

Spe-Ler: Serious Gaming for Youngsters with Intellectual Disabilities

Joan De Boeck, Jo Daems, and Jan Dekelver

K-Point, K.H. Kempen University College, 2440 Geel, Belgium
{joan.de.boeck, jo.daems, jan.dekelver}@khk.be

Abstract. When working with youngsters with intellectual disabilities, it is often a challenge to teach them ‘boring’ content (e.g. the ‘rules of daily living’ in their school or care-center). In this paper we propose a serious gaming approach in order to facilitate the learning process. The novelty in our concept is that we decouple the game and the didactical content, which allows us to transfer the learning to the youngster’s leisure time. In our research, we built a framework containing several (fun) games and an administration environment that facilitates the creation of learning content. In a user experiment, measuring the user’s joy and motivation we found that the subjects enjoyed playing the games and were very attentive when the didactical content appeared.

1 Introduction and Problem Statement

Teaching ‘boring’ content to young people is often a challenge. This is especially true when working with youngsters with intellectual disabilities. The didactical approaches are limited and appear to be too moralising for the target group. On the other hand, a significant group of contemporary youngsters with intellectual disabilities do have a ‘natural’ interest for computers and computer games. Electronic games are now an everyday part of childhood and adolescence [1]. Exploiting this interest, the idea of offering the didactical content using the concept of serious gaming may be a solution [2]. While the positive results of serious gaming are still under a lot of debate [3][4], literature review also suggests that electronic games present many potential benefits as educational tools for health and physical education [5], and that those games may improve young people’s knowledge, skills, attitudes and behaviours in relation to health and physical exercise. This may be true in general, if there were not a huge variety in ICT competences in our target group[6]. Integrating the didactical content directly into a game may sound obvious, however, when the game is too difficult compared to the ICT competences, or simply when the player does not like the game, the entire didactical approach falls off [4].

2 The Concept

For the reason mentioned above, in the Spe-Ler¹project, we propose and evaluate an alternative approach in which we disconnect the gaming from the learning aspect; an

¹ Spe-Ler is an acronym for ‘SpelendLeren’ which is the Dutch for ‘Learn While Playing’.

approach which has been applied in a somewhat less explicit form in the Replay Project [7]. The aim of European Commission funded project REPLAY was to develop a gaming technology platform to provide young people who have become marginalised in society as a result of anti-socialbehaviour with a learning environment to facilitate their reintegration into society.

In the proposed Spe-Ler approach, the key point is that the games are played for fun without any didactical content. The used games are selected based on the success they have among the target group, so that there already is a level of certainty that the users are motivated to play the games. At certain moments (e.g. between two levels, after some time, ...), the game is interrupted and the didactical content shows up. The pedagogical team that is interested in offering that specific content to the target group creates this content. This way, the total concept is driven by both end users preferences in relation to games and supporting team. This approach is also suggested in other areas of serious gaming where higher success is expected from a collaborative creation process [8].

The content is offered as a short game interruption by means of a short movie (maximum one or two minutes), as it were a commercial. After the movie we offer one multiple choice question to the user. It is important to note that this question is not a 'knowledge check', but rather offers a 'dilemma' to the player so that he/she is forced to reflect on the offered material. The given answer is stored in a database and is at the coach's disposal for later didactical approaches. After the question has been answered, the game continues. The hypothesis is that the player, being in a good mood while playing the game, is more open to receive the information and messages transmitted during the short interruptions.

3 Technical Implementation

Given this concept, we implemented both a programming framework, as well as an administration tool. As the administration tool is used by people with limited ICT knowledge, creating a 'gaming' session for a particular group or individual must be as easy as possible. Hence, coaches only have to combine games and movies. In a first step, they have to select what games they want to be played (according to the ICT and intellectual skills of the player). Next the coach can select a number of movies that will be shown. All movies, together with the integrated questions are ordered in any desired order, according to the coach's insight.

During the game, the player can freely choose what game to play, but always sees the didactical content in the same order as the coach has decided.

When new content is required, people having a role of 'content provider' add movies. Those content providers have the permission to add extra movies and define a question per movie. Movies are classified by theme, allowing to easily create 'thematic courses'.

Finally, for adding new games, any 'fun' game can be added to the system because the games themselves may not contain learning content. However, to add a new game, the game must be compatible with the framework in order to support the interruptions

at regular intervals. To support this in the easiest way, we built a programming framework that allows a programmer to make any computer game compatible by adding only a few lines of code. In our proof of concept, this framework has been build using the DotNet platform, but porting this part of the code to another programming platform (e.g. Java) allows us also to makethose games compatible with the Spe-Ler concept.

4 Case Study

In order to test our approach, we set-up a proof of concept experiment. In the Spe-Ler environment, we imported 6 arcade-games as shown in figure 1. The games were written during a student's project, and adapted afterwards in order to be compatible with our framework. A student in Occupational Therapy, in collaboration with the staff of the MPI², created 25 short movies explaining different aspects of the rules of daily living within the centre. All those movies and a multiple-choice question per movie were put into the system. For the experiment, the question was not a dilemma as intended by the Spe-Ler concept, but instead was a simple question that could be answered after understanding the situation in the movie. This gave us a better way to have an impression of how well the movie had been understood.

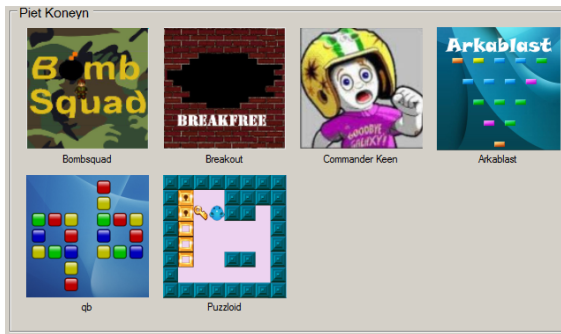


Fig. 1. Selection screen where the user can choose the game he/she wants to play

Eleven (11) youngsters, 7 boys and 4 girls with an age between 12 and 18, all with mild or moderate intellectual disabilities were asked to participate in our experiment. In the week before, 7 subjects had the opportunity to play the games beforehand, but without didactical interruption.

² MPI: a multidisciplinary institution for people with mild to severe intellectual disabilities. The MPI has an ambulant, semi-resident as well as a resident department and they accompany/guide/take care of children, youngsters and adults.

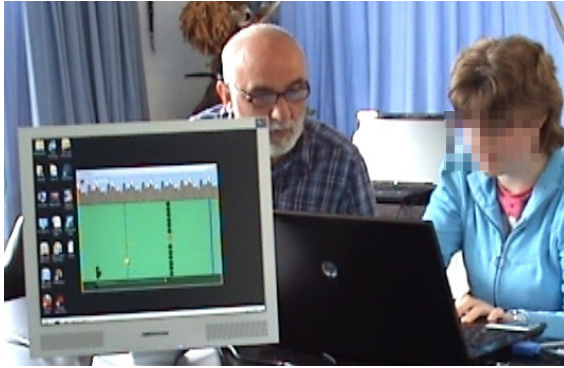


Fig. 2. Experimental setup: subject playing game, with coach

In the actual experiment, all participants were asked to come and play the games for half an hour, but they were not told about the didactical content and de interruptions after each level. All subjects, without exception were happy to come and play. For their convenience and their comfort, there was a coach from the centre sitting next to the player, in case they should need any assistance.

A researcher observed the youngsters and scored their behaviour and facial expressions (joy, frustration, concentration, ...) while everything was recorded on video for later reference. After the experiment, one of the coaches shortly asked some subjective questions.

Not any subject showed frustration or disinterest during the interruptions. Some appeared to be amused, others were neutral, but all were well concentrated. From the answers to the questions, we could learn that all subjects tried to answer the questions the best they could.

On the other hand, we found that for those youngsters that had not practiced before, it was difficult to finish a level, so they had not many 'learning' moments. Similarly, we found that for the subjects with moderate intellectual disabilities, understanding the movies was borderline. Hence, special care has to be taken to select games and content at a level perfectly suited to the subject's capabilities.

The subjective questionnaire did not revealed any surprises. All answers were very in line with our observations. Only one of the subjects did not like the games, and wouldn't play again. None of the subjects rejected the interruptions, and all could recall the content of at least one of the movies.

5 Conclusion and Future Work

Based upon a real need of a care centre for people with intellectual disabilities, we proposed a serious gaming approach. Specific to this approach is that the games at itself do not contain any serious content, but instead, the content is provided during short interruptions. This is done using short movies followed by a question. We built an environment that makes it easy for non-ICT people to add content and to create

personalised gaming sessions. In a proof of concept experiment, we found that all subjects enjoyed their gaming session and had a positive attitude against the movies. The questions were answered to the subject's best effort.

In a next step, we want to evaluate the net learning effect of our approach, because we realise that the learning periods are short compared to the fun-time. On the other hand, decoupling the game and the didactical content, this approach is one that can be applied during the youngster's leisure time.

We also believe that the Spe-Ler approach can be useful in other domains, such as very young children, as well. This is something that has to be sought-out in the near future, as well.

Acknowledgements. Part of this research has been funded by the Belgian Federal Government (P.O.D. Maatschappelijkeintegratie), combatting the digital divide (project number 2010/020) and has been co-funded by the K.H.Kempen University college.

The authors want to thank Tim Vannuffelen, Mohamed Kadi, Evelien Van Dinngen, GlennCenens en Jeroen Aerts for their effort during the implementation of this project and Lindsay Peters for her help in the creation of the movies.

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