Handheld technology in the classroom: focusing on literacy Work in Progress

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Introduction

Postman (Postman, 1971) pointed out in 1971 that the term [literacy] continues to change as the means of communication change. The term 'digital literacy' is relatively new, grounded in what appears to be a widely held perception that society needs a 'new' literacy as a result of new communication technologies and, in the context of education, that students' life chances hinge of their grasp of new technologies" (Tyner, 1998); (Kist, 2000); (Gilster, 1997). Tyner suggests that today literacy consists of the *skills* with which man *manipulates* the many media of mass communication (Tyner, 1998:62). Emphasis added). The Norwegian Department of Education for example focuses on digital "literacy¹" as a basic skill and competence (UFD, 2004). In assessing and evaluating digital literacy, one faces new challenges – challenges of operationalising digital literacy. Nixon for example argues that one is still uncertain about how to observe new practices associated with new technology and what form of analysis one should apply to multimodal texts (Nixon, 2003:410).

Mobile technology is a part of the daily landscape - 99% of 16-24 year-olds, 88% of secondary school students (13-16 year olds) and 96% of upper secondary school students have access to a mobile telephone in Norway (SSB, 2003). Many have seen the potential that handhelds have to offer, of "one-to-one" device-to-student ratio and flexible access to learning which many have argued is necessary for any sort of impact to be made in education (Brown, 2001; Hennessy, 2000; Inkpen, 1999; Norris, Soloway, & Sullivan, 2002; Shields & Poftak, 2002; Soloway, Grant,

¹ The word "literacy" does not have a direct translation into Norwegian and is translated either to "dannelse", which is close to the German "Bildung" or "kompetanse" – competence.

Tinker, Roschelle, Mills, Resnick, Berg, & Eisenberg, 1999; Soloway, Norris, Blumenfeld, Fishman, Krajcik, & Marx, 2001; Tatar, Roschelle, Vahey, & Penuel, 2003; Vahey & Crawford, 2002). Trotter for example discusses whether handheld technologies in school are "new best technology tool or just a fad" (Trotter, 2001), a point which Vahey also raises (Vahey & Crawford, 2002:5).

Following on from this, the study reported in this paper looks at the introduction of handheld devices in the classroom environment from a social-cultural perspective. Headland Primary School², in Norway, has attempted to integrate handheld technology in the classroom³. The paper builds on preliminary findings from a field study at Headland Primary School in Norway, and argues that while the technology "offers affordances", personal experience and perception of the technology also play a role in how the artefact is used. In particular, this paper is concerned with investigating whether the students' perception of the technology plays a role in how and why handhelds are used in class.

Digital Literacy

Digital...

Digital can refer to several kinds of artefacts – from different kinds of desktop computers, to laptop to mobile telephone or mobile computer (PDA) as well as the different programs each one has. Research in digital literacy thus needs to take this into account. What do the different digital artefacts *afford? Affordance* was coined by J.J. Gibson. Gibson suggests that what we perceive when we look at objects are their affordances not their qualities (Gibson, 1986). Gibson uses the example of chair – that it should look "sitable" – which is also relative - knee-high for a child is not the same as knee-high for an adult. Affordance thus refers to the perceived and actual properties of the object, the fundamental properties that determine how the object can possibly be used. **Digital** 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. Säljö for example points out that a

² The name and location of the school have been changed to protect the identity

³ The handheld technology and the supporting software were donated by Hi-CE at the University of Michigan (<u>http://www.handheld.hice-dev.org/</u>).

"very obvious feature of computers is that they allow for powerful visualisation 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"

(Säljö, 1999:153).

...literacy

Much has been written on the concepts of literacy and of digital literacy and "other literacies". Street suggests regarding literacy as "practices", where literacy practices are a means of focussing upon "social practices and conceptions of reading and writing" (Street, 1984:1). Street further elaborates this concept to referring to a "broader cultural conception of particular ways of thinking about and doing writing and writing in cultural contexts" (Street, 2000:22). For many, literacy has simply meant having encoding and decoding skills which were in turn seen as building blocks for doing other things - such as comprehending, engaging in classroom learning, studying curriculum subjects, and so on (Lankshear, undated). Säljö (Säljö, 2001:164) argues that writing is an artificial medium for communication and part of a technique or technology, a man-made resource for communication which assumes a physical accomplishment as well as intellectual insights. Eisner defines literacy as

"...a way of conveying meaning through and recovering meaning from the form of representation in which it appears" (Eisner, 1997:353).

The focus here appears to be on the concepts of *meaning* and *understanding*. Paul Gilster 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" (Gilster, 1997:9).

As in literacy, the concepts of meaning and understanding also appear to be dominant in defining *digital literacy*. However, in addition one sees that the concepts of *evaluation* or *critique* are added to understanding and meaning. In Gilster's definition of digital literacy he also emphasises *integration*. Tyner (Tyner, 1998) points out that the "introduction of new literacy tools raises intriguing questions about the way people pick and choose from the elements of a text – form, content and context – to navigate and make sense of an increasingly mediated world."

Brown and Day (Brown & Day, 1983) argue that the ability to summarise 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 – which involves reading, copying and deleting elements from the text – reading, interpreting, highlighting. Rasmussen's (Rasmussen, 2003) study of students in a multimedia classroom also reflects elements of understanding 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. Both concepts <u>imply</u> the affordance that lies within the technological functions of copying, pasting and deleting, but <u>do not specifically refer to it</u>. While the concepts of copy-delete and copy-paste are both possible in an analogue world, it is the digital which facilitates this literacy.

Hermeneutics suggests that the very process of both reading and analysing a text is incremental and creative – readers gradually work out their categories of understanding in order to arrive at a coherent interpretation. The textual whole must be interpreted as part of larger totalities (Bruhn Jensen, 2002:21-22). Understanding is interpretation. As Gadamer explains, understanding is not "an isolated activity of human beings but a basic structure of our experience of life. We are always taking something as something."(Lankshear, undated). Gadamer (Gadamer, 1989) considered language to be central to hermeneutic pre-understanding, with the understanding of written text being central. From a hermeneutical perspective, reading involves *interpretation*, and where all interpretation is highlighting, and it is thus justifiable to speak of the interpretation that lies behind every reproduction, and as such it must be possible to give an account of it (Gadamer, 1989). Thus, through interpretation, hermeneutics serves as a conceptual framework for understanding literacy. Kist for example pictures that a "new literacy" classroom would develop students' critical literacy and that students would become both critical readers and writers of texts. Again, this raises the question of what "being critical" involves. 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... selecting and rejecting on the basis on some content" (Gadamer, 1989:84-85).

What society considers as valid can be seen being applied to one form of literacy - in the debate of which books are appropriate for children.⁴ This debate of what is appropriate for

⁴ (Ross, 1995) and (Tucker, 1990) give detailed arguments for which children's books are deemed as worth reading, library censorship, a debate which is beyond the scope of this paper, but is worth mentioning.

children can also be applied to computer or video games, and which games are suitable, selecting and rejecting on the basis of the content and culture.

"What value is there in playing computer games?" is a frequently asked question by adults. Gee (Gee, 2003) claims that when people learn to play video games they are learning a new literacy. Gee gives two reasons for "expanding" literacy to include video games. First, he suggests that language is not the only important communicational system. Images, symbols, graphs, diagrams and many other visual symbols are particularly significant – thus the idea of different types of visual literacy would seem to be important (and knowing how to interpret them), and secondly that 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 (Kress, 1998).

Kress further stresses that each (mode) makes "possible certain kinds of things, in its particular way, and each prohibits certain things". This can be translated as in that each mode affords different things. The concept of images carrying meaning can also be found in Gibson's thesis that a 'display' is "a surface that has been shaped or processed so as to exhibit information for more than just the surface itself" and suggests that images, pictures, and 'written-on surfaces' afford a special kind of knowledge that he calls *mediated or indirect*, knowledge at second hand.

Several issues are raised here: whether digital literacy is context and situation-bound; how to identify digital literacy; and further, what differentiates the concepts of competence and skills. In the DeSeCo⁵ program it is emphasised that the terms "skills" and "competencies" are not used as synonyms – while skills is used to designate an ability to "perform complex motor and/or cognitive acts with ease, precision, and adaptability to changing conditions", the term "competence" is defined as "the ability to meet demands or carry out a task successfully, and consists of both cognitive and non-cognitive dimensions" (Rychen & Salganik, 2002).

The study

Headland Primary School has around 250 pupils from grades one to seven. Most inhabitants live in apartments, terraced houses and single-family houses and around 20% are immigrants. In the

⁵ OECD's program for the definition and selection of competencies (DeSeCo) <u>http://www.portal-</u> <u>stat.admin.ch/deseco/</u>

classes followed there are 40 children, 11 of which are immigrants. The study follows the same children and teachers in grade six and seven, over 2 consecutive semesters (spring and autumn semesters 2004), over an observation period (filmed) of 3 + 4 weeks. The teachers and the pupils were interviewed at the end of both observational stages. In addition, the pupils were asked to draw concept-maps of where, when, how and why they used their PDAs at both stages.

Jordan and Henderson point out that video analysis is a valuable tool for the study of learning activities as the video provides "optimal data if we are interested in what "really" happened rather than in accounts of what happened" (Jordan & Henderson, 1994:13). Silverman (Silverman, 2001) emphasises that the character of the data is critically affected by the positioning of the camera. Concept-mapping was used as a means of expressing ideas quickly, and to provide evidence from each of the students. According to the ImpaCT2 study concept maps "consist of putting words that represent concepts in boxes and linking these by means of words or phrases, so that the connections can be read" (Somekh, Lewin, Mavers, Fisher, Harrison, Haw, Lunzer, McFarlane, & Scrimshaw, 2002). Novak and Gowin (Novak & Gowin, 1984), found that this approach gave researchers more accurate insights into pupils' thinking than traditional methods of testing, or in the notion of a mind map.

Preliminary Findings and Discussion

The two classes were joined together to one class in the seventh grade, but had the same number of teachers in the classroom. They have a listening-room – for when the teacher needs to speak to the whole class, a room for "working" and three adjacent rooms for group work. In the working-room, the pupils sit mainly in groups of four, some in pairs and some alone.

From the concept-maps the pupils report using the PDAs for homework and schoolwork; games at home, school and free-time. It appears that the pupils regard the PDAs as "fun" (gøy), and this is evident both in the first concept maps drawn in spring 2004 and those drawn in autumn 2004. The issue raised is whether "fun" gives competence in other genres and whether there is a connection between fun and literacy. This debate is often taken up in the understanding of games.

From memo and content log 5th November:

During lunch while eating, many pupils take out their PDA to play Seven Seas, ...pirate game, and Spider (solitaire), some BubbleBlasters (quick quizzes), drawing on Sketchy (animation), PiCoMap (concept-maps), Cooties (which they call 'meet'), PicChat

(simultaneous beaming), and checking assignments for the following week (they still get their assignments on paper as well, so paper and PDA appear to be existing side by side).

Eventually I see that game playing during lunch-break is the daily 'routine' and happens almost



every lunch.

The pupils also appear to perceive of the PDA as "easy" to use. Students say that PDA is not difficult to use. I ask Magnus if he plays games very often. He says that he does, but that Paal plays more often. This is confirmed by other pupils in the classroom. When I ask Paal about which games he plays, he answers "Seven Seas" (he has the highest score in the classroom). Asked to explain how to play the game Paal answered that it was easy and that one just had to "take the boats".

Concept map by 7th grade pupil.



Screenshot of Seven Seas: http://www.5star-shareware.com/Windows/Games/Puzzle/sevenseas-screenshot.html

This raises issues of whether game-playing can be regarded as a competence – whether it is context dependent or independent; situation free or bound. Does being able to use one program make it easier to use another? Knowing which program and medium to use for different tasks. Does understanding what the game Seven Seas is about have any values beyond that which is apparent? Liestøl for example argues that computer games offer a repertoire of problem solving where the experience is linked to the understanding of a problem (Liestøl, 2001:129). The issue raised here is whether this can be regarded as a competence and whether this is transferable to other situations. Both from the concept maps and the video-material it appears that the pupils use different media for different things:

From memo and content log 9th November

Nina and Maria want to finish their work in KRL (?)- they do not know what the word "empathy" means so they look it up on the Internet. They go over to the PC corner and look up the word – write down in their books after going through their search engine.

After finishing their task [in this case, sentence writing in English], the pupils use "SpellCheck" – a word spelling program which highlights the words which are mis-spelt. The program does not offer alternatives to the misspelt word. Anna was writing a sentence with the word "clown". SpellCheck highlights the word "*clovn*," and the message that "*the word is incorrect*" comes up (tape 3-0:36:30:04). After several tries (*klown; clawn*) Anna opens her dictionary and looks up the Norwegian word (klovn) in a Norwegian-English dictionary, gets the right spelling and corrects the word. This way of working is observed several times

during this particular lesson [Additional note: this way of working is observed several times over the observation period].

• • • •

3rd lesson:

Elisabeth (teacher) started the lesson in the Listening-room by introducing the program iKWL (I Know, Wonder, Learn) to the class. She drew the interface on the blackboard and went through creating a new iKWL with the pupils. After that the pupils went back to their desks in the working-room.

...

I asked Elisabeth whether it was possible to beam from iKWL, and she said she was not sure, but called one of the students to try it out. The first beaming went well, but the next one: Elisabeth's PDA hung up every time and she got the message: "Fatal error". Elisabeth didn't know how to fix it, so she asked Katrina (a pupil) to help her.

Katrina started by resetting the PDA, then synced and fixed the problem (she had to delete the program and re-install it)[...] I asked Katrina what she did if she could not fix the problem – she said that she first asked the other pupils, and asked Olav (ICT-teacher) in the end. Elisabeth said that she thought it was great and that she would not have managed this on her own - Katrina managed to fix the problem.

Is what one sees here both an element of discovery as well as problem solving? When the students get a new program they do not wait for instructions - they just start to tap on the screen. The question is whether this is evidence of transferring skills and competence from one context to another, and one situation to another. Does being able to play games set the foundations for problem-solving at a different level, in a different genre?

References

- Brown, A. L., & Day, J. D. (1983). Macrorules for Summarizing Texts: The Development of Expertise. *Journal of Verbal Learning and Verbal Behavior*, 22, 1-14.
- Brown, M. D. (2001). *Handhelds in the Classroom*. Retrieved 20 February, 2004, from http://www.education-world.com/a-tech/tech083.shtml

Bruhn Jensen, K. (Ed.). (2002). A Handbook of media and communication research : qualitative and quantitative methodologies. London: Routledge.

Eisner, E. (1997). Cognition and representation: A way to pursue the American dream? *Phi Delta Kappan*, 78(5), 349-353.

Gadamer, H.-G. (1989). Truth and method (2nd, rev. ed.). London: Sheed & Ward.

- Gee, J. P. (2003). What Video Games Have to Teach Us About Learning and Literacy: Palgrave Macmillan.
- Gibson, J. J. (1986). *The Ecological Approach to Visual Perception*. New Jersey: Lawrence Erlbaum Associates.
- Gilster, P. (1997). Digital literacy. New York: Wiley.
- Hennessy, S. (2000). Graphing investigations using portable (palmtop) technology. *Journal of Computer Assisted Learning*, *16*, 243-258.
- Inkpen, K. M. (1999). Designing Handheld Technologies for Kids. *Personal Technologies Journal*, *3*(1&2), 81-89.
- Jordan, B., & Henderson, A. (1994). Interaction analysis : foundations and practice. *The Journal* of the Learning Sciences, 4(1), 72 s.
- Kist, W. (2000). Beginning to create the new literacy classroom: What does the new literacy look like? *Journal of Adolescent and Adult Literacy*, *43*(8), 710-718.
- Kress, G. (1998). 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* (pp. XXXVI, 260 s.). London: Routledge.
- Lankshear, C. (undated). *Frameworks and Workframes: Literacy Policies and New Orders*. Retrieved 5th August, 2003, from http://www.schools.ash.org.au/litweb/page600.html
- Liestøl, E. (2001). Dataspill : innføring og analyse. Oslo: Universitetsforl.
- Nixon, H. (2003). New Research Literacies for contemporary research into literacy and new media? *Reading Research Quarterly*, *38/3*(July/August 2003), 407-413.
- Norris, C., Soloway, E., & Sullivan, T. (2002). Examining 25 Years of Technology in U.S. Education." *Communications of the ACM*, 24(8).
- Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. Cambridge: Cambridge University Press.
- Postman, N. (1971). The new literacy. The Grade Teacher, 88, 26-27,40.
- Rasmussen, I. (2003). *The use of Cut and Paste as a Joint Productive Literacy Practice in Knowledge Building*. Paper presented at the International Conference on Computer Support for Collaborative Learning CSCL, Bergen, Norway.
- Ross, C. S. (1995). If they read Nancy Drew, so what? *Library & Information Science Research*, *17*(3), 201-236.
- Rychen, D. S., & Salganik, L. H. (2002). *Definition and Selection of Competencies* (DESECO): Theoretical and Conceptual Foundations. Strategy Paper: OECD.
- Shields, J., & Poftak, A. (2002). A Report Card on Handheld Computing. *Technology and Learning, February 2002.*
- Silverman, D. (2001). *Interpreting qualitative data : methods for analysing talk, text and interaction* (2nd ed.). London: Sage.
- Soloway, E., Grant, W., Tinker, R., Roschelle, J., Mills, M., Resnick, M., Berg, R., & Eisenberg, M. (1999). Science in the Palms of Their Hands. *Communications of the ACM*, 42(8).
- Soloway, E., Norris, C., Blumenfeld, P., Fishman, B., Krajcik, J., & Marx, R. (2001). Devices are Ready-at-Hand. *Communications of the ACM*(June).
- Somekh, B., Lewin, C., Mavers, D., Fisher, T., Harrison, C., Haw, K., Lunzer, E., McFarlane, A., & Scrimshaw, P. (2002). *ImpaCT2: Pupils' and Teachers' Perceptions of ICT in the Home, School and Community. A Report to the DfES*. London: DFeS/BECTA.

- SSB. (2003). Andel som har tilgang til diverse informasjons- og kommunikasjonsteknologi, etter familietype, husholdningsinntekt, kjønn, alder, utdannelse og arbeidssituasjon. 2. kvartal 2003. Retrieved 24 March, 2004, from http://www.ssb.no/ikthus/tab-2003-11-06-01.html
- Street, B. V. (1984). Literacy in theory and practice. Cambridge: Cambridge University Press.
- Street, B. V. (2000). Literacy events and literacy practices. In M. Martin-Jones, Jones, K. (Ed.), Multilingual literacies: reading and writing different worlds. Amsterdam: J. Benjamins Pub.
- Säljö, R. (1999). Learning as the Use of Tools. A Sociocultural Perspective on the Human-Technology Link. In P. Light & K. Littleton (Eds.), *Learning with computers : analysing productive interaction* (pp. XI, 201 s.). London: Routledge.
- Säljö, R. (2001). Læring i praksis : et sosiokulturelt perspektiv. Oslo: Cappelen akademisk.
- Tatar, T., Roschelle, J., Vahey, P., & Penuel, W. R. (2003). Handhelds Go to School: Lessons Learned. *Computer*(September 2003), 30-37.
- Trotter, A. (2001). *Handheld Computing: New Best Tech Tool Or Just a Fad?* Retrieved 2002, from http://www.edweek.org/ew/newstory.cfm?slug=04palm.h21
- Tucker, N. (1990). *The child and the book : a psychological and literary exploration* (Canto ed.). Cambridge: Cambridge University Press.
- Tyner, K. (1998). *Literacy in a digital world : teaching and learning in the age of information*. Mahwah, N.J.: Lawrence Erlbaum.
- UFD. (2004). Program for digital kompetanse 2004-2008. Oslo: Utdannings- og forskningsdepartementet.
- Vahey, P., & Crawford, V. (2002). *Palm Education Pioneers Program: Final Evaluation Report:* SRI International.