motiverte elevene til større innsats under forsøket.

Ut fra egne deltakende observasjoner og i samtaler med lærerne ved skolene A og B fikk jeg inntrek av at mange elever samarbeidet godt og virket motiverte for prosjektarbeidet i digitale mapper. Spørsmålet blir om de digitale mappene alene kunne ta hele æren for de gode resultatene. Designet for forsøket og forskningssprøsmålene kunne til en viss grad bidra til at jeg fikk de svar jeg ønsket å oppnå. Som tidligere nevnt, var jeg noe overrasket over de gode resultatene på skole A, idet alle elever opprettet og i mer eller mindre grad opplevde produktive læringsprosesser i de digitale mappene i løpet av to uker! Ved første inntrek fremstod skole B som mest utviklingsorientert og moderne. Her skulle jeg ta grundig feil, i den forstand at lærerne ved skole A hadde en bedre didaktisk og pedagogisk kompetanse når det gjaldt bruken av de mediespesifikk egenskaper som kan benyttes i læringsmiljøer i de digitale mappene. Lærerne arbeidet systematisk, satte opp felles mål for perioden, fikk skolert seg i bruken av digitale mappene og var lojale til forsøkets målsettinger.

ale prosesser, dels ved hjelp av språket, slik Hauge et al. viser i sine studier (Hauge et al. 2007). Elevene ved skole B uttalte at flere elevgrupper ved skolen var motivert for oppgaven i digitale mapper, og de var raskt i gang med nytt gruppearbeid etter forsøkets fire uker.

**DISKUSJON AV RESULTATER**

Avslutningsvis ønsker jeg å ta noen forbehold før jeg diskuterer forsøkets resultater. Forsøkets design bygde på en (positiv) forutsetning om at digitale mapper kunne legge til rette for produktive læringsbetingelser med det som resultat at elevene kunne oppleve produktive læringsprosesser. Et alternativt formulert forskningsspørsmål kunne være: Hvordan opplever du å arbeide i digitale mapper? Med et slikt spørsmål kunne jeg fått svar på elevenes opplevelser om digitale mapper av positiv og negativ karakter. En kritisk innvending til undersøkelsens forskningsspørsmål kunne være at jeg så å si la svarene i munnen på deltakerne i undersøkelsen.

Etter at forskørene var avsluttet, er det noen erfaringer som ble gjort ved de to skolene som kan ha betydning for videre pedagogisk praksis. Ut fra mine erfaringer ved de to skolene har det blitt klart for meg de mange forholdene som spiller inn og som har betydning for å utvikle produktive læringsprosesser for elevene. Dette henger tett sammen med lærernes didaktiske og pedagogiske kompetanse. Å peke ut et eller flere spesifikke forhold eller årsaker til suksessfaktorer lær seg ikke gjøre, og dette ville vært en banaliserings av kompleksiteten i hele feltet.

Det er to forhold som jeg mener har betydning for i hvilken grad de digitale mappene bidro til produktive læringsprosesser for elevene. Det første forholdet angår lærernes kompetanse, og det andre gjelder elevenes kompetanse under forsøket. Først vil jeg vise positive handlinger lærerne utførte under forskoen som jeg mener var suksessfaktorer for å opprette produktive læringsprosesser for elevene. De tre positive handlingene utgjør lærernes didaktiske og pedagogiske kompetanse:

1. Lærernes evne til å samarbeide i lærerteam
2. Lærernes kompetanse til å utarbeide et didaktisk helhetsopplegg
3. Lærernes motivasjon til å utvikle e-læringsledelse og bruke IKT.

For det første var en avgjørende suksessfaktor for forsøket at lærerne hadde vilje og ønske om å samarbeide i team. Dette innebar at lærerne seg imellom hadde opparbeidet en samarbeidsskultur, undervisningsdesign og møtepunkter der faglige spørsmål ble luftet, drøftet og løst fortløpende. Disse momentene blir støttet, som jeg tidligere har vist, av Vinje (2004) og Hauge et al. (2007). Dessuten var det et avgjørende forhold at møte- og undervisningsplanene ble


- Skriv fornærmelser i sand, men velgjerninger i stein.

Men under forøkene ble lærernes veilederkompetanse satt på en stor prøve. Å utvikle veilederkompetanse er en utfordring lærerutdanningen må ta på alvor, ut fra de kompetansekravene hele skoleverket setter til lærerne. Når det gjaldt ressursituasjonen under forøkene, kom det også frem at ekstra bevilgninger i form av flere lærere og IKT-support var suksessfaktorer ved den skolen der alle elever fikk opprettet digitale mapp. I arbeidet med digitale mapper inspirert av Engle og Conants modell (2002), mener jeg et viktig kriterium
for suksess er at læreren gir fra seg noe av sin funksjon som kunnskapsformidler. Sammen kan elever og lærere utforme læringssdesign «som et resultat av hva elever og lærer gjør sammen i undervisningen» (Hauge et al. 2007: 195). I stedet blir elevene kunnskapsformidlere for hverandre, og de blir også aktive i å utvikle og konstruere egen kunnskap. I dette forsøket er det blitt vist at de digitale læringsressursene stimulerte elevene til positive læringserfaringer. Lærerne veiledet elevene, og skilllet mellom lærer og elev ble til en viss grad utvisket idet de digitale læringsressursene var et nytt medium som også skapte nye møteplasser for så vel elever som lærere.


Hvilke positive erfaringer gjorde så elevene under forsøkene på de to skolene? I hvilken grad opplevde elevene de digitale mappene positivt i læringssammenheng? I de videre drøftingene må det forbehold tas at jeg gjorde ikke et sammenliknende forsøk mellom bruk av/ikke bruk av digitale mapper. Dermed kan jeg ikke fastslå at mappene i seg selv var den eneste årsaken til datassetets resultater. Når det er sagt, ville jeg redegjøre for mine erfaringer fra to skoler der digitale mapper var i bruk. Datasøket viste at elevene opplevde nye læringsarenaer, og de ble mer aktive i sin egen læringssprosess hvor arbeidet med de digitale læringsressursene fikk en fremtredende betydning.

De digitale mappene ble en ny og positivt opplevd undervisnings- og læringssammenheng for mange elever og lærere. For det første ble skoletiden utvidet under forsøket, og elevene opprettet nye møteplasser for skolearbeidet. De digitale

Samlet sett opplevde jeg at et viktig suksesskriterium ved begge skolene var ledelsens støttende holdning og faglige og moralske engasjement, slik tidligere studier på dette feltet også dokumenterer betydningen av (Vinje 2004; Hauge et al. 2007). Utdanningsystemet har den senere tid fått nye didaktiske og pedagogiske muligheter gjennom Web 2.0. Når det gjelder de pedagogiske og didaktiske muligheter og spørsmål for dette verktøyet, har digitale verktøy som kommer inn under Web 2.0 en stor mulighet. Elever og lærere og skolens øvrige aktører (foreldre, politikere) kan gå inn og snakke, samarbeide, vurdere og produsere kunnskaper sammen og i sann tid. Men de digitale verktøyene og Web 2.0 kan skape kontaktpunkter mennesker imellem som kan planlegge negative aktiviteter. Massakrene på de to skolene i Finland var i stor grad planlagt ved hjelp av Internett. Lærerutdanningen bør kvalifisere sine studenter i
dette, slik at fremtidens lærere evner å vurdere kritisk og anvende Web 2.0 didaktisk og pedagogisk i morgendagens skole.

REFERANSEN


Challenging educational expectations of the social web: a web 2.0 far?

Neil Selwyn
Professor, Faculty of Education, Monash University, Australia
neil.selwyn@monash.edu

ABSTRACT
This short position paper reconsiders the exaggerated expectations that currently surround the social web and education within many sections of the education technology community. In particular four popular assumptions of the social web are challenged, namely: (i) expectations of enhanced participatory learning; (ii) expectations of enhanced equality of opportunity; (iii) expectations of learner affinity and interest; and (iv) expectations of freedom from proprietary constraints. The paper contends that many of these expectations stem from a tendency for education technology researchers and writers to over-value seemingly ‘new’ informal uses of the social web, whilst downplaying unequal power relations between individual learners and formal processes of education. The paper concludes that educationalists and technologists alike should strive to look beyond the rhetoric of the social web, and develop realistic and critical understandings of the ‘messy’ realities of social web technologies and education.

Keywords
social web, web 2.0, software, education

INTRODUCTION
Alongside other tags such as ‘web 2.0’, the ‘modern web’ and ‘social software’, the ‘social web’ provides a convenient umbrella term for a host of recent Internet tools and practices ranging from social networking and blogging to folksonomies and ‘mash-ups’. Whilst many computer scientists dispute the technical necessity of such rebranding and re-versioning of the Internet, these labels reflect the changing nature of contemporary online activity – in particular what is described as a ‘mass socialization’ of Internet connectivity based around the collective actions of online user communities rather than individual users (see Shirky 2008, Brusilovsky 2008). Thus in contrast to the ‘broadcast’ mode of information exchange that characterized Internet use in the 1990s, the web applications of the 2000s are seen to rely on openly shared digital content that is authored, critiqued and re-configured by a mass of users – what has been described as ‘many-to-many’ connectivity as opposed to ‘one-to-many’ transmission (O’Reilly 2005). Put simply, then, the current prominence of the ‘social
web’ within popular and academic discussion of the Internet reflects the growing importance that is being placed on interaction between and within groups of Internet users.

This privileging of participatory and collaborative group activity has clear parallels with contemporary understandings of learning and education, and it is perhaps unsurprising that the social web has prompted great enthusiasm of late amongst educators and educationalists (see Davies and Merchant 2009). In particular, it has been argued that social web practices have a strong affinity with socio-cultural accounts of ‘authentic’ learning where knowledge is constructed actively by learners with the support of communal social settings. A great deal of attention has been paid to the personalised and socially situated forms of learning (intended or otherwise) that are seen to stem from social web activities, with learners said to gain from participatory experiences in the co-construction of online knowledge (e.g. Lameras et al. 2009). Thus, the social web has now come to embody the long-held belief amongst education technologists that learning is an inherently social process that best takes place within technology-supported networks of learners involved in the creation as well as consumption of content. For these reasons alone, the social web is now being touted in some quarters as “the future of education” (Hargadon 2008).

As this last sentiment illustrates, growing numbers of commentators are promoting the educational potential of social web technologies in defiantly transformative terms. Aside from the cognitive and pedagogical benefits of social web use, it is now being argued widely that social web tools offer education providers an opportunity to (re)connect with otherwise disaffected and disengaged learners. For example, as Mason and Rennie (2007, p. 199) reason, “shared community spaces and inter-group communications are a massive part of what excites young people and therefore should contribute to [their] persistence and motivation to learn”. These expectations of enhanced motivation and interest are often accompanied by presumptions of enhanced equalities of opportunity and outcome, with much popular and academic commentary celebrating (at least implicitly) the social web’s capacity to recast online social arrangements and relations along open and democratic lines. As Solomon and Schrum (2007, p. 8) contend, “everyone can participate thanks to social networking and collaborative tools and the abundance of web 2.0 sites … The web is no longer a one-way street where someone controls the content. Anyone can control content in a web 2.0 world”.

There are, of course, many different forms of social web and web 2.0 applications and activities—all differing in content, purpose and potential outcome. As such it is misleading to view ‘the social web’ in uniform terms. As outlined above the ‘social web’ label refers at best to a loosely connected family of Internet services, applications and tools. Yet this heterogeneity notwithstanding, the promises of educational improvement and transformation associated with different social web practices have all too easily coalesced in the minds of many educational technologists around the world into a powerful overall
imperative for change. This imperative can be said to be largely based around a perceived set of common characteristics and principles of community, collaboration, sharing and an overall freeing-up and democratisation of action. Whilst the applications themselves may be very diverse, many education technologists have been enthused by the implications for education practice and provision arising from a general ‘spirit’ of social web use in education settings.

For example, there is now much discussion within education technology circles of how best to redesign education provision along more fluid and collaborative lines in order to exploit the education potentials of the social web. Persuasive arguments are now being advanced for the technological (re)engagement and (re)empowerment of learners through the establishment of ‘school 2.0’, ‘education 2.0’, and even ‘lifelong learning 2.0’ (Fumero 2006, Rosenfeld 2007, Wang and Chern 2008, Pettenati et al. 2009). Demands are being made for the radical rethinking of the processes and practices of contemporary education institutions – as evident in recent calls for the introduction of ‘remix curricula’ and ‘pedagogical mash-ups’ (e.g. Fisher and Baird 2009). For better or worse, the concept of the social web is having a pronounced influence on the ways in which the twenty-first century educational landscape is now being (re)imagined and (re)approached by education commentators and stakeholders.

Whilst encompassing many important points and issues, these current discussions can be said at best to provide only partial accounts of the social web and education. The need remains, therefore, to redress some of the silences and gaps in prevailing educational understandings of the social web, and set about developing critical accounts of the complex and often compromised realities of learners’ actual uses of social web tools. In particular, more attention needs to be paid to the structures, boundaries and limitations of social web use that lurk beneath any illusion of enhanced freedom and empowerment – in short more attention needs to be paid to the politics of social web use in education. With these issues in mind, the remainder of this short position paper seeks to (re)appraise the supposed novelties of the social web in education, and ask what new activities, practices, relations and outcomes are actually being facilitated and supported.

Before developing these arguments in earnest it is perhaps worthwhile stating from the outset that the proceeding critical commentary is not driven by a wilfully Luddite or anti-technology perspective that is “motivated more by fear than insight” as Behr (2009, p. 22) puts it. Instead, it is hoped that focussing attention on the problematic nature of the social web and education can provide a counterbalance to some of the more hyperbolic elements of current discourse, especially within academic and commercial circles, and therefore move the educational community towards more refined understandings of the intellectual, political, economic and technology dynamics that make the information technology a reality” (Hassan 2008, p. xi). Thus whilst they may be construed as provocative, the following thoughts are offered as a genuine
attempt to guide future educational appropriations of the social web along more realistic, and ultimately successful, lines. As Geert Lovink (2004, p. 4) has reasoned, there is a pressing need to move beyond polarised debates of either “rejecting or embracing new media” and instead think positively and negatively about digital technologies as the situation demands.

RECONSIDERING EXPECTATIONS OF THE SOCIAL WEB

Enhanced participation and learning

One of the primary shortfalls in educational debate is the disjuncture between the rhetoric of mass socialisation and active community-led action and the rather more individualised and passive realities of social web engagement by many users. As outlined above, growing numbers of educationalists and technologists view the participatory practices associated with social web use as leading inevitably to social forms of learning. Yet there is currently little evidence that most users use social web applications in especially participatory, interactive or even sociable ways. For example, despite their undoubted potential for communal activity, the most used social web tools are most often appropriated for the one-way passive consumption of content. This is readily apparent in the ways that the majority of users engage with YouTube or Wikipedia to access existing content – approaching such applications in a ‘take-it-or-leave-it’ manner rather than the intended spirit of ‘make-it-and-leave-it’. As best, therefore, most users can be said to be responsible merely for the creation and sharing of personal informational archives and ‘profiles’ of their everyday lives. As Beer and Burrows (2007, para 3.2) observe, “the mundane personal details posted on profiles, and the connections made with online ‘friends’, that become the commodities of web 2.0”. Whilst such content is undoubtedly of personal significance for an individual and their small network of contacts, it is most accurately described as constituting what Shirky (2008, p. 86) terms “the ordinary stuff of life” rather than user-generation-content created for general consumption.

Indeed, Internet usage statistics suggest that most social web applications rely on content (re)creation by around 0.5 percent of users (Arthur 2006). For example, Wikipedia depends heavily on a ‘small core’ of a few thousand ‘highly active participants’ (predominantly older, educated, North American males) that writes and edits entries that are then consumed by an audience of millions of users (Leadbeater 2008, p. 15). It is similarly reckoned that an image hosted on the Flickr photograph-sharing application will, on average, attract between 0.26 and 0.5 responses, with little constructive commentary or critical exchange that could be said to constitute learning (Cox 2008). These data therefore suggest the continued relevance of the so-called ‘90-9-1 rule’ of participation inequality—a rule of thumb amongst technologists regarding user generated content in online communities where one percent of users are said to be willing to be create original content on a regular and sustained basis, nine per cent to comment and perhaps contribute original content on an intermittent
basis, and the remaining 90 percent to just passively consume (see Nielsen 2006).

Whilst such patterning of mass non-participation can be rationalised as ‘a predictable imbalance’ that actually serves to drive online communities towards more efficient and improved outcomes (e.g. Shirky 2008), these issues challenge the educational expectations of mass participatory learning and socio-cultural ‘authentic’ exchange. Indeed, recent empirical studies of social web use by learners in formal and informal settings suggest a lack of what could be considered as ‘authentic’ or even ‘useful’ participative learning activity amongst young people. Ongoing Norwegian research by Brandtzæg (2008), for example, has identified nearly three-quarters of young social web users as what can be termed ‘non-active users’, with other UK and Australian studies also highlighting a general lack of ‘sophisticated’ or ‘advanced’ use of social web services and applications (Kennedy et al. 2008, Chan and McLoughlin 2008, Luckin et al. 2009, Nicholas et al. 2008). As Luckin et al. (2009) concluded with regard to social web use by UK teenagers at home and school, there was “little evidence of critical enquiry or analytical awareness, few examples of collaborative knowledge construction, and little publication or publishing outside of social networking sites”. At best, many users’ engagement can be said to lead to what Crook (2008) terms a ‘low bandwidth exchange’ of information and knowledge, with any potential for socially-situated authentic learning realised more accurately in terms of co-operation or co-ordination rather than collaboration between individuals. Of course, this is not to say that all learners interact with the social web in this manner. Yet for many young people, social web applications appear to be used to engage with learning content and other learners in a number of bounded and passive ways, rather than supporting unfettered active interaction with information and knowledge.

**Enhanced equality of opportunity**

As already discussed, education expectations of the social web often convey a sense of heightened equality of opportunity as well as outcome. Yet such sentiments belie what appears to be a complex and divided patterning of social web (non)use by young people and adults in practice. Empirical studies suggest that young people’s engagements with social web technologies remain differentiated along lines of socio-economic status and social class, as well as race, gender, geography, age and educational background (Dutton and Helsper 2007, Jones and Fox 2009). Indeed, it could be argued that much of the popular and commercial appeal of the social web stems precisely from the fact that the users and audiences of such applications remain skewed towards young, male, well-educated, affluent Western users. As Andrew Cox (2008, p. 508) observes:

“...The active groups are also demographics particularly interesting to advertisers. Thus, there continues to be a significant digital divide in how [social web] sites such as Flickr are used, which [...] undercuts the idea that as such they could offer major sites of cultural citizenship”.

This article is downloaded from www.idunn.no. © 2015 Author(s). This is an Open Access article distributed under the terms of the Creative Commons CC-BY-NC-SA 4.0 License (http://creativecommons.org/licenses/by-nc-sa/4.0/)
It would seem sensible, therefore, for any discussion of the educational potentials of the social web to first acknowledge that current generations of technology users continue to be as ‘digitally-divided’ as previous generations, albeit in ways which are more subtle (but no less significant) than broad-brush measures of either ‘using’ or ‘not using’ the Internet. The type of social web tools that an individual uses, the ways in which they are used, and the outcomes that accrue as a result all appear to coalesce into what can be termed a set of ‘second order’ digital divides (see Hargittai 2002). For instance, in terms of the type of social web applications used by individuals, recent studies have suggested that preferences for particular applications over others follow sophisticated class-based patterns of taste and distinction (in terms of social networking, for example, Hargittai [2007] reports that preferences for applications such as MySpace as opposed to Facebook appear to be patterned along lines of social class and educational background). Similarly, in terms of the nature of social web activity, the likelihood of a user engaging in the creation of online content has been found to be patterned by socioeconomic status (Hargittai and Walejko 2008). Whilst these data refer to North American users, there is emerging evidence that such delineations are evident between as well as within countries (Notten et al. 2009). All told, it would seem that individuals’ appropriation of, and engagement with, the social web is bounded by the same ‘abiding fault-lines of modernity’ of class, income and age that shaped previous phases of technology development throughout the twentieth century (Golding 2000, p. 179).

**Learner affinity and interest**

A third problematic assumption within educational discussion of the social web is the notion that current generations of young people are inherently attuned to such technologies. Instead, as Withers and Sheldon (2008, p. 5) observe, young people are more accurately described as holding “contradictory attitudes towards the Internet … describing many aspects of Internet use as both positive and negative”. For example, Crook and Harrison’s (2008) study of UK teenagers found nearly one-quarter reported making no use of social networking sites – offering reasons that such applications were ‘boring’, ‘time consuming’ and/or ‘uninteresting’. Whilst some respondents professed to not knowing how to make use of social networking sites, others stated that they simply preferred talking with people on a face-to-face basis – mirroring Staples’ (2009, p. 62) identification of “low satisfaction with the nature of the social interaction” as a prevalent rationale for rejection of social networking. Such sentiments were also evident in Danah Boyd’s recent ethnography of US teenagers’ use of social networking sites. Here Boyd (2007a, p. 3) identified two groups of non-participants – what she labelled as ‘disenfranchised teens’ and ‘conscientious objectors’:

> “The former consists of those without Internet access, those whose parents succeed in banning them from participation, and online teens who primarily access the Internet through school and other public venues where social network sites are banned. Conscientious objectors include politically
minded teens who wish to protest against Murdoch’s News Corp. (the corporate owner of MySpace), obedient teens who have respected or agree with their parents’ moral or safety concerns, marginalized teens who feel that social network sites are for the cool kids, and other teens who feel as though they are too cool for these sites”.

In this sense, it would be unwise to assume that a learner’s interest, motivation or affinity will be necessarily enhanced by the use of social web technologies to an activity. Indeed, a number of commentators warn against attempts to motivate and engage young people simply through the introduction of consciously ‘trendy’ forms of social web technology use into educational processes and practices (Lankshear and Knoebel 2004). As Tapscott and Williams (2008, p. 54) conclude with regard to the (mis)application of new technology in the workplace, young people’s “appetite for authenticity means that they are resistant to ill-considered attempts by older generations to ‘speak their lingo’”.

Freedom from proprietary constraints

Aside from highlighting young people’s capacity for digital discernment, the above quotation from Boyd’s study of youth (non)use of social networking applications also touches upon the often ignored role of commercial interests in the production and provision of social web tools and services. One of the deep-rooted attractions of social web technologies for many education technologists is the perceived ability for learners and teachers to ‘break free’ of the propriety interests that are seen to stymie digital technology use, not least the pre-set configurations and limitations of commercially produced software packages. Indeed, as Danah Boyd (2007b, p. 17) has observed elsewhere, terms such as social web, web 2.0 and ‘social software’ are not used by those involved in technology merely as neutral descriptors, but also as rallying calls for a new age of Internet use constructed ‘by the people, for the people’ rather than centred around the profit-driven concerns of e-commerce and the other business-related interests of the dot.com era.

Yet, if anything, the social web could be said to mark the increased privatisation and commercialisation of contemporary education processes and practices. Whilst news media are keen to present stories of lone pioneers such as Mark Zuckerberg creating applications such as Facebook in their sparetime, many of the most prominent and popular social web services are mainstream, commercially produced, for-profit services. In particular, increasing numbers of social web applications are provided by the likes of what Hinchey (2008) terms ‘media-giant producers’ such as Pearson, Mattel and Disney, rather than a ‘long tail’ of more specialised ‘grass-roots’ developments (Anderson 2006). Many of the social web applications targeted at what is referred to as the ‘teen and tween market’ such as Club Penguin, Runescape and Maplestory may be ‘free-to-play’ but all aim to make money from the users – what Allan (2009) terms ‘pocket money pickings’. Such sites rely on a variety of tactics, such as
tiered membership where subscribers are offered additional content, banner advertising and ‘micro-transactions’ where young users can ‘spend’ small amounts of virtual currency pre-paid by their parents or guardians. As a representative of Nexon – publishers of the Maplestory application – reasoned, “an ingame avatar represents an ‘ideal portrait of myself’ in the cyberworld. Teens and tweens are very active in expressing their own individuality and do not hesitate to spend money on expressing it as well” (Sung Jin Kim, cited in Allan 2009, p. 5). Thus it is important to note that what most mainstream users experience as the social web “is not simply a benign space, but one that is ultimately shaped by commercial needs” (Cox 2008, p. 508). Whilst these may appear to be trivial concerns, questions need to be raised over how the profit-seeking role of many social web providers corresponds with concerns over education and learning. Aside from the monetarisation of proprietary social web services such as MySpace, commercial interests are also featuring increasingly in the sponsorship, creation and branding of the social web, with companies keen to align themselves with the social web in order to “attract attention to their products and to establish themselves as experts, thus building trust and credibility” (Rettberg 2008, p. 141). Similar questions can be asked of how commercial demands compromise the configuration of social web tools – whether in the guise of the intervention and censoring of user content by providers (often under the guise of ‘acceptable use policies’), or else the manipulation of increasingly commercialised relationships between the individual user, online content and other users. From this perspective educationalists must be aware of the built pedagogies and configured forms of ‘learner’ designed into the structures and systems of social web tools. Recent critics have pointed in particular to the expected and encouraged commodification of creativity that many social web tools engender – pushing users to concentrate on a commodified promotion of self and exchange of what was previously highlighted in this paper as personal micro-details, in pursuit of competitive advantage in the ‘attention economy’ of the social web. As Cox (2008, p. 506) observes:

“Users’ behaviour combines quite conscious altruistic appearing behaviour whose purpose is gaining attention with a cloying language of community and positivity. In this way, the users' consumption of the site leads them to commodify their own behaviour, in ways which coincide with commercial purposes. Much of this behaviour, like blogging, seems quite solipsistic”.

As these examples all illustrate, while commentators may wish to imagine a degree of “corporate social responsibility to youth in the new media world” (Withers with Sheldon 2008, p. 7), there is always a possibility that the realities are quite different. In this sense, the profit-led involvement of IT firms in social web applications demands continued scrutiny1.
CONCLUSIONS

All of these arguments suggest that the educational application of the social web is rather more complex, constrained and compromised than prevailing descriptions of ‘education 2.0’ and ‘school 2.0’ would suggest. In particular, the points raised in this paper highlight the dangers of over-privileging the social web’s supposed ‘freeing-up’ of individual agency and informal practice at the expense of overlooking the many enduring boundaries, constraints and structures that persist within contemporary Internet use. In this sense, education in the age of the social web is perhaps most usefully seen as marking a set of continuities –rather than a set of radical discontinuities –from the educational and technological arrangements of previous decades. Whilst social web technologies may well be implicated in significant adjustments to the future organisation of education and learning, it would be foolhardy to assume that social web applications possess a capacity to somehow transform the power relations that persist between individual learners and formal institutions.

Indeed, whilst educational forms of social web technologies will continue to emerge and stabilise over forthcoming years it would seem important that the academic and technological communities responsible for much of the initial promotion and shaping of ‘the idea’ of the social web do so in a more reasoned and realistic manner than is currently the case. In particular it is essential to acknowledge the political nature and the political importance of the social web and education. As this article has demonstrated, debates about education and the social web are not simply concerned with matters of Internet bandwidth or the pedagogic affordances of wikis. They are also debates about questions of benefit and power, equality and empowerment, structure and agency and social justice. From this brief discussion alone, it is clear that current celebrations of social web use in education are not objective accounts of the realities of social web use per se. Rather they are expressions of wider debates, controversies and tensions about the future of education provision in the twenty-first century. As Michael Apple (2002, p. 442) has reasoned:

“The debate about the role of the new technology in society and in [education] is not and must not be just about the technical correctness of what computers can and cannot do. These may be the least important kinds of questions, in fact. Instead, at the very core of the debate are the ideological and ethical issues concerning what schools should be about and whose interests they should serve”.

As an ideologically driven debate, current thinking about the social web therefore contains a number of silences and gaps that need to be recognised and confronted – not least the portrayal of social web technologies as capable of enacting new arrangements and forms of education. For all its intuitive appeal, the widespread valorisation of informal learning and the individualised learner with current understandings of the social web in education dangerously depoliticises the act of learning (Gorman 2007). Such arguments present an overly
simplistic view of successful education as relying merely on groups of like-minded disembodied individuals, whilst failing to consider the wider social, economic, political and cultural contexts of the societal act of schooling. A number of critical questions therefore remain unasked and unanswered in the current accounts. For example, what is the role of the private sector and corporate capitalism in social web based learning? What inequalities of access, skills, resourcing or know-how will remain, and who will be concerned with correcting them? If the state is no longer responsible for the provision of education through school systems, then who is to assume responsibility?

All of these unaddressed questions point to the need from now on for educational technologists to approach the educational application of the social web with a heightened sense of equanimity and humility. In particular, it would seem realistic to expect any instances of informal learning that may accrue from social web use to continue to be subsumed into more formal educational practices. Indeed, current manifestations of social web use offer little, if any, reason to assume that the dominant forms of learning in (late) modern society will cease to be the highly individualised, regulated, ordered, sorted and institutionalised processes of schooling that have persisted since the late nineteenth century. As such, it is perhaps most likely that social web activities and practices will continue to be shaped by the ‘grammar’ of formal education systems in ways that are concerned essentially with the instrumentalist ‘consuming of massive amounts of symbolic information’ (Monke 2008, p. 4). At best, then, any unfettered episodes of social web supported informal learning may well remain mostly an additional benefit for already privileged social groups who tend to prosper most from all forms of learning.

Of course, moving the attention of the education community away from the highly seductive promises of the social web and towards these rather less satisfactory practicalities will be no easy task. Yet, there is a clear need for all members of the educational community to set about developing more realistic and critical understandings of the ‘messy’ realities of social web technologies and education. This task goes well beyond asking over-simplified questions of whether or not social web technologies ‘work’ or not in educational settings. Instead, educators and educationalists should set about addressing questions of how social web technologies (re)produce social relations and in whose interests they serve – thus striving to challenge and problematise the dominant discourses of transformation and enhancement in current thinking. As all the issues touched upon in this paper should attest, the debate over the social web and web 2.0 in education has only just commenced, and a great deal of (re)thinking is required before the likely benefits of such technologies can be realised. Thus, instead of moving our attention onto the even more nebulous educational potential of the semantic web and ‘web 3.0’ (see Ohler 2008), the education community has a collective responsibility to start thinking about the social web and ‘web 2.0’ in far more serious and realistic terms than previously has been the case.
ACKNOWLEDGEMENT

The author would like to thank the two anonymous referees for their helpful comments on an earlier draft of this paper.

REFERENCES


Luckin, R., Clark, W., Logan, K., Graber, R., Oliver, M. and Mee, A. (2009) ‘Do web 2.0 tools really open the door to learning: practices, perceptions and profiles of 11–16 year olds students’ Learning, Media and Technology 34, 2, pp. 87–104


‘Time to Learn’ supplement, p. 4


Rosenfeld, E. (2007) ‘Beginning the conversation about education 2.0’ *Teacher Librarian* 34, 4, p. 6


Educating the Digital Generation

Exploring Media Literacy for the 21st Century

Ola Erstad
Professor, Department of Education, Faculty of Educational Sciences, University of Oslo, Norway
ola.erstad@iped.uio.no

ENGLISH ABSTRACT

The concept of a digital generation has been dominating the public discourse on the role of digital media in young people’s lives. Issues concerning a digital generation is closely linked to questions about how we develop an education system that is able to face the challenges of the 21st Century. A growing field of research, inclined to raise awareness of present and future challenges for our education system, is ‘media/digital literacy’. This article examines research within ‘generation studies’ and public constructions of young people and digital media. Further the article presents some developments within ‘new literacy studies’ and different aspects of ‘competencies for the 21st Century’. Next, the article reflects different approaches to studying these competencies, based on different empirical data, both from my own research and that of colleagues. Towards the end the important question of inclusion and exclusion is raised. The objective is to explore some issues of importance for future development of media literacy, the educational use of digital tools and critical considerations of a digital generation. A key part of the article is the elaboration of five dimensions representing different focus areas of research on school-based studies of media literacy.

Keywords
media/digital literacy, generation, school, inclusion, exclusion.

To what extent can we describe young people growing up today as a digital generation? The concept of a digital generation has been dominating the public discourse on the role of digital media in young people’s lives (Herring 2006; Buckingham & Willett 2006). This is both seen in worries about the risks different media represent towards children and youth (Byron 2007), and in celebrations of the media culture among the young (Tapscott 2008). These overgeneralizations can easily be misleading and give the impression that all young people today are super-users and highly competent in their use of different media. A more critical stance is needed where we specify the characteristics of such a generation, and how this is articulated in different segments of young people.
Issues concerning a digital generation are closely linked to questions about how we develop an education system that is able to face the challenges of the 21st century. According to former US Secretary of Education Richard Riley, the projected top ten in demand jobs in 2010 did not exist in 2004, indicating that not only is our labour market in transition, but also the competencies needed. Such a future-oriented perspective on education is in contrast to the dominating trend in most countries where the emphasis is on a traditional transmission model of knowledge acquisition. (See for example www.21stcenturyskills.org/.) A growing field of research, inclined to raise awareness of present and future challenges for our education system, is ‘media/digital literacy’ (Buckingham 2003). Primarily because this term emphasizes that ‘reading’ (information access) and ‘writing’ (producing and expressing content) change over time (Baron 2009).

After a critical investigation into the field of ‘generation studies’, the first part of this article will present some developments within ‘new literacy studies’ and different aspects of ‘competencies for the 21st century’. The other part of this article will reflect different approaches to studying these competencies, based on different empirical data, both from my own research and that of colleagues. The main objective of the article is the elaboration of five dimensions representing different focus areas of research on school-based studies of media literacy.

CONCEPTUAL POSITIONING

There are different terms used in this field of research, such as media literacy, ICT literacy, digital literacy, information literacy and digital competence. The key term, and the one highlighted in this article, is media literacy. In a Scandinavian context the term competence is often used instead of literacy since the latter term does not translate to the languages in these countries. There are several problems with many of the terms linking technology and literacy, and I therefore prefer media literacy. The main three problems are:

- First, a lack of insight into the conceptual history in this field, where media literacy has been used since the beginning of the 1980s. Media literacy, as developed within media education (Buckingham 2003), includes all technologies and media forms, both analogue and digital. This work on what young people need to know across different kinds of media and curricula, that have been developed since the 1980s, is not often referred to in our present day research literature, with a few exceptions (Tyner 1998).

- Second, that there is a danger of becoming too oriented towards present day technologies, such as IT literacy, ICT literacy or computer literacy. Who knows what kinds of technologies we might have available in ten years from now? Media literacy points to some broader aspects of how we relate to different media and incorporates technological change. In curricula
– developments on media literacy, for example in the UK, some key concepts have been defined, such as production, representation and audience.

– Third, media literacy relates to broader aspects of living in a media saturated society, and not only skills in operating applications or information handling, which is the main focus of many international frameworks.

In this article I will refer to different conceptions of the interrelationship between media/technology literacy in the literature and as part of different frameworks.

**BEYOND ‘NATIVES’ AND ‘IMMIGRANTS’**

‘Generation studies’ as a field of research can be traced back to the German scholar Mannheim, who argues that a person’s location in the socio-historical structure defines their experience. Such a generational location, that a person belongs to, points to certain definite modes of behaviour, feeling and thought, where youth is considered as the formative years (Mannheim 1952). Thus, each generation, has a distinctive ‘generational consciousness’, which is dependent on the pace of social change. In times of accelerated social and cultural change basic belief systems need to change more quickly than the continuous and gradual transition between generations allows (Lesko 1996; France 2007).

Individuals are further internally stratified by their geographical and cultural location and by their actual as opposed to potential participation in the social and intellectual currents of their time and place. As a result, different, or even opposing, generational strata may be developed. The notion of generational strata allows us to investigate differences, as well as similarities, that may exist within and between social groups living in similar cultures and societies.

Increasingly, media have become the defining factor dividing generations. Children born since the mid-1990s belong to the first generation growing up with digital media embedded in the media culture, not seen as something ‘new’. A public discourse has been created around young people and new media conceiving them as hyper competent in using such technologies and the creators of 21st century skills.

One such influential conception was made by M. Prensky during the mid-1990s. He published several texts popularising and provoking debates on the implications of digital media, especially the penetration of the computer and the Internet. The conception was that of ‘media natives’ versus ‘media immigrants’ (Prensky 2001). The first conceives young people as media experts through their use of digital media in their everyday lives, as the ‘innovators’ of new practices of great importance for society at large. The second term is then directed towards the adult generation, born before the introduction of digital
media. Adults are immigrants in the land of the young, said to have problems in coping with the challenges of the digital society.

The implications of such generational divides are further popularized in D. Tapscott’s book ‘Growing up digital. The rise of the Net generation’ (1998), and with a recent follow up called ‘Grown up digital’ (2008), and a similar book by J. Palfrey and U. Gasser termed ‘Born digital’ (2008). These books are based on empirical data consisting of interviews with a large number of young people from around the world, even though the data itself is not presented in any detail, and therefore difficult to evaluate from a methodological perspective. However, these books are highly problematic in the way they over-generalize how children and young people are competent media users in a broad set of areas. This creates a public image of youth and media that needs to be modified. From other research we know that there are huge differences both within and between different cultures and countries in how young people relate to and use digital media (Coiro, Knobel, Lankshear & Leu 2008:3).

From the point of view of media literacy, it is important to be critical of such constructions, because they blur just as much as they enlighten us about media use and its implications. One critical voice of such public constructions as mentioned above is David Buckingham. In several of his writings he has argued for a more nuanced understanding of how young people relate to different media, creating a middle ground between media pessimists and optimists based on different sets of empirical data (Buckingham 2003, 2007).

Still, studies show that many young people are engaged with digital media. In the Nordic countries access to computers, the Internet and mobile phones with Internet access among young people between 16 and 22 is more than 90% and in some areas up to 100%. So access is not an issue for most youth in these countries. In Norway, for example, the use of digital media by youth is also high, where 73% of all 8 to 18 year-olds use the Internet daily (Norwegian Media Authority 2008).

At the same time the age-specific use of digital media is changing. On certain social networking sites people in their 20s and 30s are even higher consumers than youth. However, there are certain aspects in the contextual embedding that such media have for youth rather than for adults that seem different (Buckingham & Willett 2006; Drotner & Livingstone 2008). This can be seen in the ‘Digital Youth’ project undertaken by M. Ito and colleagues in the US (Ito et al. 2010). By drawing on different case studies from specific communities this research manages “to map the contours of the varied social, technical, and cultural contexts that structure youth media engagement” (Ito et al. 2010:31). In their findings they draw out certain genres of participation, in what they

describe as ‘friendship driven’ and ‘interest driven’. Further they have identified different levels of commitment and intensity in new media practices, in what they describe as ‘hanging out’, ‘messing around’ and ‘geeking out’. These genres of participation are then interpreted as “intertwined with young people’s practices, learning, and identity formation within these varied and dynamic media ecologies” (Ito et al. 2010:31). These studies show that there are some fundamental changes going on in the ways young people are communicating, producing texts and distributing content.

So, more correctly than as a specific digital generation, these developments can best be described as a transitional phase where digital media are still in transition and where young people today are experiencing a dual culture, between the old and the new, what S. Herring (2008) calls ‘a transitional generation’. Young people are of course of special interest because some of them are among the first to explore these new technological territories.

Such a discussion about what we mean by a digital generation is therefore important, not only to move beyond simple statements of ‘natives’ and ‘immigrants’ towards a more nuanced understanding of what characterizes such a generation, but also what impact such technologies have on specific social practices that young people are involved in.

**LEARNING AND LITERACY WITH DIGITAL MEDIA**

The key issues in trying to understand the implications of new digital technologies for children and young people are learning and literacy, or literacies in plural. This is because learning and literacy is all about the ways we make meaning of information from resources in our environment, and how we communicate by using different means, not only understood as ‘reading’ and ‘writing’ written text. In this way literacy is something that changes over time due to changes in the cultural tools we have available (Wertsch 2008).

This conception of literacy is building on the research tradition defining literacy as embedded in specific social practices (Scribner & Cole 1981; Heath 1984; Street 1984; Barton 1994). A definition of literacy made by Lankshear and Knobel (2006), encompasses these social practices that change over time. They define literacy as: “Socially recognized ways of generating, communicating and negotiating meaningful content through the medium of encoded texts within contexts of participation in Discourses (or, as members of Discourses).” This definition is not bound by certain technologies. It proposes to study literacies in practice (what people do with technologies and digital texts), and not as something predescribed, indicating that we need to understand what people are already practicing concerning media literacies in plural and what the role of education should be in employing such literacies for knowledge development. The important message is that media literacy among young people today is of
direct relevance to discussions about learning in schools, and it seriously confronts earlier conceptions of literacy and learning.

An important cultural development in recent years has been the processes of convergence (Jenkins 2006). This relates to how technologies merge, how the production of content changes, how new text formats are developed and how the users relate to information as part of communication networks in different ways. Parallel to such convergence processes some literacy theorists have sought to hold together the many new literacies under some umbrella concepts stressing the plurality of literacies, such as ‘multiliteracies’ (Cope & Kalantzis 2000, Snyder 2002) and ‘metamedia literacy’ (Lemke 1998). According to Kellner (2002: 163), “The term ‘multiple literacies’ points to the many different kinds of literacies needed to access, interpret, criticise, and participate in the emergent new forms of culture and society.” Kress (2003) however argues against the multiplicity of literacies, suggesting that it leads to serious conceptual confusion. He believes that instead of taking this path, it is necessary to develop a new theoretical framework for literacy which can use a single set of concepts to address the various aspects of literacy.

This implies that we constantly have to ask the more general question of what it means to ‘read’ and ‘write’ in a culture, and thereby how we learn (Pahl & Rowsell 2005). In the ‘Handbook of Literacy and Technology’, with the subtitle ‘Transformations in a Post-Typographic World’, D. Reinking et al. (1998) present several perspectives on how the development of digital technologies changes conceptions of text, of readers and writers and ultimately of literacy itself. This implies that media literacy relates to changes in traditional cultural techniques like reading and writing, and yet meanwhile opening up new dimensions to what it means to be a competent reader and writer in our culture.

Four areas where we see digital media having an impact on media use and literacy practices by young people are;

– A participatory culture: This term from H. Jenkins (2006) relates to ways of participating and sharing with others. In later years this has become more apparent through social networking sites as an interconnection between online and offline participation patterns.

– Information access: Since the introduction of the World Wide Web, one of the most obvious advantages of digital media is access to information. The possibilities are endless and mark a significant difference from the book age is the easy access to information provided by the Internet. In addition it has created possibilities for everyone to provide and share information online. One example is Wikipedia as a net-based lexicon where everybody can contribute. This, of course, demands more of the user to evaluate the information provided and responsibility in creating content.
Communication possibilities: The development of e-mail, chat, sms and online communities has created new conditions for communication and communicative competence as a skill for the 21 century.

Content production: An important change in literacy practices is that everybody potentially can be producers of content that can be shared with large numbers of other users on sites like MySpace and YouTube. Text-production has increased a lot in our culture, and software tools make it easy to edit films, music and so forth, something that has been termed as remixing (Erstad 2008).

The key questions then become; what are the key literacies and competencies for the 21st century, and how can we develop an education system that is adjusted to face these challenges of literacy development in the future? And what do young people really know about media, and what implications does this have for learning in educational settings? Technology serves both as a driver and a lever for these transformations.

MEDIA LITERACY FOR THE 21ST CENTURY

Some of the definitions and frameworks on media literacy that have been developed are conceiving this in a narrow sense as skills that can be broken down to certain operations. One example is the book ‘Media literacy’ (2001) by W.J. Potter, where specific skills and cognitive abilities in analysing content in the media are highlighted. However, other definitions and frameworks are conceiving media literacy more broadly. This is expressed in books by D. Buckingham (2003, 2007), where media literacy is building on a cultural studies tradition of how young people are engaged in using media in different ways and as a critique of the marketing of educational technology as a salvation for school learning. With reference to the Swedish literature theorist J. Thavenius (1995) we might also see this broader conception of media literacy as being related to the German term ‘bildung’, which is similar to ‘to be literate’ in English.

During the last decade several initiatives have been taken for developing typologies and frameworks for what has been called digital literacies (Lankshear & Knobel 2008). The different definitions and conceptions of digital literacy have often been related to certain frameworks and the development of standards for educational practices. In January 2001, the Educational Testing Service (ETS), in the U.S., assembled a panel to develop a workable framework for what they called ICT Literacy. The outcome was the report Digital Transformation. A Framework for ICT Literacy (ETS 2002).

From my own research on the educational use of digital technologies I have suggested a few categories, elaborated from the ETS framework, to specify some aspects of media literacy in school practices using digital tools (Erstad 2005). This is thought of as different aspects of how we understand young peo-
ple’s use of digital technologies in learning activities at school, and as a tool for assessing what they can and cannot do with digital media. These are:

**TABLE 1: DIFFERENT ASPECTS AND CATEGORIES OF MEDIA LITERACY.**

<table>
<thead>
<tr>
<th>Basic skills</th>
<th>Be able to open software, sort out and save information on the computer, and other simple skills in using the computer and software.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Download</td>
<td>Be able to download different information types from the Internet.</td>
</tr>
<tr>
<td>Search</td>
<td>Know about and how to get access to information.</td>
</tr>
<tr>
<td>Navigate</td>
<td>Be able to orient oneself in digital networks, learning strategies in using the Internet.</td>
</tr>
<tr>
<td>Classify</td>
<td>Be able to organize information according to a certain classification scheme or genre.</td>
</tr>
<tr>
<td>Integrate</td>
<td>Be able to compare and put together different types of information related to multimodal texts.</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Be able to check and evaluate the information one seeks to get from searching the Internet. Be able to judge the quality, relevance, objectivity and usefulness of the information one has found. Critical evaluation of sources.</td>
</tr>
<tr>
<td>Communicate</td>
<td>Be able to communicate information and express oneself through different mediational means.</td>
</tr>
<tr>
<td>Cooperate</td>
<td>Be able to take part in net-based interactions of learning, and take advantage of digital technology to cooperate and take part in networks.</td>
</tr>
<tr>
<td>Create</td>
<td>Be able to produce and create different forms of information as multimodal texts, make web pages, and so forth. Be able to develop something new by using specific tools and software. Remixing different existing texts into something new.</td>
</tr>
</tbody>
</table>

This list is one step in the direction towards an operational definition of what we mean by media literacy in school practices. The categories consist of general competencies that are not connected to specific subjects in school or specific technologies. They can be taught and are not only related to what is learned in school settings, but also to situations outside the school.

Other frameworks have used ‘digital competence’ as an overall term. One example is the working group on “key competences” of the European Commission and their report ‘Key Competences for Lifelong Learning: a European Reference Framework’. This framework identifies digital competence as one of the eight domains of key competences, defining it as “the confident and critical use of Information Society Technologies for work, leisure and communication. These competences are related to logical and critical thinking, to high-level information management skills and to well-developed communication skills. At the most basic level, ICT skills comprise the use of multi-media technology to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in networks via the Internet.” (European Commission 2006: 14). Digital competence in this framework encompasses knowledge, skills and attitudes related to such technologies.

Of special importance in an educational conception of media literacy are the possibilities the development of digital media, such as the Internet (Web 2.0) and editing software, have provided for user-generated content creation. Con-
content can be downloaded from the Internet, remixed (Lessig 2008) and put together in new ways, and then uploaded on the Internet for others to use further in a potentially endless production process. This way of working with content fundamentally changes the traditional way of creating content, known through the book. This ‘production mode’ and the new competencies of remixing (Erstad 2008) have also raised issues about students’ active roles in knowledge practices.

The critical point now is to bring the policy-agenda and the more normative research arguing for the necessity of media literacy more in touch with studying knowledge practices, and how digital media create conditions for change and transition within such practices. As shown in this section, there are different frameworks to relate to in our understanding of media literacy. However, the key challenge is to go deeper into the implications of the increased use of new technologies in educational practices.

MEDIA LITERACIES IN PRACTICE

In this section, different aspects of media literacies using digital tools as part of school practices will be highlighted. In addition we need to be informed about the media practices of young people outside schools. The objective here is not to elaborate on all the different details of media literacy mentioned above, but rather to show different approaches to studying media literacies in school practices. In the last part of this section I will propose a way of understanding different dimensions of media literacies in educational settings.

Testing media literacy

Some countries, like Australia, the USA, Norway and Hong Kong, have developed specific tests to measure students’ media literacy focusing on certain aspects of digital media. The first attempt was made by the ISTE in the USA (see www.iste.org/, NETS standards), where students, teachers and administrators can click on different online assignments and get a profile of their digital literacy skills.

In Norway, testing of digital competence was introduced in the ITU Monitor 2009 study (Hatlevik, Ottestad, Skaug, Kløvstad & Berge 2009). The results show a strong relationship between students’ digital competence and their general school performance and the educational background of the parents. The strength of this study is how it studies digital competence as interconnected with issues of access, school leadership, teacher competence and school development.

A more elaborate test, in the sense that it is using more simulation tools and not so related to specific school subjects, has been developed in Australia. This test is also more based on performance assessment in solving problems than just skills in operating the technology. In their report from the first phase Ainley, Fraillon and Freeman (2007) present the results from a study con-
duced in 2005 involving approximately 7400 students from Years 6 and 10 in around 520 schools across Australia. By having two year-groups it also traces progressions in what they call ICT Literacy.

The items distributed across the ICT literacy scale were used to develop a progress map that could be interpreted in terms of the skills and understanding demonstrated by students in their responses to the items. In this case six proficiency levels were defined and descriptions were developed to characterize typical student performance at each level. The levels and the percentage on each level are used to summarize the performance of students overall, and to compare performances across subgroups of students.

TABLE 2: ICT LITERACY PROFILES FOR YEAR 6 AND YEAR 10, AINLEY ET AL. 2007:X

<table>
<thead>
<tr>
<th>Year 6</th>
<th>Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Level 6 Students working at level 6 create information products that show evidence of technical proficiency, and careful planning and review. They use software features to organize information and to synthesize and represent data as integrated complete information products. They design information products consistent with the conventions of specific communication modes and audiences and use available software features to enhance the communicative effect of their work.</td>
<td>0.1%</td>
</tr>
<tr>
<td>Level 5 Students working at level 5 evaluate the credibility of information from electronic sources and select the most relevant information to use for a specific communicative purpose. They create information products that show evidence of planning and technical competence. They use software features to reshape and present information graphically consistent with presentation conventions. They design information products that combine different elements and accurately represent their source data. They use available software features to enhance the appearance of their information products.</td>
<td>11.9%</td>
</tr>
<tr>
<td>Level 4 Students working at level 4 generate well targeted searches for electronic information sources and select relevant information from within sources to meet a specific purpose. They create information products with simple linear structures and use software commands to edit and reformat information products in ways that demonstrate some consideration of audience and communicative purpose. They recognise situations in which ICT misuse may occur and explain how specific protocols can prevent this.</td>
<td>48.9%</td>
</tr>
<tr>
<td>Level 3 Students working at level 3 generate simple general search questions and select the best information source to meet a specific purpose. They retrieve information from given electronic sources to answer specific, concrete questions. They assemble information in a provided simple linear order to create information products. They use conventionally recognised software commands to edit and reformat information products. They recognise common examples in which ICT misuse may occur and suggest ways of avoiding them.</td>
<td>32.0%</td>
</tr>
<tr>
<td>Level 2 Students working at level 2 locate simple, explicit information from within a given electronic source. They add content to and make simple changes to existing information products when instructed. They edit information products to create products that show limited consistency of design and information management. They recognise and identify basic ICT electronic security and health and safety usage issues and practices.</td>
<td>6.4%</td>
</tr>
<tr>
<td>Level 1 Students working at level 1 perform basic tasks using computers and software. They implement the most commonly used file management and software commands when instructed. They recognise the most commonly used ICT terminology and functions.</td>
<td>0.4%</td>
</tr>
</tbody>
</table>
Only eight per cent of Year 6 students performed at level 4 or above compared to 61 per cent of Year 10 students. In contrast 51 per cent of Year 6 students performed at level 2 or below compared to 7 per cent of Year 10 students.

ICT literacy was strongly associated with socioeconomic background. Approximately two thirds (68%) of Year 6 students whose parents were “senior managers and professionals” attained the proficient standard compared to approximately one third (32%) of students whose parents were in “unskilled manual, office and sales” occupations. Three quarters (75%) of Year 10 students whose parents were “senior managers and professionals” attained the proficient standard compared to just less than half (49%) of students whose parents were in “unskilled manual, office and sales” occupations.

There were no statistically significant gender differences in the percentage attaining the proficient standard at either Year 6 or Year 10. There was no difference in ICT literacy associated with language background. They conclude that:

One should not assume that students are uniformly becoming adept because they use ICT so widely in their daily lives. The results of the assessment survey suggest that students use ICT in a relatively limited way and this is reflected in the overall level of ICT literacy. Communication with peers and using the Internet to look up information are frequent applications but there is much less frequent use of applications that involve creating, analyzing or transforming information. There are substantial differences between Year 6 and Year 10 suggesting that considerable growth in ICT proficiency takes place over these four years. Within each Year level there are differences associated with socioeconomic background, indigenous status and remote geographic locations (compared to metropolitan locations). (Ainley et al. 2007:xiv).

This assessment approach to media literacy is still in an initial phase, and several initiatives in different countries are now also being taken with the new IEA study called ‘International Computer and Information Literacy Study’ (ICILS). The important message from the Australian study is that this should not only be seen as a summative score of certain skills, but to a larger extent as an orientation towards formative assessment where students, both individually and collaboratively, perform certain tasks of problem solving.

Project-based activities in schools

My own research has shown that digital media are used most extensively and also in the most integrated educational ways as part of project work in schools (Erstad 2005; Erstad et al. 2005). Below is a description from one project.

This project took place between two lower secondary schools, one in the Eastern part of Oslo and one in the Western suburbs. At each school a group of stu-
Students (about 20 in the East, 13–14 year olds, and about 40 in the West, 14–15 year olds) took part in the project during a two-week period. The school in the Western suburbs had students from families with a high socio-economic status with only one student who was non-white. At the school in the Eastern inner city part of Oslo the students came from many different cultural backgrounds with about 65% of the students with minority speaking families and with low socio-economic status. The teachers decided that the collaborative project between the students at the two schools should be on prejudices about living in the East and the West of Oslo, and that they should use digital technology as a central part of the collaborative work.

In the project the students used different digital tools to collaborate and create an online newspaper, one for each school, which consisted of reports about the students at the other school and their community, as well as their own. The project was triggered by several news reports in a national paper at the same time, showing that the average life expectancy between the two neighbourhoods differed by eight years, lower in the East than in the West of Oslo. This shocked the students and motivated them to find out more about this.

In each group they divided themselves into an editorial board with responsibilities for different sections of the paper; on culture, religion and ethics, sport, statistics about their communities and interviews with inhabitants. They created and sent questions to each other, using a collaborative online platform and msn. Halfway through the project a group of students from each school travelled, without the teachers, to visit the students at the other school using public transportation. None of the students had ever been in the area of the other school. To document this visit each group made a video film to use in their own production.

Throughout the project the students worked with different modalities and information sources in the making of the online newspapers. They shifted on working individually on different computers looking for images, statistical data, graphs, illustrations, written texts, or editing audio interviews with players from the local soccer team, editing the video films to put on the web, and then got together to negotiate how to integrate and remix the different content sources into something new in their online newspaper. The two online papers turned out very different: the one from the school in the West possessed different visual effects, with a high quantity of images on the front page and with links to other sections of the paper consisting of more text and images. The online paper from the Eastern school was simpler in the aesthetics on the front page, with more video material, for example, video interviews with students at their own school and interviews with students from the other school recorded during their visit.

Their media literacy is expressed as part of their searches for information and sending content between the two schools. The students combined the different content they found on the Internet with their own work, either collaboratively
written texts or audio and video tapes. The editorial group at each school had the last word concerning how things should be presented in their online newspaper. Video observations of the two groups showed a very intense and creative process among the students working with different materials and sending them between the two schools. As shown above, the students involved in this project were engaged on a personal level, drawing on experiences from outside the school, yet reworking such experiences within a school context. In negotiating meaning making about differences and similarities between the two communities in Oslo the students started reflecting on their own lives, which was shown in the chapters they wrote in the online newspapers.

Of special importance in this project was the question of whether the students could trust the information they gained access to, which was stressed by the teachers throughout the project. For example, in one incident during the school visit by students from the West to the school in the East, the visiting students were given a lot of false information by the students in the East, about growing up in the East, about drugs, violence and other things, that the students from the West published in their online paper when they returned. When the teachers discovered this it created a lot of discussion about information sources and responsibilities when publishing something on the Internet for others to read.

**DISCUSSION**

So what can we draw from the different sections above, that in different ways raise issues about educating the digital generation. These sections show different approaches and aspects of the educational implications of young peoples’ use of digital media, especially linked to digital literacy. The first section is more specific about elements of media literacy, which can be measured through tests, and as an expression of how we can find out more about what students do and do not know about the way they use digital media. In the second section one example of how this might be expressed as part of project work is mentioned. Project work provides some other possibilities apart from ordinary classroom teaching in the way students are engaged in problem solving, which is a key competency for the 21st century (see www.atc21s.org). Digital media are here both a resource for these students’ learning, but also something they reflect on; concerning information sources, how they collaborate, both within and between schools, and about content creation.

Based on these two sections five dimensions can be elaborated, which highlight different aspects of how we understand media literacies as part of school-based learning.

**Dimension 1: Basic skills**

This has traditionally been expressed as certification of skills for teachers and students. It is a profile of how good you are at performing certain tasks in oper-
at the computer, the Internet or software. The problem with this approach is that the technology changes all the time, and it is difficult to develop standardizations that will last over time. And, as expressed by the young people in the sections above, handling the technology is something you explore and learn when needed. Still, not all students have the same skills in operating the technology, and teachers should track the levels of their students and use this as a starting point for how technology is used in learning activities.

**Dimension 2: Media as an object of analysis**

One aspect of media literacy in schools is the importance media and technology have as a knowledge domain in itself. During the last 40 years, media culture has become more and more evident in all levels of society. In this sense it has become a knowledge domain of importance for students to know about. This has traditionally been part of media education in school, but since the impact of digital media it has become an important part of many subjects in school. Based on what has been discussed above, the technology itself is something young people relate to, but do not have any understanding of. In this sense issues like media history, media genres and media and power become important parts of media literacy.

**Dimension 3: Knowledge building in subject domains**

This relates to how new technologies change fundamental issues within established school subjects. We have seen this before when the calculator was introduced in mathematics, and the disputes this created about how mathematics as a subject changed because of this. The same can be said about different digital media and software packages that are introduced in different subjects. How does it change the knowledge structures within the subject itself, what are considered core knowledge elements, and how do students build knowledge and approach these knowledge structures?

Knowledge is thereby seen as interconnected with the cultural tools we have available, and that this changes over time.

**Dimension 4: Learning strategies**

This dimension extends across different subject areas, and is more about the ways students approach information and knowledge. This has been important before in the way students might have problems in developing good strategies for how they learn, and their self-regulated learning. Related to digital media, this dimension has become even more important. The development of information sources on the Internet has created greater challenges in respect of student competency when searching for information, evaluating such sources and using information to build knowledge. In addition, students need to develop good strategies for how they can use information to learn more; that is to learn how to learn.
Dimension 5: Digital Bildung/Cultural competence

This last dimension points towards broader issues about learning in our culture. Issues relating to what is called ‘digital bildung’, or cultural competence, are more concerned with the overall challenges of being part of a digital culture. It is about functioning optimally in a media culture and a knowledge society, and to be able to be informed to make decisions of importance for oneself as a citizen and for society as a whole, for example when elections become digitalized and political debates takes place online. It is also about how learning is connected to identity and what I have described above as students’ learning lives across different contexts and our communicative competence in using the different cultural tools available to us. This approach to learning and literacy is more holistic and integrated about educating the digital generation.

Inclusion or exclusion?

The argument in this article has been to develop a more cohesive approach to our conceptualizations of a new digital generation. It is rather, still, a generation that uses many different media, both analogue and digital, in the everyday lives of those concerned. At the same time it is clear that young people growing up today are experiencing important aspects of the implications of digital media on our culture. New conceptions of literacy exemplify many of the challenges of educating the digital generation.

However, there is one question that is of key importance for the educational prospects for a digital generation, and that is; to what extent will we see new divisions in our societies, locally, nationally and globally, about who will become included or excluded (Warschauer 2004)? The digital divide has mainly been discussed as an issue related to access and gender differences. It is more important today to see this as an issue of competence and literacy, or more generally as Bildung for a digital age. This would imply knowing how to navigate in the information jungle on the Internet, to create, to communicate and so forth. This is where issues of media literacy and empowerment come in.

In her book ‘Literacy for sustainable development in the age of information’ (1999) Naz Rasool argues that research perspectives on technology and literacy need to re-conceptualise power structures within the information society, with an emphasis on ‘communicative competence’ in relation to democratic citizenship. Digital technologies create new possibilities for how people relate to each other, how knowledge is defined in negotiations between those involved and how it changes our conception of learning environments in which the participants make meaning. Empowerment is related to the active use of different tools, which must be based on the prerequisite that those involved have the competence and critical perspective for how to use them for learning. Literacy, seen in this way, implies processes of inclusion and exclusion. Some have the skills and know-how to use them for personal development, others do not. Schooling is meant to counteract such cultural processes of exclusion.
There is great variation in how digitally competent and technologically interested young people are. Sonia Livingstone’s (2009) studies of the bedroom cultures of young people using digital media in the UK is an example of studies that raise critical questions about what we mean by ‘digital youth’ and the role of media in young people’s everyday lives. Such studies show that not all young people are as technology savvy as the public image might imply.

The importance of educating the digital generation is not so much about being able to use digital media in and out of school, than it is about creating a space for reflection and the building of knowledge that will help all students participate as citizens in a digital culture. In this sense we have to re-evaluate our socio-cultural constructions of the school-aged learner, to prevent new marginalizing mechanisms from developing.

What will life be like for citizens in societies that are becoming increasingly more dependent on digital media in every part of their social lives? How should we, in our research efforts, try to grasp those aspects of skills, competencies and literacies that are important for being a citizen with the necessary knowledge base to take part in our society? This of course also raises some basic questions about the role of schools in our societies. Schools would then still be important social institutions as a learning space for all young people growing up, but just one of several learning spaces that children and youth relate to in their daily lives. In the next few years it will be critical to debate and research these issues and to move towards a better understanding of what 21st century competencies really are.

REFERENCES

Uptake and Use of Digital Technologies in Primary and Secondary Schools
– a Thematic Review of Research

Anders D. Olofsson
Associate Professor, Department of Education, Umeå University, Sweden
anders.d.olofsson@umu.se

J. Ola Lindberg
Professor, Department of Education, Mid Sweden University, Sweden
ola.lindberg@miun.se

Göran Fransson
Associate professor in Education, Department of Educational Sciences,
Faculty of Education and Business Studies, University of Gävle, Sweden
gfn@hig.se

Trond Eliv Hauge
Professor emeritus, Department of Teacher Education and School Research,
Faculty of Educational Sciences, University of Oslo, Norway
t.e.hauge@ils.uio.no

ENGLISH ABSTRACT
This article is a review of international research on the uptake and use of digital technologies in primary and secondary schools. The aim was to provide a credible and clear picture of current research, together with some well-informed suggestions as to how future research could develop. Two strategies were used: (1) identify themes within current research that indicate important lessons to be learned in relation to the uptake and use of digital technologies in primary and secondary schools, and (2) based on these lessons, identify which knowledge-gaps need to be closed and in the light of this suggest directions for further research. It is concluded that a rather complex and fragmented picture of the uptake and use of digital technologies emerges from the literature review. Three specific suggestions for research on the uptake and use of digital technologies in primary and secondary school are provided: (1) the outcomes of technology use in relation to different levels in the educational system, e.g. arenas of implementation and realization, (2) digital practices that are longitudinal and information-rich and that go beyond existing knowledge, and (3) initiatives for a renewal of theoretical and methodological approaches when designing and analyzing studies within the field.

Keywords
digital technology, literature review, primary school, secondary school, uptake and use, policy, school leadership, teacher professional development.
INTRODUCTION

Different education stakeholders have expressed the hope that digital technologies will substantially influence teaching and learning in primary and secondary schools. For instance, OECD (2009) put forth that digital technologies have the potential to change education and teaching in schools, while the European Commission (2008) claims that digital technologies can improve and change the core activities in educational settings. However, in education, the concept of change is both complex and multi-dimensional. Engeström (2008) informs us that “the multiplicity of change mechanisms is in itself a challenge to both practitioners and researchers” (p. 380) and Erstad (2011) stresses the importance of applying a holistic perspective in relation to the role of digital technologies in educational activities when trying to understand processes of change and development in schools. In their overview of US research on digital technologies, Warschauer and Matuchniak (2010) highlight the importance of embracing cultural conditions and, according to them, research into the uptake and use of digital technologies and change should preferably be related to socioeconomic status (SES), student diversity and cultural differences in school.

In this article, we argue that we need to unpack the discrepancy between the overall policy, the hope for change in school that is driven by digital technologies and the real state of technology use in teaching and learning. In general, reform studies have shown that simple recipes for change in school do not exist (Bryk, Bender Sebring, Allensworth, Luppescu & Easton, 2010; Elmore, 2004; Fullan, Hill & Crevola, 2006). Although a growing body of research on digital technology use in education seems to confirm this experience (Erstad & Hauge, 2011), we still need to learn more about how digital technologies affect the education system and educational practices at different levels. This article contributes to the understanding of this information gap by focusing on research on the uptake and use of digital technologies in primary and secondary schools. Apart from providing a systematic categorization, summary and overview of the research and its results, this kind of literature review can help to inform ongoing technology reforms and research into technology use and change in school.

The understanding of uptake and use

From a Nordic perspective, significant efforts have been made on the uptake and use of digital technologies in primary and secondary schools. However, there seems to be discussions about the effect of these efforts in each Nordic country. In the study, E-learning Nordic 2006 (Ramboll, 2006), it is indicated that digital technologies do have a positive effect on the change and improvement of the school organization and also on students’ learning. Even so, it is declared that higher learning outcomes from the use of digital technologies are expected, but that the potential advantage of digital technologies in schools has not yet been fulfilled. This could also be understood from another point of view, namely that digital technologies increase the complexity in schools. For
instance, Sutherland, Armstrong, Barnes, Brawn, Breeze, Gall, Matthewman, Olivero, Taylor, Triggs, Wishart and John (2004) make the point that the use of digital technologies further contributes to the complexity in schools and creates challenges and creative tensions between an out-of-school use of digital technologies and institutionalized knowledge, tasks and teaching methods. While this creative tension could take teaching and learning to new heights, it could also challenge existing educational practices in positive and less positive ways, e.g. a reduction of legitimacy (cf. Lindberg & Olofsson, 2010). However, according to Säljö (2010), research results reported in relation to the uptake and use of digital technologies in schools are not always clear and seldom indicate success (e.g. Cuban, 2001; Krange & Ludvigsen, 2008, 2009). The outcomes are far from straightforward when digital technologies are introduced either in general or in specific subjects or contexts of learning. McGarr (2009) argues that there is still a lack of research on the subject to show convincingly that the uptake and use of digital technologies in school practices actually changes the organization and the educational theories used to inform teaching and learning.

According to Tondeur, Devos, van Houtte, van Braak and Valcke (2009), the possibility of understanding the uptake and use of digital technologies in schools depends on the research design. They argue that both structural and cultural aspects must be recognized and that the research design requires several different levels, or, to put it a different way, they require a more holistic approach. Wong, Li, Choi and Lee (2008) claim that in research on the integration of digital technologies there is a need for more comparative case studies with an understanding of the processes of change in educational systems as their primary focus. Such research designs are especially appropriate when focusing on the interaction between contextual factors and the uniqueness of different situations in schools.

From the research reported on above, one might conclude that several issues need to be considered when researching the current empirical field or when trying to grasp what conclusions can be drawn from research. One such issue concerns the concepts used to guide and focus the research. “Uptake” and “use” are concepts that are often used in relation to digital technologies in primary and secondary schools and occur frequently in peer-review articles written in the empirical field. This often seems to be the case regardless of the scientific discipline of the researchers and is probably due to the fact that these two concepts capture a variety of practices, dimensions and levels related to digital technologies in schools. However, in many articles the meaning of “uptake” and “use” is rather vague in that they are not always defined and are often taken for granted. This is also evident in the articles related to the literature review reported here. In a sense, it may be possible to conceptualize “use” as “ongoing use”, whilst “uptake” could highlight the processes of implementation and integration of new aspects of digital technologies and how they are made use of. However, these distinctions may only be possible to uphold at a theoretical or analytical level. In the articles analyzed here it is not easy, or
even possible, to separate these two aspects of digital technologies and how they are used in educational contexts. Consequently, we employ “uptake and use” as a phrase that simultaneously addresses both aspects of digital technologies: something “in use” and something about “to be used” in perhaps new and changing contexts.

Two strategies are used in this research review: (1) identify research themes that might reveal important lessons to be learned in relation to the uptake and use of digital technologies in primary and secondary schools, and (2) based on these lessons provide some suggestions for future research as to which knowledge-gaps still need to be closed.

Digital technologies embrace several terms, such as computers, information and communication technology (ICT), learning management systems (LMS) and digital media like, for example, wikis, blogs, social media and podcasts (Davies & Merchant, 2009). Software is often connected to the use of digital technologies too (e.g. Brown, Klein & Lapadat, 2009). The review includes studies researching different digital technology tools and terms, such as filters for analyzing the problem of “uptake and use”.

METHODOLOGICAL CONSIDERATIONS

We took a broad approach rather than relying on a small sample for the review, for instance from a few specialist international scientific peer-review journals decided beforehand. Although it might have been easier to control some aspects of validity and reliability if a narrower approach had been chosen, we agreed that a more thorough overview of the field was necessary. In an attempt to provide a transparent view of the process of searching for and evaluating the articles to be included, and thereby live up to some of the claims of reliability and validity, what follows is what we consider to be a correct and systematic account of how this work was carried out.

The logic behind the searches was to find articles about the uptake and use of digital technologies in primary and secondary schools. In the initial search for relevant literature we consulted the international search engine EBSCOhost. Two databases, Academic Search Elite and ERIC, were included. We decided that one way of upholding the scientific quality of the article was to include only scientific journals with peer-reviewed articles. In addition, it was also decided to limit the search to relevant articles published between the years of 2004 and 2010. In order to limit the search even further, specific search terms that were understood as characterizing the research field were chosen. Given that the idea was to make the searches of the field as inclusive as possible, the search terms used could be regarded as rather broad in scope. Notwithstanding, this was understood to be a productive way of identifying articles that were relevant for the literature review. The following terms and combinations were used: digital technologies or ICT or computers, teaching or learning or K-12
and implementation or uptake or use and school culture or school organization. The searches gave 110 hits.

The first search raised some questions related to the search engines and the organization of the databases. It became apparent that finding appropriate keywords did not guarantee extended results or even results that were possible to repeat in a new search. The first round of the search was performed by one of the authors of this article. In order to double-check the search, another author performed what was imagined to be the same search. Even though exactly the same search terms and combinations were used, the results were slightly different. This may have been due to the location from which each individual logged into the database, e.g. from which university the search was performed. Different universities subscribe to different databases and sources, which means that if two universities subscribe to different journals this may also result in different outcomes when searching reference databases like ERIC and Academic Search Elite. In view of this a second search round was conducted, this time from a different university. The search engine CSA was used, and the search included the databases ERIC and PsychInfo. In an attempt to extend the search even further, it was decided to use the following terms and combinations: digital technologies or ICT or computers and teaching or learning or K-12 and implementation or uptake or use. The terms school culture and school organization were excluded this time, given that the uptake and use of digital technologies could be studied without relation to cultural or organizational issues. Again the search was limited to articles published between the years 2004 and 2010. The second search gave 276 hits. Together with the 110 hits from the first round, this gave a total of 386 hits.

The procedure was then to read through the titles and abstracts of the 386 articles found, with a focus on articles that specifically embraced aspects of and were concerned with the uptake and use of digital technologies in primary and secondary schools. This facilitated the removal of articles that did not really match the purpose of this article. In all, 53 articles from the first search and 118 articles from the second (a total of 171 articles) were identified as fitting the criteria. During our reading of the articles themes and procedures were identified by means of an inductive approach. The principle for organizing the articles in themes reflected the different “levels” of the educational system, i.e. (a) policy level, (b) organizational level and its leadership, (c) the teacher level, including issues relating to their competence and professional development, and (d) the student level. These themes should be seen as analytical categories, as some articles address more than one theme. Since the aim of this literature review was to provide a credible and clear picture of the current international research on the uptake and use of digital technologies in schools, we decided to describe the themes by using characteristic publications that exemplified the focus of each theme. Here only content characteristics were deemed to be important, and no other considerations, such as nationality, discipline, journal or the sex of the authors, were taken into account. Out of all the 171 articles, 35 different articles have been used as characterizing examples.
REVIEW

The four different themes that we identified on the uptake and use of digital technologies in primary and secondary schools were: (1) Uptake and use of digital technologies in schools in relation to policy, (2) Uptake and use of digital technologies in schools in relation to school organization and school leadership, (3) Uptake and use of digital technologies in schools in relation to teachers and teachers’ professional development, and (4) Uptake and use of digital technologies in schools in relation to students. This thematic categorization is an analytical outcome of the inductive approach used. In some cases it is possible to address only one of the specific themes, whereas in other cases certain lines or argumentation make it possible to address two or more of the themes. Thus, it was the logic behind a particular research study that led to it being placed in one theme or another. Examples of characteristic studies based on empirical data are given, as well as studies using a more conceptual or argumentative approach.

Uptake and use of digital technologies in schools in relation to policy

The first identified theme concerns different aspects of the uptake and use of digital technologies in schools as related to policy. In this context, one emergent focus is the discrepancies between the conceptions and ideas of what it is possible to achieve with digital technology in schools. For example, there seems to be a discrepancy between the arenas for formulation and the arenas of realization. Tondeur, van Braak and Valcke’s (2007) empirical study of primary teachers in Flanders, Belgium, is an example of a study with this kind of focus. Through a survey of 570 teachers from 53 different primary schools, they examine the actual uses of digital technologies in line with the competencies outlined by the Flemish Government. Tondeur et al. show that teachers are mostly concerned with the development of their own technical skills, but that the digital technology curriculum emphasizes the integrated use of digital technology in the learning and teaching process. According to Tondeur et al., this indicates a gap between the proposed and the implemented curriculum for digital technologies. The potential value of a school-based curriculum for digital technologies is suggested – a curriculum that converts the national curriculum related to digital technologies into an agenda for digital technologies as part of the overall school policy.

Based on documentary and qualitative data, Schibeci, MacCallum, Cumming-Potvin, Durrant, Kissane and Miller (2008) propose a solution to close such a gap. They emphasize that the integration of digital technologies in schools should not only include exciting practices and regulating policies, but also the processes that teachers are part of when learning to master the digital technologies for teaching purposes. According to Schibeci et al., such processes should be combined with the cultural, social and historical aspects of learning.
Other researchers show that the uptake and use of digital technologies is possible without the “push” from policy levels. For instance, in his literature review on digital technologies in Irish post primary/secondary schools, McGarr (2009) focuses on how the education system received different initiatives related to digital technologies and policy changes. McGarr concludes that national and political initiatives and steering had little impact on evolvement and uptake in the schools. According to McGarr, there is still a lack of research that clearly shows that the uptake and use of digital technologies in school practices also changes the school structure and the theories used to enhance or facilitate teaching and learning.

Another focus concerning policy is the question of how different stakeholders position themselves in their technology preferences. For stakeholders such as industry, there is an interest in creating and upholding the picture of potential benefits with digital technologies in schools, even though such benefits may not always exist. For instance, Convery (2009) shows through a document analysis that unwarranted claims of benefits from the use of “handheld computers” were put forth in a Government-sponsored report using a specific rhetoric and layout. By using photographs of learning situations with smiling teachers, large-scale strategic quotes and subtitles like “Benefits for classroom teachers” and “Enhancing Learning”, the impression was given that the handheld computers were more suitable than the underlying research actually showed. While there were results showing benefits in management and information, the help for teachers in their teaching or the benefit for students regarding their learning were less clear. From this position, Convery argues that “unrealistic expectations inhibit teachers’ pragmatic attempts to integrate technology in classroom contexts, and the teachers subsequently become blamed for the failure of technology to fulfill its promise” (Convery, 2009, p.25).

A final and different focus can be exemplified with the research of Sutherland, Armstrong, Barnes, Brawn, Breeze, Gall, Matthewman, Olivero, Taylor, Triggs, Wishart and John (2004), who describe how teams of teachers and researchers have developed ways of embedding information and communications technology (ICT) into everyday classroom practices in order to enhance learning. Based on video and interview data, Sutherland et al. depart from a more technology-driven argument when suggesting that it is important for teachers and policy-makers not to treat new digital technologies as unproblematic innovations that will somehow lead to enhanced learning and “replace” older and existing technologies.

Uptake and use of digital technologies in relation to school organization and school leadership

The next theme identified in this review concerns research on the uptake and use of digital technologies in relation to school organization and school leadership. The research displays a variety of foci, challenges, struggles and solutions. An emergent problem is the challenge of dealing with the complexity of
the educational context: in research and when to implement digital technologies. When implementing digital technologies in teaching and learning there seems to be a need for schools and school leaders to identify which improvements they actually want to achieve and which tools and methods should be used.

A study by Tondeur, Devos, van Houtte, van Braak and Valcke (2009) highlights the complexity of the uptake of digital technologies in primary schools. Using quantitative data, Tondeur et al. show how the uptake of digital technologies is positively related to a school profile reflecting higher levels of both structural and cultural school characteristics. An important conclusion drawn is that structural and cultural school characteristics are relevant for promoting educational change in general and the uptake of digital technologies in particular. Similarly, when framing the uptake of digital technologies in a context of managing change in schools, and building on data collected from a large-scale questionnaire, Wong and Li (2008) report that perceived changes in student learning towards a constructivist paradigm were mediated through pedagogical and organizational interventions. In addition, Wong and Li make a point with regard to the implications of improving school effectiveness and argue that in order to unleash the power of the uptake and use of digital technologies in school practitioners should first make clear what kind of improvements they are looking for. They ask the following rhetorical questions: Is it improvements in traditional processes and knowledge that might emerge from the use of digital technologies, or are practitioners looking for new reasoning and new knowledge? If a collegial exchange of experiences using digital technologies in educational contexts is found to foster pedagogical innovations and improve school effectiveness, then policy-makers and school administrators should pay more attention to both the institutional culture and the social context.

Another example of the variety in this theme is the survey study reported by Tondeur, Valcke and van Braak (2008). They claim that their focus on the multi-dimensional interaction of both teacher and school characteristics was helpful in developing a richer understanding of the complex process of the uptake of digital technologies. According to the researchers, actions taken at school level are crucial. They argue that such actions are related to school characteristics that in turn affect processes, for example school-based in-service training, the development of vision and mission statements, and questions about the possibility of accessing computers in the classroom. Supported by the responses to their questionnaires, Vanderlinde and van Braak (2010) call this the e-capacity of a school, understood as a school’s ability to create and optimize sustainable conditions at school and teacher levels in order to bring about effective change through digital technologies. With results from her case study, Tearle (2004) stresses that change provides positive learning opportunities, and although this takes time, it makes demands on people. She concludes that a culture of collaboration and collective efforts, with frequent reassessments of ways of working, will help the school as an organization to remain open and receptive to opportunities for change in relation to the uptake and use.
of digital technologies. van Merrienboer and Brand-Gruwel (2005) argue in a similar way when claiming that the added pedagogical value of digital technologies lies in new ways of organizing and changing learning tasks and learning contents.

Another analytical focus is related to the work of school leaders and school leadership. In his explorative and discussion-oriented article, Williams (2008) emphasizes the role of school leaders at a time of rapid growth of digital technologies. He argues that the high use of digital technologies creates a gap between a digitally supported youth culture and the more institutional culture of schools. Williams makes the point that such a transformation will be one of the greatest challenges facing today’s school leaders. Another point is that the use of digital technologies in different informal contexts creates an even larger divide between the digital culture of the youth and the institutional culture that often exists in school. Williams emphasizes that school leaders play an important role in closing this gap.

Hayes (2006) takes on a slightly different approach in her longitudinal case study of the uptake of digital technologies in government schools in Australia. A particular focus is on the school leaders and their problems when leading such uptake processes. Two main conclusions are drawn, the first being that school leaders need to develop the skills of a so-called new knowledge worker. The second conclusion is that research repeatedly reports disappointing results when it comes to how schools adapt and integrate new digital technologies. The author argues that in their methodological design empirical studies are not sensitive to the unique background factors of each school. In addition, they emphasize that the uniqueness of each school gives a certain set of context-bound challenges that require locally developed practical solutions.

The final focus in this theme concerns the challenging issue for school leaders to live up to, or deal with, expectations from the surrounding society in relation to the use of digital technologies in school. For example, building on data collected from semi-structured and focus group interviews, McGarr and Kearney (2009) examine the effect of digital technology on the leadership role of a group of school leaders. They report frustration among the school leaders, many of whom felt unable to achieve the level of digital technology use they expected in their schools. According to the researchers, the main reasons for this frustration were a lack of up-to-date resources, poor levels of technical support and insufficient time for the provision of significant technology resources.

Uptake and use of digital technologies in relation to teachers and teachers’ professional development

The third identified theme concerns research on teachers, teachers’ professional development and teacher education in relation to the uptake and use of digital technologies in schools. Teachers are seen as key players for the uptake
and use of digital technology, and aspects like teachers’ motives, beliefs, confidence and competence are highlighted. Teachers’ professional development is also in focus and is often related to the use of digital technologies in specific school subjects, as well as in relation to the initial teacher education for developing the pedagogical skills, ideas, visions and attitudes that favour the uptake and use of digital technologies in schools.

Most of the research identified in this theme seems to be coherent. An agreement seems to exist that teachers are playing a crucial role in the process of uptake and use of digital technologies and in the development of new practices pervaded by digital technologies. For example, in his research review, Ferdig (2006) concludes that from a teacher perspective the most valuable aspect is that the uptake and use of digital technologies can motivate increased quality in teaching, rather than that the digital technology in itself embodies certain qualities that guarantee good teaching and learning outcomes. Sipilä (2010), on the other hand, claims that the uptake of digital technologies in school is a process that is mediated by teacher characteristics, technological framework and the conditions within the school. According to Sipilä’s findings, based on quantitative data collected by the use of an online questionnaire, providing teachers with laptops can be a way of enhancing the teachers’ use of digital technologies both at work and in their spare time. He argues that when the use of modern digital technology is not tied to a specific time or place, teachers will have more time to evaluate the possibilities provided by the technology, which in turn will probably increase the use of digital technologies in the classroom. In relation to their empirical study, Ward & Parr (2010) discuss the possibility of reframing the question of digital technology. They argue that teachers who understand the use of digital technologies and the subsequent benefits to teaching and learning are probably more willing to learn, try new things and move away from more traditional classroom practices (see also Herrington, Herrington, Hoban, and Reid, 2009; Haydn & Barton, 2008).

Schibeci, MacCallum, Cumming-Potvin, Durrant, Kissane and Miller (2008) conclude in a qualitative study that teachers’ learning experiences with digital technologies are facilitated and empowered through long-term collaboration with colleagues and students over time. They also argue that becoming familiar with digital technologies cannot be perceived as a linear process. These researchers emphasize the importance of teachers being assisted in their uptake and use of digital technologies.

Another focus in the research connected to this theme concerns teacher beliefs. For example, in their questionnaire study, Hermans, Tondeur, van Braak and Valcke (2008) give empirical evidence for claiming that teacher beliefs about the practice of teaching are important in explaining why teachers adopt digital technologies in the classroom. Their results indicate that teacher beliefs are a strong predictor of classroom use, and that beliefs are of importance in relation to the resistance and receptiveness of school teachers to the use of digital tech-
nologies in their classroom practices (see also Tondeur, Hermans, van Braak & Valcke, 2008).

The relation between digital technologies and how they are used in different school subjects is another prominent focus of research on this theme. This kind of research is often framed in studies of teachers’ professional development. One example is Bennison and Goos’ (2010) study of the professional development experiences of Australian mathematics teachers in Queensland secondary schools. In their large-scale survey they show that a significant number of the cohort had not undertaken any activities in relation to the use of digital technology in teaching mathematics. Lack of time and access to technology appeared to be significant constraints that prevented teachers from participating in both formal and informal professional development (see also Loveless, 2006).

Another example is Haydn and Barton (2008), who report on a descriptive study of teacher professional development related to the use of digital technologies in subject teaching. They identify factors that obstruct the use of digital technologies in subject teaching, such as lack of time, difficulty in accessing enough computers for the students and the availability of data projectors in ordinary classrooms. Based on interviews with teachers from six different subject areas, John (2005) shows how other factors, such as the brief, evolving and incomplete nature of the relationship between a subject’s sub-cultures and digital technologies, create problems in teaching. In her argumentative article, Lin (2008) focuses on digital technologies as a subject in itself. She poses questions such as how are students supposed to acquire digital technology knowledge and skills and who is supposed to teach such knowledge and skills to the students? Lin argues that one might not expect students to learn automatically just by taking part in activities with digital technologies. She concludes by saying that it is unreasonable to expect that teachers who use digital technologies in their own subject areas should also be held responsible for teaching digital technologies generally.

The research represented in this theme is also slightly more normative with regard to proposals of models or frameworks for how to enhance the use of digital technology in schools. For example, based on a case study of a particular school, Loveless (2007) argues that a framework of teacher professional knowledge that highlights the relations between subject domain knowledge, the didactic relation with digital technologies and various teaching situations can support teaching with digital technologies. O’Bannon and Judge (2004) argue from a multi-method study that even if schools invest in new digital technologies, their use in the classroom is rather limited. They present a model claimed to be effective for improving teachers’ digital technology skills and their ability to integrate and use digital technology in practice. In their model, emphasis is placed on access, professional development, support, incentives and assessment.
Yet another focus of this theme is the relation between teacher education and the uptake and use of digital technologies. Sang, Valcke, van Braak and Ton-deur (2010) argue that successful use of digital technology is related to the thinking processes of classroom teachers, such as teachers’ beliefs in, teachers’ efficacies and teachers’ attitudes towards digital technology. It is therefore important to begin such thinking processes at the teacher education stage. Their data was collected by means of a survey study focusing on the relation between teacher trainees’ thinking processes and the potential level of uptake of digital technologies in Chinese schools.

A final focus in this theme can be addressed through the work of Hammond, Crosson, Fragkouli, Ingram, Johnston-Wilder, Johnston-Wilder, Kingston, Pope and Wray (2009). They depart from the question: “Why do some student teachers make very good use of ICT?” They understand “very good use” in relation to frequency, variety of use and the meeting of objectives as interpreted by tutors and mentors. Using results from an exploratory case study, including observation and interview data, they argue that student teachers who make very good use of ICT also reflect on the contribution that digital technologies make. Hammond et al. point to the responsibility of the student teacher him- or herself when it comes to understanding and using digital technologies in teaching.

**Uptake and use of digital technologies in schools in relation to students**

The fourth and final identified theme comprises research that is particularly aimed at students’ uptake and use of digital technologies in school. These studies do not overlap with the other themes as much as the others sometimes do. In particular, this research takes the students’ academic performance or learning outcomes into consideration and connects them to learning conditions and/or students’ socioeconomic status (SES). In the following, some of the most characteristic research of this theme is presented, with the most prominent focus being on the impact of the societal surroundings outside school.

One example concerning students’ academic achievements and students’ SES is the research reported on by Ferrer, Belvis and Pamies (2010) based on a mixed method approach. They state that current research is rather limited when it comes to the impact of digital technologies in education and the effect these technologies have on students’ academic performances. They also discuss the differences in academic performance according to SES. Social variables such as gender, place of birth and parents’ level of education and occupation are included. In their study of a project, conducted over a period of two years in public schools in Aragón, Spain, in which all students were provided with an individual tablet PC, the most eye-catching result is that students born in foreign countries feel more empowered in the learning process using tablet PCs than students born in Spain. In addition, students with a poor academic record improved more, and finally, students from families located in disadvantaged...
socioeconomic and cultural environments are said to have gained more in terms of academic results. Another example is the theoretical and statistical study carried out by Hohlfeld, Ritzhaupt, Barron and Kemker (2008), which focused on the digital divide in an American context (Florida). Hohlfeld et al. argue that the digital divide is usually described in three stages: (1) that students must have access to digital technologies in order to develop the necessary computer skills that enable them to acquire knowledge to create products and make decisions, (2) that students are able to use computers independently, and (3) that students improve aspects such as their intellectual, economic and cultural conditions. However, Hohlfeld et al. claim that a fourth stage in the digital divide is necessary – one that concerns the support that is available for the uptake of digital technology in schools. In their studies, it is concluded that low SES elementary and middle schools provide a good deal of support. The researchers maintain that this could be a sign that by starting to focus on the implementation of support structures, low SES schools in Florida position themselves as schools that improve the uptake of digital technologies. One interesting finding from the study is that students in low SES schools seem to make use of content delivery software more often than students in high SES schools, and that this seems to be reversed when it comes to the use of production software (also cf. Warschauer and Matuchniak, 2010).

Using an ethnographic case study approach in research into the digital literacy of young people in Australia, Bulfin and North (2007) report that young people’s practices develop around their use of digital technologies that flows across and between school, home and other spaces, thus making simple distinctions and binaries about use in each domain problematic. In their theoretical framing, young people’s engagement with language, learning and technology might be characterized as a dialogic negotiation of a complex range of texts and practices. Related to this finding is the work of Ilomäki and Rantanen (2007), who report from a longitudinal case study, containing both quantitative and qualitative data, on the development of students’ digital technology expertise in a technology intensive context. Like Bulfin and North (2007), Ilomäki and Rantanen included students’ use of digital technologies at school and at home. According to the results of the study it seems as though a process-oriented learning environment and an intensive use of digital technologies supported the development of student expertise. The flow across and between school, home and other spaces reported on by Bulfin and North (2007) also seems to be present in Ilomäki and Rantanen’s study. For example, the students used digital technologies for solving tasks outside school and developed plans related to digital technologies in their further education and future profession. In addition, the intensive use of digital technologies seems to have created both confidence with and a positive attitude towards digital technologies.

In terms of uptake and use, the final focus in this theme concerns how digital technologies differ in different age groups and school-stages. For example, Dwyer (2007) reports from a multi-case study using interview and observation data that aspects such as digital technology resources and the time available for
their use, combined with type of use, work against the valuing of digital technologies in the early years of primary school. Dwyer argues that compared with students in the later primary years, students in the early primary school years experience a reduced potential to benefit from learning with digital technologies in school.

**DISCUSSION AND CONCLUSIONS**

This article has focused on the uptake and use of digital technologies in primary and secondary schools. It has attempted to provide a credible and clear picture of the current international research on this topic. It should be noted that difficulties were encountered in terms of the vague and seldom well-defined understanding of “uptake” and “use” in most of the articles reviewed. As stated in the introduction to our article, these two concepts seemed to be taken for granted. In view of this we decided to employ “uptake and use” as “a phrase to simultaneously address both aspects of digital technologies, something in use and something about to be used in perhaps new and changing contexts”. Such a way of understanding uptake and use might have the potential to guide future literature reviews and empirical studies on this topic.

Before a few, we hope, well-informed suggestions are given for moving beyond the current situation, each of the four themes that have been identified and presented above will be discussed and understood as lessons learned from the literature review. The first theme, “Uptake and use of digital technologies in relation to policy”, seems to represent a struggle or discrepancy between the focus and ambition expressed at policy level and actual practices in schools. In the research, a discrepancy is sometimes implied between policy-makers, school and ambitions when it comes to digital technologies. This can be understood in relation to the different arenas they constitute, i.e. one arena for formulation and one arena for realization. This seems to complicate the matter of the uptake and use of digital technologies in different ways, especially when the arenas are confused. In such cases, researchers often pursue a use that is intentional and describe a practice that is not ready or good enough. One crucial issue is whether consensus can be reached on the uptake and use of digital technologies to such an extent that “good enough use” can be specifically defined. Policy-makers and other stakeholders often push their ideas of what is good enough forward in opposition to what teachers experience as a certain minimum competence for using digital technologies. This seems to be a dilemma. There also seems to be a need for the research community to inform stakeholders at policy level about such a dilemma. In terms of communicating research results, the current review can be regarded as one way of addressing the discussion.

The second theme, “Uptake and use of digital technologies in relation to school organization and school leadership”, seems to be problematic in relation to the readiness of primary and secondary schools to implement and take advantage of the technologies in everyday practice. There seems to be a need to re-
address the role of digital technologies within the school as an organization. Before starting any development work, teachers and leaders should ask themselves what kind of improvements they really want or need and how digital technologies might support them. A critical question might also be asked, namely why should digital technologies be an obvious part of the school organization and the learning activities? In addition, school leaders need to consider how to steer or support the uptake of digital technologies and to acknowledge that the social context and institutional culture in their school are vital to successful implementation. Bearing in mind that technology uptake also seems to be a highly expected activity on the part of the surrounding society, including at policy level, school leaders may experience the work of technology implementation as challenging and difficult. The fact that their work is embedded in a complex and multi-dimensional educational context that is characterized by conflicting interests and dilemmas, goals and policies (Achinstein, 2006; Frelin, 2010) makes it difficult to lead the school in a rationalistic way. In the light of this, we can only conclude that the institutional aspects of digital technologies in organizing and leading schools need to be re-addressed as a research field (cf. Arnseth & Ludvigsen, 2006; Erstad & Hauge, 2011).

The third theme, “Uptake and use of digital technologies in relation to teachers and teachers’ professional development”, is just as complex as the two previous themes. The review includes teachers’ use of and beliefs about digital technology in relation to the subjects they teach and to their own professional development. Some of the research studies reported can be characterized as complex, while others adopt a more critical approach and some take a more normative stance when presenting models for the successful uptake and use of digital technologies. A broad and to some extent heterogeneous picture has emerged. However, in the research studies reviewed, the crucial role of teachers is commonly agreed on. Inspired by Säljö’s (2010) reasoning, in this third theme we conclude that the use of digital technologies in schools needs to be researched further in order to provide a deeper understanding of the learning and teaching they can enhance. Less focus may be needed on digital technologies in emerging learning and teaching practices, and more focus might be preferable on digital technologies as driving forces for this development. Further, there appears to be a need for continuing research into teacher beliefs regarding the uptake and use of digital technologies in classrooms and on teachers’ related professional development (cf. Kirkwood and Price, in press).

Regarding the fourth and last theme identified in the literature review, “Uptake and use of digital technologies in relation to students”, it is interesting to note that SES is a theme that warrants further investigation. The larger societal surrounding seems to have an impact on the uptake and use of digital technologies and indeed also frames the possibilities and patterns of their use in primary and secondary schools. In addition, some of the research studies in this theme report on how to come to terms with inequalities concerning students’ use of digital technologies, in a short-term, long-term and life-long perspective. We conclude this fourth and final theme by pointing out that the use and flow of
digital technologies across and between school, home and other spaces seems to need further research. For example, questions that need to be asked include: Are there differences in SES with regard to what kind of Personal Learning Environments (PLEs) the students create and use? Are there differences in how these PLEs inform students’ learning in the classroom? To what extent do the PLEs support the students for living in today’s society or the society of tomorrow? This could be understood as a challenging but important task for researchers and practitioners in a primary and secondary school context.

To conclude, we will address the second strategy outlined in this article. Through the lessons learned we would like to provide some additional suggestions for future research, especially with regard to the knowledge-gaps that still need to be closed. Here it should be said that a rather complex and fragmented picture of the research has evolved through the literature review. Different aspects and issues concerning the uptake and use of digital technologies in primary and secondary schools are focused on, also at policy level. In general, the research concerns schools and schools as organizations and seems to be concerned with all aspects, including a research focus on individual students, their beliefs, attitudes and academic achievements. In addition, the articles inform us that on the one hand the research design can, or should, include large-scale surveys, and on the other hand include small information-rich cases. In addition, future studies should have a more precise focus on the uptake and use of digital technologies, and/or adopt a holistic approach that encompasses structural as well as cultural aspects.

Against the background of this understanding, we would like to make some suggestions for the future. Firstly, despite the rather extended body of research, there seems to be a need for research on each of the four identified themes that is also related to the results generated in the other themes. Future research studies should also to be better informed about previous research than appears to be the case at present. In addition, such studies ought to explore research areas that have not yet been thoroughly investigated. Here, research that is sensitive to the rapid development of digital technologies would be valuable. Secondly, there seems to be a need for more longitudinal and information-rich research studies. Although such studies may not generate results that apply to all schools in all countries or in a greater context, such as the European Union, this research could provide results that pave the way for developmental discussions about the uptake and use of digital technologies in primary and secondary schools. If this is not prioritized, the risk is that future research will continue to report a picture that is already known. Thirdly, we suggest that future research should stretch beyond the current situation by experimenting with new theoretical and methodological ways of designing and analyzing the studies in this field. One example of such a methodological approach would be to adopt a multilevel focus that takes into account the various stakeholders in primary and secondary schools. The use of a multilevel methodology may produce research results that allow each set of school stakeholders to feel that their stake is being addressed.
A multilevel methodology approach could also produce new insights into the uptake and use of digital technologies in schools and in education, how technologies are constructed and how knowledge develops in the use. Such an approach could help to address the complexities of the interactions between policy, strategic leadership, teachers and students, and probe more deeply into how the use of digital technologies can be understood in terms of the learning and teaching they enhance in primary and secondary schools.

REFERENCES


Digital Literacy in Upper Secondary School
– What Do Students Use Their Laptops for During Teacher Instruction?

Marte Blikstad-Balas
Associate Professor, Department of Teacher Education and School Research, Faculty of Educational Sciences, University of Oslo, Norway marte.blikstad-balas@ils.uio.no

ENGLISH ABSTRACT
The present study uses video recordings and qualitative interviews to examine the digital literacy practices of Norwegian students who have a personal laptop for school use. It uses the dichotomy between dominant school texts and vernacular out-of-school texts to examine the new school literacy practices. Findings indicate that the teachers’ use of visual technologies such as Power Point presentations in whole-class settings generates a variety of individual digital literacy practices among the students.

Keywords
digital literacy, student literacy practices, internet in school.

INTRODUCTION
In most societies, schools are responsible for the teaching and development of literacy skills. Different studies of literacy have highlighted the importance of investigating how literacies differ across contexts, and there is extensive research on literacy in and outside of schools (Scribner and Cole 1981; Heath 1983; Barton and Hamilton 1998; Jones 2000; Pitt 2000; Gee 2007). These studies all emphasize a dichotomy between the literacies that are formalized, standardized, institutionalized and dominant, such as most school literacies, and the literacies that are personal, informal and vernacular (Freire and Macedo 1987; Street 1993; Street 2003; Gee 2004; Barton 2007). School literacy is commonly based on canonical texts, which has led to school literacy being criticized because it requires distinct literacy practices based on academic ways of thinking and the use of academic language (Gee 2004). However, the introduction of personal laptops with Internet access in the classroom has weakened the boundary between personal and school literacies, and constitutes a new kind of literacy context worth investigating further.

The aim of the present study is to contribute to the understanding of literacy practices across domains, in particular the vernacular practices permeating school contexts that are mediated by classroom Internet access. Hence, the arti-
This article addresses the use of ICT, and especially the Internet, in educational settings. It also explores how school literacy might be changing due to the introduction of personal computers (laptops) for all upper secondary school students in Oslo. In this context the article investigates how the vernacular literacies gain terrain within the school paradigm, by examining which literacy practices students engage in while the teachers in different subjects are giving digital presentations, and whether these literacies are dominant or vernacular. This is an important issue, because it addresses what kind of contributions to the classroom practices the laptops might be providing. Students engage in a range of literacy practices mediated by laptops outside of school, and now they have a laptop they can use inside school as well – but there is little systematic research about exactly how these laptops are integrated in the school discourse. Norway is the first country in Europe to introduce a curriculum specifying digital skills as one of five basic skills across subjects, which makes it interesting to study these issues in a Norwegian context.

As mentioned above, in Norwegian schools there is extensive computer and Internet use, especially at the upper secondary school level (Hatlevik 2009). Norwegian children are also used to having Internet access, both at home and at school. Indeed, Norway is in the lead with regard to Internet access in the OECD countries (Kjærnsli 2007). Furthermore, in Norway’s largest city and capital, Oslo, all 14533 students (numbers for the school year 2010/2011) in the three years of upper secondary school (ages 16–19) now have access to a laptop provided by the school. The extent to which these laptops are used as an integral part of the students’ education, however, varies from school to school, and from teacher to teacher. The present study explores the literacy practices of 18 to 19 year-old students in the subjects religion and ethics, Norwegian and history. The study follows four students during classes for a period of three weeks in their senior school year, after which they can continue on to higher education. At this point it would be reasonable to expect instances of the literacy practices the students have acquired through their thirteen years of schooling. I have used New Literacy Studies (NLS) perspectives on literacy (Street 1993; Street 2003; Barton 2007), to investigate how these students engage in literacy events and literacy practices in their daily school lives.

SCHOOL LITERACY IN NORWEGIAN CLASSROOMS

In Norwegian schools there is no fixed canon of texts, and the curriculum gives teachers ample latitude in the choice of what to read. Nevertheless, it is well established that textbooks play a dominant role in determining text choice in the classrooms (Imsen 2004; Skjelbred, Solstad et al. 2005; Skjelbred and Aamotsbakken 2010). This textbook dominance might be challenged by the explicit focus on ICT in the curriculum, the extensive use of Learning Management Systems (LMS) (Håland 2007; Hatlevik 2009) and broad access to the Internet in Norwegian schools (Frønes, Narvhus et al. 2011).
The National Curriculum in primary and secondary education (the Knowledge Promotion) emphasizes the importance of ICT in schools. Digital competences are supposed to be integrated in the teaching activities in all subjects at all levels as basic skills, and as mentioned above, most students have access to the Internet in school as well as at home (Hatlevik 2009). Among students at upper secondary school level, 71% access the Internet on an average day, either at school or at home (Vaage 2010). In general, upper secondary school students spend their online time on (in decreasing order of importance) reading news, sending and reading e-mails, using social networks such as Facebook or MySpace, searching for facts and background information, using bank services or buying products, looking at advertisements, watching movies, TV or video clips, searching for information about happenings, playing games or other entertainment activities or to listening to the radio (Vaage 2010). This means that the Internet text practices typical of this age group do not have an explicit educational purpose. On the contrary, most of these practices are associated with entertainment of some kind. Furthermore, international studies suggest that even though the population’s access to the Internet is close to a hundred percent (like it is in Norway), it is still rare to find Internet use integrated into meaningful learning activities (Cuban 2001; Madden, Ford et al. 2005). How one can address literacy in and outside of defined learning contexts is addressed in the following section.

THEORETICAL PERSPECTIVES AND DICHOTOMIES OF LITERACY

The current concept of digital literacy was introduced by Paul Gilster (1997). The term has many possible meanings (see for instance Bawden 2008), and it can be difficult to distinguish it from other literacy terms such as media literacy, computer literacy, Internet literacy and so on. As emphasized by Gilster, digital literacy is much more and much wider than mastering technical skills (Gilster 1997), and Colin Lankshear and Michele Knobel (2008) have attempted to provide an overall definition of digital literacy as “a shorthand for the myriad social practices and conceptions of engaging in meaning making mediated by texts that are produced, received, distributed, exchanged, etc., via digital codification” (Lankshear and Knobel 2008). This is an attempt to ground digital literacies within the scholarship of NLS, in which literacy is considered a social practice rather than a universal skill. This definition relies on Brian Street’s definition of literacy as “a shorthand for the social practices and conceptions of reading and writing” (Street 1984). Since NLS’ perspectives on literacy are central in the presented study, it is natural to also use Lankshear and Knobel’s definition of digital literacy.

Within the framework of NLS it is assumed that literacy is a critical social practice that is constructed in everyday interactions across local contexts. Two terms are essential in this connection; literacy event and literacy practice. I will in the following use the term literacy event as defined by David Barton, who frames literacy events as “all sorts of occasions in everyday life where the writ
ten word has a role” (Barton 2007). In these, the role of the written word can vary, which implies that pictures, films, commercials, hypertexts and artwork can also be the basis of a literacy event. Next, when Brian Street started to use the term literacy practice, it was as a prolongation of the term literacy event (Street 1995). There are many social practices in general, and we might see literacy practices as a specific kind of social practice, involving written language (Barton 2007). Moreover, literacy practices can be regarded as general ways of using literacy in different contexts. Street (1995) emphasizes that the term refers to behavior as well as the social and cultural conceptualizations that give meaning to the uses of reading and/or writing – which is also how I use to the term. To sum up, social and cultural attitudes and notions of literacy and the way people use literacy are part of literacy practices. Thus, literacy practices might include a social regulation of texts with regard to who has access to given texts and who can produce them (Barton and Hamilton 1998).

Texts, which form the basis of any literacy event or practice, gain value depending on who their author is, and on the power relations involved, that is to say the persons or institutions that require the text to be read. The possibility of generating and maintaining such a textual hegemony is not evenly distributed, and it is therefore essential to consider power relations while exploring literacy. This will often generate a dichotomy of literacies, like the distinction between “domesticating” or “empowering” uses of literacy (Freire and Macedo 1987); the distinction between “constrained literacies” or “creative literacies” (Barton 2007); the difference between the vernacular and specialist varieties of language (Gee 2004); or the notion of “dominant” and “vernacular” literacies (Street 1993). What these classifications all try to describe is a difference between the literacies that are determined and regulated by others – schools for instance – and those literacies that are the result of individual choice.

My main argument for the use of Street’s dichotomy between dominant and vernacular literacies when doing educational research inside the school system is that the school domain is associated with the dominant categories of literacy. It is precisely school texts that are the most common examples of dominant literacies. Furthermore, the texts used in schools often come from a textbook, and are often full of assignments and questions for the students (Kress 2003). Schools also use their own varieties of academic language (Gee 2004), and the purpose of reading in school is for the sake of learning (Barton 2007). Indeed, the way we talk about texts in a classroom is different from other talk. As often as not the classroom discourse follows a structure where teachers get to ask a question for which they already have an answer (Mehan 1979), very often an answer that comes from a book, which is not a common pattern outside school.

There are perils involved in using dichotomies like the one presented here, that is to say if they are used in a dialectical manner and implicate a set of false choices. Clarke (2006) argues that there is an inclination within the educational community to dichotomise, and a tendency to ignore the interconnectedness of these dichotomous categories. He also finds that many privilege one category...
while denigrating the other. In the presented study, the dichotomy between vernacular literacies and dominant literacies needs to be understood as complementary and fundamentally interrelated, not as an oppositional taxonomy. One category should not be presented as better than the other, since different learning goals require different practices. Therefore, one’s literacy practices will always draw on texts from both the vernacular and the dominant domains. Furthermore, situations might arise where it will be impossible to distinguish between the two categories. The Internet per se cannot be either dominant or vernacular, neither can textbooks nor any other texts. However, texts can be defined as part of school during class, and can become texts of the dominant category when for instance the teacher makes them part of school practices. This means that the categories dominant and vernacular illustrate how practices mainly associated with different domains can be complementary and interrelational in the daily literacy school practices.

METHODS AND CONTEXT
The data for the present study was collected in January 2011, at a popular upper secondary school in Oslo. The school’s entrance requirements are high; consequently students at this school have above average grades. The data comprises video recordings, a collection of artifacts from the classroom (such as textbooks, teachers’ PowerPoints, students’ notes, assignments, etc.) and qualitative interviews with students. Four students were recorded during 16 lessons in the subjects history (4 lessons), Norwegian (8 lessons) and religion and ethics (4 lessons) during a period of three weeks and were chosen with help from their teachers. This purposive sample was based on gender (two boys and two girls) and location in the classroom (so that the cameras would be spread in the front, middle and back of the room). Teachers were encouraged to suggest student respondents that together would be somewhat representative for the varied working methods of the class, and that had a record of low absence in their subjects. All students and teachers were informed in writing that the project was about reading texts and what kind of role texts play in school subjects. Students and teachers who appear in the film gave their written consent to participate. The interviewed students are called Stine, Andreas, Hedda and Thomas. I have also changed the names of their teachers.

In this article the focus of analysis is literacy practices connected to the teachers’ use of digital presentations. All student activity was recorded using a small head mounted camera, similar to a head lamp. This provides a clear record of what each student spent his or her time doing during each lesson, what texts they read, how often they engaged in different literacy events and what characterized the different subjects in this class. The concept of literacy practices implies, as discussed above, feelings and attitudes that cannot be observed or documented directly by a video camera. Still pictures of predominant literacy events from the recordings were therefore combined with textual artifacts as a basis for interviewing the four students in pairs.
The interference and effect of video cameras in the classroom is well discussed (Speer and Hutchby 2003; Munthe 2005; Heath, Hindmarsh et al. 2010), and will not be discussed further here. Instead, I refer to Heath, Hindmarsh et al. (2010) who throughout their various studies of a diverse range of settings and activities, always found that the camera is “made at home” within a short time, and that there hardly is any empirical evidence suggesting the supposed camera effect continues beyond the initiation of recording. Neither do I in this study have any data suggesting that the camera altered student or teacher behavior. The students were aware of the cameras, and occasionally commented on the fact that they were being recorded, but most of the time it was not a topic. Last but not least, the student interviews confirm that the video recorded activities are typical.

Collecting artifacts from the classroom has become increasingly popular (Clare and Aschbaccher 2001; Stecher, Wood et al. 2005; Matsumura, Slater et al. 2006). By textual artifacts I refer to physical objects used or constructed in the classroom, for example tests, textbooks, homework, the teacher’s digital presentations, maps, messages on a LMS and so on. A potential weakness in collecting artifacts for research purposes is that the artifacts per se give no information about how they have been used. This problem is addressed during the interviews, by using still pictures of predominant literacy events in combination with textual artifacts to stimulate students’ descriptions of their daily school literacy practices. The still pictures of typical activities were chosen using time as a criterion; hence the pictures are representations of the activities that were most common for each student in each lesson. The recordings are coded using software called Video Graph, which gives a systematic indication of how much time each student spent on different activities. Based on that, I have chosen pictures that clearly show the student activity in question. In the first part of the interviews I used pictures from history lessons, as these provide good examples of the practice of digital presentations by the teacher. In the second part of the interview the use of vernacular texts across subjects is addressed, and pictures across subjects are used.

The semi-structured interviews were conducted in pairs. Stine and Andreas were interviewed together, as were Hedda and Thomas. The first interview, with Stine and Andreas, lasted for 50 minutes, while the interview with Hedda and Thomas went on for 33 minutes. Both interviews were conducted on the school campus a week after collecting the last video recordings. The interviews started by asking the students to comment on specific laminated A5 pictures, which were extracted from the recordings. The pictures were marked with the subject, date and student’s name, and were organized by subject. Each student commented on his or her own pictures and explained what they were doing in each picture. While looking at pictures from one specific subject, the students were also showed the textual artifacts from the recorded lessons and asked to comment on both form and content. Towards the end of the interview the students were encouraged to talk about some pictures showing students using the Internet for entertainment while the teacher was giving a digital pres-
Presentation. These last pictures were gathered across subjects, and were not marked with the subject, date or student names. I interviewed the students in Norwegian, transcribed the interviews and had them translated into English.

DATA ANALYSIS

In the recorded lessons the teachers tended to take the role that Reedy (2008) describes as “the teacher as the presenter of information” while using digital presentations. Teaching sequences using digital support were a frequent activity in the 16 recorded lessons, and in four of the lessons it was the only activity performed by the teacher. In addition to being showed to students, and commented upon in class, the presentations were also made available for the students in the school’s LMS. The presentations were all in Microsoft Word or PowerPoint format. The text was mostly organized in the form of bullet points using key words and short phrases instead of continuous text. Occasionally there could also be a picture or graphic representation. The content of the presentations varied across subjects. They were primarily presentational and informational, with occasional questions or assignments for the students.

As all the recorded history lessons consist exclusively of the teacher giving digital presentations, pictures from these lessons were used as a starting point when discussing literacy practices revolving around the teacher presentations. Thus the first interview extracts presented, in which the students describe and elaborate on their activities, are from this subject. Literacy practices regarding teacher presentations across subject are addressed in the last section of results, in which the students talk about how they decide whether to pay attention to the teacher or to do other activities in general, regardless of the subject. Neither the subject itself, nor the teacher, seem to predict the students’ activities, but whether they have Internet access or not plays a major role, as we will see in the following section.

Literacy practices during teacher presentations

During the interviews, the students were shown pictures of themselves in the different subjects, and asked to comment on these and explain what is going on in each picture and what they are doing. The pictures are, as mentioned, extracted from each student’s video recordings in class, and they all show activities that the student spent a significant amount of time on. As a consequence, all of the comments the students have regarding these pictures, concern activities that were frequent for them during the three weeks of the data collection. The following sequences from interviews are all based on six pictures from each of the students in history lessons.

Andreas is the first student to comment on his pictures. In all the pictures his laptop is turned on, and in all the pictures the teacher is presenting a text using the digital Smart Board. Andreas has opened Facebook on his screen in two of
the pictures (from two different lessons), a blog in one picture, the news in two pictures (from different lessons), and the LMS in one picture. Andreas is sitting in the first or second row (there are six rows, and there are about 27 students in class), and which desk he chooses in each lesson varies. In all the pictures his history textbook is on his desk, it is however closed at all times. In one picture the book closest to him is actually from another subject. I ask Andreas to give me his first impression of the pictures:

<table>
<thead>
<tr>
<th>Andreas:</th>
<th>well there is very little related to the lesson, at least. I see that in one picture I don’t have my history book, but another book (laughter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(...)</td>
<td></td>
</tr>
<tr>
<td>Andreas:</td>
<td>there isn’t anything relevant to the subject at all really – well I am on the LMS once (laughter)</td>
</tr>
<tr>
<td>Interviewer:</td>
<td>I didn’t try to find pictures where you are doing other things, so that it is - - - I have looked through your recordings and then I have chosen pictures of what you do the most during the period /…/</td>
</tr>
<tr>
<td>Andreas:</td>
<td>it’s very accurate, I believe. Yes. (looks through) There is the Lady Gaga page again, I am on Facebook, and here I am on - - well some other page that I have been linked to or something like that - - - and here on Facebook again - - and then I’m on the LMS</td>
</tr>
<tr>
<td>Interviewer:</td>
<td>why do you go on the LMS, what can you find there?</td>
</tr>
<tr>
<td>Andreas:</td>
<td>I think it’s just because in the end you get tired of just being on Facebook, so you just check for news on the LMS or something, that’s why I’m there, but yeah - -</td>
</tr>
<tr>
<td>Interviewer:</td>
<td>yes?</td>
</tr>
<tr>
<td>Andreas:</td>
<td>and then I am on VG [newspaper] in the next picture - - - yes</td>
</tr>
</tbody>
</table>

Stine’s pictures are similar to Andreas’ in the sense that she also sits in the second or first row, and the teacher is presenting something on the Smart Board in all the pictures. The history textbook is present in one of the pictures (closed), and in four of the pictures other books are on her desk (closed). Stine has turned her laptop on in five of the six pictures, and in the sixth picture the computer is completely absent. Four of the pictures of the laptop screen show that she is using Microsoft Word and in one picture she is on Wikipedia. When Stine is asked to comment on the pictures she says the following:

<table>
<thead>
<tr>
<th>Stine:</th>
<th>I see that I either take notes or - - - find content or look at Håvard (history teacher) teach - - -yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewer:</td>
<td>but do you often take notes during history lessons?</td>
</tr>
<tr>
<td>Stine:</td>
<td>yes, or, at least I try, it happens that I’m not able to, or don’t have the energy to do it, or well, you know</td>
</tr>
</tbody>
</table>
Hedda’s pictures show that she is sitting in the second or third row during the recorded history lessons. She has her laptop turned on in all pictures, but in one picture she has almost closed her laptop. In all her pictures we can see the teacher giving a digital presentation. In two of the pictures Hedda’s screen shows that she is playing a game, in one she is writing in Word and in two pictures she is on an Internet page of historical maps, the same as the teacher showed them. Hedda starts to laugh when she looks through her pictures:

<table>
<thead>
<tr>
<th>Interviewer:</th>
<th>you are laughing at your pictures, Hedda, do you think they are funny?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedda:</td>
<td>yes, yes - - maybe I shouldn’t be playing games during history lessons but</td>
</tr>
<tr>
<td></td>
<td>(…)</td>
</tr>
<tr>
<td>Hedda:</td>
<td>(keeps looking through the pictures) these are the maps or something like that, yes, okay. Yes, I am looking at maps. I am writing something, I think I might be writing what he [the teacher] said will be on the test</td>
</tr>
<tr>
<td>Interviewer:</td>
<td>right?</td>
</tr>
<tr>
<td>Hedda:</td>
<td>yes. That is pretty much the only thing I write down in history</td>
</tr>
<tr>
<td></td>
<td>(…)</td>
</tr>
<tr>
<td>Hedda:</td>
<td>and then I am paying attention, since I took down the laptop, I think - - yes, and then I am looking at more maps - - and then I play games – and I play more games</td>
</tr>
</tbody>
</table>

The fourth respondent Thomas’ pictures show that he chooses to sit in the back row, and from this location it is hard to see what the teacher is doing and what is written on the Smart Board. In four of the pictures Thomas has his laptop turned on, once he is on Skype chat, and three times he is on sites where you can play online games. In the two remaining pictures, both from the same day, he is drawing. I ask him what he thinks about his pictures:

| Thomas:   | (looks through the pictures) here we have games, drawing, drawing, games - - |
| Interviewer: | I think that’s a game too |
| Thomas:   | (laughter) games, chat, and yes |
| Interviewer: | what do you think of the pictures? |
| Thomas:   | I don’t know, it is what I usually do during history lessons |
| Interviewer: | it is? |
| Thomas:   | mm |

Even though there are similarities between these students’ responses and actions, a distinction can be drawn between Stine’s and the others’ literacy practices at this point. While Stine says she tries to pay attention and take notes, which is the dominant and intended literacy practice associated with
digital presentations, the other three students engage mostly in vernacular literacy events. Their digital literacy practices revolve around using the Internet as a text base where they can find alternative texts. During none of the 16 lessons are any of the students in class denied the use of their laptops or encouraged to close or put them away. In other words—they have access to the Internet at all times. All in all, the pictures show that the digital teacher presentations are a good opportunity for the students to use the computer to engage in vernacular practices. The topic in the last part of the interview is this search for other types of texts, texts that are not embedded in the dominant intended educational setting.

Vernacular literacy practices in the school domain

In the last part of the interviews, I show the students seven pictures in which the different teachers in different subjects are giving digital presentations while the students are using their laptops to engage in vernacular literacy practices. I ask Hedda and Thomas how they determine how they will use their computers during each lesson:

<table>
<thead>
<tr>
<th>Thomas:</th>
<th>it depends on how we feel, or how I feel at least</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewer:</td>
<td>yes?</td>
</tr>
<tr>
<td>Hedda:</td>
<td>it depends entirely on what I feel like doing. - - If we want to take notes we take notes during class, we pay attention, for instance in history and philosophy [optional subject]. I always take notes, because it’s so hard, but if we feel like not paying attention during Norwegian we are on VG [news] or Facebook or whatever</td>
</tr>
</tbody>
</table>

I ask Hedda to elaborate on this:

| Hedda: | I don’t know, it’s just so natural to log onto Facebook, it’s like a habit, in a way. If you go on the Internet you just go to Facebook, kind of, you just check if something has happened |

Andreas says that what he does the most at school, regardless of the subject, is to be on Internet pages that are not related to the subject content. When asked to discuss what they use the computer for at school, the answers from the four students were quite consistent—they use it for whatever they want, which is usually something other than taking notes and paying attention. When I ask how they know that they can go online during class, Andreas answers, “When the teacher is teaching”, and Stine agrees. This is consistent with the video recordings, where the teachers’ instruction in whole-class generates room for a variety of vernacular digital practices. Andreas and Stine do not agree with there being a distinction between the use of computers at school and at home:
What Andreas and Stine refer to as *messing around* turns out to be complex and diverse literacy practices that take place during the teacher presentations. What each student looks for and chooses to spend time on reading on the Internet varies, but there are also distinctive patterns. For instance, the video recordings reveal that Andreas usually spends his time on the Internet reading news, on social networking sites, or reading blogs about celebrities and fashion. In comparison, Hedda and Thomas spend most of their time during teacher presentations playing online games. All four of them also access Facebook from time to time. Finally, Stine tries to take notes during history, but if she is tired she might end up choosing other activities.

All in all, there is a clear trend across subjects, evident in both the recordings and the interviews, that vernacular activities such as games, reading newspapers, checking out what is new on Facebook, and reading blogs, are what the students for the most part use their laptops for during teacher presentations. Indeed, an overwhelming majority of the texts the students choose to spend time on during teacher presentations are not what could be categorized as dominant or integrated in the school domain in any way. On the contrary, these texts have entertainment as the main goal. The students are quite aware of this, and they all laugh when they see pictures of themselves engaging in vernacular literacy events at school. On several occasions they express that they should be doing something else, that they should not be playing games, checking out Facebook or reading online newspapers. Even though the students are aware that their textual practices differ from the intended practices, they do not offer any important reasons for avoiding these alternative practices. In fact, there are no immediate consequences for opting out of the dominant literacy practices associated with digital teacher presentations. The clear tendency in this data is that no sanctions are applied against vernacular digital activity. This means that the students have a genuine possibility to engage in other texts than those chosen by the teachers during digital teaching sequences.

**Lack of simultaneity concerning the presentations**

From the findings above, one might assume that the digital teacher presentations play a minor role in the student’s literacy practices at school in general. The respondents all explicitly state that they do not pay attention to most of these presentations, sometimes they do not even try to. They all have their
computers on during most of the presentations, and they actively go online and search for other texts on a regular basis. The recordings show that this is not the case only for the four respondents chosen to record their own activities, but for the class as a whole. Even though there are some variations in the extent to which the students pay attention to the teacher’s presentation in class, they might later engage in literacy events involving these presentations. If and when they do so, it is without the teacher. This is possible because the teachers always publish their presentations on the school’s LMS. Indeed, Hedda seems to feel that it is unimportant whether the students pay attention or not during the actual teacher presentations in class:

<table>
<thead>
<tr>
<th>Hedda:</th>
<th>it’s like, he [the teacher] puts out everything he says in key words, on the Internet, so there is really no point in even being there</th>
</tr>
</thead>
</table>

At this point one could ask whether it is possible to say that the teacher is in fact making the *presentation* public, because the verbal comments used by the teacher to supplement the written words and images in the presentation are lost if the students during classes do not listen to it, remember it or write it down. What they get access to is not a movie or an audio file combined with text, it is solely the textual artifact used by the teacher:

<table>
<thead>
<tr>
<th>Andreas:</th>
<th>and sometimes it’s just – some only have key words so when you are going to see through and check what they did during class you don’t really understand what they did</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stine:</td>
<td>no, you don’t understand anything of what they have tried to say</td>
</tr>
</tbody>
</table>

As we can see from the quotes above, this distinction between the presentations in and out of context is brought up in the interviews in which Stine and Andreas discuss the nature of the presentations across subjects.

**DISCUSSION**

The interviews with Stine, Andreas, Thomas and Hedda presented above all indicate that Internet practices are not well integrated in an educational setting. In other words, this study provides yet another example of Internet practices not being properly incorporated in the curricula or used coherently for educational purposes (Cuban 2001; Kozma 2003; Zhao and Frank 2003; Madden, Ford et al. 2005; Livingstone 2009). This is despite the fact that many consider the Internet to have the potential to change education dramatically, and despite the rapid growth of Internet access in schools. In other words, mere access to information in itself does not necessarily lead to improved education or to fundamental change (Schofield 2006; Law, Pelgrum et al. 2008).

Indeed, the most striking finding in the empirical material drawn on in this article is the lack of simultaneity between the literacy practices of the teacher and
practices of the students during the digital presentations. When the teacher is actually giving the presentation, the students are busy doing other things; first and foremost being entertained on the Internet. When the students occasionally feel the need to relate to the presentations, it is always because they need specific information for an assignment or preparing for a test. Furthermore, because they usually did not pay attention during the presentation in the first place, the text in the presentation does not always make sense when they find it on the LMS. This means that the teacher and the students cannot be said to share common literacy practices based on the teacher’s digital presentation, since teachers and students do not operate on the same time scale. When the teacher is presenting, the students are not engaging with the presentation, and when and if the students eventually engage, the teacher’s part in the presentation is over. Students and teachers rarely participate simultaneously in literacy events based on digital teacher presentations. Furthermore, if the students choose not to use the digital presentation at all, they justify this by searching for information either on the web or in their textbooks.

These digital teacher presentations are dominant in two ways: they represent an institutionalized version of literacy, connected to the school domain, and they are also dominant regarding the amount of time spent on them in class. Ironically, this dominant literacy practice that is initiated and maintained by the teacher, generates a variety of vernacular literacy practices among the students. During the presentations, they can use the Internet in any way they want, and usually this means the same way as they use it at home or anywhere else. Hence, Internet access is adding to a weakening of boundaries between the dominant literacies of school and the vernacular, personal literacies of the students.

If the students are allowed to choose the basis of most of their literacy events, even at school, there is a risk that they will lack experience with certain types of texts and practices. The literacy practices connected to the dominant school area are based on academic texts, a text type that requires certain ways of reading and certain ways of engaging with the text. If students at upper secondary level can choose not to pay attention to any teaching sequences based on digital support, these students might not be prepared to engage in similar literacy events in college where this kind of presentation is used extensively (Ivanic 2009).

**CONCLUSION**

The study presented in this article is a small qualitative study, but the findings are consistent with those of large international studies. These show that the link between the dominant school practices and the “new” ICT technology in the educational setting is, at best, a tenuous one. I argue that this might be because many schools assume that the technology will fit into school practices, and thus use the computer as a supplement to the “regular” instruction. However,
the students have their own vernacular practices concerning the use of the same technology, which they bring to school and wherever they go. This means that if schools fail to create the need of relevant educational Internet-based practices, the students will continue to use the Internet mainly for their personal vernacular practices, even at school. This also implies that the students might lack experiences with academic literacy practices that they will encounter in higher education and elsewhere – and then they will need to learn how to engage in literacy practices revolving around teaching sequences using digital support.

Due to the rapid technological changes taking place in classrooms, it is important that the question of students’ literacy practices connected to the school domain is researched further. For instance, there are uncertainties about the extent to which the textbook is still the most frequent text in both teacher and students’ school practices. There is no doubt that there are textbooks to be found in the classrooms, but it is worth exploring how much they are used and for what purposes. The present study draws on empirical data where the textbook is nearly absent in the students’ literacy practices.

It is timely to question how the students in the empirical material spend their time, and what kind of learning outcome they might be getting, not in school in general, nor in each class, but during the sessions of teacher instruction. One possible response to evidence of the kind presented here is to follow up the students’ lack of intended behavior by reducing their possibilities to engage in activities that are clearly competing with the teachers’ dominant and intended practice. However, this response does not address the challenge educators are faced with when it comes to integrating ICT in educational settings. Also, one might ask whether the fact that new technologies are being used, has a causal relation to the “new” literacies we see here. Are these vernacular activities a completely new phenomenon? Are the teachers’ digital presentations a new practice? Or are they old practices of well known school routines, where the teacher is presenting information and students are engaging in whatever else they have available? When asked what they did during teacher instruction before they had laptops, one of the students said he used to spend his time drawing.

This is not news. What might be new is the amount and kind of entertainment now available within the classroom walls, and we need more research about how these new possibilities are being met by students and teachers. There is also a need for research and knowledge about how to successfully and continuously integrate the Internet in a variety of educational setting – and thus prevent it from becoming just a technological “add on” with no explicit educational goals.

It goes without saying that banning Internet activity will not contribute to developing students’ literacy skills. What might need more explicit attention, is that neither will allowing unlimited Internet access without any guidance or clear educational purpose.
REFERENCES

This article is not provided.
Educating Teachers for the New Millennium?

Teacher training, ICT and digital competence

Cathrine Edelhard Tømte
Dr. Art, Research Professor
NIFU – Nordic Institute for Studies in Innovation, Research and Education
cathrine.tomte@nifu.no

ABSTRACT

In this study we explored how teacher education institutions handle the use of ICT in teacher education. A qualitative approach conducted as a multiple case study design involved three teacher education institutions. Two case studies where conducted in 2009 and one in 2012. Findings revealed that teachers appear to have become more aware of the use of ICT in education in 2011 compared to 2009. Still, teacher students remain to be sufficiently well prepared on how to use ICT for pedagogical purposes, even if their technical skills are improved over the years.

Keywords
teacher training, ict, digital competence, curricula

INTRODUCTION

Norway was one of the first countries in the world to include Information and Communication Technology (ICT) within the national curricula in compulsory education. In 2006 the Norwegian Ministry of Education and Research introduced a new educational reform; the Knowledge Promotion reform; which included a new curriculum in compulsory and upper secondary education (1st–13th grade). The reform emphasized five basic competence aims considered equally important, and one of those was to develop digital skills¹. Consequently, teacher ability to provide learning opportunities in digital competences for their pupils was highlighted. Moreover, the use of ICT in teaching and learning became widespread in Norwegian schools (Egeberg, Gudmundsdóttir, Hatlevik, Ottestad, Skaug, & Tømte, 2011).

Another aspect was that teacher-training institutions in Norway were to include using ICT in their curricula, in order to prepare student-teachers for using ICT in their own pedagogical practice. The reform initiative was influenced by a set of three previous national initiatives: the PILOT-program in teacher education;

1. The five basic skills: digital skills, oral skills, being able to express oneself in writing being able to read, being able to do mathematics, being able to use digital tools (Norwegian Directorate for Education and Training, 2006, 2012).
the PLUTO-program and, finally, the Learning Network-program² (Erstad & Hauge, 2011).

Shortly after the introduction of the Knowledge Promotion reform, teacher education underwent change. In 2010 the initial teacher training program was split into two specialized educational pathways: National Curriculum Regulations for Differentiated Teacher Education Programs for Years 1–7 and for Years 5–10. Key objectives for both pathways were that education should be integrated, professional-looking and based on research as well as being of high academic quality (Følgegruppen, 2011). The ICT dimension was mentioned only vaguely, as will be demonstrated.

Several studies confirm the discrepancies between policymaking highlighting the ICT issue in education and the “slow uptake” of the use of ICT for pedagogical purposes among compulsory schools (Egeberg et al., 2011; Haugerud, 2011). Moreover, research on ICT in education is often concerned with ICT issues related to youngsters/pupils, teacher use of ICT and school management (Biagi & Loi, 2012; OECD, 2010, 2012; Scheuermann & Pedró, 2009; Tømte & Hatlevik, 2011). Within teacher education institutions, the slow uptake of ICT has been documented by research (Granberg, 2011; Hetland & Solum, 2008; OECD, 2012; So et al., 2012; Wilhelmsen et al, 2009).

Studies on ICT in teacher training build upon several approaches, spanning the organizational framework of ICT in teacher training institutions (Adamy & Heinecke, 2005; Hetland & Solum, 2009; Wilhelmsen et al., 2009); teacher trainers’ attitudes, skills and practices on ICT in their own teaching (Judge & O’Bannon, 2008; Strudler & Grove, 2003; Whittier & Lara, 2006; Wilhelmsen et al., 2009) and student-teachers’ attitudes, skills and how they are being prepared to teach with ICT (Granberg, 2011; Haugerud, 2011; Wilhelmsen et al., 2009). Furthermore, ICT in teacher education has been a policy concern in many countries, and these concerns have also been reflected in international initiatives such as the ICT initial teacher training 2008–2010 at OECD (OECD, 2012) and at the ICT in Education strand within UNESCO (2011a, 2011b).

**OBJECTIVES AND RESEARCH QUESTIONS**

Bearing this in mind, the objective of this paper is to identify how teacher education institutions handle national guidelines and policies regarding ICT in teacher education, and to grasp how teachers and student-teachers consider

---

² The first, The PILOT project involved 120 primary and secondary schools from 1999–2003. Six universities and university colleges conducted follow up research. Along with this initiative was the PLUTO-program, which involved eight teacher education institutions (universities and colleges) in development programs during 1999–2004. The last of the reforms, the LN- program engaged about 600 primary and secondary schools and 19 universities and university colleges in networks nationwide from 2004–2009 (Hauge & Erstad, 2011)
what constitutes the value of using ICT in teacher education. In this work the following research questions are posed:

- How are national curricula on teacher education and its guidelines on ICT reflected in the local framework of teacher education institutions?

- What do teachers and student-teachers consider important regarding ICT in teacher education?

These questions are addressed through a multiple case study approach, including document analysis and interviews with teachers and student-teachers.

The following sections elaborate on the use of ICT in education and on Digital Competence, and give an overview of the national curricula for teacher education. Then follows a presentation of data and methods; findings from three teacher education institutions, and concluding remarks.

**ICT IN EDUCATION AND DIGITAL COMPETENCE**

ICT in education comprises diverse topics, spanning from organizational approaches, the situation of technical equipment and user perspectives including competences toward the use of various digital tools and digital technologies. As for the last, the term Digital Competence emerges. For years, research has elaborated on what constitutes Digital Competence (Buckingham, 2006; Gentikow, 2007; Lankshear & Knobel 2006; Punie & Ala-Mutka, 2007). What seems to be a major concern is that the notion itself is a moving target in the sense that it evolves rapidly and in line with the appearances of new technologies. One approach, which derived from merging and updating previous studies, suggests the following definition:

> Digital Competence is the set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socializing, consuming, and empowerment. (Ferrari, 2012, p. 3)

This understanding of digital competence appears rather broad and it includes skill development, ability to use tools along with other competences deriving from many arenas. Still, it corresponds to what has been the dominant understanding of digital competence in Norway, as communicated as early as in 2005 by National Network of ICT in Education: “Skills, knowledge, creativity and attitudes required to be able to use digital tools in learning and living in a knowledge society” (ITU, 2005). This approach has been updated when the
Norwegian Ministry of Education and Research founded the National Centre for ICT in Education:

Digital literacy can be defined as a set of knowledge, skills and attitudes. These are required as a prerequisite for being able to use digital tools, media and resources appropriate and prudent to solve practical problems, communicate, gather and process information and create digital products. Developing digital judgment by acquiring knowledge and good strategies for online use is an important part of digital competence (iktsenteret.no; downloaded 6.9.2012)

This understanding is also mirrored by the competence aims on digital competence described in the Knowledge Promotion reform. Another possibility would be to consider the importance of ICT as educational discipline and as pedagogical tools in developing effective educational services. In this respect ICT represents not merely tools, ICT also informs and shapes our modes of communication, and the processes of our thinking and our creativity. Granberg rephrases this as a shift in focus moving from learning about ICT to learning through ICT (Granberg, 2011).

To analyze the adoption of Digital Competence in education, a broad approach covering a set of multiple skills and competences in seven broad arenas is suggested by Ferrari (2012). The arenas derive from a study of a set of frameworks on ICT in education. In this work, the author realized that many of the competence arenas remained focused on technical operations. Figure 1 shows a balanced approach, where each competence areas is developed equally.

![Figure 1. Competence areas (Ferrari, 2012, p. 4)](image)

The competence arenas as described in figure 1, include technical aspects along with skills and competences that are more likely to be associated with ways of teaching and learning, and thinking and behaving with and through technology. This gives the notion digital competence a rather broad approach.
In this study, we explore how teacher-training institutions report on digital competence within their institutional curricula and how this might correspond to national teacher-training curricula.

Moreover, we elaborate on how teachers and student-teachers cope with the ICT issue and with digital competence in teacher education. In this, issues related to technical equipment and teaching and learning about and with ICT emerge.

NATIONAL CURRICULA FOR TEACHER EDUCATION

Several educational tracks qualify for working as a teacher in Norway. Common for all types of teacher education is that it is regulated in a national curriculum (Norwegian Ministry for Education and Research, 2003). Based on this national curriculum, local curricula are stated in an institutional document specific to each higher education institution, in an institutional curriculum contract. In the national curriculum for initial teacher training, running from 2003–2010, ICT was mentioned only vaguely, and digital competence was hardly mentioned at all.

Not surprisingly, many higher education institutions referred rather generally in their own institutional documents to the ICT-issue in teacher education in this period. Hetland & Solum found substantial variations in the amount of detail the institutions gave about ICT in their documents: some hardly mentioned ICT while others revealed an extensive understanding of digital competences, both as a tool and in terms of integrating ICT into their teaching and learning (Hetland & Solum, 2008, pp 42–45).

The national curriculum was renewed in 2010 when National Curriculum Regulations for Differentiated Teacher Education Programs for Years 1–7 and Years 5–10 were introduced. Compared with the previous national curricula as of 2003, National Curriculum Regulations for Differentiated Teacher Education Programs appear to be more concise regarding ICT, for example by including the competence aims deriving from the Knowledge promotion reform.

The new national curricula included competence aims deriving from the Knowledge promotion reform, which comprised the aim of digital competence, and made some explicit formulations on the use of digital tools as well as understanding of societal perspectives related to technology.

Nonetheless, these formulations have become more precise, and it would be interesting to see how they are incorporated in local frameworks within teacher education institutions. In this paper, we look at this in our third case, which is based on data after the implementation of the new national curriculum.
DATA AND METHODS

To address the research questions, a multiple case study design (Yin, 2009) informs the empirical work, which comprises three cases. Each case includes individual teacher education institution’s uptake of the use of ICT in teacher education. This way, the multiple case-study design includes three different teacher education institutions. Moreover, two case studies derive from the period covering the previous Initial Teacher Training Education Program; one case study springs from the new National Curriculum for Differentiated Primary and Lower Secondary Teacher Education Programs. The multiple case-design gives some indication of how one particular teacher-training institution handles the new curricula regarding the use of ICT, and how two teacher-training institutions interpreted and implemented the former initial teacher-training curricula on ICT. However, the case study design will not inform us if there are any developments within the teacher-training institutions. Nonetheless, findings from these three cases might give us new insights on how teacher trainers and student-teachers handle and think about the use of ICT in education, across teacher-training institutions and teacher-training programs and curricula. Each case includes document analysis and interviews with management, teacher trainers and student-teachers at three teacher-training institutions, along with observations from online instruction at one teacher-training institution (case 3).

The selection of cases 1 and 2 was mainly based on the fact that these cases had employed two very distinct approaches towards ICT: one was selected because of its reputation for being particularly good at integrating ICT in teacher education, whereas the other was less accustomed to use ICT in training, but was nonetheless acknowledged to be a solid teacher education institution. Case 3 was selected because it offers an online version of the new differentiated teacher education program.

Cases 1 and 2 were completed in 2009. Case 3 derives from a study where the new teacher education curricula had been recently introduced (in 2010; 1–7 grade; in 2011; 5–10 grade).

Interviews from cases 1 and 2 were conducted before the introduction of the new national teacher education curriculum regulations for Differentiated Teacher Education Programs 1–7 and 5–10, and case 3 shortly after the introduction. All interviews were semi-structured, and included various topics on

3. These were part of the Norwegian national report to the OECD-project “ICT in initial teacher training”. The OECD study comprised ten countries, and was a project strand within the OECD/CERI project New Millennium Learners (2008–2010). This particular selection was also a common guideline for all participating countries within the abovementioned OECD-study. Nonetheless, such an approach also corresponds to the two approaches to integrating digital competences or ICT that Hetland & Solum (2008) describe as approaches like “using ICT as a tool” and those “integrating ICT”.


5. In the third case, the entire study is not yet completed.
ICT and teacher education. From cases 1 and 2 a preliminary draft of the final report was sent for validation to a selection of key informants; for case 3, a midterm report including key findings was discussed and validated by a group of informants. Considering that the two cases based on Initial teacher education (cases 1 and 2) were part of one study and the last case (case 3) belonged to another study, some of the interview-questions regarding ICT and digital competence varied from cases 1 and 2 to case 3. Still, the overall issue of ICT and digital competence was treated equally in all cases. Topics addressed in all cases were “plans and strategies regarding ICT in teacher education”; “access to ICT equipment for teaching and learning”; “teacher training on ICT and learning”; “pedagogical use of ICT in the teaching profession” and “mastery of ICT software and tools”.

We interviewed the program manager responsible for teacher training, teachers and student-teachers within all three institutions. In cases 1 and 2 teacher trainers were interviewed in groups; or in individual telephone-interviews. In case 3 all interviews were group interviews. In case 3, we also observed online instruction. Table 1 informs on the groups of informants.

### Table 1. Matrix of Informants

<table>
<thead>
<tr>
<th>Teacher education program</th>
<th>Format</th>
<th>Institution</th>
<th>Program manager</th>
<th>Teachers</th>
<th>Teacher students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial teacher education (2003–2010)</td>
<td>Campus</td>
<td>Oslo University College: Case 1</td>
<td>1</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Campus</td>
<td>Sør-Trøndelag University College: Case 2</td>
<td>1</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Differentiated Teacher Education Programs 1–7 and 5–10 (2010–)</td>
<td>Online</td>
<td>Telemark University College: Case 3</td>
<td>3</td>
<td>12</td>
<td>30</td>
</tr>
</tbody>
</table>

### Methodological Constraints

As already stated, the three cases vary in that they are based on two versions of national curricula. Consequently data were collected in two different contexts; National curricula for initial teacher training and differentiated teacher-training curricula. In other words, the context in which interviews were conducted varied, even if topics addressed were similar in all three cases. Moreover, case 3 varies from cases 1 and 2 in that campus-based instruction dominates in cases 1 and 2, while instruction is given online in case 3. However, by including these three cases, we are given the opportunity to illuminate how one particular teacher-training institution copes with the new curricula regarding the ICT issue, and how former initial teacher-training curricula on ICT were interpreted and effectuated differently by two teacher-training institutions. Furthermore, together, the sample of three cases gives us important information on how teacher trainers and student-teachers cope with the ICT issue before and after the implementation of the new teacher-training curricula,
across teacher-training institutions. The findings from each case are organized and analyzed in these overall topics, and these are elaborated after a short presentation of the characteristics of each teacher education institution that constitute the three cases.

PRESENTATIONS OF THE CASES

Case 1: Oslo University College
Oslo University College is a large teacher education institution in its number of student-teachers. It is well known for having a long tradition of teaching with ICT and for its research community of ICT and learning. There is a special ICT-unit that teaches ICT to students in teacher education. In 2009 ICT was one of the disciplines that students could specialize in during the last two years of their teacher training. The special ICT-unit teaches all students in their first or second year during specific classes on ICT and the use of ICT in education.

Case 2: Sør-Trøndelag University College
Sør-Trøndelag University College is the largest teacher education provider in Norway, and has had a long tradition for educating students in the teaching profession. Most students are from central Norway. In a national context, teacher education offered from this institution is considered solid and traditional. However, ICT has been reported as just poorly taken care of within the teacher education institution.

Case 3: Telemark University College
Telemark University College represents a small teacher-training institution in the south-east of Norway. Until recently, most students were recruited from the surroundings, but from 2009, online teacher education has been offered. First, as initial teacher education, and from 2010, differentiated teacher education programs. This initiative has widened the recruitment basis; the online program enrolls student-teachers from all over the country. Teachers are trained in teaching through synchronous videoconference systems at fixed times on a weekly basis.

Teaching and learning online might serve as beneficial to students and teachers to become digitally competent, in that they are trained in using diverse ICT as part of their education. Thus, one could expect case 3 to differ considerably from cases 1 and 2 as this group of students and teachers is expected to be well equipped with computers and other ICT devices necessary for online education, and to be well trained in order to master the technology. This aspect will be elaborated in this paper.
FINDINGS FROM THREE TEACHER TRAINING INSTITUTIONS

Institutional curricula and ICT

In 2009, when the two first case studies Oslo University College and Sør-Trøndelag University College were conducted, the Knowledge Promotion reform had been running for three years, and one could expect teacher-training institutions to adjust themselves to the competence aims, such as digital competence, as introduced by this reform. Still, in both cases absence of the ICT issue and digital competence was confirmed in the curricula. Even if Oslo University College reported having had a strong focus on ICT for years, ICT was not covered in its general strategic plan. Sør-Trøndelag University College did not report any institutional focus on ICT in 2009, but indicated that work was being prepared in order to face the changes in the national curriculum for teacher training.

Our third case derives from Telemark University College, a teacher-training institution, and interviews and observations were conducted shortly after the introduction of the new curricula as part of differentiated teacher education programs for compulsory education. The formulations concerning ICT and digital competence from the National Curricula on Differentiated Teacher Education Programs are repeated in Telemark University College’s own stated goals for degree programs for years 1–7 and 5–10; this way of echoing the national curricula is also identified in several teacher-training institutions (Følgegruppen, 2011).

Organization

Oslo University College reported in 2009 having a special unit that instructed on ICT to student-teachers. One of the reasons given for organizing ICT training as a special unit, instead of integrating it into all subject fields, was that the subject teachers were not trained well enough to teach ICT alongside their subject. Many required support to integrate ICT into their subject teaching, and the ICT teachers work together with the subject teachers to achieve that. The special ICT unit instructed all student-teachers in their first or second year, by offering specific classes on ICT and the use of ICT in education. The special unit for ICT in teacher training offered students general courses on different software, but did not offer any individual instruction or a help-desk for those students that did not attend the courses.

Also at Sør-Trøndelag University College, in 2009, ICT was taught separately in a specific course for students, but only to a limited extent. The main reasons were flagged to be that very little ICT training was offered to teacher trainers, and teacher trainers also judged the ICT equipment situation to be poor, with too many old computers and not enough computers for everyone.

In 2010, Telemark University College (HIT) introduced Teacher Education Program Years 1–7 and in 2011 for years 5–10. Both programs were offered to
campus students, online students and to students affiliated to a study center near their homes. Online students participate from personal computers at home. Students at a study center and online students participate in instruction based on real time videoconferences broadcasted from campus, together with campus students. Still, both these two groups of students are required to participate in three mandatory campus-based meetings per year. Instruction is given through lectures, seminars and tutorials, all in real time videoconferencing, mainly held at fixed times twice a week.6

All in all, the ICT equipment side was reported taken well care of by HIT. There was a ICT and learning section with a special responsibility towards online students and students affiliated to study centers. Staff within this section held teacher competence and ICT expertise and played a central role as “translators” between technological opportunities and didactic challenges associated with teaching online. In addition, staff worked closely with the online teacher education programs, both in terms of operations, procurement and ICT technical support to both students and teachers. At the first mandatory session for student-teachers on campus the ICT staff offered extra training in the evening. All in all, most students reported that technical problems did not represent a problem for online instruction.

Learning management systems (LMS) were introduced in Norwegian higher education during the early years of 2000 (The Norwegian Directorate for Education and Training, 2006). All our cases reported using and communicating with the LMS, but their practices seemed to vary to some extent. All institutions reported it as serving as the main tool for information between staff and students, like e-mail messaging and posting papers. For example, teachers were to post course material in the LMS, and to respond to inquiries from students. Moreover the LMS were reportedly used for papers and examinations, where students handed in their work online. In our third case, the LMS also served as a place to log on to the videoconferencing system used to broadcast lectures online. In this case the LMS were used synchronously for chat purposes and asynchronously through the use of digital portfolios, e-mail and open records available to anyone on the course.

Teacher trainers

Teacher trainers at Oslo University College reported few courses and little general training in using ICT. This was explained by management as lack of funding and time to provide classes for teacher trainers in addition to student-teachers. Some teacher trainers attended student classes in the beginning of the project-period, but there had only been a few courses specifically for person-

---

6. The programs are organized with regular lessons online with usually three to four sessions a week in real time. The sessions are given lectures, seminars, tutoring, and students can work in groups regardless of location. Examinations are organized at home exam / oral online or campus / school exam. This varies from subject to subject. There are three mandatory meetings on campus during the academic year.
nel. Therefore, the subject teacher trainers have had to become fairly self-reliant when they do need to use ICT in their teaching, although they could get support on ICT use when working together with the ICT teacher trainers. Even though Oslo University College has had a relatively long-term focus on the use of ICT, not all teacher trainers were good at using ICT in their teaching. In general, most personnel reported using ICT as (one of many) tools in their teaching, such as PowerPoint, at least occasionally.

At Sør-Trøndelag University College there was limited ICT training for teacher trainers; some of the teacher trainers had tried to teach each other in classes, in non-compulsory classes offered every year, but attendance was poor; teacher trainers also argued that the equipment at Sør-Trøndelag University College was not up to date or adequate, with too many old computers and not enough computers for everyone; finally, it was also suggested that the age of teachers might play a part, as the mean age among teachers at Sør-Trøndelag University College was relatively high. Still, there was no clear link between these problems and staff age, as some of the most eager users of ICT were found amongst older staff.

All in all both at Oslo University College and Sør-Trøndelag University College, most teacher trainers reported rather poor inclusion of ICT for pedagogical purposes, most likely by using PowerPoint for instruction. Nevertheless, at Sør-Trøndelag University College, some teacher trainers reported a degree of wider interest in teaching with digital tools, and they have ended up teaching their colleagues how to make better use of ICT in training. At Oslo University College, teachers affiliated to the special unit for ICT, reported themselves to be rather ICT savvy, in contrast to their teacher training colleagues outside this unit. Nevertheless, mastering technology itself does not necessarily provide student-teachers with new insights into how to teach and learn with ICT or to become digitally competent.

At Telemark University College, teacher trainers that instructed online were recruited from among the most motivated of the teaching staff. These underwent a systematic training program. The training appeared to be mainly concerned with mastering various tools and devices for online instruction and to identify the relevant ICT tools suitable for every discipline. Teachers themselves pointed out that teaching online gives many opportunities for innovative use of digital resources and to exploit the fact of the students being geographically dispersed. For example, we witnessed how the students in the social sciences under the theme farmland were told by the teacher to submit photos from their local community to a public directory in order to illustrate geographic variations. This can also be implemented in the here and now perspective for online students, while the campus student would have spent much more time working (getting pictures from home, taking them to the lecture, prepare for sharing, etc.). On the web all students seamlessly survey the geographical variations based on where the students are. This example from case 3 illuminates some of the potential of online education. There are many opportunities for
innovative use of digital resources and the exploitation of the students being geographically dispersed. We believe that developing this potential will probably also benefit campus students in the long term.

**Student-teachers’ experiences regarding the ICT equipment situation**

In 2009, students considered the technical equipment to be of poor standard at their teacher training institutions Oslo University College and Sør-Trøndelag University College. At Oslo University College, the projectors and computers that were installed in every classroom often failed to work. In addition, the campus-wide wireless network did not work within the Department for Teacher Training. Several students also commented on the absence of interactive whiteboards; there was one in the ICT section, but that was booked for teaching students who majored in ICT. Moreover, students reported that the quality of the technical equipment was better at most of the partner schools.

Online students and students participating from a study center close to their homes to teacher training at Telemark University College reported in 2011 the equipment situation and the ICT standard to be sufficient. The main reason for this is based on the organization of the ICT equipment situation; the online students had to bring their own computers to the first mandatory meeting at campus, for technical upgrading, which made them capable of participation in online videoconference-based instruction. If students participating from study centers reported problems with the ICT equipment, local communities were responsible for taking care of the situation, as this was included in their partnership agreement with Telemark University College.

**Student-teachers’ experiences on the mastery of software and ICT tools**

In 2009, students reported ICT training insufficient; they were mainly provided with courses on how to handle different software. Students’ general opinion on ICT was that they did not receive enough ICT training. Like Oslo University College, students at Sør-Trøndelag University College experienced more hands-on, practical training when using ICT at training schools compared to their teacher-training institution. Furthermore, students reported teacher trainers’ lack of confidence and skills when using ICT, or even excluding ICT in their teaching. Even if some teachers at Oslo University College were more confident in the use of ICT in teaching and had better facilities and equipment, students were not more content with the ICT training than those at Sør-Trøndelag University College. Previous findings in the Norwegian context confirm these observations; Hetland & Solum (2008) found that no teacher training institutions in Norway would be able to report that all teachers were confident in using ICT in their teaching (Hetland & Solum, 2008, p. 39). Moreover, Wilhelmsen et al. (2009) found that in Norway, four out of ten students...
in all teacher-training institutions reported to be insufficiently educated in using ICT.

Being an online student at Telemark University College was stressed to have strengthened both confidence and skills when it came to using various digital tools and media that may be relevant in their own teaching. Some of the online students thought it easier to put themselves into the pupils’ situation later – which they thought would be characterized by a large element of digital tools. Some highlighted, for example, that they had become more conscious of the need “to develop self-discipline so that you do not end up with another digital activity than was intended”, as one put it. Still, there seems to be less awareness of other aspects of digital competence among the student-teachers. Bearing this in mind, one could assume that teachers who teach online, and the student-teachers who attend online classes, would be more aware of the ICT issue and digital competence than campus students at Sør-Trøndelag University Campus and Oslo University College. Moreover, since case 3 was more recent, one could expect these students to be more confident with ICT, as we know that the general ICT competence in Norway has improved over the years. Furthermore, since this case derives from after the implementation of the new curricula in teacher education, there is reason to expect these students to be aware of issues relating to digital competence. Still, our findings might call this into question. Even if teachers at this teacher-training institution are good in bringing in new ways of teaching and learning with digital tools, there still seems to be a lack of awareness of instruction on digital competence as including issues related to information management, creation of content and knowledge, ethics and responsibility, to mention some key words from Ferrari’s model. Even if teachers provided students with innovative use of ICT in their instructional practice, students themselves did not seem to be aware of how they should teach through ICT and to instruct on digital competence in their own teacher profession. Some students report that they prefer the use of interactive whiteboards: some have seen them and some have used them at the schools where they have been in practice, or associated with, but they seem to have little overview of opportunities that come with interactive whiteboards and they exhibit little reflection on digital learning resources as an alternative to the textbook. Students also expressed uncertainty about how to use computers and the Internet in their own instruction. As one claims, “we know how easy it is to lose focus when you are out on the web, so how can we expect pupils to manage it? Perhaps it is best to prohibit the use of the Internet in class?”

CONCLUDING REMARKS

In the national curriculum for initial teacher training, running from 2003–2010, the ICT issue was only vaguely mentioned, and uneven treatment of digital competence was absent. Cases 1 and 2, which derive from this period, confirm nonappearance of ICT and digital competence in local institutional curricula. In the third case, based on the new national curricula on teacher edu-
cation, the teacher-training institutions’ curricula formulations on digital competence correspond with the national curricula.

Findings revealed from cases 1 and 2 show that even if these institutions seem to have different approaches towards the ICT issue within their teacher-training programs, the similarities are striking; in both cases students report expecting more substance related to ICT in teaching and learning than they are actually obtaining. Moreover, both institutions reported lack of organizational support, insufficient technological equipment; insufficient ICT competence and outdated perspectives on how to use ICT in teaching. Even if the institutional awareness on this issue was high in our study, we found little action from the management side of the institutions related to this. Also student-teachers approached the ICT training issue within their educational contexts quite randomly. In case 3, the situation was different in that the ICT situation as it related to infrastructure and technical competence was well taken care of. Teachers were well informed on how to use ICT for instruction. Still, critical aspects regarding digital competence remained unsolved. This aspect is to some extent highlighted by Haugerud (2011) who underpins the importance of being aware of two different scopes for ICT and education; technical proficiency does not result in digital competence and knowing how to use ICT in a learning context. In our case, the situation is that even if teacher trainers demonstrate innovative ways of using ICT for pedagogical purposes, students do not seem to recognize these efforts very consciously. It might look as if they take this way of instruction for granted, which is not very surprising, since they depend on technology as part of being online students. Still, what is interesting is that they demonstrate such little awareness of how to use digital tools in their own teaching practice, and even of how to teach on digital competence-related issues themselves.

These findings are interesting as Norway claims to be at the front of the field of ICT and education in an international context. Several steps have been taken from the policymaking side: the national curriculum for compulsory education and teacher education has been renewed, including notions regarding the ICT issue as it relates to digital competence. Teacher-training institutions are required to integrate digital competences into their teacher training, as set out as guidelines from the Knowledge promotion reform from 2006, in the white paper from 2008–09, and in the National Curricula for Differentiated Teacher Education Programs. However, as shown, the process seems to be slow and inadequate. Haugsbakk (2011) explains this by claiming that the overall investment in ICT seems to have been founded on misleading premises enhancing ICT in teaching and learning, without considering the complexity that also follows the inclusion of ICT in these practices. As a result, the existing plans from the authorities suffer from shortcomings and are inadequate to meet the challenges for schools and teacher education institutions. These perspectives are confirmed in cases 1 and 2 in our study. Moreover, other studies point to the same direction; in 2008 Hetland and Solum found that there are great variations in the existing contracts within teacher training institutions;
most of them were focused on access and practical use of ICT, even if some institutions showed signs of further understanding of how ICT and digital competence could be linked to learning processes. Few of the institutions included digital competences in relation to practical training in partner schools (Hetland and Solum, 2008, p. 43). The new national curricula for Differentiated Teacher Education included some issues regarding digital competence. Still, as shown, it takes a while to implement these in teacher training practices. Our study based on case 3 somehow confirmed this. A similar finding is reported by the research group that follows the reform of the differentiated teacher education program; it revealed that student-teachers scored lowest on questions about the students’ basic skills in ICT (Følgegruppen for lærerutdanningsreformen, 2011, pp. 69–71). The present paper opened by asking whether we are educating teachers for the new millennium, and called this into question by asking how teacher trainers and student-teachers are coping with the ICT issue in teacher education, with a certain eye on what constitutes digital competence. As shown in our three cases, teacher training institutions’ institutional documents (institutional curricula) correspond with national curricula on teacher education. Moreover, as for teachers, they appear to have become more aware of how to use ICT for educational purposes in 2011, as demonstrated in the third case, as compared with cases from 2009. Student-teachers have yet to be sufficiently well prepared on how to use ICT for pedagogical purposes, and even what constitutes digital competence, even if their technical skills appear to have improved over the years.

We have demonstrated that learning about ICT and the use of ICT as part of a discipline or profession constitutes part of teaching practice at the teacher-training institutions. We have also witnessed that the third objective, to learn about ICT as part of a learning process, is to some extent present among teacher trainers in case 3. Moreover, the new curriculum requires that the student-teacher when graduating should be able to understand the societal perspectives related to technology and media development (safe use, privacy, freedom of speech) and help ensure that children and young people develop a reflective attitude to digital arenas. Furthermore, the curriculum stressed that the candidate ought to provide change and development expertise as the basis for meeting future school needs. Conclusions from the third case remain preliminary, as these student-teachers have not yet graduated. Time will show if they are being sufficiently prepared for our millennium, as it relates to technology and digital competence.

REFERENCES


Hatleiv, O. et al. (2011) *Monitor 2010. Samtaler om IKT i skolen*. Oslo, Senter for IKT i undanningen


Appropriation of Digital Competence in Teacher Education

Elen Instefjord
PhD-candidate, University of Stavanger / Assistant Professor, Stord/Haugesund University College, Norway
elen.instefjord@hsh.no

ABSTRACT
The aim of the article is to explore opportunities for appropriation of digital competence in teacher education. Digital competence is knowledge, skills and attitudes required in order to use technology critically and reflectively in the process of building new knowledge. According to Wertsch learning to use a cultural artefact is characterized by two processes: mastery and appropriation. The article reports from a case study of two teacher education institutions. Findings indicate that the same challenges are found in both institutions: the conflict between mastery and appropriation, and between personal and educational use of technology, and the resistance towards technology among some teacher educators. The results signify that in order to create opportunities for appropriation of digital competence and encourage use of technology as part of pre-service teachers’ professional didactic competence, technology should be better integrated as pedagogical tools for teaching and learning in all subjects in the teacher education programmes.

Keywords
teacher education, technology, digital competence, appropriation

INTRODUCTION
Over the last two decades, considerable time and money have been invested in integration and use of technology at all levels of education, and a number of large reforms have swept through the Norwegian education system (Lund & Hauge, 2011). However, in spite of the investments and the ever increasing availability of technology in schools (Egeberg, Guðmundsdóttir, Hatlevik, Ottestad, Skaug, & Tømte, 2012), there still appears to be a gap between the technology available in classrooms and teachers’ use of this technology for educational purposes (Kopcha, 2012; ten Brummelhuis & Kuiper, 2008; Petko, 2012; Zhao, Pugh, Sheldon, & Byers, 2002). Studies have revealed that many teachers do not integrate technology effectively into their classroom activities (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Harris,
Mishra, & Koehler, 2009) and that minimal pedagogical change can be identified (Somekh, 2008).

Research has also indicated that pre-service teachers’ experience with technology from teacher education programmes influences how they later choose to use technology in their teaching (Drent & Meelissen, 2008; Agyei & Voogt, 2011). Nevertheless, providing pre-service teachers with the necessary competence in order to integrate technology in their future classrooms remains a challenge for teacher education programmes worldwide. Teacher education programmes are commonly criticized for their failure to provide pre-service teachers with the necessary experiences of how to utilize educational technologies in a teaching practice (Chien, Chang, Yeh, & Chang, 2012) and for not focusing sufficiently on developing pre-service teachers’ digital competence (Wilhelmsen, Ørnes, Kristiansen, & Breivik, 2009). This is confirmed in a recent report from the Nordic Institute for Studies in Innovation, Research and Education, indicating that development of professional digital competence is consistently weakly rooted in the management of teacher education programmes, and that most programmes lack a coherent approach to the development of such skills (Tømte, Kårstein, & Olsen, 2013). An analysis of the curriculum for teacher education in Norway indicates that digital competence is integrated to a limited extent in the curriculum documents and that there are variations between the different institutions in terms of technology integration (Instefjord & Munthe, 2014). Thus, there is a need to investigate further how teacher education programmes prepare pre-service teachers for using technology in their future classrooms. Against this backdrop we ask: What opportunities for appropriation of digital competence does teacher education offer? In short, digital competence is knowledge, skills and attitudes required in order to use technology critically and reflectively in the process of building new knowledge. The focus of this article is directed towards teacher educators’ and pre-service teachers’ perceptions and descriptions of digital competence and how technology is being used and appropriated by teacher educators and pre-service teachers.

THEORETICAL PERSPECTIVE

In the Knowledge Promotion Reform, a curriculum reform for primary- and secondary education that was introduced in Norway in 2006, the ability to use digital tools was emphasized as one of five basic skills. This was recently followed up by a framework for basic skills, developed by the Norwegian Directorate for Education and Training in 2012, which highlights that developing digital skills means “learning to use digital tools, media and resources and learn to make use of them to acquire subject-related knowledge and express one’s own competence” (Norwegian Directorate for Education and Training, 2012, p. 12). Being able to use digital tools is now seen as a central competence at all levels of society, and a number of attempts have been made towards developing a common understanding of the notion digital competence. In a
Digital competence is the set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment (Ferrari, 2012, pp. 3–4).

The definition illustrates the complexity of the concept by indicating that being digitally competent involves far more than having technical skills. Technical skills and the ability to use specific tools are only two of many aspects of digital competence. In this article digital competence refers to the wide range of competencies associated with the use of digital technologies. These technologies include hardware and software used for educational as well as social and entertainment purposes, both in school and at home. The competence needed to make use of these technologies embraces technical, cognitive and social-emotional perspectives of learning with digital technologies (Ng, 2012). Preparing pre-service teachers for their future classrooms requires teacher education programmes that help students develop an understanding of this complexity, both in terms of technologies and competencies. However, digital competence for teachers is also about being able to use technology to promote student learning and contribute to building knowledge in all the ways the definition calls for. This requires a special expertise that differs from digital competence of other professional groups (Krumsvik, 2011). The specific focus in this article is therefore directed towards the development of digital competence as a tool for teaching and learning.

Learning is seen in light of Somekh’s (2008) understanding of learning as a situated process being mediated by the context of the classroom, school and larger society. The concept of mediation implies that individual’s interaction with objects in the world is mediated by cultural artefacts: signs, symbols and tools. By using various physical and intellectual tools, we are able to solve problems and master social situations in ways that would not have been possible without the support of cultural artefacts. Artefacts carry with them a history of use and are altered, shaped and transformed when employed in activities (Säljö, 2000). In the process of learning how to use artefacts, Wertsch distinguishes between the mastery of a cultural artefact and the appropriation of a cultural artefact. The first refers to knowing how to use an artefact, while the latter refers to “the process of taking something that belongs to others and make it one’s own” (Wertsch, 1998, p. 53). If we see learning and development as mastery and appropriation of cultural artefacts, these processes stand out as a sophisticated process of coordination between humans and cultural artefacts (Säljö, 2006). Learning begins with an initial contact with something that is not familiar to us. At this stage of the learning process we begin to try out a new
artefact and start to investigate the different aspects of how the artefact mediates, and we may require help from others who are more familiar with the artefact. In this way we meet cultural artefacts in specific contexts and may begin to see them as resources for particular types of activities. As we spend more time getting to know the artefact, we learn new ways to use it and we discover new functions that we did not recognize in the beginning. Through these processes we learn to master the artefact in different contexts and it becomes so natural for us to use it that it will eventually be a part of our identity; it becomes appropriated and we will no longer need help from others.

Nevertheless, cultural artefacts are not always easily appropriated, and often a cultural artefact is mastered but not appropriated by the learner. Seen in light of Ferrari’s (2012) definition this may mean that aspects of digital competence, such as being able to use technology to communicate, could be mastered in a particular context such as for socializing with family and friends, but not appropriated by the learner to such an extent that he or she would choose to use it in an educational context to create and share content and build knowledge creatively. There may also be situations of appropriation without mastery, where both interest and motivation are strong, but understanding of how to use the cultural artefact is still lacking or unsophisticated (Polman, 2006). Thus, appropriation without mastery refers to “coming to value a practice, but not yet having the competency to carry it off” (Laffey, 2004, p. 377).

According to Wertsch, an important aspect of appropriation is that it always involves some sort of resistance: “In such instances of mediated action, the agent may use a cultural tool but does so with a feeling of conflict or resistance” (Wertsch, 1998, p. 56). In operation, the cultural tool is not part of their identity and they may therefore choose to use it only in situations that demand compliance.

**DESIGN AND METHODS**

**Selection**

The study was designed as a multiple-case study (Yin, 2009) with two cases. The cases were selected on the basis of an analysis of programme descriptions for primary and lower secondary teacher education programmes for years 1–7 and 5–10, respectively, from all teacher education institutions in Norway. In the programme description from the first institution no examples of technology integration were identified, while the second demonstrated multiple examples of technology integration. Thus, the cases illustrate potentially contrasting situations in terms of emphasis on use of technology. The purpose of the study was to explore further the differences found at the curriculum level in order to gain a deeper understanding of how the use of technology in teacher education contributes to pre-service teachers’ appropriation of digital competence.
Recruitment of teacher educators took place in three steps. First, written information about the project was sent to the Dean of each of the institutions in November 2011, inviting teachers to take part in the study. The Deans then forwarded the information to a selection of teachers. Thirdly, the researcher contacted these teachers and made arrangements directly with those who were willing to participate. A total of nine teacher educators agreed to participate in the study. Four teacher educators were female and five male. They taught a variety of subjects: Norwegian (2); mathematics (1); Pedagogy and Pupil-related Skills (4); Educational technology (1); and Physical Education (1).

In order to get in touch with pre-service teachers and simultaneously gain some informal indications of how technology was used, the researcher participated in lectures at both institutions. Two full days of lectures were attended in each of the institutions together with pre-service teachers in their first and second year of teacher training during April 2012. In line with ethical standards for research, all pre-service teachers who attended these lectures received oral and written information about the purpose of the visit, and they were asked to indicate their willingness to participate in focus group interviews. A total of 14 students volunteered to participate.

Data collection

Data was collected in April 2012 through individual interviews with teacher educators and focus group interviews with pre-service teachers. Both types of interviews were conducted as semi-structured interviews (Kvale & Brinkmann, 2009) and were fully recorded. Teacher educators were asked about their perception of what constitutes the notion of digital competence and what they believed a teacher in their subject needed to know in order to be digitally competent. They were also asked about how and how much they used technology in their own teaching and how they would rate their own level of digital competence. The interviews lasted between 32 and 91 minutes. All interviews were conducted on the basis of the same semi-structured interview guide and thus the time spent on each interview was controlled by the interviewees.

Focus group interviews were used to collect data from pre-service teachers. While group interviews are ideal for gathering many opinions from individuals within a group, focus group interviews are interactive and are particularly useful for understanding the collective perspective (Gibbs, 2012). Two focus group interviews were conducted in each of the cases. Two groups (one in each case) consisted of only two students, while the remaining two groups consisted of respectively six and four students. Nearly the same interview guide that was used in the individual interviews with teacher educators was used for the focus group interviews. However, in line with recommendations for moderation of focus group discussions (Gibbs, 2012), not all questions were covered and new areas of discussion were included as they arose from the group interaction. The focus group interviews lasted between 35 and 72 minutes.
Data analysis and presentation

Interviews were fully transcribed in HyperTranscribe and analysed in HyperResearch. Each interview was analysed by closely reading the transcripts several times. During the first reading, an overview of the data was achieved and broad categories focusing on initial patterns in the interviews were identified (Miles & Huberman, 1994). In the second reading, specific words and paragraphs that captured specific themes from the interview guide were highlighted. As a result, three main categories were identified: self-perceived digital competence level, use of technology for educational purposes, and reflection on digital competence for teachers. Each interview was then re-coded in light of these categories. In the next step of the analysis data from each case was assembled as a set and a descriptive case report was written for each case. These case reports are included in the findings section. While examples of comments from the individual interviews are shown in the presentation, the data from the focus group interviews are presented without quotations from individuals. This is done to underline the collective perspective as the unit of analysis (Gibbs, 2012).

In order to facilitate a cross-case analysis, an analytic approach based on the theoretical perspective presented earlier was developed. Wertsch (1998) argues that learning to use a cultural artefact is characterized by two processes: mastery and appropriation. These aspects of the learning process have been used to frame the discussion in this article with the purpose of understanding how digital competence and teacher identity develop in interaction with one another.

RESULTS

Results from each case are presented separately. Teacher educators have been given fictitious names, while pre-service teachers are primarily referred to as students. All quotations have been translated from Norwegian by the researcher.

Case 1

Teacher educators Sarah, Chris, Ben and Karen work at a university college located in the eastern part of the country. Substantial investments and efforts have been made towards integration of technology, including providing laptops for all students in the teacher education programmes for primary and lower secondary education. The institution also provides a support system for students and faculty. The four teacher educators interviewed in this case represent three different subjects (Pedagogy and Pupil-related Skills (Sarah and Ben), Educational technology (Chris), and Mathematics (Karen)).

Chris and Ben rated their own level of digital competence and their interest in technology as being above average. They both had experience from different
professions before they joined the university college. Ben did not have any formal technology training, but had previously run his own ICT-company and had worked as an ICT coordinator in an elementary school. Chris, a teacher in Educational technology, was trained as a computer technician. He was the main teacher in an introductory course on educational technology and had strong opinions concerning the importance of integrating technology in teacher education. The two other teacher educators in case one, Sarah and Karen, both rated their digital competence as about average. Neither of them had any formal training in the use of technology, but they both felt quite confident about using technology. Karen, a Mathematics teacher, said:

Some of my colleagues are a lot better than me, I am, it’s not the area that I know most about, but I do what I need to master it with my students” (Case1: Karen).

Karen used technology regularly in lessons and had a clear educational rationale for her use of technology. When required to reflect on the technology she used in class, she commented:

We use Excel, in several different areas, and then students learn to use Excel while they also see what this can be used for in school, and we also discuss what is good and what is not good about using spreadsheets. And we use GeoGebra, a programme that is very good for solving equations and working with functions, and for showing things in geometry. And then we have a discussion about why it is ok to use it in teaching and which benefits it provides pupils (Case1: Karen).

Sarah was very enthusiastic about technology. She had recently introduced iPads as a new tool in Pedagogy- and pupil related skills, and she was utterly excited about all the new possibilities this tool could provide. Although her institution did not encourage it, she had also chosen to use Facebook both for communicating with her students and for educational purposes. According to her, all but one of her students were already on Facebook, and she therefore found Facebook to be a more efficient platform for communication. However, when being asked about what criteria guided her selection of apps or other learning resources, Sarah acknowledged that she did not always have an educational rationale for her choices.

All teacher educators reported that they used digital tools both for preparations, in the office, at home, and in the classroom. They all used PowerPoint presentations regularly and most of them said they used PowerPoint in all lectures. Ben, however, believed that his students did not learn enough from looking at PowerPoint presentations and had therefore chosen to use other methods of delivery:

I use digital tools, this is kind of a dilemma, because I use them a lot. But I use them a little differently than others. We try to provide exemplary teach-
ing, we hope we get there, but we cannot, because students have a certain expectation that we will have slides and have prints and have things they should write down, the way it has always been. And in a way I understand that, but we know that they forget the pictures very quickly. So I thought, what do we do about that, how do we give them experience with other methods than highlighted sentences on a screen? So, I thought I would do something different. And I chose to use illustrations instead. So I present an awful lot of pictures, animations, movies, stuff like that, and besides from that I am analogue, so I draw, I use my own drawings and scanner, and I simply draw on the blackboard (Case1: Ben).

When being asked about what a teacher needed to be able to do or know in order to be digitally competent, a number of the teacher educators mentioned being able to use PowerPoint and social media. One teacher educator noted:

They should at least be able to use PowerPoint or Prezi, and then they should master the use of e-mail. I think social media are also important. I don’t master Twitter, I don’t know why, but I think they should at least master one of them, either Facebook or Twitter (Case1: Sarah).

The interviews also revealed that all the teacher educators saw use of interactive whiteboards as an important aspect of teachers’ digital competence. However, Chris, the educational technology teacher, was the only one who knew how to use an interactive whiteboard, while Ben, Karen and Sarah all expressed concerns about their own lack of competence in this area. In Karen’s words:

I haven’t learned to use a SMART Board well enough to use it in my teaching. I have taken a course, so I do know what it is about, and I’m planning to attend a course here on the 15th of May, but I haven’t had time to learn it properly (Case1: Karen).

This comment aligns with the feedback students provided in the focus group discussions. The six students in the first group were second year students on the 1–7 programme, ranging between 20 and 35 years of age. On the whole, they rated their own level of digital competence as being fairly high. However, the students were clearly split on their views about how much they had learned about use of digital tools during the programme. Most of the students in the group were of the opinion that their digital competence had been acquired before they started the programme. One student was more positive than the rest. She had a particular interest in technology and rated her own digital competence level as being very high. This student said that the programme had contributed to increasing her competence level. The discussion revealed that the institution offered a compulsory, introductory course in educational technology during the first year of the programme. However, a number of practical problems were pointed out about the introductory course. Students felt that the course was too detached from the rest of the subjects and that even though they...
had worked with the mandatory requirements during the first year, the competence acquired during the course was already lost. The activities did not enable them to build connections between what they learned in the course and what they needed in their future teaching. Comments also suggested that they were critical as to how the technology course was organized. The course was taught in a large lecture theatre with many students present, and the lecturer was either the educational technology teacher or presenters representing external companies such as SMART Technologies. According to the students there were too many students and too little time, a situation that made it difficult for them to receive necessary support if they encountered any technical problems. Instead of explaining how to solve technical problems, assistants would do the tasks for them. Due to the way this course was organized they did not have any practical experience with, for instance, the use of interactive whiteboards, and they were therefore critical to the overall learning outcome of the course.

The two students who took part in the second focus group discussion were generally more positive about the introductory course. They were first year students on the 5–10 programme and the interview was conducted immediately after they had attended a full day’s course in the use of a SMART Board. They said they found the course interesting and that they had gained new competence through attending the course. However, they noted that they would have learned more if the course provided an opportunity to experiment with the board instead of only watching the presenter. Although they both perceived their own level of digital competence to be more or less average, none of them had any previous experience with using an interactive whiteboard.

Case 2

Teacher educators Tom, Peter, Lisa, David and Anna teach in the second teacher education institution located in the western part of the country. The five teacher educators represent three different subjects (Norwegian (Tom and Peter), Pedagogy and Pupil-related Skills (David and Anna), and Physical Education (Lisa)).

Tom and Lisa both rated their own digital competence level as average, while David, a Pedagogy and Pupil-related Skills teacher, and Peter, a Norwegian teacher, rated their own digital competence as fairly high. They had both used technology for many years, both in personal situations and with their students, and one of them had participated in national projects related to the use of technology in education. In the words of Peter:

I’m not a technician myself, but I’ve always been interested in how to use it in a rational and meaningful way, but also in teacher training, including for example related to, uh, everything from digital portfolios […] to the use of digital whiteboards (Case2: Peter).
However, the last teacher educator in case two, Anna, a Pedagogy and Pupil-related Skills teacher, expressed serious concerns about both her own level of competence and the general level of digital competence at her university college:

No, but the [digital] competence is in general too low, I think, but I think I’m among the very worst, most of the others are better than me (Case2: Anna).

Comments also suggested that several of the teacher educators had attended theoretical introductory courses in how to use an interactive whiteboard but had no practical experience with the board. For this reason they did not feel confident using this technology in the classroom. One teacher educator said: “I have taken a course, but I have never used it. I don’t know how to use it” (Case2: Tom).

Teacher educators were asked to explain how they understood the notion digital competence and what they thought a teacher needed to know in order to be digitally competent in their subject. Several of the teacher educators indicated that this was a difficult question. One of them said:

If you want me to define it that could be a little bit difficult because I haven’t even read the course book about digital competence. But I believe it means that you should be able to use technology and manage information and communicate through it. […] No, but all these new pages with Twitter, and all these places where children can go in and create their own pages, and how dangerous that is, that is something the teacher should talk about. And the ethical perspective and how girls can be offended through Facebook and all these new things. That is something I would have spent time on if I were a young teacher today. And that is what I tell my students (Case2: Anna)

Tom argued that he did not see any big difference between the digital competence needed in his subject, Norwegian, and other subjects:

Yes, no, but I doubt that the subject Norwegian is so special in this regard. Digital competence in Norwegian, is that any different from digital competence in religion or social science? But perhaps it’s a little different in mathematics and physics where they need models and figures and those sorts of things (Case2: Tom).

Peter, on the other hand, had a clear opinion of what teachers needed to know in order to be digitally competent. According to him, teachers needed basic competence in standard software, social media, learning platform and internet, as well as a strong didactic competence:

[…] they should have a minimum of awareness, and I believe they do, although they do not always manage to use it, but awareness of what is
good ICT didactics, that is how you can use ICT in a didactic manner. When they use PowerPoint, as most teachers do, what is a good PowerPoint, how can you use it properly? It can be used in many ways, depending on what the purpose of the PowerPoint is (Case 2: Peter).

As was found in the interviews in case one, all teacher educators in the second case reported that they used technology for preparations and in the classroom. Except for Lisa, the Physical Education teacher, they all reported that they used PowerPoint in nearly every lecture. Tom was concerned that the way PowerPoint was used in the teacher education programmes did not serve as a good example of how their students should use technology in the classroom. He was worried about what he expressed as lack of connection between the instructional strategies used by the teacher educators, and the relationship between the practices for which the students are prepared:

It feels like I sit by that machine nearly all day. And that leads to, when I finish work and go home at night, I do not really want to turn on my computer in the evening. I simply think I use it so much, but I use it less in teaching, but maybe, yes, no, I will not say I use it too much, but too badly I’d rather say. [...] You know, I think that when our students get out in the classroom during practical training they will soon understand that they cannot follow our example and give only one way lessons like we do here (Case 2: Tom).

He followed up this comment by saying that he wished the students would acquire more practical skills for use in school. Comments in the focus groups indicated that this concern was also shared by the students. The students in the first focus group were first year students at the 1–7 programme, between 20 and 25 years old (two male, two female). They rated their own level of digital competence as being average for their age group. They mastered standard software, were able to search for information on the Internet, and used social media for personal purposes. The discussion revealed that students felt attending lectures at the teacher education programme had not given them ideas for future teaching. In the preceding lecture they presented a multimodal text they had created by themselves. Nevertheless, when asked about what kind of digital tools they had encountered in the teacher training programme, they said that they had not learned anything new about digital tools, and that digital tools were not used in the programme at all. The interviewer found this information surprising and the students were therefore asked to elaborate. The students then explained that they had “only” used PowerPoint, YouTube, Internet and Word. According to them, they did not see these tools as technology worth mentioning; these tools were simply tools that they used more or less every day as learners. The discussion also revealed that they were tired of PowerPoint being used in all lectures, and that, although they had enjoyed working with the assignment they had just presented, they did not see much value in accomplishing it.
The two students (one male, one female) in the second group were students on the 5–10 programme and they were both 22 years old. These students shared the teacher educators’ view on interactive whiteboards. Comments indicated that the students had been introduced to interactive whiteboards during practical training and they were clear that being able to use an interactive whiteboard to enhance student learning was an important aspect of teachers’ digital competence. However, they had little or no experience with interactive whiteboards from the teacher training, and were critical about the lack of training in this area.

**DISCUSSION**

This study investigated opportunities for appropriation of digital competence in two different teacher education institutions. Before we discuss the opportunities for learning in terms of Wertsch’s distinction between mastery and appropriation we should once again direct our attention towards Ferrari’s (Ferrari, 2012) definition of digital competence. In short, digital competence is the knowledge, skills and attitudes required to be able to use technology reflectively for a number of different activities in a number of different contexts in life. For a teacher, digital competence is also about having the competence needed in order to help others develop a digital competence in line with all the aspects included in Ferrari’s definition. Such a competence demands awareness around the use of technology that goes far beyond technical skills. According to Haugerud (2011), what has to be appropriated in order for pre-service teachers to use technology effectively as teachers, is far more than use of technology in isolation or in personal situations.

However, when asked about their level of digital competence, several of the teacher educators in both cases focus primarily on the technical aspects of their competence when they describe their own competence level. Although the two cases were initially chosen because of their potentially contrasting situation in terms of technology integration, the results do not unveil any major differences in terms of teacher educators rating their digital competence. In both cases most of the teacher educators rate their own level of competence and extent of technology use as being around average – some a little higher, some a little lower, but in general nearly similar to everyone else’s. Moreover, they use their technical skills as a measure of their own digital competence. Seen in light of Wertsch’s (1998) perspective on learning as mastery and appropriation of cultural artefacts, teacher educator’s descriptions of their own digital competence may be seen as indicators of mastery without appropriation. This can, for instance, be seen in Tom’s description of his own use of PowerPoint. He masters the technical aspects of the software itself, but he is not happy with neither his own use of it in the classroom, nor does he see any potential educational benefits. In case one, Ben’s description of how he uses technology in the classroom may serve as another example of mastery without appropriation. Ben uses the cultural artefact with a strong feeling of conflict or resistance and does
not view the artefact as something that belongs to him or his teaching practice. When the level of resistance grows sufficiently strong he may refuse to use the cultural artefact all together (Wertsch, 1998). In Ben’s example this is nearly the case, – he still uses technology, but he admits that he prefers to write and draw on the board instead.

If we rate our own competence as very high, there is little need for competence enhancement. Ben’s resistance towards the use of technology can be seen as an example in this regard. Although Ben has not appropriated the use of technology as seen from a teaching perspective, he masters the technology and therefore he is not interested in learning more about how to use the technology in a teaching context. An important aspect of appropriation of a technology as a cultural artefact is therefore to find ways to overcome this resistance (Säljö, 2006).

Karen can be seen as an example of a teacher educator who has appropriated digital competence. Although she is relatively humble when she talks about her own digital competence level, her answers in the interview indicate that, with the exception of interactive whiteboards, she masters the necessary artefacts both on a personal and didactic level. She demonstrates a high level of pedagogical reflection concerning uses of technology for educational purposes and makes it clear that she only uses technology when she finds this to be the tool best suited in order to accomplish the desired learning outcome. A similar example is found in case two where Peter reflects on what digital competence is for a teacher. He knows how to use the technology and can make use of it in a number of different contexts.

The interviews also revealed examples of what seems to be appropriation without mastery, for instance when Anna reflects on what a teacher should know in order to be digitally competent. She evidently sees the value of social media in education without being able to use them herself. Anna knows that her own digital competence is lower than most of her colleagues and students, and, although her understanding is lacking, she is interested and motivated, and spends time discussing the issues with her students. This appropriation of an activity may serve as motivation for trying to develop the necessary competence required for the activity (Haugerud, 2011). Another example of appropriation without mastery is related to the use of interactive whiteboards. In both cases teacher educators and pre-service students see the use of whiteboards as an important aspect of teachers’ digital competence, but they do not master the artefact. Although these teacher educators lack the competency to use the relevant technologies, it can be positive that they have come to value the technologies. However, unless they also actively seek to develop the necessary mastery, there is no guarantee that this may serve as what Polman (2006) refers to as preparation for future learning.

For pre-service teachers’ opportunities for appropriation of digital competence, the examples of mastery without appropriation and appropriation without mastery are discouraging. The example from case two, where pre-service
teachers initially claim not to have used any digital tools in the teacher education programme, and later mention a number of examples of digital technologies they have used, indicates that pre-service teachers and teacher educators have different opinions on what it means to use digital tools in the classroom. While students seem to have appropriated use of technology to such an extent that it has become part of their identity as learners (Wertsch, 1998), teacher educators still tend to see technology as an add-on that does not necessarily blend with their teaching strategies. They use PowerPoint to structure their lectures, but there are few pedagogical justifications for their use. The differing opinions found, underlines the need for a common language that enables teachers to reflect on the use of technology to enhance learning. In order encourage use of technology as part of pre-service teachers’ professional didactic competence, teacher educators must acknowledge the complex relationship between mastery and appropriation on the one hand and personal and professional use of technology on the other hand. Such a competence cannot be developed through independent introductory courses in the use of technology as that discussed in case one, but should be intertwined with the context of the classroom, school and larger society.

Mastery without appropriation is also found among pre-service teachers. An example of this can be found in case two, where students talk about the multimodal texts they presented earlier the same day, or in case one, where the students talk about the introductory course they have attended. They have used technology to complete the task, but they do not see the technological accomplishment as personally valuable (Laffey, 2004). On the other hand, seen in light of Säljö’s (2006) perspective on appropriation as a process of coordination between learner and artefact, the initial contact with new technology that such courses can offer should not be underestimated as a starting point for the learning process. In this way the introductory course may serve as a toolbox for the pre-service teachers, with a variety of tools that can be pulled out in different situations. However, all cultural artefacts carry with them a history of use and are themselves altered, shaped and transformed by the activity, in which they are used (Säljö, 2000). If pre-service teachers continue to use the artefacts after the initial encounter, they may learn to use them in other contexts than the one in which the artefact was originally introduced. But this process requires time and assistance from someone who is more familiar with the artefact in order for pre-service teachers to appropriate the artefact sufficiently to transfer what they have learned in a teacher education context to their future job as a teacher.

In this connection, the fact that most of the teacher educators and pre-service teachers in both cases rate their own digital competence as similar to everyone else’s may weaken the opportunities for appropriation of digital competence among pre-service teachers. If we see learning as a process of coordination and collaboration between learners and cultural artefacts, students must interact with someone who has a higher level of competence in order for learning to take place (Säljö, 2000).
Limitations

As a final point it is important to acknowledge the limitations of the study. One of these limitations is related to the nature of the data collected. Focus group interviews are useful for exploring ideas and interpretive validity (Johnson & Turner, 2003). Furthermore, focus group interviews are particularly useful for studying social interaction as a means of producing a more complete understanding of the issues discussed (Halkier, 2010; Gibbs, 2012). On the other hand, the possibility of the discussion being dominated by one or two students must be taken into consideration. Although the task of the moderator in a focus group discussion is to present the issues in question and create an open atmosphere where the participants are comfortable expressing their attitudes, students may be influenced by the more dominant participants in the group and thus be less inclined to present their personal opinions (Kvale & Brinkmann, 2009; Johnson & Turner, 2003; Gibbs, 2012). Moreover, both pre-service teachers participating in the focus groups and teacher educators were volunteers and thus their views on the issues discussed may not represent the full range of views.

A second limitation that should be addressed is the relatively small number of participants in the study. It is difficult to determine whether the same results could be identified across a larger group of teachers or in different institutions. However, the purpose of a case study is not to generalize across populations but to contribute to expand on or generalise theories by studying individual, group or organizational phenomena in the context of which they occur (Yin, 2009). This is what Yin refers to as analytic generalisation (Yin, 2009, s. 15). A second kind of generalization within case study research is naturalistic generalisation (Melrose, 2009; Stake, 1995). The purpose of naturalistic generalisation is not for researchers to present conclusions that can be transferred to a large population, but to invite readers to reflect on how ideas from the depictions presented may be applicable to their own situations (Melrose, 2009). In the current study, teacher educators are invited to translate the cases into their own day-to-day experiences with integration of technology in their classroom.

Finally, the question of reliability should be mentioned. While reliability in quantitative research depends on instrument construction, reliability or credibility, qualitative research relies largely on the skills of the researcher (Miles & Huberman, 1994). All analyses in this study have been done by the same person, something that may influence the reliability of the results. However, in order to improve reliability and reduce the potential bias of one person doing all the analyses, excerpts from the interviews were discussed with a second researcher.

CONCLUSION

Together the two cases highlight some important challenges regarding the appropriation of digital competence in teacher education. The stories presented
in this article suggest that the same challenges are found in both cases; the conflict between mastery and appropriation and between personal and educational use of technology, and the resistance towards technology among some teacher educators. This resistance may to some degree explain the gap between pre-service teachers’ and teacher educators’ personal use of technology and their competence in how to make use of technology in a learning context. In order to create opportunities for digital competence and teacher identity to develop in interaction with one another, it is therefore necessary to find ways to overcome this resistance. This can only be done by integrating technology even more as a pedagogical tool for teaching and learning in all subjects in the teacher education programmes.

Pre-service teachers who start their first year of teacher training autumn 2014 will not graduate until 2018. By the time they enter the classroom as teachers, the technical aspects of their digital competence in terms of mastery of digital tools may already be out-dated. Focus should therefore be directed away from mastery of tools themselves and towards appropriation of a digital competence that embraces awareness of how technology can be used critically and reflectively in the process of building new knowledge.

REFERENCES


ABSTRACT

Teacher education has recently been criticised for not fulfilling its obligation to adequately prepare teachers to utilise digital tools in the classroom. In this paper, we raise the question of why Norwegian teacher education does not prepare student teachers to integrate digital tools into their teaching as required by the Norwegian curriculum. We question the formal premises governing the development of digital competence in teacher education and how they correspond with the requirements of the Norwegian National Curriculum. To gain insight into this question, we analysed how digital competence is presented in the official key documents that create the framework for teacher education, and compared them to the requirements of the Norwegian National Curriculum. Our findings indicate that there is a weak link between the curriculum and the premises for digital competence in teacher education.

Keywords
digital competence, teacher education reform, national curriculum
INTRODUCTION

Teacher education is a complex institution that is a part of higher education and is closely related to schools (Jahreie, 2010). Teacher education has a double role: it develops both student teachers’ professional skills and their expertise in facilitating pupils’ learning. Therefore, constructing high-quality teacher education is multifaceted, requiring consideration of schools and pupils’ needs, and the current curricula, in order to prepare students for future teaching positions. Goodlad (1990) declared that ‘the education and training of teachers and principals must be closely tied to both the realities of schools and the conditions necessary to their substantial improvement’ (p. 27). Dissatisfaction with schools is often transferred to dissatisfaction with teacher education, which is criticised as ineffective at preparing teachers for their work and as ‘unresponsive to new demands’ (Darling-Hammond 2000, p. 166).

Norwegian teacher education underwent a reform in 2010. The new teacher education system has stronger subject specialisations and two tracks: a primary/middle school track and a middle/secondary school track. A major aim of this reform was to educate teachers to prepare children for the future (St. meld. nr. 11 (2008-2009), 2009). To that end, teachers should be able to integrate digital tools into teaching and learning, and identify the needs of children and youths’ digital lives (St. meld. nr. 11 (2008-2009), 2009). Despite the reform, teacher education in Norway has recently been criticised for not fulfilling its obligation to adequately prepare teachers for the school environment when it comes to digital competence (Gudmundsdottir, Loftsgard & Ottestad, 2014; Tømte, Kårstein, & Olsen, 2013). Tømte, Kårstein, and Olsen’s (2013) report focused on how future teachers are prepared to teach with and through digital tools. The report concluded that most teacher education institutions do not have a holistic approach to developing digital literacy, and that student teachers are not equipped to utilise digital tools (Tømte, Kårstein, & Olsen, 2013). Gudmundsdottir, Loftsgard, and Ottestad’s (2014) findings underpin this mismatch between teacher education and schools when it comes to digital competence. However, the reports do not elaborate why future teachers are not prepared to teach with and through digital tools when leaving teacher education. Yet, these concerns are far from new with regards to the situation of digital competence, and issues regarding future teachers’ repertoires for meeting contemporary challenges were raised a decade ago (Ludvigsen & Rasmussen 2006).

In this paper, we focus on the formal premises and concentrate on the Norwegian official governing documents in teacher education, and how these treat digital competence. These documents can be described as the framework of teacher education, guiding teaching in teacher education institutions. We raise the following question:

- What are the formal premises governing the development of digital competence in teacher education, and how do they correspond with the requirements of the Norwegian national curriculum?
To gain insight into this question, we analysed how digital competence is presented in the official key documents that create the framework for teacher education, and compared them to the requirements of the Norwegian National Curriculum (Norwegian Directorate for Education and Training – NDET, 2006). This article is organised as follows. First, we briefly present the concept of digital competence that forms the basis of our analysis, before moving on to describe our methodological approach. Finally, we present, analyse, and discuss our data and findings.

DIGITAL COMPETENCE: SKILLS, LITERACY, AND COMPETENCE

In this article, we draw on digital literacy as a conceptual framework for analysing the premises that govern the development of digital competence in teacher education, discussing the use of the concepts of digital literacy, digital competence, and digital skills. In Norway, due to the Norwegian language’s lack of a direct translation of literacy, the initial debate centred on two terms: digital dannelse (digital Bildung) and digital kompetanse (digital competence) (Erstad, 2005; Erstad 2007; Søby, 2003). Recently, references to the concept of digital competence in policy documents in Europe have increased (e.g., Ferrari, 2012, 2013; Hatlevik & Christoffersen, 2013), and we have therefore chosen to use this term.

Digital literacy is a complex term that has been incorporated within formal curricula. Curricula can also be described as social practices mirroring society’s definition of tools that are deemed essential. The concept of digital literacy has been debated (Alvermann, 2002; Buckingham, 2006; Gilster, 1997; Johannesen, Øgrim, & Giaever, 2014; Lankshear & Knobel, 2004; Knobel & Lankshear, 2006; Mifsud, 2006; Tyner, 1998). Initial discussions focused on defining and operationalising the concept, how to approach it in learning, and the distinction between the manipulation of digital tools and a broader conceptual understanding (Allan, 2006; Buckingham, 2006; Gilster, 1997; Knobel & Lankshear, 2006). Tyner (1998) dichotomised literacy, presenting it as tool literacies and literacies of representation. Tool literacies are concrete and include the use of and skills in computers, networks, and technology, while literacies of representation concern facility with information and media, including critically evaluating them and identifying what they represent (Tyner, 1998). Knobel and Lankshear (2006) also argue for an understanding of digital literacy as literacies, bringing up concerns about the understanding of digital literacy as an ‘it’ literacy—a ‘capacity or ability, a skill (or set of skills)’ (p. 16), ‘as it presents literacy as neutral and contextless’ (p. 17). Knobel and Lankshear (2006) criticised ‘it’ literacy on account of it being related to consuming information rather than producing information. Tool literacy may be associated with a narrow understanding of digital competence, an instrumental perspective. The meaning of competence is not static, but changes over time, not only as a result of technological development, but also as social practices develop. An example of this can be seen in the Norwegian context, where a
broad understanding of the concept has been developed (Erstad, 2007; Johannesen, Øgrim, & Giæver, 2014; Krumsvik, 2007). This understanding applies a converging notion where tool, critical and learning competences are included. We draw on this in our analysis.

ANALYSING DOCUMENTS

In this research, we utilised document analysis (Bowen, 2009; Silverman, 2004) to identify, understand, compare, and analyse the treatment of digital competence in governing documents of teacher education (2010) and in the National Curriculum (NDET, 2006). For the purposes of our study, document analysis was deemed appropriate, as our aims are to gain insight into the premises governing the development of digital competence at teacher education, and understand the consistency and/or discrepancies between digital competence in teacher education and the national curriculum. The documents were first skimmed, both manually (reading the texts) and digitally (searching the *.pdfs), focusing on topics related to digital competence. This process we reiterated, reading the texts closely. Information was organised thematically according to tool competence and/or critical competence.

With regards to documents pertaining to teacher education, we have focused on the White Paper St. meld. nr. 11 Læreren Rollen og utdanningen (2008–2009) (2009), as this forms the basis for the reform; the National Curriculum Regulations for Differentiated Primary and Lower Secondary Teacher Education Programmes for Years 5–10, as these ‘provide the overarching policy’ (Regulations; Ministry of Education and Research 2010b, p. 3) for teacher education programmes; and the National Guidelines for Differentiated Primary and Lower Secondary Teacher Education Programmes for Years 1–7 and Years 5–10 (Guidelines; Ministry of Education and Research 2010a), which have their legal basis in the Regulations and supplement the Regulations. Furthermore, the Guidelines specify the scope, objectives, structure, and intended learning outcomes for each subject and provide the policy for teacher education institutions’ programme descriptions. It is the local teacher education institutions that are responsible for detailed course descriptions based on the National Regulations and Guidelines.

The National Curriculum for Primary and Lower Secondary Schools and the Framework for Basic Skills were analysed in order to understand the schools’ requirements with respect to digital competence. The Framework for Basic Skills (NDET, 2012) is an overarching document where the aim was to guide the revisions of the Norwegian National Curriculum (2006) and the objectives of the five basic skills.\footnote{The curriculum identifies five skills (reading, writing, oral skills, numeracy, and digital skills) as basic to learning in school, work, and society, and stipulates that they be incorporated into all subject-specific curricula.} We studied the Norwegian versions of the documents, as these are the official documents. We are aware that, in presenting...
translations, we present elements of interpretation. Furthermore, they are the documents that teachers and teacher educators relate to. We also found that some official translations to English omitted parts of the text, and lacked specific subject details. After analysing the documents, we translated the relevant excerpts. The documents are listed in Table 1.

### Table 1 Documents Analysed for this Study

<table>
<thead>
<tr>
<th>Governing Documents for Primary and Lower Secondary School</th>
<th>Governing Documents for Teacher Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework for Basic Skills</td>
<td>National Curriculum Regulations for Differentiated Primary and Lower Secondary Teacher Education Programmes for Years 5–10 (2010b)</td>
</tr>
<tr>
<td></td>
<td>National Guidelines for Differentiated Primary and Lower Secondary Teacher Education Programmes for Years 5–10 (2010a)</td>
</tr>
</tbody>
</table>

In analysing the documents, we utilised a ‘skim-read-interpret’ (Bowen 2009) iterative strategy. Initially we skimmed curricula for both teacher educational tracks (primary/middle/secondary) and curricula for grades 1 through 10 for schools. For the purposes of this article, we took a pragmatic decision and focused on middle and secondary schools. We focused on how digital competence is defined in Norwegian, Mathematics, and Social Science in the seventh and tenth years of school in both the national curriculum and the national guidelines for teacher education. These subjects were chosen because they cover the largest amount of teaching hours during the ten years of compulsory school (excluding physical education). With regards to teacher education, we have also included the subject Pedagogy and Pupil-related Skills, as it serves as an overarching subject in teacher education and is the only compulsory subject.

We read printed and digital versions of these documents, conducting both manual and digital searches for the following terms: digital, media, technology, tools, information, communication, basic skills, and ICT (information and communications technology). After the initial searches, it became clear that the terms digital and ICT returned the same results as searches for media and technology because they are used in the same sentences and phrases. However, the notion of technology does not always parallel that of digital, often referring to technologies with other meanings than digital. Readings of the texts found that the National Curriculum uses the terms copyright and privacy in sentences...
adjacent to those with the term digital judgement. Such conjunctions might be overlooked in a digital search. We systematised our data by using a spreadsheet.

Data were interpreted from a digital competence framework. With regards to the specific subjects, we juxtaposed the data from the national curriculum and the teacher education documents. Moreover, we established the meaning of digital competence being utilised, and contextualised it focusing on tool and/or critical competences. In doing this, we identified similarities and discrepancies.

**FINDINGS: SIMILARITIES AND DISCREPANCIES**

Firstly, we look at digital competence in the National Curriculum, and the Framework for Basic Skills, as this forms the formal definition of digital competence for Norwegian schools. Secondly, we analyse the White Paper (St. Meld 2008–2009), as this defines the role of digital competence in teacher education. Thirdly, we examine the Regulations (Ministry of Education and Research 2010b) and link these to the Guidelines (Ministry of Education and Research 2010a), which are subject-specific. Then we analyse how these premises correspond with how digital competence is treated in the same subjects in the Norwegian curriculum.

The premises for school were laid by the reform of 2006, identifying digital skills as a basic skill (2012), previously called ‘the ability to use digital tools’ (2006), to be integrated at all levels and all subjects throughout the school system. The Framework for Basic Skills (2012) defines digital skills as follows:

> Digital skills involve being able to use digital tools, media and resources efficiently and responsibly, to solve practical tasks, find and process information, design digital products and communicate content. Digital skills also include developing digital judgement by acquiring knowledge and good strategies for the use of the Internet. (NDET, 2012, p. 12)

The term skills can indicate a limited understanding of digital competence, more akin to an instrumental tool literacy, and it is therefore crucial for understanding the concepts underpinning ‘digital skills’. This definition focuses on the ability to use digital tools in practical manners, emphasising processing, searching, producing, designing, and communicating. Furthermore, the notion of ‘digital judgement’ is highlighted, which refers to cyber ethics, security, and safety, including privacy and copyright and source evaluation. From the above definition, we see that the premises for school include both tool and critical competences.

Furthermore, in the Framework of Basic Skills’ definition, we see a dimension of having digital skills for achieving and supporting learning processes:
Consequently, using digital skills is a natural part of learning both in and across subjects, and their use provides possibilities for acquiring and applying new learning strategies while at the same time requiring new and increased powers of judgement. (NDET, 2012, p. 12)

In addition to tool and critical competences, the dimension of learning competence is added. This dimension focuses on digital competence as a means to further learning. Keeping these premises for school in mind, it is interesting to examine how the formal documents for teacher education treat digital competence.

The White Paper (St. meld. nr. 11 (2008-2009), 2009), on which the 2010 teacher education is based, emphasises digital competence as a basic skill to be integrated into all subjects (p. 13), and in doing so follows the premises laid down by the school reform of 2006. The White Paper also emphasises the importance of teachers’ competence in being able to incorporate digital media in their teaching, including evaluating different media for their pupils’ learning:

> It is important that teachers can assess the relevance of and make use of different media in dealing with pupils’ learning. This also means being able to familiarise themselves with ethical and legal issues with the use of the media. (St. meld. nr. 11 (2008–2009), 2009, p. 13, our translation)

Furthermore, the White Paper directly refers to the need for children to achieve the competence aims in the National Curriculum (St. meld. nr. 11 (2008–2009), 2009). In addition, the White Paper points out that social media has changed pupils’ role from that of consumers to producers, and gives special attention to the need for children to be aware of the complex ethical and legal issues involved in using the Internet, which often require good judgement. The White Paper argues that today’s student teachers must know how these issues affect children and adolescents, as well as how to use new technology in education (St. meld. nr. 11 (2008–2009), 2009). This indicates a learning competence that focuses on a didactical dimension.

In the Regulations (Ministry of Education, 2010b), digital competence was found twice: first, when specifying that teachers should have knowledge of developing pupils’ basic skills across subjects, across the curriculum and across disciplines, focusing on further developing students’ basic skills, and second, digital competence was mentioned, specifically focusing on digital judgement, as we saw in the White Paper, to further children and youths’ attitudes in digital arenas:

> […] understand the social perspectives involving digital and media development (safe Internet use, privacy, and freedom of expression), and be able to help children and youths develop a responsible attitude to digital arenas. (Ministry of Education, 2010b, our translation, §2)
On a theoretical level, these two documents present a holistic approach. The Regulations imply a learning competence together with the other basic skills, but do not emphasise digital skills specifically except for digital judgement. The Guidelines (Ministry of Education, 2010a) were developed on the basis of the White Paper and the Regulations. These act as the guiding principles for the development of curricula at local teacher education institutions, ensuring a nationally coordinated teacher education. In describing the content in teacher education, basic skills are referred to as

[… both a prerequisite for the development of knowledge and a part of this competence in all subjects. (Guidelines, 2010b p. 9, our translation)

In the above, we see that the importance of basic skills is underlined. Furthermore, the Guidelines emphasise the responsibility that each subject has in attending to student-teachers’ knowledge of how to develop pupils’ basic skills in the subject, and the fundamental importance that these skills have for learning in general.

The subject Pedagogy and Pupil-Related Skills is the only subject that is compulsory in teacher education, spread over three years. The aim of this subject is to ensure the ‘necessary subject-knowledge platform, provide methodological competence and develop skills in addressing relational and social issues to acquire a theoretical conceptual framework’ (Ministry of Education, 2009, p. 2). Furthermore, this subject also focuses on students’ knowledge of basic skills as a prerequisite for working with various subjects. As an overarching conceptual subject, it is natural to examine the premises that Pedagogy and Pupil-Related Skills lays for future teachers’ digital competence.

In Pedagogy and Pupil-related Skills, student teachers should ‘have knowledge of digital tools’ (2010a, p. 17, our translation) in order to be able to ‘facilitate pupils’ learning progress and their development of basic skills’ (p. 17, our translation). Here the focus is both tool competence as well as learning competence and being able to reflect on the didactic possibilities of using ICT. Furthermore, they are to have ‘knowledge about how digital tools can support pupils’ understanding of their own learning processes and are important tools in the students’ learning strategies’ (p. 19, our translation). This latter learning outcome for student teachers is in line with the learning competence that we have seen presented in the National Curriculum (2006), but from a more didactical perspective.

Student teachers are also to have knowledge about the media’s influence on children and youths, as well as children and young people’s active participation in the media society (Ministry of Education, 2010a, p.17, our translation), so as to assess various tools for supporting teaching and learning, and to reflect on the didactic possibilities of ICT use. Critical competence is presented from an evaluation of various learning resources perspectives. In another reference to student teachers being able to develop pupils’ basic skills, the emphasis is
on ‘oral skills, reading and writing in order to enable them [the pupils] to meet [the] school’s and society’s challenges’ (p. 19, our translation). Furthermore, they are required to have knowledge of children and youths’ activities in the media society. However, digital responsibility does not appear to be included. We find it interesting that digital skills is left out.

The concept of digital competence seems limited when moving from the White Paper to the Regulations and further to the Guidelines when referred to in the general part. The general descriptions in the Guidelines do not bind teacher institutions adequately. The White Paper’s intention is in line with the school reform, where digital skills are to be integrated into all subjects.

DIGITAL COMPETENCE INTEGRATED INTO SUBJECTS

The Norwegian curriculum addresses digital competence in two areas: the general introduction to the basic skills for each subject (on a general level) and, in greater detail, the competence aims for each subject, which specify how digital tools should be used to achieve learning outcomes. Together, these sections lay out the premises in detail for pupils’ digital competence. We present the three subjects separately, first examining the premises that the curriculum lays and then comparing them to those in the guidelines.

Norwegian

In Norwegian studies, the focus in the general description is on how digital skills can support the learning of the Norwegian language through integration into teaching:

Digital skills in the subject of the Norwegian language means the ability to use digital tools, media and resources to get and process information, to create and edit various types of texts and to communicate with others. In this context, it is important to have the ability to evaluate and refer to sources in a deliberative manner. Development of digital skills is part of learning to read and write in Norwegian through searching for, using and eventually assessing [texts], referring to digital sources in written and oral texts and producing increasingly complex texts. (NDET, 2013b, p. 5, our translation)

Here, the subject and digital skills, tool and critical competences, appear to be closely interconnected. Digital skills are incorporated into learning to read and write, and as such, digital skills and Norwegian complement each other. Digital competence is manifested through different learning activities, such as obtaining and processing information and creating and editing texts in Norwegian. Furthermore, digital skills in Norwegian also explicitly deal with issues of digital judgement, including knowledge of copyright and privacy laws and the critical evaluation of sources:
It also involves developing knowledge of copyright and privacy law and having a critical and independent attitude towards different types of digital sources. (NDET, 2013b, p. 5, our translation)

In the competence aims for the Norwegian language, we also see a focus on producing, assessing, and presenting texts using various tools and media. Composite texts with hyperlinks are specifically mentioned as an end-of-year goal for the seventh year of school. Searching for information is again mentioned, including the ability to evaluate and select information. The skills referred to as digital judgement are present in these competence aims, which concretise the intentions of the general description, emphasising both tool and critical competences.

In comparing digital skills in the curriculum for schools to the learning outcomes for Norwegian in the Guidelines, we see that student teachers are expected to ‘have knowledge of the current school curriculum for Norwegian’ (p. 30) and can use the curriculum to formulate goals for teaching Norwegian and develop relevant criteria for assessment (Ministry of Education, 2010a, p. 32). References to digital competence include knowledge of literature in different media and what happens in transposing a text from one medium to another. Digital competence is also referred to in conjuction with composite texts:

[U]se different digital tools in Norwegian language, to create and evaluate digital composite texts (p. 31, our translation)

The concept of digital judgement as described in the school curriculum is not mentioned under the subject of Norwegian in the Guidelines. The national guidelines give the Norwegian language subject primary responsibility for teaching the three basic skills of speaking, writing, and reading, but not digital skills. This is in itself interesting.

There are very few direct references to digital competence, which indicates a gap between the requirements laid by the curriculum and the Guidelines. While we see both tool and critical competence in the curriculum, we see only an indirect reference in referring to basic skills in general. While Norwegian in the curriculum takes a specific responsibility for digital skills, this is not the case with the Guidelines, where oral skills, written, and reading are the specific responsibilities of Norwegian. In learning outcomes, we see no evidence apart from the creation of composite texts and the ability to make use of different tools for teaching Norwegian. While the first is specific, the latter is more vague and does not require a high level of commitment.
Mathematics

In the general description of digital skills in the Mathematics curriculum (2006), the focus is on tool, critical, and learning competences, in terms of how digital tools can be used to support learning in mathematics:

Digital skills in mathematics involve using digital tools for learning through games, exploration, visualisation, and presentation. This also involves learning how to use and assess digital tools for calculations, problem solving, simulation, and modelling. Additionally, it means the ability to find information, and then analyse, process, and present data with appropriate tools and to evaluate sources, analyses, and results. Developing digital skills involves working with composite digital texts of increasing complexity. As well, it means becoming more aware of the benefits that digital tools have for learning in the subject of mathematics. (NDET, 2013a, p. 5, our translation)

Critical competence is emphasised through the importance of finding, analysing, and processing information and results, along with the critical evaluation of sources. The competence aims to follow up on several topics with a slight twist: the addition of ‘with and without digital tools’ (NDET, 2013a, pp. 7–9). This is interesting, as analogue and digital tools for mathematics are linked. Digital skills in the competence aims are visibly linked to learning mathematics, such as data collection and presentation, as well as drawing and exploring geometrical figures, co-ordinate systems, and maps, but there is no focus on aspects of digital judgement such as copyright and privacy, but only on critical evaluation of sources and results. Both tool and critical competences are strongly linked to Mathematics as a subject.

In the learning outcomes for Mathematics in the Guidelines, we found only two citations that refer to digital competence:

– have knowledge about expressing themselves orally, read, expressing themselves in writing, and using digital tools in mathematics (p. 35, our translation)

– have insight into and experience using of various learning materials, both digital and others, and the possibilities and limitations of such teaching aids (p. 35, our translation)

The focus is on insight and experience in using digital tools and other teaching aids in the subject and knowing their potential and limitations. Compared to the competences presented in the curriculum, we see that tool, critical, and learning competences are directly linked to the Mathematics in the curriculum, but not in the Guidelines. The competence defined in the Guidelines is strongly tool-oriented, focusing on the use of tools, and with little or no focus on critical and learning competences. Furthermore, the focus is on the student teacher’s own basic skills, but there is no didactical dimension to learning competence.
Four of the basic skills in the curriculum are prioritised by a ‘home subject’ with which they are associated: mathematics covers numeracy skills, and Norwegian speaking, reading, and writing skills. However, digital competence is neither prioritised in any of the subjects so far reviewed, nor does it have a ‘home subject’ (Engen & Øgrim, 2009).

**Social Science**

The general description of digital skills in the social sciences offers a broader approach to digital competence. In the first part we see tool and critical competences explicitly mentioned:

> Digital skills in social studies means the ability to use digital resources to search for information, explore websites, critically assess sources, and select relevant information on topics in the subject. Digital skills also include using digital tools for presentation and collaboration to prepare, present, and publish multimedia products. Additionally, digital skills means the ability to communicate and collaborate digitally on social science topics and to follow the rules and norms of online communication, including privacy and copyright laws. (NDET, 2013c, pp. 5–6, our translation)

The use of digital tools to support presentation and collaboration is mentioned specifically, and the rules and norms of online communication and privacy and copyright law are highlighted as important aspects of digital skills. Furthermore, in the competence aims, ‘netiquette’ and privacy and copyright law are dealt with from the fifth to the seventh years of school, as well as from the eighth to the tenth years. The social sciences also focus on the critical evaluation of sources throughout middle and lower secondary school. The second part focuses explicitly on learning competence:

> Developing digital skills in the social sciences involves learning to use digital tools and media to acquire academic knowledge, to express competence, and to reinforce academic information. Digital skills in the social sciences are learned in a process that starts by using digital tools to find and create academic content. Also, digital skills include the ability to develop and use various search strategies, to make critical choices and to express academic reflection. (NDET, 2013c, pp. 5–6, our translation)

Similar to the Norwegian curriculum, tool competence is strongly intertwined with learning competence. Social Science presents a comprehensive, holistic approach to digital competence.

In the learning outcomes in the Guidelines for social sciences, the focus is on tool, critical, and learning competences from a didactical dimension:
can use sources and materials relevant to Social Science, developing pupils’ basic skills

use and evaluate digital tools and sources for teaching, and help ensure that students can relate actively and critically to digital media. (Ministry of Education, 2010a, p. 76, our translation)

It is clear that the subject has an explicit responsibility for evaluating sources. The other dimensions of digital judgement that are especially visible in the curriculum, copyright and privacy, are not mentioned here. However, while the learning outcomes correspond to a certain extent with the curriculum, the learning outcomes are far less comprehensive and holistic.

WEAK LINKS

The double role of teacher education means that the relationship between the curricula for teacher education and for schools is crucial. We conclude that there is an obvious disparity between the terms that the curriculum sets for the education of digitally competent pupils and those that the governing documents of teacher education set for the education of digitally competent teachers. This disparity appears both in how digital competence is understood and in the degree of commitment to it.

Our findings indicate that, firstly, digital competences fade from the White Paper to the Guidelines. The White Paper has a broad understanding of digital competences, including tool, critical, and learning competences. However, the Guidelines have a narrower tool focus, where critical and learning competences are more implicit and less visible and therefore less binding.

Secondly, on a general basis, the curriculum is clear and takes a coherent, holistic approach to the use of digital tools and the development of digital skills, including digital judgement. The premises for digital competence in teacher education are less clear; they are somewhat fragmented and random.

Thirdly, similarities and disparities vary according to the subject. We see that there are disparities between the curriculum and the premises for digital competence in teacher education with regards to which dimensions in digital competence are underlined—tool, critical, and/or learning competences. For example, the teacher education subjects reviewed in this paper specifically mention digital judgement only within the context of the social sciences, while these subjects’ counterparts in the curriculum explicitly address the topic. We see that, while learning competences are to a certain extent emphasised in the social sciences, religion and philosophy of life, and ethics.
Guidelines, there are differences as to whether it is the didactical aspects that are highlighted or student learning.

To sum up, we see that digital competence in the curriculum does not correspond with formal documents that form the premises for teacher education. Weak links between the curriculum and guidelines for teacher education imply that teacher education does not meet the needs of school. Furthermore, vague, non-binding guidelines give the responsibility for the development of local plans to promote teachers’ digital competence. Regional and local differences emerge between and within the different teacher education institutions, which again means that it is not ensured that all student teachers are digitally competent. Local study plans may include digital competence to a greater degree than the National Guidelines. Furthermore, practices in local teacher education may differ, and this study does not refer to practices but rather discusses premises that formal documents lay out for teacher education. Thus, the recent criticisms aimed at teacher education (Tømte, Kårstein, & Olsen, 2013; Gudmundsdottir, Loftsgard, & Ottestad, 2014) appear to highlight an important issue. However, it is not simply a question of teacher education institutions failing to do their job. The problem is that formal premises for digital competence in teacher education have not been formulated.

REFERENCES


