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What Counts as Digital Literacy

Experiences from
a Seventh-Grade Classroom
in Norway

Introduction

It is tempting to attribute changes to some technological innovation but erroneous to do so.¹

Neil Postman's point in 1971 was that literacy continues to change as the means of communication change.² This puts literacy in what one can call a "time-frame" – the meaning of literacy changes as means of communication change over time – being literate at the turn of the 19th century had different implications than it has now. Many have for example attributed higher levels of literacy to the printing press.³ On the other hand, Kress points out the dangers of attributing changes to a technological innovation. Taking on a sociocultural perspective, the assumption is that learning has to do with how people appropriate and master tools for thinking and acting that exist in a given culture or society.⁴ This anchors literacy and learning in societal perceptions of what is important for a particular society. Thus, the nature of "literacy" is not neutral, rather becoming literate has always depended on mastering processes that are deemed valuable in particular societies, cultures and contexts;⁵ it is defined

¹ G. Kress, "Visual and Verbal Modes of Representation in Electronically Mediated Communication: The Potentials of New Forms of Text", in I. Snyder (ed.), *Page to Screen: Taking Literacy into the Electronic Era*, London: Routledge, 1998.

² N. Postman, "The New Literacy", *The Grade Teacher* 88 (1971), see pp. 26–27 and 40.

³ The attribution of higher levels of literacy to the Gutenberg press has been debated; however it is beyond the scope of the present paper to enter into this debate.

⁴ J. V. Wertsch, *Voices of the Mind: A Sociocultural Approach to Mediated Action*, Cambridge, MA: Harvard University Press, 1991, as referred to in R. Säljö, "Learning as the Use of Tools: A Sociocultural Perspective on the Human-Technology Link", in P. Light and K. Littleton (eds.), *Learning with Computers: Analysing Productive Interaction*, London: Routledge, 1999.

⁵ M. Warschauer, *Electronic Literacies: Language, Culture, and Power in Online Education*, Mahwah, NJ: Lawrence Erlbaum Associates, 1999.

by different/particular social groups, as Street's definition of literacy as a practice also suggests.⁶

Yet the concept of digital literacy has recently figured in many studies of use of new technologies, policies and documents both in Norway and elsewhere. The terms used to describe the concept appear to differ somewhat – from digital, media, information, visual and multimodal literacy or literacies, education and competencies. What is ascribed to digital literacy also varies – from describing the physical skills of using digital artefacts to intellectual-critical information competencies, to a holistic interpretation of education as “learned”. This paper attempts to show that many of the definitions of “digital” literacy appear to build on similar concepts. Specifically, it is argued that to understand “digital” literacy we need to focus on the individual's understanding and perception of digital affordances. To demonstrate this, reference is made to a study that attempted to integrate handheld technology in the classroom and examples are used to illustrate the issues that are described in this paper.

Understanding “Digital Literacy”

...teachers and parents are told – and children believe – that students' life chances hinge on their grasp of new technologies.⁷

In Norwegian, the word for *literacy* does not have any direct or current translation that is in use; and in this context, literacy is often translated into either *competence* in English or *dannelse*, which can be compared to the German term *Bildung*. It is interesting to note that the antonym, *illiteracy*, however, does have a direct translation – *analfabet* – which literally translated means “not knowing the letters”. I would like to juxtapose digital literacy to its antonym, thus turning the tables and asking what it means to be *digitally illiterate*. What are the consequences of being digitally illiterate in a digitally *literate* society? Tyner, drawing on Freire's seminal work, points out the powerful social stigmatism that is associated with being “illiterate”.⁸ Being illiterate means being left out from part of the social goods in a culture and experiencing some degree of disempower-

⁶ B. V. Street, “Literacy Events and Literacy Practices”, in M. Martin-Jones and K. Jones (eds.), *Multilingual Literacies: Reading and Writing Different Worlds*, Amsterdam: John Benjamins, 2000.

⁷ K. Tyner, *Literacy in a Digital World: Teaching and Learning in the Age of Information*, Mahwah, NJ: Lawrence Erlbaum Associates, 1998, p. 3.

⁸ *Ibid.* Tyner draws on P. Freire, *Pedagogy of the Oppressed*, New York: Continuum, 2000.

ment. Is digital literacy *something* one expects to learn at school, something one brings from other contexts or a crossover of both? From a socio-cultural viewpoint, what does a student have to appropriate and master in order to be called digitally literate by the current society? What counts as “digital” literacy?

In attempting to understand digital literacy, it is important to first raise the issue of what digital artefacts afford⁹ that analogue ones do not and the user’s perception of these artefacts’ affordances. *Digital* often stands in contrast to *analogue*; it is worth noting, for example, that the digital affords textual interactivity, which can be considered from the perspective of the role of the reader and the writer. Digital can refer to several kinds of artefacts – from different kinds of desktop computers, laptops, mobile telephones or mobile computers (PDAs), as well as the different programs each one uses. Säljö points out that

...a very obvious feature of computers is that they allow for powerful visualization of models and all kinds of complex phenomena. ... the mode in which abstract concepts that can never be observed in any direct sense (such as force and momentum) can be “made visible” and manipulated in simulation offers new pathways for learning.¹⁰

Perception, affordance and literacy can be linked by drawing on the Norwegian folktales by Asbjørnsen and Moe.¹¹ Pål, Per and Espen Askeladden are three brothers. Espen is the youngest of the three. According to the tale, Espen usually follows a path, picking objects along the way. The two brothers laugh at the objects that Espen collects, as they appear to be rubbish. However, Espen finds ways and means to use the things that he collects and finds use for them in the tasks that he is allotted, whereby

⁹ *Affordance* was coined by Gibson (see J. J. Gibson, *The Ecological Approach to Visual Perception*, Hillsdale, NJ: Lawrence Erlbaum Associates, 1986). Gibson suggests that what we perceive when we look at objects are their affordances not their qualities. “Affordance” refers to the perceived and actual properties of the object, the fundamental properties that determine how the object can possibly be used. The term “affordance” has in later years been the source of debates, with the term “constraints” as the antonym (for a discussion of affordances and constraints see: D. A. Norman, *The Design of Everyday Things*, London: The MIT Press, 2002). However, in this paper I am using the term “affordance” to refer to the individual’s perception of the possibilities offered by an artefact and how these perceptions affect the way the artefact is used.

¹⁰ Säljö, *op. cit.*

¹¹ P. C. Asbjørnsen and J. Moe, *Samlede eventyr*, 9th ed., Oslo: Gyldendal, 1998.

he wins the princess and half the kingdom. Seen from a different angle, Espen perceives qualities or “affordances” of the objects that his brothers do not. He is creative in the way that he applies the objects’ affordances to suit his needs. Applying this to the study of digital literacy, definitions of digital literacy *imply* the affordance of the technological functions but *do not specifically refer to it*. Viewing literacy through the affordance lens means that digital literacy becomes personal and not universal. Perceiving the affordances of a digital artefact is an essential ingredient in understanding digital literacy. Perception is subjective. As Vygotsky argues:

By this term I mean that I do not see the world simply in color and shape but also as a world with sense and meaning. I do not merely see something round and black with two hands; I see a clock...¹²

Thus, being able to perceive that something round and with two hands is a clock implies not only that one knows that this is a clock that affords telling the time, but also that one can set the clock to a particular time and that time stands in relation to something else. The ability to perceive not only the characteristics of an artefact but its affordances can thus be linked to the context, culture and the individual. This argument can be extended to digital literacy, not only in the debate of what is accepted as digital literacy as depending on the particular context and culture, but also in taking account of perception and affordance.

Consider digital literacy in the school context. Does being able to send text-messages from a mobile phone or playing puzzle games constitute being digitally literate? While sending SMS messages represents the height of “e-literacy”¹³ for my mother, from an educational perspective, SMS-sending, and mobile telephones in general, have so far been frowned upon by schools. To my understanding, much of what has been written about digital literacy builds on the following common grounds:

i) The manipulation of digital tools as a skill.

Learning to manipulate digital tools and learning the techniques of using digital artefacts. It is true that one has to be familiar with the “key-strokes” to a certain extent – and this is perhaps the reason why it crops

¹² L. S. Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*, Cambridge, MA: Harvard University Press, 1978.

¹³ I use the terms e-literacy and digital literacy interchangeably in this paper.

up in definitions of and debates around digital literacy. This understanding of literacy focuses on the knowledge of how to operate the digital tools. From a socio-cultural point of view, one can term this literacy as the mastery process of the more technical aspect of digital technology. The technical knowledge or skill is needed if the affordances are to be perceived. This knowledge is sometimes taken for granted¹⁴ – perhaps an example of the expectations of a digital society? What differentiates skill and competence in this context?

ii) *Digital literacy as an extension of and building on traditional print concepts of literacy or literacies.*

Traditional print literacy, apart from coding and decoding skills, has been defined as ways “of conveying meaning through and recovering meaning from the form of representation in which it appears”¹⁵. In digital literacy, the focus appears to be on the ability to screen, evaluate and be critical to “not-always-reliable” information available on the internet, information which previously was screened by teachers and librarians. Lankshear and Knobel¹⁶ criticize the understanding of literacy as a skill that one needs to have, which one has to standardize for teaching. They argue that current understandings of digital literacy place a heavy focus on being able to evaluate and select “the best” information. They further argue for a need not to operationalize but to problematize the concept of digital literacy, while not denying that elements of skill and technique are involved in practices of reading and writing. Again, this raises the question of what “being critical” involves – does being critical amount to finding the information which is most correct? Or one can relate this concept of being critical to Gadamer’s concept of taste – that taste

obeys a criterion of content. What is considered valid in a society, its ruling taste, receives its stamp from the commonalities of social life. Such a society chooses and knows what belongs to it and what does not ...

¹⁴ A friend recently purchased a mobile telephone and while the “quick guide” highlighted how to download music, use the phone-camera and other “advanced” adjustments, there was absolutely no introduction as regards how to actually *ring* from the telephone.

¹⁵ E. Eisner, “Cognition and Representation: A Way to Pursue the American Dream?”, *Phi Delta Kappan*, vol. 78, no. 5 (January 1997), pp. 349–353.

¹⁶ C. Lankshear and M. Knobel, “Digital Literacies: Policy, Pedagogy and Research Considerations for Education”. Paper presented at the ITU conference: *Kreative Dialoger*, Oslo, 2005.

selecting and rejecting on the basis on some content.¹⁷

iii) *The appropriation of information and intelligent “cut-and-paste”/ “copy-delete” techniques.*

Kist¹⁸ envisions that a “new literacy” classroom would develop students’ critical literacy and that students would become both critical readers and writers of texts. Brown and Day¹⁹ argue that the ability to summarize information – which they term as “copy-delete” – is an important study skill, which involves the *comprehension* of and attention to importance at the expense of trivia; reading, copying and deleting elements from the text, reading, interpreting, highlighting. Rasmussen’s study of students in a multimedia classroom also reflects elements of understanding and integrating in what she describes as a “cut-and-paste” literacy practice, where the students’ perception of what is relevant as well as their understanding of the text is central.²⁰ While the concepts of copy-delete and copy-paste are both possible and have traditionally been used as working methods in analogue classrooms, the digital both facilitates this literacy (it is easy to “copy-cut-paste”) while the sheer volume of information available makes the search for “correct” information more difficult. Here it is the process of integration and appropriation of the information that become the focus of “literacy”. The student’s individual understanding is crucial. Paul Gilster²¹ defines digital literacy as “the ability to understand information and – more important – to evaluate and integrate information in multiple formats that the computer can deliver”. Here digital literacy is not only the search for the “best” information but also the student’s ability to appropriate the information and integrate it into his or her own work. Further expanding on the definition of digital literacy, Gilster adds the computer’s “multiple formats”, asserting that it is not only the search

¹⁷ Hans-Georg Gadamer, *Truth and Method*, rev. 2nd ed., London: Sheed & Ward, 1989, pp. 84–85.

¹⁸ W. Kist, “Beginning to Create the New Literacy Classroom: What Does the New Literacy Look Like?”, *Journal of Adolescent and Adult Literacy*, vol. 43, no. 8 (2000), pp. 710–718.

¹⁹ A. L. Brown and J. D. Day, “Macrorules for Summarizing Texts: The Development of Expertise”, *Journal of Verbal Learning and Verbal Behavior* 22 (1983), pp. 1–14.

²⁰ I. Rasmussen, *Project Work and ICT: Studying Learning as Participation Trajectories*, Doctoral Thesis, Oslo, Norway: University of Oslo, 2005.

²¹ P. Gilster, *Digital Literacy*, New York: Wiley, 1997.

for correct information and its appropriation that is important, but also the familiarity with multiple formats. This implies that one has to be able to perceive the computer's various formats and affordances, and also making use of the computer's affordances to solve the task at hand.

iv) The inclusion of the visual.

Recently, there has also been focus on expanding literacy to include the visual aspects. Gee opens the discussion of literacy to include video games.²² He claims that when people learn to play video games they are learning a new literacy, arguing that language is not the only important communicational system and images carry meanings that one is not always able to recover from the text. This is also reflected by Kress, who argues that the visual may be more useful for transmitting large amounts of certain kinds of information.²³ These and other similar arguments have given rise to the term "visual" literacy. Lankshear–Knobel and Tyner²⁴ suggest that one has to look at literacies, not "a" particular literacy, and that literacies co-exist. One can argue that there are many forms and contexts of "digital" or "e"-literacy – from the daily to the specific.

Going back to the Norwegian folktales, Espen Askeladden perceived the affordances of the objects he collected, and used them in ways that he needed. I argue that finding new ways of doing things and making the technology work for your needs is "a" literacy. One must keep in mind that youth in the 21st century are familiar with many forms of digital technology, from mobile phones, which have practically 100% penetration in Norway, to Gameboys and Nintendos, amongst other digital artefacts.

In summary, one can argue that if a person does not perceive the affordances of a technology, this will have consequences for how it is used. While, as I have pointed out, there is a myriad of definitions of digital literacy, few of these appear to take into account the user's perception of the digital artefact's affordance. I argue that the user's perception of the digital artefact's affordance is important in understanding digital literacy and in analyzing and understanding how and why a digital artefact is used in different contexts.

²² J. P. Gee, *What Video Games Have to Teach Us About Learning and Literacy*, New York: Palgrave/Macmillan, 2003.

²³ Kress, *op. cit.*

²⁴ See notes 7 and 16 above.

Methodological Approach and Case Description

Nothing is more necessary to comprehending what anthropological interpretation is, and the degree to which it is interpretation, than an exact understanding of what it means – and what it does not mean – to say that our formulations of other peoples' symbol systems must be actor-oriented.²⁵

The methodological approach chosen was classroom observation supplemented with interviews and concept-map drawings by the students. In addition, the work of eight students was downloaded from PAAM²⁶, including logs that the students wrote for their teachers once a week. The students were observed for two periods of time, a three-week and a four-week period over two consecutive semesters. While the camera was placed at the back of the classroom during the first few days of observation, since the students were equipped with mobile technology, the students' activities also tended to be mobile; and in order to capture what was happening and the students' interactions, the camera was moved closer to the students, and moved from group to group. Thus, the researcher's role can be described as an active observer, asking the students questions about their activities while the activities were being enacted.²⁷ The general aim of the study was not to provide generalizations but rather to provide in-depth knowledge of the use of mobile technology in primary school classrooms.

The classes followed consisted of 40 children at Headland Primary School²⁸ in Norway. The study followed the same children and teachers in grades six and seven over a period of two years. The two classes were joined together into one class in the seventh grade, but had the same number of teachers in the classroom. They used a listening-room – for when the teacher needed to speak to the whole class – a room for “working” and three adjacent rooms for group work. In the working-room, the pupils sat mainly in groups of four, some in pairs and some alone. The students (and the teachers) were equipped with Palm IIIcs and a folding keyboard.

²⁵ C. Geertz, *The Interpretation of Cultures: Selected Essays*, New York: Basic Books, 2000.

²⁶ Palm Artefact and Archive Manager: see <http://goknow.com>.

²⁷ Much can be said about this method of data collection and observation. Silverman for example notes the effect of the camera on the observees; however, this discussion will not be taken up in this paper. See D. Silverman, *Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction*, 2nd ed., London: Sage, 2001.

²⁸ The name and location of the school have been changed to protect the identity. The handheld technology and the supporting software were donated by Hi-CE at the University of Michigan (<http://www.handheld.hice-dev.org>).

Examples from the Classroom

The examples chosen are divided into three: problem-solving of technical problems, discovery, and using digital technology together with other technologies.

Students quickly developed technical problem-solving skills. During the first observational sessions, it was noted that the PDAs from time to time had some technical problems. In one session, it was observed that Olav's PDA was, as he said, "dead". He tried to fix the problem by pressing the green "on" button, but the PDA did not start. Then he changed the batteries. When that still did not appear to get a response, he uncapped the stylus and pressed the "hard reset" button at the back of the PDA. The PDA still did not respond. He then went to his teacher. In other sessions it was observed that the teachers quite often turned to the students for solving technical problems. When the students were asked how they "knew" what to do to solve these problems they said that they had experimented on their own PDAs.

The discovery process was explored through digital games and other programs. One of the more popular pastimes in the classes followed was playing games. The games were obtained from different sources: downloaded from the internet or beamed from a parent. These games did not make up part of the curriculum and the students discovered how to play on their own. Students found the handhelds in general easy to use.²⁹

This discovery aspect also refers to many other programs – not all the programs in the Hi-CE suite were used during class. The students, however, still used them in their own time. When a new program was installed the students first tried to use it on their own, whether it was a spreadsheet program for mathematical use (Cells) or a virus-transfer simulation program (Cooties). This brings up the aspect of fun for its own sake – although there is no direct educational goal in the games that they play, such as Solitaire and Seven Seas, and the value of such games is often debated. Even Derek, who is described by the teachers as a "weak student", plays Seven Seas often.

There were also indications of the students' being able to use the technology together with other forms of technology, be it digital or analogue and finding ways to make the technology suit their needs. One example

²⁹ See also L. Mifsud, "Using Handheld Technology in a Norwegian Sixth-Seventh Grade Classroom: Student Perceptions", in M. van 't Hooft and K. Swan (eds.), *Ubiquitous Computing in Education: Invisible Technology, Visible Impact*, Lawrence Erlbaum Associates (in press).

of practice which was observed in most of the students was using PicChat, a program for simultaneous beaming, mainly used for collaborative on-task assignments. The students used it for sending “secret” messages to each other. This way of using the program evolved after the students were asked to delete messages and drawings which the teachers regarded as inappropriate from their PDAs. The students realized that the teachers could not see the messages and drawings they sent to each other using PicChat.

Another example is the students’ using the PDAs together with pen, paper, books and desktop computers. Needing the meaning of the word “empathy” and not finding a meaning which she understood in the dictionary, Nora went over to the desktop computers to search for the meaning of the word in online dictionaries. Cecilia is writing sentences in English on her PDA. She looks up the word *clown* in the Norwegian-English dictionary as repeated typing of the word “clown” gets a “the word is incorrect” message. The students here manage to make themselves familiar with the technology and dare to experiment (e.g. “I have tried it out on mine”). They also dare to try out the different programs for other things than they originally were meant for. This can be seen in the students trying out the pedagogical programs on their own, even though these are not used for educational purposes by the teachers. One can also see evidence of trial and error, and doing this can be interpreted as a sign of familiarity with the technology. I argue that these are examples of e-literacy.

Analyzing these examples from an extended perception-affordance viewpoint, it appears that the students have perceived some of the PDA’s affordances and are making this work for them in the students’ own context. They perceive the technical limitations (the PDAs are not networked) and go to the desktop computers when this is needed. The students’ perception of the PDA’s affordances is also indicated in the students’ adaption of the program PicChat to suit their need for personalization and privacy.

One can also see a transfer of responsibility and expertise from teacher to student. Jonassen et al.³⁰ argue that while teachers must familiarize themselves with the technology, there is no need for them to become experts and they will be most successful in helping students to learn *with* technology. They further argue that if the teachers give up some authority, then the learners must assume it.

³⁰ D. H. Jonassen et al., *Learning to Solve Problems with Technology: A Constructivist Perspective*, Englewood Cliffs, NJ: Merrill/Prentice Hall, 2003.

Reflections and Directions for Future Work

Digital literacy is a complex phenomenon. In using the term digital literacy, studies have to take up what counts as digital literacy in different contexts. In an educational context, does the students' exploration of digital artefacts count as e-literacy? In many definitions of digital literacy, for example, this is not so as the focus is more on information seeking and integration. Studies of use of digital technology that focus on digital literacy need to take into account the user's perception of the affordances of a digital artefact. This is crucial in analyzing and understanding how and why a digital artefact is used in different contexts. It is also important to take into consideration the culture that the technology is being used in, and whether the technology contributes to an evolution of new practices which become embedded in the culture. There is also a need for studying the teacher's perception of the technology in more detail, and whether this affects the pedagogical use of the technology in the classroom.³¹

³¹ The author extends her gratitude to the Institute of Information Systems at Agder University College, Kristiansand, Norway, for funding this research; InterMedia and the University of Oslo, Norway, for their support; and the Center for Highly Interactive Computers in Education at the University of Michigan, USA, for providing the handheld technology and supporting software (<http://www.handheld.hice-dev.org>). Sigmund Lieberg provided comments on an earlier draft.