A Virtual Learning Environment for Short Age Children

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Abstract

New information technologies provide great chances that are motivating many projects in educational environments to validate new material capabilities. In this paper we introduce a project that validates educational capabilities of a game. This game, called Prismaker, incorporates two versions: a physical version and a virtual version. Thus, we want to find out the real potentialities of games in learning processes and to evaluate a single game from two points of view: the physical game and the virtual version that is being developed. The virtual version is supposed to simulate a real playing environment where both teacher and student get help.

1. Introduction

New information technologies offer new tools that can fully modify the way we nowadays think of teaching. But the design of these tools is especially complex, because of the kind of users that these tools are aimed to. These users have a smaller expressive capacity and are obtaining some adult skills.

The creation of software for children is usually linked to the binomy computer games and visual interfaces. Their playing issues and their attractive interfaces make these kinds of tools especially interesting for educational environments.

Though there are many studies about motivation importance, there is a lack of scientific knowledge about the factors that have an effect on motivation, enjoyment and satisfaction [6]. New works have appeared lately suggesting that computer games increase motivation for children learning at school [6, 4]. Some of those works go further, and they state [3] that playing in children is equivalent to working in adults. When playing, children grow up, develop their physical abilities, discover the world and learn to relate with other people.

Anyway, using computer games provides new characteristics that improve any learning process. According to Sedighian et al [8] computer games supply meaningful learning, goals, success, challenge, cognitive artifact, and association through pleasure, attraction, and sensory stimuli. These factors are even enhanced when using 3D environments and attractive visual interfaces.

Computer games can play a significant role in forming children attitudes toward computers and offer the possibility of learning a wide variety of contents, both in and out of school. In recent years, if you had looked at the aisles of any computer megastore, you would have had difficulties to find games or educational software that didn't incorporate the usual fare of war, conquest, or competition. Those games have been found to appeal largely to boys, providing them with important starting experiences with technology. Yet, the situation has grown more complex [1].

This paper faces two goals. First, it introduces the multidisciplinary project where Virtual-Prismaker is being developed. Second, it describes the main features of this educational computer game.

2. Virtual-Prismaker project

A capital goal in this project is to evaluate the educational potentiality of Prismaker[tm] game from two points of view: the physical game, and the virtual game. This latter is in development stage.

This project is being carried out in conjunction with the corporation that created the physical game and it tries fundamentally to analyze the game's utility inside educational environments. In order to achieve this goal a multidisciplinary team has been created, formed of computer engineers, psychologists, and pedagogues. Psychologists and pedagogues are designing activities for both the physical and the virtual game. These activities are grouped into three categories: language, mathematics and

capabilities (attention, perception, corporal perception, spatial perception, temporal perception, etc).

At the same time, children and teachers from different primary schools are collaborating to validate how good this game may be for short age children. This validation will begin next academic year. Up to date, we have introduced this project to primary school teachers, who are collaborating in the final design of all activities.

Prismaker[tm] [7] is a construction game that provides a reduced number of kinds of pieces (see figure 1) to build with. Besides conventional possibilities, you can use logos to assign a meaning to these pieces, and, this way, it is possible to extend the educational features of the game. This game is intended for children older than 3 years. Available activities meet educative needs for each age. The physical version of this game has received several prizes because of the educational features it incorporates.

Figure 1. Prismaker[tm] system

The psychologists and pedagogues team is assigned the task to design activities for any educational field that could be carried out using Prismaker material.

These activities where playing is an important factor improve the learning capacity children have in each of their evolving states [9]. This improvement is achieved because children activity is performed in an imaginary situation. Thus conceptual behavior or guided idea is started and improved inside the game.

By designing these activities we try to take advantage, not just of educational capacities, but also of the benefits a game provides in the development of personality. Personality parameters influenced by playing are [5]:

1) *Affectivity*: Playing supports the affective or emotional level, because it is an activity that provides pleasure and entertainment. It allows children to express themselves freely, to positively channel their energy and to soften their stress.

2) *Mobility*: Psychomotor activities provide children of pleasant corporal sensations and contribute to their maturity, their motor independence and separation process.

3) *Intelligence*: Initially, the development of intellectual capabilities is linked to the senso-motor development. The way to acquire capabilities depends on the genetic potentialities and on the resources and environmental possibilities supplied.

4) *Creativity*: Playing leads to creativity, because in every playing level children are forced to make use of skills and abilities which give them chances to be creative in their expression, productivity and invention.

5) *Sociability*: As far as games and toys make easier any communication process and exchange, they help children to establish relations, preparing them for social integration.

These activities have been incorporated using a set of forms where any Prismaker[tm] material used to carry out the game is explained. Each form shows how to play a specific game, which capabilities are enhanced by this activity, what are the general goals, what are the specific goals, and the curriculum parts where it could be used. Figure 2 shows an example of these activity forms.

Figure 2. Activity form

A great variety of activities can be developed in a classroom. For instance, you may give children pieces with logos showing the more relevant events of a tale. Then children have to put the pieces in the right order so they can tell the tale to their classroom partners. This helps in improving, for instance, temporal perception.

Anyway, Prismaker[tm] material should be considered as a support resource for teachers for some of the usual activities carried out in the classroom.

Any available form is structured in different sections to help understanding the activity and the way it should be achieved. These sections are educational general goals, specific goals, capabilities developed, material needed, suggestions, task, scholar age, evaluation criterion, and difficulty level. Besides this, a questionnaire has been designed to allow teachers to evaluate each pupil's activity as well as the activity itself.

3. A new virtual playground

In the current development of the virtual version of Prismaker[tm] we provide children with a working environment as similar as possible to the way things exist in the real world. In this project, as in other children software designs [2], an important factor is the methodology used in the development and the participation of the final user in this process. The designing process is meant to be participative and multidisciplinary, where children, teachers, pedagogues and software and graphics designers work together to achieve the final goal.

Virtual-Prismaker is a 3D environment based game (figure 3) that tries to simulate the possibilities offered by the physical version of Prismaker[tm] game. This environment uses the different kinds of pieces of Prismaker[tm] system to develop many different games, which have been designed by a group of psychologists to help in the development of different facets of children's personality: language, mathematics, etc.

Figure 3. Children playground

All games inside our 3D virtual environment are carried out in a playing room. Of course, there are different rooms. These rooms have different difficulty levels, in the way that the level the child finds in the activities in a given room agrees with his age. Children can even customize the look for some of the objects in the room: the walls, the table, etc.

Virtual-Prismaker has been designed for people without computer knowledge. To make these people easier to use Virtual-Prismaker, we are engaged in removing computer concepts, such as "load/save", "menus", and so on. We have designed a user interface based on metaphor use that offers the concepts the way a child is familiar with.
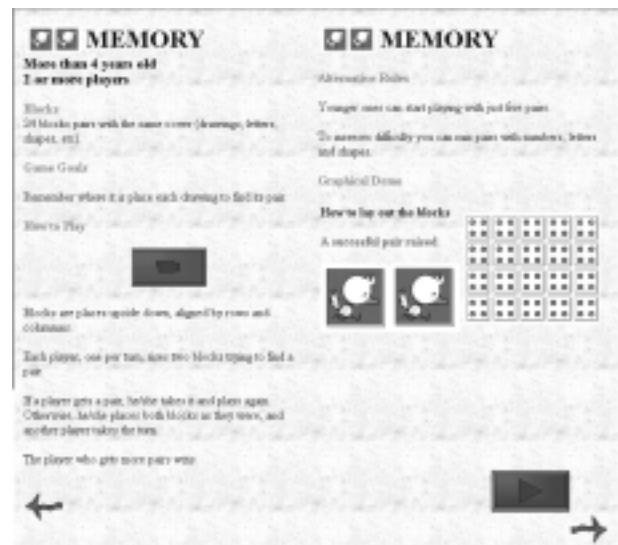

Figure 4. Interactive virtual book

Game instructions are collected in a virtual book. When this book is selected, it is opened and all available games are shown. Each one of these games is represented by its icon and a piece of text. When you select an icon, its associated text is automatically read and that game's instructions pages are shown (see figure 4).

The pages of the book are just HTML pages composed of text, sounds, images and videos. To allow children that are not able to read to understand these instructions, the text in the pages is automatically read by means of a voice synthesizer. In some specially hard to play games, or in games for very short age children, we have included videos to visually explain how to play. Then, the user can choose to play - and the playing environment for that game will be shown - or he can choose another game from those available in the book.

One of the most difficult games to play is the construction game. In this case, we have replaced standard I/O operations (load/save) with some shelves where users can store their work, so it can be resumed later at any moment. To add new blocks to the construction, children

take them from a box and drag them to the playground, avoiding this way the use of toolbars or menus.

One of our goals is to allow playing through Internet. This will allow children to compete and collaborate. Competition is one of the more important factors in children motivation, and collaboration helps in learning team working and sociability. Thus, for instance, when children build a new construction they can share it with their friends to build more complex constructions. To allow collaboration or competition with any Internet user we create a game server. When a user wants to play with another user, the system shows all "friends" willing to play. So, the user chooses his game partners from this list.

To make teacher's work easier, our system allows him to design new games based upon the basic activities we provide, so they can adapt activities' contents to the didactic unit they are teaching. So, for instance, when studying world geography, a teacher can design a puzzle representing the world, or he may use a "memory" game where students must find pairs of cards to associate a country to its capital.

Apart from all this, the system is able to track, not just the final result of each activity, but the sequence of tasks the user has performed to achieve that result. Thus, it allows the teacher to gather information about the reasoning process and he can discover children "reasoning patterns". Besides, a user is able to learn without the physical presence of a teacher. Our system evaluates any performed activity and is able to find out if that activity was successful.

4. Conclusions

As time goes on, we can look back and see how education has changed through time. Nowadays, information technologies are being used at schools and we need to validate how good this new educative material is working.

Thus, we introduce an educational project where we want to analyze the advantages of playing a game. And this, from two different points of view: a physical game and a virtual game.

An interesting goal is to find out the way to take advantage of all the chances supplied by information technology in learning processes. We show some of them: tracking the learning process, introducing virtual multimedia help, and, of course, enhancing the motivation children find in playing a computer game.

We think that Virtual-Prismaker incorporates many educative features, and that it is flexible enough to let teachers use it in their necessary curriculum parts. Virtual-Prismaker interface is attractive enough to increase children's motivation in their learning process.

Our first prototype has been evaluated by a group of teachers that found it useful, and we hope to get the same results later on this year when the virtual game will be tested in school with students.

5. Acknowledgement

6. References

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