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Use and effects of educational software in initial reading education

Marjoke Bakker¹, Erik van Schooten², Rosemarie Irausquin³, & Helmer Strik¹

CLST | Centre for Language and Speech Technology
Radboud University

Kenniscentrum
Talentontwikkeling
Zwijsen

¹CLS/CLST, Radboud University, The Netherlands, ²University of Applied Sciences Rotterdam, The Netherlands, ³Zwijsen, Educational publisher, The Netherlands

Conclusions

- ▶ Teacher preparation and class organization are important when using educational software in initial reading education
- ▶ The use of educational reading software benefits initial reading development
- ▶ Students who practice more with the software improve more
- ▶ Also using the software at home does not seem to lead to an additional benefit

Background

- Educational software can be beneficial in initial reading education (e.g., Blok, Oostdam, Otter, & Overmaat, 2002): individual practice on students' own level, with immediate feedback
- Use of educational software in the school practice is not easy: e.g. organizational or technical difficulties (e.g., Macaruso & Hook, 2007)

This study

- Mixed method: qualitative interview-study, quantitative effect study
- Focus on the educational software package accompanying the most commonly used Dutch initial reading method for Grade 1, called Veilig Leren Lezen (VLL; Uitgeverij Zwijsen, 2013).

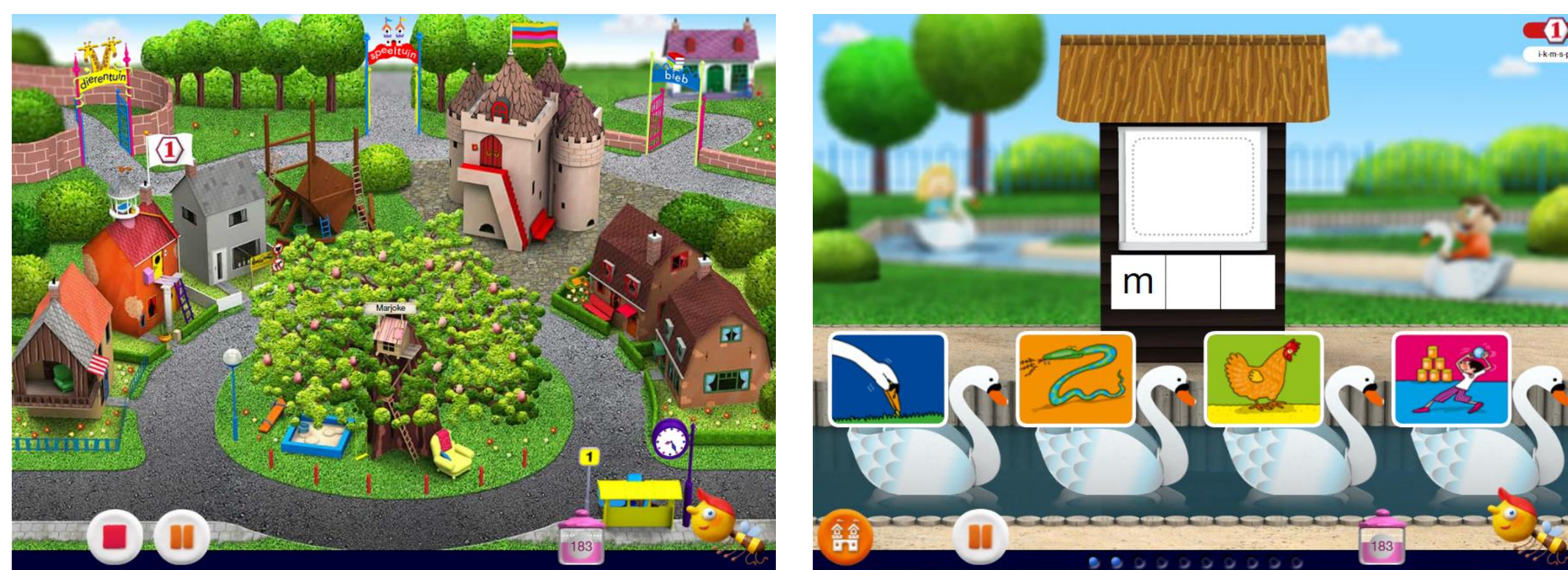


Figure 1. Screenshots from the educational software accompanying the initial reading method Veilig Leren Lezen

Research questions

- 1 What are good practices for implementing educational software in initial reading education?
- 2 Does the use of the software in the (often less than optimal) school practice lead to the expected learning outcomes?

1. Interview study

Method

- Semi-structured interviews with seven Grade 1 teachers
- Focus on teachers' experiences with the use of the VLL educational software in the teaching practice
- Based on the interviews, a list of good practices was drawn up

Results

The most important good practices emerging from the interviews are:

- **Teacher preparation:** reading the teacher manual and trying out the software
- **Class organization:** making plans for how to implement the software in the lesson program, e.g. when and how often the software is used, how student turns are managed

2. Effect study

Method

Study setup

Quasi-experimental study with three research conditions:

- SoftwareSchool: VLL with educational software used at school
- SoftwareSchoolHome: VLL with educational software used both at school and at home
- Control group: VLL without educational software

The study ran from September 2015 to January 2016 (first half of the Grade 1 school year).

Participants

1434 students from 73 Grade 1 classes from 57 Dutch primary schools

Measurement instruments

Pretest: Letter naming test Aug/Sep 2015 (VLL)

Posttest: DMT Jan/Feb 2016: standardized test of reading fluency and accuracy (Krom, Jongen, Verhelst, Kamphuis, & Kleintjes, 2010)

Intensity of software use: Log data on intensity of use of the educational software (at school and at home) in the period between pretest and posttest: 1) number of sessions, 2) number of exercises performed in the software, 3) time spent on the software

Data analysis

- Multilevel regression analysis in MLwiN
- Posttest score as dependent variable; pretest score and time between pretest and posttest as predictors
- Student, class, and school level covariates included if significant
- List-wise deletion of missing data

Results

Effect of condition

- Significantly higher improvement in the schools where the software was used than in the control group ($R = .556$)
- No difference between SoftwareSchool and SoftwareSchoolHome

Effect of intensity of software use

- Significant effect of number of reading and spelling exercises performed in the software at school, in addition to condition ($R = .097$)
- No additional effect of number of exercises in home software
- Effects of number of software sessions or time spent on the software were not significant in addition to condition

Table 1. Multilevel models with DMT posttest score as dependent variable ($n_{\text{students}} = 1031$, $n_{\text{classes}} = 58$, $n_{\text{schools}} = 45$).

Predictor	Model 1: nulmodel + sign. covariates ^a		Model 2: + condition		Model 3: + #software exercises at school		Model 4: + #software exercises at home	
	B	SE	B	SE	B	SE	B	SE
Intercept	24.16***	0.59	20.27***	1.40	20.17***	1.47	20.16***	1.47
Pretest score letter naming test	0.94***	0.05	0.95***	0.05	0.95***	0.05	0.95***	0.05
Days between pretest and posttest	-0.01	0.05	-0.02	0.05	-0.04	0.05	-0.04	0.05
Condition SoftwareSchool			5.53***	1.72	4.59**	1.85	4.59**	1.84
Condition SoftwareSchoolHome			4.07**	1.58	2.87*	1.73	2.85†	1.74
#software exercises at school (/10)					0.17**	0.07	0.17**	0.07
#software exercises at home (/10)							0.01	0.09
Model fit comparison			$X^2(2) = 9.55^{**}$		$X^2(1) = 5.42^*$		$X^2(1) = 0.01$	
Explained variance student level			$R^2 = .001$, $R = .024$		$R^2 = .010$, $R = .097$		- ^b	
Explained variance school level			$R^2 = .309$, $R = .556$		- ^b		$R^2 = .006$, $R = .077$	

IGLS estimation was used. For the regression coefficients one-tailed significance tests were used.

^aIncluded covariates are: parental education, repeated Grade 1, number of years in the Netherlands, time allocation to language education in class, class and school proportion of students with low parental education. ^bno variance explained (negative R^2)

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$

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