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Intelligent Interactive Accompaniment Platform to Support the Learning Process for Highly Vulnerable Children

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ABSTRACT

Access to information and digital tools worldwide is a reality through the internet; Data in the cloud, connectivity applications, work networks, however, in the area of Education we find problems when implementing a strategy of dissemination, use and application of platforms in the vulnerable sector. We speak of the vulnerable sector as the group of families that do not have access to coverage or equipment that allows access to "Information and Communication Technologies", the statement made by UNESCO shows through an international study that; approximately 1.5 billion students could not attend school due to the COVID19 pandemic, 706 million do not have access to computers, 56 million students live where there is no mobile network coverage, with which they proposed alternatives such as radio station programs and community televisions, in addition 63 million teachers do not have the means to reach students since the doors of schools were closed in 191 countries. It is necessary to accept the educational proposals that exist and translate them into the collective reality without affecting equality of opportunity, a precise case in our proposal taking as input the educational material by the Ministry of Education of Ecuador to implement an intelligent interactive support platform as a support in the learning process directed for highly vulnerable children of the preparatory sublevel, for which the guidelines have been revised and work will be carried out in the form of knowledge modules identified as: Module scope of logical-mathematical relationships, module scope of corporal expression and motor skills , module area understanding and expression of language, module area of artistic expression. These modules will be programmed with content that can be interrelated with interactive books that include a specific game so that the child interacts with the information and activities proposed, giving them instant positive feedback, an incentive to continue in the game and reach complete a unit of study, likewise intelligent interactive multimedia material will be programmed, leaving a set of tools so that the teacher can include other activities with the same virtues mentioned.

Keywords: Intelligent, Accompaniment platform, Learning process, Vulnerable children

INTRODUCTION

Access to information and digital tools worldwide is a reality through the internet, institutions from all sectors manage data in the cloud, connectivity applications, work networks, however when a study perimeter is established, in our In the case of the Education area and figures are reviewed, we can find some inconveniences when implementing a strategy of diffusion, use and application of platforms, reviewing the data at the Ecuadorian level in terms of telecommunications infrastructure and coverage, number of access equipment, is lagging behind the vulnerable sector.

We speak of the vulnerable sector as the group of families that do not have access to coverage or equipment that allow access to "Information and Communication Technologies" ICTs, the declaration made by UNESCO and places it as "digital gaps in distance learning", evidence through an international study that; approximately 1.5 billion students were unable to attend school due to the COVID19 pandemic, 706 million do not have access to computers, 56 million students live where there is no mobile network coverage, with which they proposed alternatives such as radio station programs and community televisions, in addition 63 million teachers do not have the means to reach students since the doors of schools were closed in 191 countries.

Analyzing the guidelines of the prioritization of the curriculum presented by the Ministry of Education of Ecuador due to the current health emergency; "The Ministry of Education has the responsibility to guarantee compliance with the constitutional mandate that establishes the right to a relevant, adequate, contextualized, updated and articulated education throughout the educational process, in the National Education System, in its levels, sublevels, offers -ordinary and extraordinary- and modalities. In this context, it has faced the great challenge of carrying out a curricular prioritization that guarantees quality education, developed on the basis of the current national curriculum, issued through AGREEMENT No. MINEDUC-ME-2016-00020-A, of February 17, 2016, considering the essential basic learning that allows equity, access to subsequent training and educational processes, which avoid educational inequalities and social exclusion".

STATE OF THE ART

Education is one of the sectors that has evolved technologically slowly and gradually, a fact that was undoubtedly visualized due to the present health emergency, other sectors such as industry, commerce, could be sustained in terms of activities to be developed, an example of this it is industry 4.0, the Internet of things, e-commerce, which could virtualize tasks and support institutions in a semi-presential way, however there is also evolution in the educational sector, a fact that is cited in the work of (Francisco J. Guzmán, Marco Velázquez, & Angélica López, 2020), first establishes the panorama of industry 4.0 that allows us to generally make decisions about industrial operations based on artificial intelligence, then places in context the evolution of the transition from education 1.0 to 4.0 (See table 1) where the fundamental link is "pedagogical proposal that proposes a training path for the

Table 1. Evolution education 1.0 – 4.0. (Francisco J. Guzmán, Marco Velázquez, & Angélica López, 2020).

	Educator	Educating	Content	Time	Space
Scholarly 1.0	learned master	submissive student	Speech – writing	Cyclic	physical classroom
Scholarly 2.0	lead teacher	enterprising student	Practices	two-dimensional	Laboratories – workshops
Scholarly 3.0	Mediator and facilitator	self-taught participant	Multimedia, computer media	Synchronous – asynchronous	virtual concrete
Scholarly 4.0	Experience designer for virtual learning environments	Users of online educational services	Real time	Real time	Massive virtual - custom

development of managerial talent in charge of educational institutions, with the intention of contributing to decision-making and the solution of complex problems in a creative way at the juncture of the fourth industrial revolution. It is made up of three areas: Talent Development 4.0, Digital Governance Skills and Specialization for the Management of an Intelligent Institution. The participant, first, is sensitized about digital culture and institutional culture. Later, he carries out methodologies and uses tools based on disruptive technologies. Finally, he makes decisions and incorporates a culture of continuous improvement to guarantee the relevance and permanence of school entities".

The problem occurs when there are no off-line interactive platforms that allow to be in the structure of personalized massive 4.0 or Virtual education to provide feedback to a student in their learning process, it can be evidenced through the publications made in recent months by the pandemic, as is the case of the work carried out by (Ruiz, 2020), where he presents the panorama that was experienced worldwide, a change from mass schooling to individual online schooling, giving rise to inconveniences such as infrastructure gaps, connectivity , of possibilities of educational uses by teachers and students of technological resources, also mentions that it has affected the right of the state to Education for all.

In the work of (CÁCERES-CORREA, 2020), he presents the panorama that is experienced in the vulnerable sector, limits the work related to the delivery of study guides for carrying out activities without feedback, the level of education of the parents, the time, the socioeconomic factor, undoubtedly affects learning, another group received classes through television and radio and in the same way they did not obtain feedback, giving the panorama for if it is not a lack of knowledge of the skills, a desertion student, also underlines that in the event of a return to face-to-face learning, it would be for a purpose other than the desired one, "These returns to school respond more to a market need than to a real educational interest."

In the work that he presents (Díaz Delgado, 2020), he talks about the tools used in the environment that emerged from face-to-face to virtual, among

which we have: learning at home, a scenario in which parents were part of the educational system as teachers' aides; improvised digital literacy, study of information and communication technologies for parents, students, teachers, having problems in compatibility of schedules of teachers, parents, students in terms of work, availability of equipment, number of children to receive classes, however , a post-pandemic scenario becomes visible with a possible digital literacy with a strict pedagogical sense.

The need that we attack is to supply accessible tools to the vulnerable sector to support the objective of the Ministry of Education of Ecuador that it underlines in the Educational Continuity Plan; "The Institutional Plan seeks an adequate organization within the institution and with external organizations to guarantee that all students remain in the educational process, whether at home, at school or in any other option that guarantees educational continuity. The Institutional Plan commits the members of the educational community to constructive dialogue for concerted and cooperative management in favor of education." Among the pillars that will support the project proposal is the information provided by the Ministry of Education in its educational plan that with the interaction of experts in the field of education, experts in the field of computer systems, educational quality management, electronic systems, generate an interactive off-line virtual platform that includes intelligent interactive books, tool repositories, virtual tutors to support the learning process, implementing the platform in all its stages in order to obtain a system accessible to the vulnerable sector.

VIRTUAL PLATFORMS

The current events derived from the global pandemic caused by Covid-19, caused an emergency in migrating from face-to-face education to virtual education, and virtual platforms are a key piece in this process, which has been analyzed by several authors such as (Morales Espíndola , 2020), in his article "Knowledge management, through digital learning platforms and tools in the face of migration from face-to-face classes to online", which addresses the management of educational technologies in virtual learning environments. In the face of a historical event, such as the Covid-19 pandemic, for which the different educational systems found themselves in the need to migrate classes to virtual education.

In the American sphere according to (Ramírez, 2020) in his article "Virtual Education in Mexico: emerging challenge before COVID-19" This research highlights the progress and challenges of Mexico to migrate face-to-face to virtual education in a prolonged state of school absence, although virtual education has been integrated into institutions, the development of specific skills, innovative teaching-learning strategies and the use of virtual platforms will guarantee quality virtual education.

For the Ecuadorian case we have (Vinueza-Vinueza, 2020), in his article "Analysis of the implementation of the educational services portal: Educar Ecuador" presents an analysis of the implementation of the Educar Ecuador educational platform in the national education system, In addition, the importance of the use of virtual platforms. It is necessary to emphasize that

there are areas that, due to their geographical and economic location, do not have access to information and communication technologies (ICT).

INTELLIGENT SYSTEMS KNOWLEDGE MODELS

As is the case in other areas, it is also detected in Higher Education that the use of Artificial Intelligence (AI) can be, and in some cases is being, a powerful means of inclusion through adaptive support in pedagogical help and in teaching. resource delivery. And do it in a sensitive, relevant and pertinent way with the personal and group learning situation of the students, in response to their demand for knowledge and for the development of their skills.

(Villarreal Farah, 2003) indicates that the different computer systems are intended to support the teaching process and, in particular, student learning. However, there are few applications that can demonstrate that they support the achievement of the proposed content and/or skills. In the area of artificial intelligence, for a long time, intelligent tutoring systems were developed with some level of results. However, in the last decade a new type of system has appeared, based on intelligent agents, which have demonstrated their effectiveness in training processes and support for the work of both teachers and students. These systems behave not only as an intelligent tutor, but as another member of a group of students. As a result of the development that technology has undergone in recent years and the results of research on these intelligent agents, a growing attention has been observed for these systems.

(Zapata Ros, 2018) in his article "The transition from LMS to Intelligent Learning Systems in Higher Education" explains the need for a pedagogical and instructional design model that integrates students in new environments and guides that help to common and desirable learning outcomes. He raises the need for an analysis of the conditions necessary for its validation.

In the study carried out by (Cateneo, 2016) where he details the development and implementation of an Intelligent System that assists the teaching-learning process between students and their teachers. For the construction of said computer system, the application of unconventional technologies from Artificial Intelligence is foreseen, seeking to generate a benefit for students.

VIRTUAL TUTORS

When we talk about virtual teaching environments, the theories emphasize the role of the virtual student, as the main person responsible for their own learning, turning the Virtual Tutor into a facilitator of this process in the academic, technological and personal spheres.

This is why, citing (Freire, 2018) in his article "The tutor in virtual learning environments", he maintains that among the main qualities of virtual tutors are that of encouraging the development of independent study, empathy, proactivity, being good host, possess communicative and didactic mastery, be flexible and demanding with the fulfillment of the student's tasks. Cases such as the ones he mentions (Gracia, 2020) can also be seen in which he proposes as a problem that it is the absence of activities that allow virtual tutoring to improve academic performance in technological universities.

We can verify in the work of (Orozco González, 2020) in his article a methodology for implementing a chatbot as a virtual tutor, where he explains the use of Chatbots supporting the teaching-learning process since they help students to advance in their academic development within a university subject.

CHATBOTS FOCUSED ON EDUCATION

A great educational resource is a chatbot, which allows dialogic learning based on a communicative process between the learner (student) and the bot, which has 3 phases: start, response and feedback. When talking about a group, an additional moment is involved, the discussion: the chatbot gives the premise and starts the conversation through a question, then the participants make their comments like a forum and answer and receive feedback, this technology allows achieve a pedagogical model focused on student learning (Sandu & Gide, 2019).

The researchers (Hien, Cuong, Nam, Nhung, & Thang, 2018) in their work expose the use of chatbots in an educational context, which can serve to remember key information from past sessions and classes; It responds to common questions of the study topics and allows solving administrative procedures such as assignment assignments, grades, schedules, etc.

Intelligent tutoring systems (ITS) are presented as technological learning resources that are made up of chatbots to provide real-time feedback to participants, serving as a guide to enter virtual learning environments. The University of Honk Kong conducted criminology courses adapted to this methodology. Based on the IBM Watson Assistant platform and machine learning algorithms (Gonda, Luo, Wong, & Lei, 2019).

A chatbot was developed by the Tecnológico de Monterrey, which was used to generate a course on artificial intelligence, its fundamental basis is the treatment of data that involves three fundamental moments: compilation, manipulation and expansion. The chatbot's response focuses on giving simple answers through a context associated with "frequently asked questions" giving hierarchy to the relevance in each of the questions, also allowing interaction by voice (Reyes, Garza, Garrido, De la Cueva, & Ramirez, 2019).

They explain (Crespo Miguel, M., & Domínguez Cabrera, B, 2020) within their work that a chatbot is nothing more than a question-answer system based on prior knowledge of experts in a specific area, these are designed in such a way so that human intervention is not necessary at the time of its execution, based on artificial intelligence. In addition, they focus on medical use focused on an interview process for language evaluation.

APPLIED EXPERIMENTATION

Educational books have been and will continue to be one of the main tools of school education, currently several means have been used to optimize their use with the support of ICT. But many of these have not been addressed in school-level education, much less for vulnerable students. The proposal uses a teaching methodology supported by ICT, with which a student can access

educational content appropriate to their level, this content being playful and fully interactive.

The proposal is essentially based on a digital book with interactive content, which will run on a Tablet with an Android operating system. This content is based on the SCORM model (Shareable Content Object Reference Model) and may contain multimedia content (Text, Audio, Video, etc.). Also considers the use of serious games within the resource to use a playful learning methodology. This content also known as learning objects are widely used in educational E-Learning platforms or platforms based on Moodle.

Education is one of the sectors that has evolved technologically slowly and gradually, a fact that was undoubtedly visualized due to the present health emergency, other sectors such as industry, commerce, could be sustained

The educational content of the learning object in the form of a book will be adapted according to the academic curriculum of the Ministry of Education of Ecuador so that the student obtains the skills required according to the level.

In addition to the educational material based on the SCROM model contained in the book, a virtual tutor will be presented to provide feedback on the interaction maintained by the student with the application. This tutor will be presented in the form of animations and will contain intelligent methods for managing the student's learning, as well as performing different motivational interactions for the child.

This mobile application will connect to a web server that will function as a repository for interactive books and will be able to collect information on the interactions that the student has carried out in their learning process. Books with various themes can be added to the repository and these books can be added to the application's collection of books, requiring a single internet connection to download and that the book in particular can be used without the need for an internet connection.

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