

Investigating the design space of using mobile devices for supporting language and communication skills in primary school.

The last decade has been seen a rapid increase in the number of tablet and mobile applications for educational purposes that are aimed at very young children. Many of these have the objective of training children in reading and writing. This paper presents a research investigation that has the aim of exploring the main design challenges in designing a mobile application with the educational purpose of supporting language and communication skills in primary school.

Narrative is a primitive function of human psychology and a fundamental aspect in the construction of meaning as well as a way for a child to organize knowledge to express creativity, use imagination and language [1]. Young children (aged 3-5) enjoy reading and creating stories together with adults. Children at this age are at the pre-operational stage [2] and they are progressively learning how to use symbols. In particular, wordless picture books are used by teachers in pre-school to stimulate children to elaborate a story starting from the pictures and/or the words represented. The literature suggests that when children play an active role in these activities, with a high level of engagement and interaction, there is a significant increase in their vocabulary acquisition and an improvement in their communication skills [e.g. 5].

Our research wants to understand how to support children's development of language and communication skills through the co-creation and co-reading of multimedia narratives. This investigation is mainly focused on an educational context, thus it is directed to support teachers in achieving specific pedagogical objectives in the school curriculum.

We aim to contribute to the discussion on how to design mobile environments that support teachers and children in the achievement of educational benefits for the development of language and communication skills.

In order to investigate this issue, we have conducted two research studies in a pre-school in Switzerland. The two studies were based on the use of Fiabot!, a mobile application developed in a similar context [3]:

1. Study 1 aims at understanding how children co-write a multimedia wordless picture story (MWPS),
2. Study 2 let us explore the co-reading of a MWPS.

In these studies, we addressed the following research questions:

RQ1. How can technology help pre-literate children to **co-create a multimedia story**?

RQ2. How does **co-reading** contribute to the development of language and communication skills?

RQ3. During **co-reading**, what are the support/stimuli provided by the **interactions between child and adult**?

RQ4. How can we measure the main **educational benefits** of the experience?

RQ5. How can technology **support teachers** in running co-reading and co-writing activities in pre-school?

Giving the nature of the studies, we embraced a qualitative approach based on contextual interviews (teachers), observations (of class activities), and focus groups (children and teachers). Data from the different sources were transcribed and coded in an inductive and deductive way separately by two researchers. We also analysed the stories produced by looking at the type of utterances produced (e.g. contextual and/or decontextualized), biographical elements, strategies of the adults in keeping the children focused, occurrences and frequency of use of individual words.

Overall, we engaged 6 pre-school classes (3 in each study), 3 teachers (the same in both studies), and 15 children aged 5-6, (F=8, M=7) in study 1, 16 children (F=9, M=7) in study 2. Children worked in pairs in both studies. In study 2 one of the researchers had the role of stimulating the co-reading by asking questions (contextualised and de-contextualised).

Our main purpose was to investigate the design space of using mobile devices for supporting language and communication skills in primary school. Thus, the outcomes of both studies have been elaborated in terms of design challenges in order to inform the process:

- Provide a workflow that supports the plot development according to the activity (co-writing, co-reading) (macro workflow level),
- Find a strategy to manage the users' turn taking and collaborative activities (micro workflow level),
- Assist co-reading and co-writing by scaffolding with questions, asking for recap, and encouraging with compliments and other reinforcing sentences.
- Support the overall understanding of the story,
- Provide a pre-defined toolset for media mix.

By considering these results in combination with other relevant design guidelines [4], we will progress to developing a prototype and evaluating it in this school and others.

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