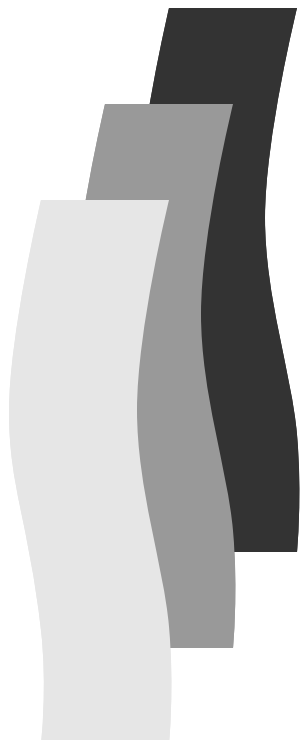# The Power
# of Writing

Creative Writing on Computers: 6- to 10-Year-Olds Writing to Read

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The Norwegian National Curriculum (L97) demands digital literacy and writing on personal computers, but until now, computers in schools have been misused in a consumer ideology based on behaviorism, an ideology funded by the computer industry. The available software programs followed the traditional stimulus–response model in which the program controlled the child like the traditional teacher in asking questions, and the student's role was only to find the right answer (Erstad, 1998). Healy (1998) sums up hundreds of research reports and describes serious damage to children's concentration and learning from using program packs developed with a consumer ideology.

The Norwegian National Curriculum from 1997, however, regards the student as a producer and communicator of his or her own knowledge. This is in tune with a constructivist and social-interactionist view of learning (Lave & Wenger, 1991; Ludvigsen, 1999; Piaget, 2001; Vygotsky, 1978) and the computer-supported collaborative learning paradigm (CSCL) in computer research (Koschmann, 2001).

While there were thousands of computer projects following a market ideology, projects about the child as producer were rare. ERIC in 2000 listed about 20,000 projects on computers in primary schools, but only 20 of these were about creative writing on computers for 5- to 7-year-olds. The majority of these reports referred to the U.S. project Writing to Read (WTR) (Chamless & Chamless, 1993), which reported very positive results, but we do not know to what extent the results were influenced by the massive sponsorship of IBM.

My pedagogical view is quite similar to WTR. I believe, like Chomsky (1982), that writing is easier than reading, and should come first. Because handwriting is difficult for 5- to 7-year-olds, writing on the computer should come first, and the teaching of formal handwriting should be delayed until grade 3 (8-year-olds). In contrast to WTR, my project "Creative Writing on Computers: 6–10-Year-Olds Writing to Read" has no sponsorship from commercial computer firms, and teachers and children in my project are stimulated by a more playful and informal approach (Liang & Johnson, 1999), using simple recycled computers with an ordinary word processing program.

The project was a three-year action research project in 14 classes in Norway, Denmark, Finland, and Estonia. Only the findings from the Norwegian classes are described in detail in this article. The children were followed from grades 1–4. All schools had 2–10 recycled, inexpensive computers placed in corners in the classroom, equipped only with a simple word processing program. The research problems examined were as follows:

- How should word processors be used in creative writing for grades 1–4?
- How should the research project build a digital database of the children's text production over three years?
- How could networks be built between schools and communities for the spread of these innovations?
- Might a concentration on computer writing in grades 1 and 2, and a delay in the formal teaching of handwriting until grade 3, give better results in written language?

Findings of the Study

Qualitative Analysis of Students' Writing

Norway: Grade 1. Through examining 1,500 texts written by grade 1 students (6-year-olds), I mapped the development of spontaneous computer writing for the first time in Nordic countries. The development was rather similar to the better-established research in spontaneous handwriting development (Sulzby, 1990), but proceeded faster, because some steps in handwriting do not exist for computer users, and the mechanics of computer writing are easier. The results are similar to Schrader's (1990) in the United States. She concluded that the development of writing on the computer was similar to that of handwriting for 4- to 7-year-olds, but went much faster than in handwriting, because some problems were solved by the computer (things like standard lettering, line direction, and line shift). Through playful writing, the children learned 24 capital letters and 20 lower case letters as a mean score. The children also wrote short texts and stories. Karlsdottir (1998) concluded that letter knowledge by the age of 7 was the most important factor in predicting reading ability in grade 4.

Norway: Grade 2. The children knew most of the letters of the alphabet, and through their own writing they also learned to read in grade 1. The formal teaching of letters and reading through ABC books, traditionally used in grade 2 in Norway, became unnecessary. The children simply continued to write and read. The playful writing and reading (Liang & Johnson, 1999) exploded at the beginning of the school year. The children, working in pairs, became assistant "teachers" for their partners, discussing technical problems and content in their writing. Capital letters were now regarded as childish. They used lower case letters, as is done in "real books." The 2,700 texts analyzed from grade 2 students provided background for analyzing literacy development in grade 2. Newspaper production, reading books, and letters were the most important genres used in grade 2.

Playing "newspaper office" with an editor, journalists, and layout people became an inspiring challenge. Using the computer enabled students to produce a professional layout. One newspaper had 12 pages, and included national and local disasters, sports, jokes, school activities, a story about working for a child center for homeless children in Brazil, and comic strips. When the students played "publishing house," the production of ABC books became popular. Students created easy reader books suitable for different reading levels. The authors wrote books on different themes, from classical

fairy tales to modern science fiction. One class produced 100 textbooks in two months. Rich class libraries became important.

Norway: Grade 3. The children continued to use the most important genres at a more advanced level; the writing genres at this stage divided into more sub-genres. In newspaper productions, the standards were raised. The classes studied different professional newspapers thoroughly, and had serious discussions about their choice of content, picture placement and size, titles, layout, ingresses, and plain texts. The total size of the newspapers might be 20 pages, richly illustrated with good drawings. Rich variety of content and the objective handling of complicated, controversial national and international matters demonstrated a high level of journalistic competence.

The books produced became more varied and serious within the genres of factual prose and fiction, as well as in many subgroups and creative combinations of genres. The boys were inspired by action films, comics, and horror books, while the girls loved fairy tales and romantic literature. Dramatizing script ideas, and drawing the story before or during writing, heightened the quality of writing. Long lasting cross-disciplinary themes inspired students to enjoy writing. For example, a two-month theme titled "Flight" included lessons in science, social science, and mathematics, supported by arts and crafts. The writing during the "Flight" unit covered topics ranging from Greek mythology to birds to modern airports. The process-oriented strategy (Hoel, 2000) raised the quality of writing. Here, computer writing demonstrated its greatest advantage. The first draft got constructive response from the computer-partner and the teacher. The child might produce up to 10 revisions of a book of 20–60 pages long, each version building off the response to the previous versions, without difficulty. Using handwriting, this would be impossible. Oral response was still dominant, but written responses were now well established. The 8-year-olds read longer and more complicated books, often several hundred pages long. They produced reports and book reviews of books by professional authors and by their own classmates.

Denmark, Finland, Estonia. Classes in these countries showed similar development. However, while 6-year-olds in Norway continue their elementary education in the same institution, children in other countries change institutions, from preschool for the 6-year-olds, to regular school for the 7-year-olds. The children changed both institutions and teachers, and discontinuity became a problem.

The Danish grade 1 students (7-year-olds) began the project in the middle of the year because of the late installation of computers in the classroom, and the change of teachers. The writing level was lower than in the Norwegian classes. But by grade 2 (similar to grade 3 in Norway), the children showed a similar developmental level in their writing compared to students in Norwegian classes. The teachers felt that computer writing made it easier for children from multicultural backgrounds to learn Danish as a foreign language.

The Finnish class had Swedish as their mother tongue. Their writing level was high, and their reading skills impressive. The children changed physical environments from "preschool/kindergarten" for 6-year-olds to grade 1 in primary school when they

became 7 years old, as in Denmark. But the preschool teacher was allowed to follow the children into grades 1 and 2.

In Estonia, the project became a kindergarten project for the oldest children in the 3- to 7-year-old group. We could not follow the same children for 3 years, as we did in the other countries. The level of writing was amazingly high. For example, one 6-year-old started making a book about a bull and a cow. The preschool teacher expected the book to be 10 pages long by the time it was completed! At the end of the project, a classroom teacher tried to follow up the work in grade 1 (Lang, 2003). Her class was divided into six groups, five of which were working in the classroom, with the sixth group in the library writing on four computers. A special computer teacher assisted them.

Qualitative Evaluation of Writing Level

The qualitative development descriptions are based on 7,500 texts, 60 edited videos, direct observations, and teacher reports (Trageton, 2003b). The analysis answered the fourth question posed in the introduction: "Will a concentration on computer writing in grade 1 and 2, delaying the formal teaching in handwriting to grade 3, give better results in written language?"

International reading tests (IEA) are regarded as relatively valid and reliable, but writing tests are controversial. The IEA writing test for grades 6–9 resulted in cultural disagreement about what was a "better" written composition (Allard & Sundblad, 1991; Purves, 1992). In England, the Implementation of the National Literacy Strategy (DEE, 1997) gives some guidelines for writing for Key stage 1 (9 years). The United States has a long tradition of evaluating the quality of children's texts (Gorman et al., 1988). Evaluation of the American computer-writing project WTR used different scales for 6- to 7-year-olds (Chamless & Chamless, 1993). Different U.S. states present norms for "good" writing. The Pennsylvania State Curriculum in Writing has developed detailed guidelines for writing from Kindergarten to grade 6. Descriptions of acceptable writing for grade 3 include the following:

- Composes pieces that develop a problem or central idea and flow from beginning, middle to end
- Adapts writing style/form to maintain focus on topic, purpose and/or audience (stories, letters, journals, poems, plays)
- Includes literacy elements in narratives (characters, setting, problem, major events, solution)
- Writes complete sentences (subject + verb) using end punctuation appropriately (periods, exclamation points, question marks) most of the time

In Norway, there was strong resistance to using a predefined set of norms. We used a holistic evaluation based on connoisseurship (Eisner, 1994). According to Eisner, connoisseurs of a subject tend to show a high agreement in a holistic evaluation of what is a "good" and "bad" level in that area (here, the subject was the text productions of the children).

Quality in Creative Writing: End of Grade 3

Eight computer classes and nine handwriting classes were assigned two 40-minute writing tasks: "Write a fairy tale," and "Describe a visit to the dentist." The handwritten pieces were transcribed into computer texts, and mixed randomly with responses from computer classes. Two experienced language teachers in teacher education made a holistic scoring of the content quality of 594 texts on a scale from 1–4, where the highest score is 4. The agreement between evaluators was high.

The results (Table 1) show clearly higher scores for the computer classes in writing tasks by both boys and girls, with the highest difference in scores for the boys (Keetley, 1997). All differences are significant at the $p<0.001$ level. The boys' scores are lower than those of the girls overall, but in four classes the mean score was alike.

Limitations to note are that the compared classes are statistically a stratified sample, and an experiment always tends to get better results (Hawthorne effect).

Handwriting Test

The most controversial aspect of the project was delaying the formal teaching of handwriting until grade 3. Would this delay be negative for students' handwriting? A test compared the quality of the handwriting between computer classes and traditional handwriting classes. Two experienced specialists on handwriting in primary school made a holistic assessment of the quality of the handwriting on a scale 1–4, where 4 was highest. The agreement between evaluators was high. Results were as follows:

Quality of handwriting

Computer classes: 2.74

Handwriting classes: 2.45

How many words written in a minute?

PC classes: 4.35

Handwriting classes: 4.91

In spite of delayed formal teaching and a much shorter training time in handwriting, the computer classes demonstrated better quality in handwriting, but a slightly slower speed. The differences are significant at the $p<0.001$ level. The delay in introducing formal instruction in handwriting was most profitable for boys.

	Dentist Visit			Fairy Tale		
	Boys	Girls	Total	Boys	Girls	Total
PC 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

Table 1. Content quality of creative writing

Total mean was 2.19.

The website for the project (www.hsh.no/home/atr/tekstskaping) gives more detailed evaluations, has an English-subtitled video to describe the total strategy, a lot of articles in English in addition to the Norwegian articles, and a representative selection of about 1,000 computer texts from grade 1–3.

Conclusion

The project is not about the child as consumer of information technology, but the child as producer within the CSCL paradigm (Koschman, 2001), where communication is the keyword. This is in tune with the constructivist and social interactionist view on learning in our National Curriculum. Developing new methods for literacy learning in lower Primary school is the main result of the project (Trageton, 2003b). For the last hundred years, the reading aspect of literacy has dominated, with the old debate about the strengths and weaknesses of the whole language versus the phonics approach in reading. In this project, the writing aspect of literacy has been given more weight. The project documented three years of experience, with 7,500 texts and 60 edited videos showing the development of writing. The development of the computer writing program in grade 1 is quite similar to that which is described in Schrader (1990). The old reading and writing teaching style was revolved 180 degrees to a program of writing and reading learning. Writing is easier than reading (Chomsky, 1982; Clay, 1975; Hagtvet, 1988; Sulzby, 1990). Using the computer as a writing tool, instead of relying on complicated handwriting, made this revolution possible. The letters in writing and reading are identical when typed, and the correspondence between writing and reading was made easier by this similarity. The children learned to read from their own text production. Because writing came first, they could use the strengths and reduce the weaknesses of the different reading methods. The results are in tune with the WTR project in the United States (Chamless & Chamless, 1993). However, their equipment and strategy was too complicated and costly (Singh, 1991) compared with the recycled computers used in our Nordic project.

Høien (1996) stresses decoding as the central factor in reading:

$$Reading = decoding \times understanding$$

When children are writing to read, however, instead of decoding, they start with understanding and the easier coding of their own thoughts in the writing/reading process:

$$Understanding \times coding \times decoding = reading\ of\ meaningful\ text$$

When children are writing or reading a meaningful text grown out of their own imagination, they will, in addition, develop letter knowledge, use combinations of the phonics and whole language reading methods, and the understanding of the total text becomes meaningful whole language. After reading their own texts, children advance to read unfamiliar meaningful texts produced by their peers, and from interesting books in the library. This is the theoretical explanation of why "writing to read" seems more effective than starting off by reading externally generated texts from an ABC primer (Willows, 1988). The task becomes more motivating for the child.

When the child is mastering elementary reading, writing and reading are knit tightly together. The writing is stimulated by intense reading from the library, from newspapers, and from other sources. Writing stimulates reading. Reading stimulates writing in different genres. The process-oriented strategy to raise the quality of the texts (Hoel, 2000) becomes much easier, because computer writing allows repeated revision and editing without difficulty.

Because of the good results of this project, many communities in Norway have started new projects to replicate and improve this literacy strategy for grades 1–4. The strategy will be re-evaluated by five master student thesis in "ICT and Learning" research programmes on a larger scale (Salomon et al., 2004; Vavik, 2003). Many other countries, especially Denmark and Sweden, show a strong interest in similar strategies. More research in this area is required.

Reading research and reading tests dominate the international debate. Reading tests have been obligatory for all Norwegian schools since 2004. Our Ministry for Education has also funded the development of writing tests for grades 4, 7, and 10 (Berge & Vagle, 2003). These tests become obligatory in Norway in 2005. This may become the start of a new Centre for Writing Research parallel to the existing Centre for Reading Research. Hopefully, this will produce a better balance between writing and reading research. Should the name of our association be changed from "Reading Association" to "Literacy Association"?

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