Design of a low-cost virtual reality system, as an aid mechanism in online classes for children

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Abstract

In the development of educational activities, being able to understand and understand the activities carried out is important to be able to have the greatest concentration, many techniques use audio-visual educational material. Taking advantage of this material in the present work a methodology is proposed to be able to use this material using low-cost devices, in order to have a virtual reality system with all the functionalities and with a control where the development of the material that is being displayed can be monitored. as well as being able to manage the material. The methodology proposes the use of virtual reality glasses the size for children, a cell phone, a computer and a wireless network, accompanied by a virtual reality program that can be configured and connected between a computer, this configuration is done using the application "Trinus VR", which allows us to connect and share the visualization between the computer and the cell phone. In the application of the methodology, it was visualized with some stories where children can read and understand the message of the story, the results show that children can concentrate better if they are shown audiovisual material and through virtual reality glasses maximum concentration is achieved Because he is only looking at the story, likewise the use of virtual reality glasses of the size for children, helps the child feel comfortable and does not perceive the use of the glasses, achieving only focus on the story, we conclude by indicating that the methodology can be scalable and applicable to other courses and disciplines.

Keywords 1

Virtual reality, education, reader plan, student, wireless network.

1. Introduction

In the development of online classes, children tend to take classes on computers, mobile devices or other electronic devices, in this process, children are subjected to many distracting agents, which can be the television, toys or a family member who is at home, virtual reality techniques emerge as an alternative to be able to collaborate in the educational process by collaborating in classes. We found related works using Virtual Reality in the design and implementation of a low-cost physical activity intervention, which is designed to foster an intrinsic motivation to adopt lifestyle changes in children aged 6 to 10, which interacts through virtual pets [1].

We also found work related to improving emotional deficiencies, in the development it was possible to adapt 6 learning scenarios with approaches such as control of emotions and relaxation strategies, 4 simulate social situations, managing to demonstrate that Virtual Reality is one of the best means to offer learning in a fun and motivating way for these children [2].

Learning through Virtual Reality, which are visual and used for the education of students, when subjected to the presence of visual information, could affect the selection and organization processes

WTEK-2021: Workshop on Technological Innovations in Education and Knowledge Dissemination, May 01, 2021, Chennai, India.
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by overloading the student's cognitive capacity, with the use of signaling we could highlight these processes, so we are going to analyze the principles of multimedia design which can provide evidence to promote learning applied to a Virtual Reality environment [3-4].

We also found works related to Virtual Reality, related to the evaluation of the listening experience in 3 dimensions, for which 2 applications have been used: the "exploration of the musical labyrinth" and the "learning experience in the room". In a 3D stage where you can listen to a musical piece, the space was limited for greater concentration limiting distractions, a welcome message is sent showing the instruments and musical genre, in total 8 different "genre rooms" were implemented considering intuitive and reliable navigation as a key aspect [5].

Distance education is gaining more and more strength, which is why there are referenced studies to be able to evaluate this type of modality directed towards adults, for which class sessions are designed in synchronous and asynchronous mode in order to be able to reinforce the topics that were not understood during the online session. [6]. In the use of haptic devices as mechanisms to be used in educational environments, we find many applications, with the intention of being able to work with their interface that are normally very pleasant, with which users do not require much effort for cursor movements, thus eliminating all types of muscular stress that the use of conventional devices can cause [7].

In the environment of video games and virtual reality, dedicated to improving many aspects of people's daily lives, we can find the use of video game consoles to improve muscle recovery and learning tasks [8-9]. In the process of education in health areas, related works are presented on the power of practical differences in the real world versus the practices in virtual reality, in order to differentiate the experiences between these two study modalities, achieving varied results, they were categorized as According to the multidimensional classification based on abilities, cognitive and affective, the results based on abilities are the compilation and automaticity of particular abilities and cognitive learning includes verbal knowledge, the organization of knowledge and cognitive strategies [10].

We find works where the digital learning experience based on the use of Virtual Reality techniques is explored in more detail, knowing the variety of meanings, spaces, processes and teaching strategies to discern a global perspective on the construction of the experience of student learning, multi-modality is an emerging phenomenon which will influence the design of digital learning especially when it is used in virtual reality, the results contribute to being able to discern about multimodal teaching about virtual reality, with an emerging form in which paradigms based on systems design are combined with embedded, situated and reflective praxis in spatial, emotional and temporal virtual reality learning environments [11-12].

There are many topics related to educational processes, such as the theory of cognition, incorporated as a research framework with the aim of exploring about the influence on virtual tours about wines and their sensory experience of wine, in the educational process. , this process began with the laboratory tasting where the influence of virtual reality videos was compared with traditional videos about vineyard tours and wineries, from which it was possible to obtain that virtual reality tours had higher sales to Unlike traditional videos, consumers with more knowledge about wine were able to appreciate the video and the flavors and aromas more than those with less knowledge about wine [13].

2. Materials and Methods

In order to develop the methodology, the following three stages were designed, which are presented in figure 1, where each of the stages corresponds to an essential process in the fulfillment of the objective, the results of each stage serve as input for the next stage, that is It is necessary to have the necessary equipment and the necessary wireless connection, in order to demonstrate the use and

application of the methodology. Each of the stages is developed below, describing the elements necessary for its application, as well as the application and the results we hope to obtain.

Figure 1: Block diagram of the proposed methodology.

2.1. Device Configuration

In the development of the methodology, the first stage corresponds to being able to ensure the availability of the devices and how they can be configured, with the intention of being able to be used in the next stage. The equipment that is required is a Virtual Reality glasses and a cell phone, in our case we work with children, virtual reality glasses are required with a special size for them, there are lenses of various sizes and models on the market, the choice is the virtual reality lens as can be seen in figure 2, managing to have small lenses so that they have better comfort and do not feel the weight of the lenses, because added to the weight of the cell phone, it has to be supported by the child. For the connectivity between the cell phone and the computer, the Trinus Cardboard VR application is recommended, which allows you to view on the cell phone everything that is projected on the computer screen as can be seen in figure 3.

In figure 2, you can see the connection diagram, for which it is required n equipment that can be connected to a wireless network, where the cellular equipment and the computer equipment must be connected. This connection is important because it is by this means that the computer and the cellular equipment can be connected, in this way everything that can be observed on the computer can be observed on the cellular equipment.

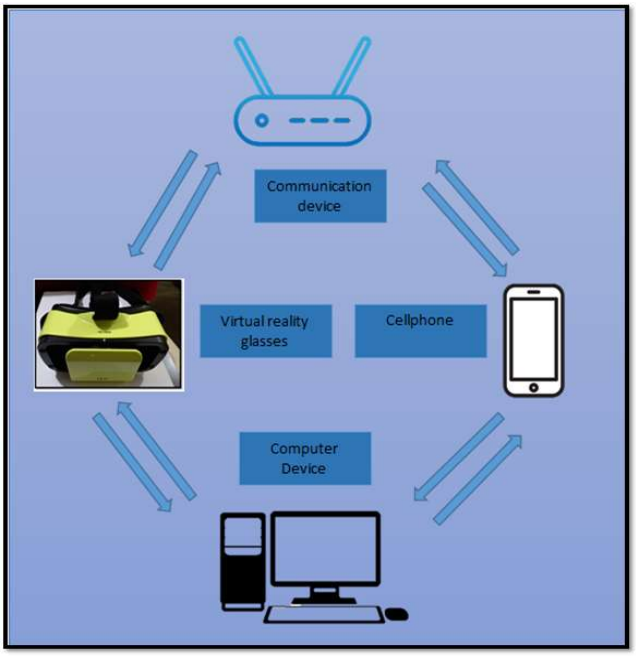

Figure 2: Device Connection Diagram

Figure 3: Virtual Reality glasses

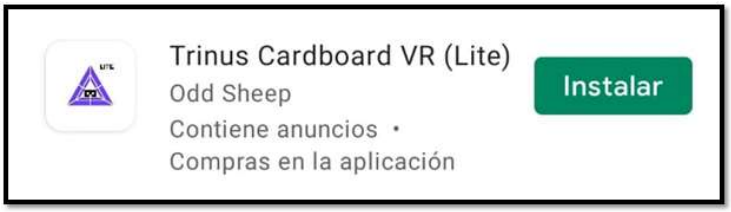

Figure 4: Application for virtual reality connection

In figure 4, the Trinus Crdboard VR application is presented, who is in charge of being able to send to the cell phone, everything that is displayed or can be seen on the computer screen, this mobile application is free and can be downloaded from the repositories depending on the cellular equipment's operating system.

In figure 5, you can see the configuration interface of the Trinus Cardboard VR application, to be able to connect you have to be on the same Wi-Fi network with the computer, being on the same network, we proceed to turn on the application using the form icon triangle and the cellular device will be connected with the computer.

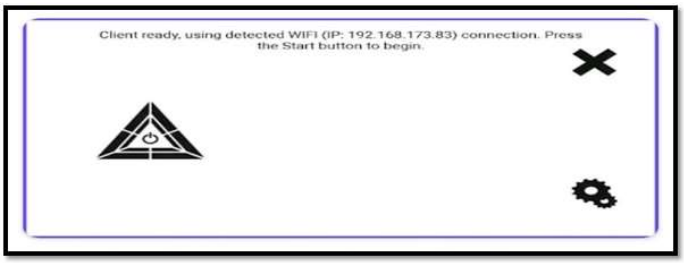

Figure 5: Application settings for virtual reality connection

In figure 6 you can see the way of visualization of the cell phone using the Trinus Carboartd VR application, where you can distinguish two views that correspond to each eye, giving the sensing and virtualization to the virtual reality model.

Figure 6: Visualization of the virtual reality scene on the mobile device.

2.2. Adaptation of educational material

Having configured the necessary equipment, choose the educational material that can be displayed on the virtual reality device, for this task, it is necessary that the devices are synchronized. One of the problems that children present is the ability to concentrate at the time of reading stories, in this sense the chosen material is to be able to disseminate stories that children can see and read through virtual reality glasses. In order to improve their reading comprehension skills, the chosen file is a story that has video, audio including subtitles so that they can read as can be seen in figure 7.

Figure 7: Story that is displayed on the computer and virtual reality glasses.

2.3. Presentation to the student of the educational experience with virtual reality

Having configured the devices and having the educational material ready to be viewed, the next stage in the development of the methodology is the presentation of the glasses to the child and the ability to view their content. This stage is very important because the results of this stage will depend on whether the child can easily fit in with the use of the lenses and if he feels comfortable with their use, as well as with the material he is projecting. The following images show the use of the glasses with the child's interaction.

Figure 8: Front view of child with virtual reality glasses.

In figure 8, it can be observed, the front view of the child using the virtual reality glasses, it is observed that the lenses are coupled with the cellular equipment, with which, any smartphone can be coupled with the lenses. Due to the size of the lenses, the child feels comfortable and the lenses fit naturally on the top of the head, making the child concentrate on what is being projected.

In figure 9, you can see a top view of the use of the lenses, where it can be seen that the lenses fit easily on the child's head, due to the size of the lenses and the material that is comfortable. The intention at this stage is to get the child to focus on what is being projected rather than on the equipment he is using.

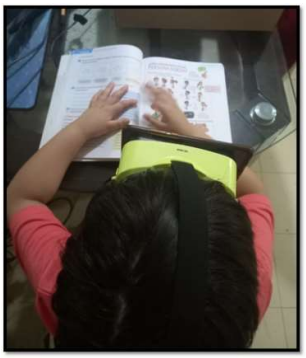

Figure 9: Top view of boy with virtual reality glasses.

3. Results

The results that are reached at the end of the research, are related to the use of technology in order to improve certain daily tasks in order to facilitate their work, it is this theme education is one of the very important and worrying processes of parents In the initial ages is where much attention should be paid, the subject of reading and its comprehension is one of the most important processes, so long times are dedicated to it so that you can read and understand the readings.

Regarding the first stage of the methodology, the results show that using the appropriate devices help greatly in the implementation of the methodology, therefore it is necessary to use free programs for connection between the computer and the cellular equipment. Related to the second stage of the methodology, the choice of stories, was a great success, because children are better coupled with the audio visual material achieving their interest in seeing and finishing the story, with the help of the material you can navigate through the video making this process repeatable, this work is achieved by controlling the material that is being observed in the lenses, from the computer, the same that is observed in the computer is observed in the lenses, therefore, the material is controlled educational from the computer.

Finally, we can indicate in the third stage of the application of the methodology, that the child feels comfortable in the experimentation with virtual reality glasses, with emphasis on the audiovisual educational material that is observed through them, manages to be concentrated, calm and eager to be able to visualize, managing to repeat the experience, in most cases.

4. Conclusions

As a conclusion we can indicate that the use of technology is very important in applications related to education, among these, we can indicate that we can deal with many devices and applications, we can also have digital material available on the internet that we can use for educational purposes , in some cases adapting them to the needs of each one. Among these mentioned materials we can against with applications where the same information and visualization can be shared between the computer and the cell phone, in this way if we can against with a virtual reality glasses, we can against with a low-cost device, using virtual reality for purposes educational.

We concluded the research indicating that with the use of the system and the proposed methodology, we can improve the performance and understanding of the readings through visualization through audiovisual materials, which helps students in reading comprehension. The methodology can be scaled and applied to other courses, such as being able to view material in English, mathematics, among others. We must consider that using virtual reality technology, we can activate the greatest number of senses such as visual and auditory, in addition to that we have all the attention because we are only looking at what is being visualized, causing the maximum attention, we

can propose complement the study with the use of other equipment such as brain-computer interface devices, to assess the level of attention at the time of viewing the material.

It is recommended as future work, to carry out the application of the methodology, through an evaluation of the results and to be able to compare them with results obtained without the use of virtual reality glasses, to evaluate the results and the applicability of the methodology.

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