Creative Writing on Computers 6-10 Year olds. Writing to Read. 1999-2015

Abstract: *The pioneer project 1999-2002 was presented at the 13th ECR in Tallin 2003 and published in Pandis, Ward, Mathews (2005) Reading, Writing, Thinking.*

Introduction: Expressing yourself orally and written and ICT production is key competences in Norway and EU. Writing is easier than reading 4-7 years (Clay 1975, Hagtvet 1988) but reading research dominate. Computer writing is easier than hand writing. There are still surprisingly few studies about computer writing 4 -11 year olds.

Problem: Will playful computer writing and delayed handwriting to grade 3 give better writing results and easier way to reading?

Methods:Action research/development, sociocultural learning. 14 classes followed in 4 Nordic countries 1999-2002. Development documented by 7500 multimodal texts, 60 edited videos, writing tests, teacher reports, questionnaires parents/children.

Highlights: *Collaborative communication. Higher writing quality. Longer texts. Easier way to reading. Reduced reading problems. Better motivation for writing and reading. Delayed and better handwriting!*

Pioneer prosject 1999-2002

Results: The 6 year olds (grade 1) learned writing/reading through playful computer writing in pairs. Traditional textbooks became unnecessary - library important. Children produced own textbooks by playing "Authors", "Publishing house", "Newspaper office" In Grade 3 (8 year olds they composed more complicated books, different genres, advanced newspapers. Writing stimulated reading. Writing tests after 3 years showed significant higher quality in computer classes than handwriting classes. Handwriting tests showed also significant higher quality in computer classes in spite of delayed handwriting.

Further implementations and research 2002-2015:

This presentation will mainly concentrate on the further development and research the last 13 years. This strategy has spread to hundreds of schools in the Nordic countries, also for 4-6 year olds. A textbook for teacher education (Trageton 2003) is translated to Danish, Swedish, Finnish. The website www.arnetrageton.no shows English articles , over 70 videos from different Nordic classes practicing Writing to Read, a text corpus of approximate1000 computer texts. The content of 30-40 master degrees, two doctoral studies and several post doctor studies in the area is reviewed, discussed and given ideas for future research on this vast area.

Pioneer project. 1999-2002

1. Introduction

For 200 years Reading has been the dominant factor within Literacy in school start, Textbooks, PISA, national reading tests. In research 90% reading -10 % writing (Hattie 2010). Traditinal **Reading** and handwriting has given 20% of the students reading problems and especially boys: handwriting problems. Motivation loss in the school start gives dropouts later. But Writing is easier than reading and for 4-7 year olds and is a dominating factor in literacy (Clay 1975, Chomsky 1982, Teale & Sulzby 1986, Hall 1987, Christie 1991, 2001, Hagtvet 1988, 2003, Lorentzen 2001). Computer writing is easier than handwriting (Willows 1988, Chamless & Chamless 1993, Goldberg 2003, Kulik 2003, Trageton 2005). The strategy in the project simply start with the easiest factors in Literacy, turning the traditional *Reading and writing* (for hand) to *Writing to Read* (by computer).

The national curriculums in Europe are all inspired of a sociocultural learning theory and collaborative learning (Vygotsky 1976, Säljö, Engeström). The active learning student who produce knowledge is the ideal. EU key competence nr 1 Communication: *…express/interpret thoughts/feeling/facts oral and written and interact linguistically…*and nr 4. Digital compence: …*produce, present and exchange information*.... The Norwegian National Curriculum (2006) have 5 key competences, Orally expression and written expression comes first in all subjects. Then comes Reading, Mathematic and the new Digital competence with the same active goals as EU: *Produce, compose and publish own multimodal textes*.

2. Computers in School. Earlier research. Consumer or producer?

All rich countries have for the last 20-30 years seen ICT and computers as important tools for learning in school, and have used billions of EURO or dollar for hardware and software. When I started in 1999 ERIC already registrated 20 000 research projects on computers in primary school. But only 115 projects about writing, and for 5-7 year old I found only 20, mostly from the big Writing to Read project in US. The child as consumer dominated totally in research, the child as producer or playlearner was almost nonexistent. Many scepticals document negativ effect for learning by this consumerism. Already Healy (1998) found damaging effect by heavy concumption of internet, CD rom, play station, hundreds of TV-cannels. Quick shifting of pictures/texts on internet gave serious consentration problems. Wössmann & Fuchs (2004) found negative computer effects on PISA results. High density of computers gave low learning results (ex Norway). Low density of computers gave high learning results (ex Finland). But ICT research has moved away from behaviorism where the program control the student in the 60-70 ies to a cognitive/constructivist learning theory where the student contol the computer. Papert (1984) inspired of Piaget, and since the 90ies the sociocultural learning theory has developed Computer-Supported Collaborative Learning inspired of Vygotsky (Koschman 2001, Jonassen 2000). But in *practice* Jonassen said that 85% of all educational software program in school was the oldfashioned behavioristic type, harmful for learning. Today, progressive schools try to follow the CSCL ideal in ICT use, corresponding with the National Curriculums, but they are in minority. For the 21. century skills, creativity is a clue word. In contrast to convergent thinking measured by IQ tests, Guilford (1950) would measure divergent intelligence with creativity tests Creativity tests measure idea richness, flexibility, originality, fluency, entrepreneurship, playfulness, artistic attitudes in problemsolving (Cropley 1970) and the new creativity wave (Csikzentmihalyi 1996, 2000) became a reaction against IQ and convergent testing , like PISA and national reading tests.

3. Research question

In playful, creative computer writing there is no right answer, children in their creative dialogues in pairs discuss, write, produce, communicate and express billions of own meanings oral asnd written in their their creative multimodal texts and drawings. The

written product may be letter strings, wordbooks, sentences, stories, factual prose. The textproduction will be within all school subjects. Research question:

Will creative, playful computer writing for 6-10 year olds, and delayed formal handwriting to grade 3 (8 year olds) give higher writing quality and easier and more motivated reading?

4. Setting-Methods

A quasi experiment with 14 classes in Norway, Denmark, Finland and Estonia was followed in 3 years. The classes had 2-10 recycled computers in the different classrooms, and a printer. The ideal was action research/development where the teachers used the mentioned computer writing strategy in a way according to the National Curriculum, in tune with their own thinking, in relation to the school climate and class students in continuing discussion with follow up researcher and common meetings to discuss the development.

Data collections were observations in the classes, 130 hours video edited to 60 videos 25-30 minutes each. These videos were sent to all teachers during the project for discussions and inspirations for each others. Teacher reports and common meetings filled out the picture. In the end of every year, the teachers sent to the central researcher the text production for all students on paper. 7500 multimodal texts drawing/verbal text were scanned. About 1000 of the texts were chosen, systemized and classified to give an impression of the qualitative progression in writing. Letter tests in the beginning of grade 1 and grade 2. In the end of year 3, tests of the writing level in fiction and factual writing. 8 computer classes compared with 9 traditional handwriting classes in Norway, strategic, not random sample. Questionnaires for parents and for children in the end of year three gave their attitudes of the project.

5. Results

4.1 Qualitative development

Grade 1. The children started in pairs making letter strings with all their fingers. They experimented with the different functions of the word programme on the computer in a playful way, the size of letters, different fonts, versales/minuscles through use of Caps Lock, spacing, shift. After printing letter hunting-on the illustration 39 U.

| Letter strings- Letter hunting | Wordlist-Wordbook | Sentences-Stories |

 Quickly the pair learnt most of the letters, and advanced so to produce wordlist-wordbooks of their own oral vocabolary and made illustrations. Gradually come the first sentences and small stories. Through writing /reading their own texts, 99% solved the reading code easily through grade 1 through this playful strategy,

Grade 2. 70% knew all the letters with the test in the start of grade 2. Separat ABC/textbooks became unneccesary, but a rich library became important. They wrote their own textbooks and newspapers. One class made 100 textbooks in two months. Beneath some examples.

| Textbook: Pippi. 5 pages | Wild animals in Africa. 6 pages | Newspaper. 6 pages. News.Sports |

The children were reading their own books, comrades books and library books chosen after the reading level of the individual child. Some of the books were structured through the common theme for the class, in other cases they were «free authors» to chose what type of book they wanted to produce. Newspaper production was a common project fior the whole class, divided in small groups. Poem production and letters were also important genres.

Grade 3. The children produced more advanced fiction and factual prose, 20-60 pages, often inspired of their reading of professional library books within their own interests. Many textes were knit to long themes across the subjects, ending in presentations for other classes and parents. They read much longer and complicated books than the teachers had seen in their earlier handwriting classes. The newspapers showed more advanced journalism and documented their own knowledge from TV and professional newspapers presentations. They documented knowledge to the massmedias communication from world news and more local events, but also their personal critical meanings around the mass medias presentations. Letters became more complicated and classes sent letters to other classes, also in English.
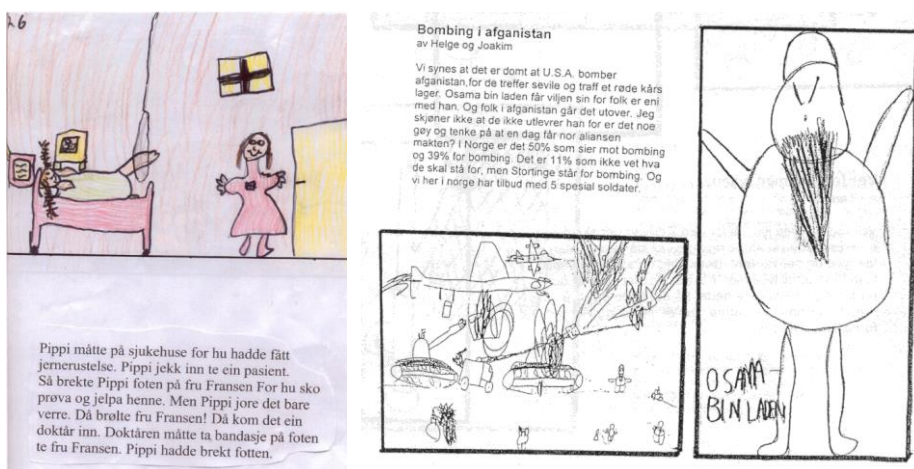
Book: Pippi. P. 26   Newspaper: 16 pages. News. Bombing in Afganistan

4.2.1 Creative writing test (End grade 3)

8 computer classes and 9 handwriting classes got two 40 min. tasks, factual prose and fiction: Describe a dentist visit (292 texts) Compose a Fairy tale (302 texts). The computer classes wrote on computer as usual. The handwriting classes by hand, and their textes were afterwards transcribed to computer texts and mixed randomly with the computer classes textes. The evaluaters were experienced language teachers in teacher education with no earlier contact with the project. They scored the textes 1-4 where 4 is the highest. The interreliability was high. Results: Computer classes wrote better textes than handwriting classes both within factual proses and phantasy text. The significance was $p<0.001$. The computer classes is about one year ahead. The

difference boys/girls was smaller in the computer classes, especially in fairy tale.

	Dentist visit			Fairy tale		
	Boys	Girls	**Total**	Boys	Girls	**Total**
Computer classes	2.16	2.54	**2.33**	2.27	2.43	**2.32**
Handwriting classes	1.78	2.28	**2.05**	1.85	2.24	**2.05**

4.2.2.Handwriting test. End grade 3)

Delaying the formal teaching of handwriting one year was the most controversial with the whole project.(BBC News 1998). Teachers and politicians thought this delay would give negative effect of the handwriting.

Therefore we made a classical handwriting test (Karlsdottir 1999). The students got a printed text from grade 3 textbook with the order: Transcribe these text by handwriting as nice and fast you can in 2 minutes. Our hypothesis was that there would be no difference in spite of much shorter training time in the computer classes. The quality was evalated of two experienced teachers from Lower Primary with scores 1-4. The surprising result was that the computer classes had the nicest handwriting, significant at $p > 0.001$ level:

	Quality 1-4	Speed: Words pr minute
Computer classes	2.74	4.35 words
Handwriting classes	2.45	4.91 words

However the handwriting classes had a slightly faster speed, because of training time over two years. Informal control the next year showed that the handwriting speed in computer classes now had developed as handwriting classes.

Discussion

Writing is easier than reading (Clay 1975), computer writing easier than handwriting (Willows 1988). To concentrate around the easiest components in Literacy first gives better motivation and results for Literacy learning. The writing letters are similar to reading letters in library books and other foreign textes. The four main components talking, listening, writing, reading becomes a dynamic whole, not trained as isolated parts. Colloborative text production give better social climate in class.Continuing text revisions, respons and criticue are natural and easy. Publishing on net gives higher self-esteem for the writer to express his/her meanings in a democracy. The strategy is in tune with the Nordic and European National curriculums and the 21th year hundred

Commented [A1]:

skills. In WTR the child knit writing/reading together and use a flexsible and individual combination of the classical three reading methods the last hundred years. Phonics – Word – Whole language. Through writing/reading own text the child use the strong sides with all methods, without the weaknesses with each of the three methods isolated.

Reading = Decoding x Comprehension. But 20& reading problems and the comprehension is to low in many countries (PISA 2011)
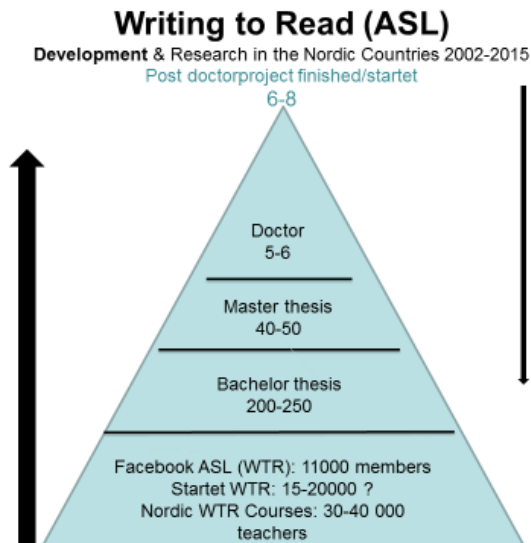
WTR = Comprehension x coding x decoding. The writing/reading is easier and the motivation get higher

Part II Further implementation and research 2002-2015

Turning the total literacy learning from traditional *Reading and writing teaching* to *Writing and reading learning* gave sucessful results. Hundreds of teachers and communities in the Nordic countries wanted to try the same strategy. A textbook for teachers on 308 pages was written (Trageton 2003), This was translated in shortened versions to Danish (Trageton 2004), Swedish (Trageton 2005, 2006, 2014) and Finnish (Trageton 2007). Through the questionnaires for parents and children the parents shows an importan factor to modernize schools. Therefor a booklet for parents was written (Trageton 2005b, 2010). In the last version also a chapter about playful computer writing im preschool (1-5 year olds) was added

A website was established www.arnetrageton.no with a short introduction. *Video* shows introduction video, English texted and short versions of 14 of the 60 videos in the project. From 2002-2015 there are published up to now 67 videos from preschool and primary school, practicing this digital writing strategy from Norway, Denmark, Sweden, Estonia, Finland, also from TV programs about the strategy. A lot of them of them English texted. *English articles* shows international presentations 2003-2015. *Tekstsamling* shows a representative selection of about 1000 of the 7500 multimodal textes. This website is continuing revised and together with the textbooks will inspire further development of this digital strategy for literacy learning.

The figure shows that the implementation from 2002 to 2015 is a bottom-up movement:Courses for 30-40000 teachers in the Nordic countries,15-20 000 have started, school developments within whole communities, in teacher education 200-250 bachelor thesis, 40-50 masterdegrees but only 5-6 doctoral studies fullfilled or started. There is very little top-down help, because few professors at the Universities have qualifications or research interest in this new area. But in later years some postdoctor projects are fullfilled or under work.

Writing to Read (ASL)
Development & Research in the Nordic Countries 2002-2015

Post doctorproject finished/startet
6-8

Doctor
5-6

Master thesis
40-50

Bachelor thesis
200-250

Facebook ASL (WTR): 11000 members
Startet WTR: 15-20000 ?
Nordic WTR Courses: 30-40 000
teachers

School development/research examples

Norway. In Bergen community 18 schools tried out the strategy in 2002. The teachers got 3 day courses through the year. In 2003 43 shools wanted to start, and in 2005 the government in Bergen desided that all 65 schools should practice digital writing on computer, because this would be demanded in the new National curriculum. In a follow up study Writing to Read with ICT report Vavik (2003) led four master students within ICT in learning in a follow up study, comparing 18 computer- and handwriting classes grade 2. The reading level was similar in the two groups Aasheim 2005, the writing level was clearly best in the computer classes on meaning, time relation, global structure, text binding, sentence structure word variation, creativity, spelling Textlength correlated high with quality. The computer classes acess to computers in the classroom evry day wrote 50% longer textes than the handwriting classes. Teacher attitudes was the most important factor (Sandal 2005) and classroom observations showed that in spite of the rule to use all fingers during writing on keyboard, many of them used only 1-2 fingers and therefore not so effective in writing (Sørensen 2005)

In another Teacher University College the teachers let their students in their practice period try out WTR and make reports. The teachers summed up and published their positive reports (Hegerholm & Matberg 2013)

Sweden. All schools in many communities have had similar systematic development and teacher training like Bergen. 200 communities have now "one computer pr child" strategy, and within teacher education there are 130 bachelor thesis studying different

aspect of the Writing to Read strategy. (Trageton 2012) A Facebook group ASL (WTR) have in June 2015 expanded to 11000 teacher members. In Sandviken community a special education teacher has since 2004 developed WTR further - adding speech synthesis program and talking keyboards, first in own class, later extended to all schools in the community. She has written a practical textbook for teachers (Wiklander 2015).She documented very quickly way from writing to reading, and the texxts had astonishing high standard on writing. Delayed handwriting to grade 2 in Sweden gave as good results as in Norway. Since 2011 a follow up research started (Hultin & Westman 2013 a) describe the good results, an easily way to reading, strong reduction of reading problems and a very high writing level. Hultin& Westman (2013b) analyze here the different genres the children are prooducing texts from. Their ongoing research have now startet follow up the progression of digital writing in grade 3-5 also.

Another project followed up with research is Sollentuna community within "one computer per child". To the WTR principle is added and strengtened through the writing pairs publishing on intranett and get systematic feedback respons from teachers and another pair. After rewriting the finished stories are published on the website for the school. A pilot study with 87 students followed one year comparing computer and handwriting classes found that the computer classes wrote much longer texts, better logical structure, fluency. The social network respons of comrades texts rise the quality through rewriting. Grade 1 was often at grade 3 level. Textlength from 300 words to 2850. Greater reading rapidity (Genlott & Grønlund 2013). Their follow up project with 502 students compare the computer classes results on the National tests in Literacy and maths in grade 3. Preliminary results show that computer classes get 19% better results, boys 29% (Genlott & Grønlund 2015).

The only fullfilled doctoral study in Sweden (Tyrèn 2013) had focus at how the school development problems through following tree WTR classes in three years where the budget, and personnel was changed much during the project and made the normal development problematic.

Finland. In the practice school in the Swedish speaking teacher education 2006-2009 a WTR strategy inspired of Trageton 2005 was testet out, and with follow up research (Yllikallio & Häggblom 2010) The book describe both the practical work and glimpses from four master degrees (Åhlberg 2008, Gädda & Åbacka 2010, Törnblom 2011, Häggblom 2011) Also two bachelor degrees are mentioned (Nylund 2008, Åbacka 2008). Later master degrees Within WTR are Södergård (2014) and Hällström (2014).

At Helsinki university there have been many postgraduate courses within WTR, both start courses and advanced cours holder courses. These were background for a national funded project in Espoo city 2008-2010 where 25 schools followed the same model as Bergen with 3 course days pr year. The practical results was published in a book (Kyllijoki ed 2011), and also 7 master degrees and 2 bachelor degrees in the

follow up research by professor Takala (2013). Her conclusion was: Good teaching tool , inspire and give better writing, develop social/communicative skills and creativity. Suited for individual needs . Positive teachers. More research necessary for evaluating effectiveness for reading. Totally there have been 11 master degrees in this area, ranging from use within special education, comparing computer and handwriting, verbal communications in computer pairs, English trough WTR, immigrants and Finns using WTR, case study immigrant boy, effect of WTR at boys reading. But because the thesis is only in Finnish language, it is not easy to refer to.

Some other research. Dahlbom (2010) evaluated Piteå communitys effective development project 2006-2009. After the project WTR became the normal strategy for all schools. Finne, Roås & Kjølholdt (2014) documented the positive effect of WTR + speech synthesis program and talking keyboards with adult immigrants learning Norwegian. Hashhemi & Andersson (2012-14) study digital arenas in read- and write practices in three classes followed 3 years, Liberg (2013-16) analyzes 700 textes in grade 3 written by WTR classes, Uusen & Puigi (2015) compared textes written by computer and hand in grade 5 and Åkerlund (2013->) analyze videos of oral dialouge among 20 pairs computer writing.

From Reading and writing to Writing to Read

The Nordic research conferances "Skriv! Les!" (Write! Read!) 2011, 2013, 2015, has given better balance beetween writing and reading presentations. Among 70-80 presentations per conference roughly 20 % is about Literacy in general, 40% Writing, 40% Reading. This is in sharp contrast to the dominating Reading research in the world. Digital writing like WTR had only one presentation in 2011, 2 in 2013 and 7 in 2015. We see a growing interest in turning the reading dominans to a digital writing dominance , especially for 4-10 year olds year olds.

International reviews

Goldberg (2003) and Kulik (2003)review 38 US studies in computer writing: More and better writing, more motivated, social and collaborating students.Torgersoen & Elbourne (2002) make metareview of many computer writing studies: produce longer textes, higher quality, engaged students. Merchant (2007, 2009) give review over the UK studies, concluding with the same positive effects. Murphy &Graham (2012) review 27 projectsabout weak readers/writers. The computer as tool gives better writing quality, length, organiuzing, correctness, motivation. Warschauer (2009, 2012) within the huge "one laptop per child" research shows positive effect on writing (if the teachers have good competance, not else). Low effect on other school learning areas.

But still there are surprisingly few studies (especially in the early years) in this important and simple way of computer writing/reading for better literacy learning.

Future research possibilities

In this new WTR literacy practice the last 20-25 years there are hundreds of possibilities for master - doctor - postdoctorproject within Education, Special education, ICT, Psychology, Linguistics, Literature, Didactics in language and other subjects in school, Antropology, Etnograpgy etc.

Some rough themes:
National writing tests. Compare computer writing with handwriting grade 3-4. Grade 7?
Language play with computer/tablet 3-5 year olds
Cultural differences of WTR in different countries
Effect in foreign language learning
Conditions for implementation in school, community, country
The touch writing system. What effect on writing?
Differences in using Latin, Arab, Chinese, Japaneze keyboard
Linguistic analyzis of thousands of electronic textes in different genres
Will qualities of drawings correlate with quality of verbal texts
Libraries influence on quality of childrens digital textes
Desktops, laptops, tablets influence on digital writing?
Oral language studies in pair digital writing
Longitudinal description 4-16 years

This is only some examples of research themes. The next 20 years I hopethere will come hundreds of master/doctot/postdoctor project within this central but almost empty area of literacy research to get better balance between writing and reading research.

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