

Technology-enhanced language games for early learning of Estonian as a second language: teachers' ratings and development

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Summary

In early childhood, children learn through playing (Koolieelse lasteasutuse riiklik õppekava, 2008/2011). To support children's development at different levels, the teacher must be able to choose educational materials that consider children's individuality and are age-appropriate for them (Bodrova & Leong, 2010; Kutsestandard, 2020). Thanks to their effectiveness and appeal to children, technology-enhanced learning resources are increasingly used to support children's language development (Cavus & Ibrahim, 2017; Hao et al., 2021; Neumann & Neumann, 2014). In relation to the transition to Estonian-language education, there has been an increased need for language learning games that would be suitable for teaching Estonian as a second language for children with different levels of language proficiency. Studies have shown that using language learning games in second language learning improves children's language skills, increases motivation, is fun for children, and offers collaboration opportunities (Saleh & Ahmed Althaqafi, 2022). However, Peterson et al. (2020) have pointed out that Estonian kindergartens lack suitable tools and language learning games to develop children's language skills. Therefore, this study aimed to determine teachers' ratings of the suitability of technology-enhanced language games created to support non-native children's acquisition of Estonian as a second language.

Methodology

The development process of the technology-enhanced language learning games was based on the ADDIE model, which divides the development of learning materials into a five-stage process: analysis, design, development, implementation, and evaluation (Branch, 2010). In the first analysis stage, a group of universities' experts in the Estonian language, educational technology, early childhood, and

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special education set the goals for the development process and mapped existing language learning games. Criteria and instructional materials for developing technology-enhanced language games were created in the design stage. In the development stage, kindergarten teachers teaching non-native children were recruited, and 101 technology-enhanced games were developed with the universities' experts (Meesak & Uibu, 2024). These included vocabulary, grammar, listening, and speaking games, which were integrated with the areas of the National Curriculum for Pre-school Child Care Institutions (2008/2011): maths (40 games), art (34 games), movement (15 games), music (12 games). Kindergartens used the games with their 2–7-year-old children in the implementation stage and provided feedback. The games were completed and in the evaluation stage, the games were made available online, in-service training was organised for teachers, and teachers were asked to use the games with children and provide evaluations of the finished games. The current research mainly focuses on the stages of implementation and evaluation.

Kindergartens were recruited to use the language learning games and provide feedback in the implementation stage. In total, 64 teachers participated by playing the games with their children in the kindergarten. Teachers could choose the games, and each teacher provided feedback for one to ten games. Feedback was gathered for 185 game sessions. In the evaluation stage, in-service training was carried out for teachers, and after that, the participants were asked to use the games and provide feedback. Ninety-nine teachers conducted 202 game sessions in their kindergartens (two to four game sessions per teacher). A questionnaire was used to collect feedback in the implementation and evaluation stages. Teachers were asked to rate the suitability of the games based on three aspects (correspondence to children's Estonian language level, content comprehensibility, appeal to children) on a 3-point scale. Teachers were also asked to mark the Estonian language level of non-native children participating in each session and the age of all participants.

McDonald's Omega and Cronbach's Alpha were used for reliability statistics. Descriptive statistics were calculated for the teachers' ratings of the suitability of the games. Next, the Mann-Whitney U test was used to identify the differences between the teachers' ratings in the implementation and evaluation stages. The effect size was estimated based on the biserial rank correlation. The Mann-Whitney U test was also used to determine the difference between the number of children participating in the games during the implementation and evaluation stages. Spearman's correlation was used to find the relations between the teachers' ratings of the games' suitability and the number of children participating. Finally, Kruskal-Wallis non-parametric analysis of variance was used to compare teachers' ratings based on the Estonian language level of non-native

speakers in the game sessions. The epsilon-squared indicator was used to estimate the effect size (Tomczak & Tomczak-Łukaszewska, 2014). The data was analysed with Jamovi version 2.4.8 (The Jamovi Project, 2024).

Results and discussion

First, we determined the teachers' ratings regarding the suitability of the technology-enhanced language learning games and the differences in the ratings between the implementation and evaluation stages. In both stages, teachers gave the highest ratings to the appeal of the games, which is one of the key characteristics of a high-quality language learning game, as it relates to motivation and interest. If a game is engaging and enjoyable for a child, they acquire the intended language skills through play (Hirsh-Pasek & Golinkoff, 2008). Teachers also highly rated the comprehensibility of games, which was expected, as the topics were chosen based on the National Curriculum for Preschool Child Care Institutions (2008/2011). Teachers gave somewhat lower ratings to the correspondence of the games with children's Estonian language levels. Children with different home language backgrounds start learning Estonian as a second language at various ages and with varying base levels (Leola et al., 2024). It is challenging to create educational games suitable for children with age-appropriate development and those who are less proficient or gifted (Gürkaynak, 2015; Taimalu et al., 2020). Next, we determined the extent to which teachers' ratings of the suitability of the games differed during the implementation and evaluation stages of the game development. The results showed that teachers' ratings of the correspondence to children's Estonian language level and content comprehensibility were higher for the finalised games, demonstrating the effectiveness of the development process. There were no significant differences in teachers' ratings of the games' appeal between the implementation and evaluation stages, showing that children greatly enjoyed the language learning games at both stages.

Second, we wanted to determine the relations between teachers' ratings of the games' suitability and the number of children participating. The results of the Mann-Whitney U test showed that the average number of children participating in the games was higher for the implementation stage. However, Spearman's correlation results showed that teachers' ratings of the correspondence to children's Estonian language level were weakly and positively related to the number of children participating in the games only in the implementation stage. Teachers' ratings of the games' content comprehensibility and appeal to children were not related to the number of children participating in the games, either in the implementation or evaluation stages.

Third, we were interested in the extent to which teachers' ratings of the suitability of the language learning games differed based on the Estonian language level of non-native children playing the games. We categorised the game sessions into groups based on the non-native children's language levels, and it became evident that children with very different language proficiency participated in the sessions. There was a significant, but slight difference in teachers' rating for correspondence to children's Estonian language level, but only between the game sessions, where complete beginners (group 1) and children whose vocabulary was sufficient for using situational sentences, as well as children whose vocabulary was adequate for everyday communication (mixed group 3–4) participated. There were no differences in teachers' ratings regarding the games' content comprehensibility and appeal to children. This indicates that the games created during the development process were equally understandable, enjoyable, and motivating for children with varying levels of language proficiency.

High-quality technology-enhanced games suitable for supporting teachers in teaching non-native children Estonian as a second language were created. It should be noted that different teachers rated the games in the implementation and evaluation stages, which allowed for obtaining objective feedback from a wide range of users, as the teachers participating in the implementation and evaluation stages were independent of each other. However, this might be one of the reasons for the differences in teachers' ratings in the implementation and evaluation stages. Also, it must be taken into account that teachers provided information regarding non-native children's Estonian language level, and they might have considered children's proficiency level or general age-appropriate level when rating the suitability of the games. Also, all teachers taught in kindergartens where children with Estonian as a second language attended, and there was no further information regarding the background of the teachers. Due to the extensive development process, which included continuous feedback from university experts, and expectations for teachers to play the games with their children as well as fill out a questionnaire, the feedback was collected for only three aspects of the Learning Object Review Instrument (Leacock & Nesbit, 2007), which were also generally phrased. Future developments of language learning games could include intervention or longitudinal studies, providing valuable information regarding the effectiveness of using technology-enriched games in language learning.

Keywords: developing language learning games, technology-enhanced game, Estonian as a second language, kindergarten teachers' ratings