EDUCATIONAL GAMES FOR CHILDREN WITH DOWN SYNDROME

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EXTENDED ABSTRACT

The commonness of Down syndrome (DS) increased worldwide. Inclusive education, which embraces educational, social and emotional practises, based on well-structured instructions, interventions and support in the classroom is extremely valuable. In parallel with the in-class activities, educational software stimulates the inclusion. This paper presents the recommendations for such educational applications together with the pilot study intended for acquiring basic learning skills. The developed educational game was presented to children in the Day Care Centre for DS (DCCDS) in Skopje. Their enthusiasm and interest to use it is the greatest motivation to carry on with the study and after an approval by the experts and parents to offer it as a mobile application.

INTRODUCTION

Regardless of the considerably improved prenatal detection, the incidence of this congenital anomaly increased worldwide. People with DS deserve the same opportunities and care as others, which results in increased life expectancy and better quality of life. This can be achieved by constant parental care and support, monitoring of the mental and physical conditions, medical therapies, and consistent community support (Reid, 2018).

Inclusive education proved to be the best way to provide educational, social and emotional benefits starting from very early childhood (Felix, 2017). Moreover, it changed the attitudes towards this disability and improved the interaction with children with DS (Campbell, 2003). If well designed and implemented, specially created educational applications can significantly facilitate the process of inclusive education, enhancing the cognitive and learning skills of these vulnerable children.

FEATURES OF EDUCATIONAL SOFTWARE INTENDED FOR DS

Educational software aims to stretch the abilities of their users. However, children with DS are usually gifted for one-type skills: language, math, strategic thought or physical coordination. They typically manifest a deficit of attention; thus they are not capable of comprehending longer or more complex rules (Mason, 2015). Children with DS are not patient to wait for the application to download or to process the following steps (Skotko, 2005). They also need instant rewards for each successful outcome. Furthermore, DS children have significant vision deficit and anomalies in colour discrimination (Krinsky-McHale, 2014), and a lack of control of muscles stiffness affecting their motor skills (Vicari, 2006). These cognitive and neuropsychological profiles, amplified with the guidelines for supporting children with disabilities (Encarnação, 2018) and the recommendations of the specialists from DCCDS resulted in the following conceptual design criteria:

1. Intuitive gameplay with easy navigation and few, simple functionalities accessible by clicking over a perceptive icon, which is active throughout the whole image;

2. Clear interface with bright colours, clear contours, realistic and simple images, and without anthropomorphic features or facial expressions (Lee, 2018);
3. Substituted single and double finger gestures by two touches: from the source place to the target (Landowska, 2018);
4. Virtual tutor who announces the game, and responds with an appropriate facial and voice expression (Herring, 2017);
5. Simple and unambiguous instructions, which are repeated whenever an image is touched;
6. Adjustable progression pace, based on the performance of the DS child;
7. Learners are not capable of reading, so the instructions should be spoken or presented with the sign language;
8. Quick download and very short waiting time to advance from beginning to end;
9. Free of charge.

CREATED APPLICATION

The application consists of three integral parts: developing literacy skills, developing basic mathematical competencies and practising memory (Fig. 1.). The screens have a white background, few images and intuitive navigation.

To give learners an opportunity to set their own pace, and to enable the progress, all three parts have three levels, starting from the simplest and ending with the most advanced.

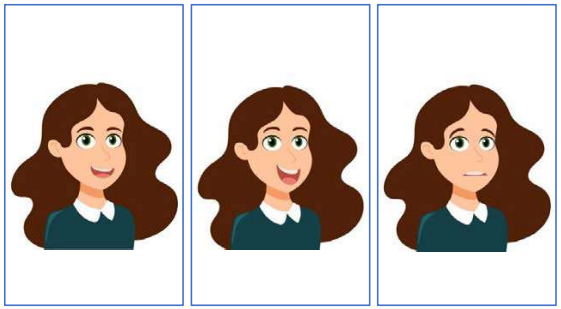
Figure 1. Memory game, intermediate level: coupling equal images, the initial letter with an image, the written name with an image, and numbers with a word

Implemented by Davor Trifunov

Each part of the application has its virtual tutor (Fig. 2), who has a full and deep voice and a perfect pronunciation. Tutors introduce the task, the levels, speaks out the names of the touched objects or pf the two navigation icons (Fig. 1).

If the learner accurately performs the task, tutor's face smiles and says a randomly picked congratulation with a happy voice. If the learner has failed, tutor's face becomes sad. After three wrong attempts, sad faced tutor suggests to repeat the task with a calm voice. After five consecutive mistakes, the advice is to go back to the previous level or to ask for help.

Figure 2. Three tutor's moods: instructional, happy and sad



Designed by Ana Zdravkova

FEEDBACK

Seven young boys and two girls aging from 15 to 19 and their parents were the first evaluators of the application. The game was installed on one tablet and demonstrated to every child individually. The age and the basic reading skills enabled them to successfully play the memory game. The whole event was touching for everyone. The kids were noticeably amused and attracted, except one girl, who was too shy. She listened the tutor with great attention and observed how the others played.

The most experienced boy comprehended the game immediately and asked to play the first. After trying all the options several times, he generously let others play. He manifested his frustration from the absence of an immediate congratulation after each successful coupling by lifting the speaker to hear the greeting.

Other five kids explored him, tried the game and managed to play it independently. The most extrovert boy succeeded after several trials and errors, and then tried to download the game from Google Play. Two kids, a boy and a girl created a strategy to first open all the tiles, and then couple them.

Two boys were not competent with the written words, one couldn't even discover the initial characters. They turned to the easier level of the game of own accord and were not enthusiastic to play it again.

During the second visit, all the kids, except the shy girl, activated the game and played it more competently, including the boys with lower literacy skills.

CONCLUSIONS

The ultimate goal of DCCDS is to prepare the kids for an independent life. They started making own meals under a full supervision of DCCDS staff and organized a cocktail with self-made bread and snacks. The next stage is to purchase the ingredients and start cooking according to a written recipe. To

achieve this goal, their literacy and understanding of quantities should increase significantly. According to DCCDS staff and their parents, the educational game will be of a great use.

The major challenge is the indifference and the anxiety of some kids. Hopefully, they are very confident in using the smart phones. Before launching it on Google Play, the application will be polished and upgraded with new contents suggested by the specialists from DCCDS. As a consequence, those kids who were shy to show their incompetence or who were not interested to use it will be able to experience it with the support by their family members.

The educational game is in Macedonian only. It can easily be adapted to other languages, making it available to wider community.

KEYWORDS: Down syndrome, educational software, life skills, mobile and tablet applications.

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