DEVELOPMENT OF PROTOTYPE OF MOBILE 3D OF COGNITIVE TRAINING ASSOCIATED TO CONSERVATION PROBLEMS FOR CHILDREN 5TO7 YEARS

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Abstract—The main objective of the present pedagogical and technological proposal is to encourage socialization and learning processes of children aged 5 to7 years with learning disabilities, through conservation problems using a 3D mobile environment, always looking for healthy psychosocial balance so that in the future as autonomous adults, be able and capable in resolving their conflicts and problems. To achieve this goal the development of 3D Cell Prototype for conservation problems associated with cognitive training will be developed searching and looking for new ways of learning that facilitate learning in children.

Index of terms—Cognitive Disabilities, Conservation issues, Prototype 3D Mobile.

I. INTRODUCTION

It is undeniably the increasing role of technology in the world, has been irreplaceable communication tool, interactivity, work and communities, and although its use is not overcrowded as an educational assistant, it is clear that education is becoming more of hand with technology in all areas of learning to be a major support in the teaching-learning process. Colombia has been comparatively lagged behind in this field and the development of learning options technological resources for children with learning problems of at early ages. They require specific and specialized methodologies being the play and playful components very important, because children in many ways replaced the language for fun to communicate with the world, learning to interact with their environment through play. Combining game and technology produces positive results because the child learns and internalizes rules and regulations having fun and learning simultaneously.

This is the purpose of this development work: creating a learning method by means of Prototype 3D mobile of didactic character, which empowers the child to identify and resolve specific problems that streamline and transform the old methods of traditional school for a few more in line with the complexity of today's world and with new tools that provide science and technology to improve the way of life of man in our time.

With traditional methods, children with learning difficulties in mathematics, not only does not learn them but its performance is deplorable and this creates apathy and lack of motivation. It requires breaking with the textbook method for not improving the results of the recent PISA tests and to break the vicious circle of bad bases that have preschool children. Piaget's findings were revolutionary in the sense that he finds that the child learns not only in school, but that he internalizes and retains abstract numbers through a very complex relationship of objects and figures. Considering this guideline, the idea is to create an educational game for children aged 5 to 7 years with cognitive disabilities, in order to improve care and learning by association to a Mobile Platform, which promotes the child's motivation for achievement by its variability and design.

It seeks to find the entities, attributes and relationships associated with this prototype, define the requirements for the same, develop all requirements encountered and that are consistent to given need and to test its functionality. It is necessary to note that the cognitive theory refers not only to data storage or assimilation of information but to develop the ability to integrate, to relate, and to modify actions based on the analysis of the unknown with the known. For this case, we turn to the cognitive theory, to identify how the child begins to learn the concept of conservation and how to strengthen that knowledge through play and playful that in children is so important and also has purposes: as exercise, as a symbolic universe and regulated as something that has rules. The game is integral to child development and it is reiterated here that this is a way to replace verbalization that in that age has not yet been able to fully develop.

As for video games as an educational tool, they are a form of entry of the infant to the world of culture and computer

simulation. This type of technology is contributing positively to education because it improves skills, abilities, knowledge and attitudes; therefore school performance, motivation and concentration and besides to educate the child in planning strategies to retrieve information, to study in the transdisciplinary and with logic in problem solving. The relationship between man and machine in this specific case, teaches the child to minimize mistakes, and enjoy it with more productive use.

The prototype will be initially developed to run on mobile devices with Android operating system. The prototype is developed using the Unity3D game engine. The game engine can: To render graphics: 2D and 3D, detect collisions, control sound, provide artificial intelligence, create networking, create animations, manage memory and implement memory gravitational effects. In short: The engine facilitates the design, creation and graphic representation of the game.

How this development work is implemented: with the help of several areas of engineering: Software Engineering, some technical tools and 3D game development. The goal is to develop a game with which children with learning disabilities, through use strengthen the notion of conservation proposed by Piaget through the child's relationship with objects and figures and arithmetic clarification and to consolidate this process goes to the Picaa Application, developed at the University of Granada (Spain) for autistic and Down syndrome, which has advantages because the interface adapts to the context and needs of the student and it is individualized, and it adds the Application Ablah designed for ANDROID devices that help people with language disorders and also helps to attack behavior problems and improve communication and work is very useful to work for things like hygiene, teaching numbers and the teaching of biology.

II. THEORETICAL

Instructor-oriented authoring tools for educational videogames.

It is cautioned that digital games are becoming a rising trend in learning due to their potential educational benefits, however their application uses encounter disadvantages as their high production costs and the difficulty of finding prepared and committed instructors in the process development to achieve educational goals. The digital games-based in learning have been identified as an attractive complement to traditional methods of learning and awake the attention of all people that by long hours are entertaining, motivating and challenging unlike traditional websites, that the people find confusing, complicated and boring. As it is not easy for the high costs to produce video games for educational purposes article authors propose to provide instructors oriented to devise their own learning tools.

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A general architecture for the integration of educational standard video game from virtual learning environments.

It is noted that the combination of virtual learning environments and educational games requires solving practical and conceptual challenges and therefore these authors present a general alternative architecture emphasizing how abstract the communication between video games and virtual learning environments for purposes of accommodation and adaptation. Virtual learning environments have provided multiple teaching tools to the instructors, that support the teaching learning process and are also useful for monitoring the quality of the materials, used in the learning process and how each student uses; this has allowed that the instructor focus on and personalize the task with each student by identifying and working with their particular characteristics, however, everything is not easy in virtual learning environments. It can turn it in a very passive way to learn and can be difficult to control the ethical behavior of the student. In this context, it is good to explore the pedagogical benefits of the game for their revolutionary and new methodological contributions; among its characteristics it is highly interactive, achievements to pursue can be reached very quickly and dispatch more direct and abundant information on user behavior, information, however, with the videogame cannot get a serious sequence information on student progress. For these reasons, it is beneficial synergy between virtual learning environments and video games to find ways to program monitor and evaluate the performance of each student; this adaptation can be achieved in phases so that this is a challenge for the scientific community that work for better education in the world.

Can the virtual educational games contribute to cognitive development of young foreign language learners?.

It starts from the premise that the game itself is a necessary and irreplaceable ingredient in the learning process of children, but it is accepted that this is another thing; Videogame has other elements of interactivity and other forms of reading yet have not been analyzed and have not been studied in depth. The game permits education of body, character, intelligence, helps develop skills, when competitive contributes to the internalization of rules by children, can

aerate conflicts and overcome tensions, encourages friendships, camaraderie ,it is a formidable inductor for teamwork, but educational videogame of virtual character starts up other skills and abilities, develops in the child such strategies at the expense of others and strengthens their technocratic, individualistic and highly competitive spirit without say that this is bad but long term it can cause deformation and misconceptions of what should be healthy competition and solidarity. The important to highlight in the research of Vera Rodríguez is that she emphasizes the qualities of the virtual game for its level of cognitive functioning and the role of the mediator in the transition between these levels and their contribution to the development of thought in addition to its playful and entertaining.

Stages of cognitive development in AI systems, based in uncertain logic.

According BenGoertzel and Stephan Vladimir Bugaj, a novel theory of stages in cognitive development is presented, corresponding to the theories of Piaget but specifically oriented toward the systems AI centered conclusive uncertain components. These four stages are articulated (infantile, concrete, formal and reflexive) and both are characterized in terms of external cognitive achievements (in the manner of Piaget) and in terms of internal control dynamic conclusive. The theory is illustrated by analyzing specific problem solving tasks corresponding to the different stages. The AI engine Novamonte with its probabilistic logic, chains uncertain components and its empowerment in the world of simulation Agi-Sim, is used as an example throughout the text.

The authors affirm that contemporary cognitive science essentially does not contain a theory of developmental psychology AI, a lack that is frustrating from the perspective of AI scientists, concerning to the understanding, design and control of cognitive development AI systems generally intelligent. Of course there is a vast science of psychology of human development and of course a research programs to take the main ideas from the above and of course as much as possible to bring to the entire domain. The Paper of these authors describe the work they have done in this direction, as part of a larger project to develop a systematic theory of cognitive development AI.

III. DEVELOPMENT

This is a development project given by the agile methodology Scrum, which has some phases and activities for better analysis and implementation of the prototype. The different roles of the Project are: Product Owner (Client), SCRUM MASTER (Project Manager), Scrum Team (Team Development) Stakeholders (establishment interested in the Project). Later, it proceeds to the iteration planning (development phase), in whose development cycles the following process is followed; in a week: gathering requirements, planning Iteration) (tasks for developing requirements). In Running the Iteration: every 8 days. Synchronization with the Product Owner, the Scrum Master, Scrum Team and the General Lab our Inspectorate in inspection and adjustment in the last day. Joint review between Scrum Master and the Scrum Team. With the analysis of these results, a process is created to draw conclusions. It then proceeds to identify entities related to Prototype Mobile 3D cognitive training associated with conservation problems for children 5-7 years.

Based on the above, the application needs, are identified, its functional requirements what is the nature of the application and the required functionality. The next step is the identification and design of objects and scenography for each scenario, the functional requirements are analyzed to finally extract use cases after analyzing the application. Clear identification and design of objects (characters, geometrical shapes, and columns, holes in the wall and stage design) interactive and evident in the various stages of the application and for the specific case of this article, is possible only through sketches and figures, which are shown below

FIGURE 1
FIRST SCENERY 1

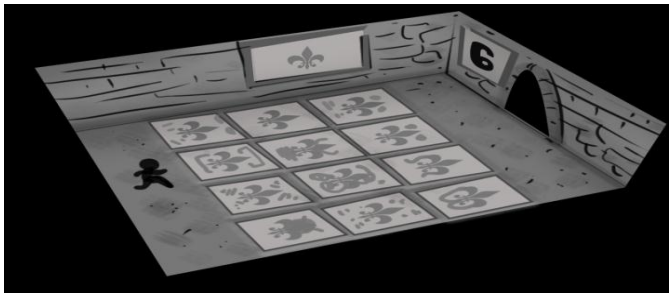


FIGURE 2
FIRST SCENERY 1.1

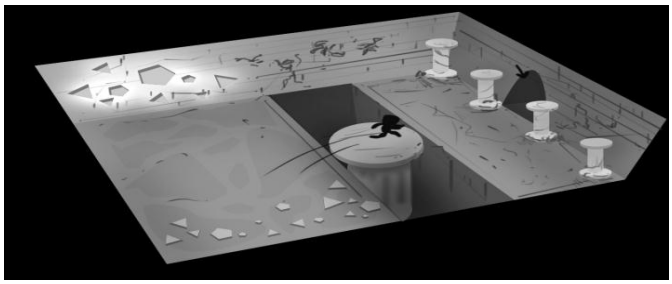
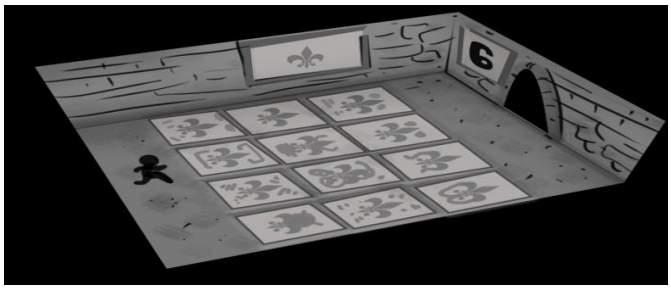


FIGURE 3
SECOND SCENERY



Subsequently, the functional requirements are listed. They are described and specified, how it is made and how its definition and how are grouped as shown below.

TABLE 1
FUNCTIONAL SPECIFICATION REQUERIMENTS

IDENTIFIER: RF01	**NAME:** to begin new game
LEVEL: necessary	**PRIORITY:** medium
ENTRADA: not applicable	**OUTPUT:** • Starting the first scenery
DESCRIPTION: the system allows starting a new game whenever the user wishes. Whenever start a new game, it will start in the first stage.	
PRECONDITION: start application	
POSTCONDITION: rendering of the first scenery	
MANAGEMENT DIRECTION: no applicable	

May be seen in figures the relationship between the player and use cases covering the different features that can make the player within the different application sceneries. Subsequently, detailed use cases are specified, the sequence of iterations between the system and the player, listing the steps and interacting with the system. A sample of this sequence can be simplified sample.

FIGURE 4
DIAGRAM OF FIRSTUSE CASE SCENERY

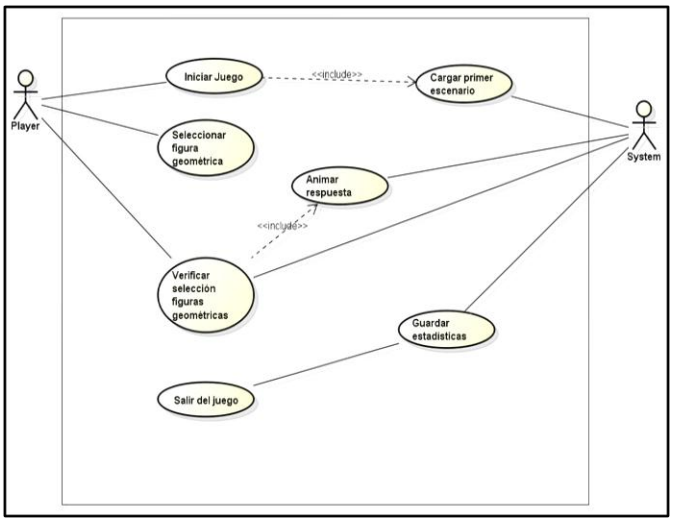


FIGURE 5
USE CASE DIAGRAM SECOND SCENARY

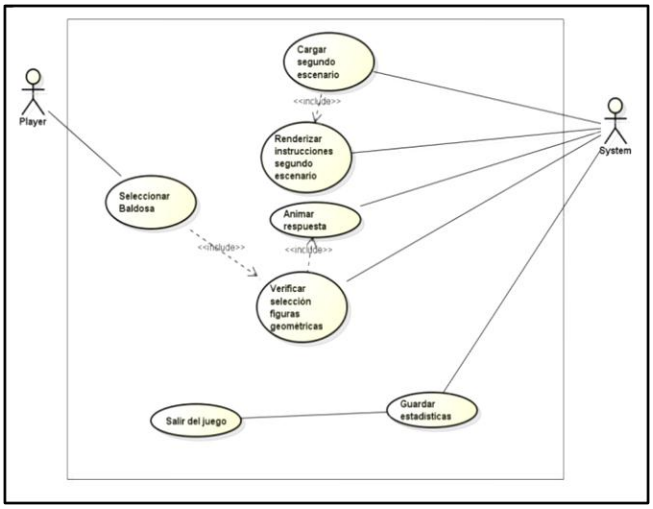


TABLE 2
SPECIFICATION OF USECASES

N° Use case	**CU01**
Name of use case	To start game
Actors	Player, system
Description	It starts a new game
Preconditions	Started application
Normal flow	**1.** The user presses the play button again **2.** The system execute CUO2
Flow alternative	Not applicable
Comments	

IV. RESULTS

The result of this development project given by the methodology was consistent with the goal for develop a series of phases and activities to counter the deficiencies of cognitive disability and contribute to the learning tasks for this group of children 5 - 7 years. By identifying the roles of the project for plan later this iteration as explained in detail in the methodology, it was found that the activities can be carried out, making viable the fluidity and interaction themselves. It became clear, verifying these results, the application needs to

be developed were identified, and identified and designed the objects and scenery for each scenery, detailing their requirements and use cases extracted from the analysis of the application.

The functional requirements of the application were implemented in the various meetings with the project tutor. Finally, they were described and specified functional requirements of the application to develop, that is, the functionality of each requirement, the fields that make up its definition and how they are grouped. Then checked through the list, the use cases corresponding to each functional requirement of the application that is going to develop, and use case diagrams of the first stage and the 2nd were observed. Application scenery. In relation to the use cases, is constructed and observed the sequence of interactions between the system and the player by checking the steps that he continues to interact with the system. These tasks adjustment corroborate assertions by the investigator Ángel Del Blanco, in the sense that it is necessary "to properly integrate Video virtual games to learning environments."
Conclude these results, emphasizing that models of the entities identified in the previous section were showed, extending activity diagrams for each scenery and then the classes diagram of the application.

As noted before, this research effort can expand and diversify into other fields of knowledge, to facilitate and improve learning for children with cognitive disabilities through playful, reiterating what was stated by Hetzer, who says: "Games are tests that help demonstrate the ability to overcome obstacles, be they motive or intellectual type. We believe that it enhances learning, and increase intrinsic motivation in learners of all ages, containing the same elements of a problem and require the use of solution strategies "[11].

V. DISCUSSION

The creation of technological teaching tools help the child with learning disabilities, not to slow down his development and not to create environments stagnation and conformity, but to grow, to overcome his deficiencies and cognitive limitations and become a skillful individual and autonomous in time to achieve results. According to Piaget, there are elements and resources that underpin the intelligence of children with learning problems, it is necessary to discover and enable to overcome his shortcomings. This type of cognitive training associated with conservation problems , will be liable to progress to the extent that science and technology develop devices and applications to expand and diversify its use and as well as equipment and labor resources available to expand areas for research. As shown in the results it is open the option to work from new developers, because there are definitely a lot to do still, is not the last word.

VI. CONCLUSIONS

In this paper a practical work was developed a tool for a given problem, the identification of entities, attributes and relationships associated with a Prototype Mobile 3D cognitive training in mathematics to children aged 5-7 years was achieved, and the process was successful in the descriptive and functional analysis of the application.

This type of operational development in which the main component involves the game as strategy in the teaching and learning process is fabulous to attract and engage the child to a new kind of playful learning, he protagonist and interactive antagonist blocks while enjoying it and simultaneously learning.

The creativity, originality and clever fusion of ideas and processes to generate learning facts are very important. This is what has been done in developing this research to propose new ways of assimilating and learning for children with learning disabilities. Piaget called the attention to the fact that it is not repeating old formulas that disabilities are overcome, but furthering into the multiple associative alternatives that have science and education for the child progresses definitely overcoming his disability.

REFERENCES

[1] CALERO PEREZ, Mavilo. Educateplaying, Editorial San Marcos. P 4

[2] GOOLE SITES. Definition of Human-Computer Interaction.[Online].<https://sites.google.com/site/seminario1les/contenido-de-la-asignatura/Unidad-N2/2-La-relacion-Hombre-Mquina-y-su-esquematizacion/21-Definicin-de-Interaccion-Hombre-Maquina> [Cited 28 January 2014]

[3] SET EQUIPMENT. What is Android: Features and Applications.[Online].<http://www.configurarequipos.com/doc1107.html> [cited 28 January 2014]

[4] PÉREZ MARTINEZ, Eugenio. Development of an educational game for learning English through mobile phones.Spain, 2011, 135 h. Degree project (Computer Engineering).University Carlos III of Madrid.Faculty of Engineering.[Online].<http://e-archivo.uc3m.es/bitstream/handle/10016/12995/PFC_Eugenio_Perez_Martinez.pdf?sequence=1>

[5] WHITE, Angel., TORRENTE, Javier., GER MORENO, Paul., MANJÓN Fernández, Baltasar. Ninth IEEE International Conference on Advanced Learning Technologies: a General Architecture for the Integration of Educational Videogames in Standards-compliant Virtual Learning Environments. In: celstec [online]. (2009) <http://celstec.org/system/files/file/conference_proceedings/icalt2009/data/3711a053.pdf> [cited April 8, 2014]

[6] TORRENTE, Javier., GER MORENO, Paul., Baltasar Fernández MANJÓN, Baltasar., SIERRA, José Luis. Instructor-Oriented Authoring Tools for Educational Videogames. In: aminer [online]. (2005)

<http://pdf.aminer.org/000/270/623/a_simulated_student_player_in_support_of_the_authoring_process.pdf> [Cited 11 April 2014]

[7] Blikstein Paulo., Abrahamson, Dor., Wilensky, Uri. Multi-Agent Simulation as a Tool for Investigating Cognitive-Developmental Theory. In: northwestern [in línea]l<http://ccl.northwestern.edu/papers/2007/NU%20CCL%20AERA%202007%20Piaget%20Conservation%20Paper%20v8.pdf> [Cited 13 April 2014]

[8] GRIFFITHS, Mark. What is clear from the empirical literature Is that the negative Consequences of playing almost always Involve people Who were excessive users of videogames: The educational benefits of videogames in: ucla center [online]. Vol 20, No.3 (2005)

[9] VERA RODRIGUEZ, Esperanza. Can virtual educational games contribute to cognitive development of young foreign language learners?. In: eleducador [online]. (May. 2009) <http://www.eleducador.com/images/stories/fotos_articulos_x_area/tecnologia/4366_Juegoeducativos.pdf> [Cited May 2, 2014]

[10] TOYS, Buenos Aires, Kapelusz. I PastellsAlsina, A. Reflective learning in initial teacher education: A model for learning to teach mathematics. Educ mat.Vol 22 No. 1 Mexico. 2010.

[11] GARCIA GOMEZ. A. The importance of play in early childhood education and development. Journal of education and development.1 No. 10. Dec. 2009.

[12] MARTINEZ PEREZ, F. The importance of play in preschool and proper pedagogical direction. [Online] <www.monografías.com> [cited 5 May 2014]

[13] Chateau, Jean (1958), Psychology of playgrounds, Buenos Aires, Kapelusz

[14] Piaget, Jean (1982), "The classification of games and its evolution from the emergence of language" in symbol formation in children, Mexico, Fondo de Cultura Económica