Development of a Web Software for Children and Adolescents Suffering from Autism Spectrum Disorder for Better Learning in Lima, Peru

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Abstract: At present it can be seen that many children and adolescents who exercise their classes, whether face-to-face or virtual, have a little difficulty when it comes to learning, in some cases it is because they also suffer from this so-called Autism Spectrum Disorder that in its serious acronym (TEA), for this learning problem the development of Web software is being proposed which can help with the learning of children and adolescents; Through the program to be carried out, it will be possible to provide the necessary help, such as, for example, that they can recognize some of the gestures that their teachers show as well as their classmates. In Peru there are many cases but unlike other countries they chose to be able to implement software that could help them, showing us good results such as the improvement to be able to understand their educational classes, apart from that, being able to recognize the expressions of their peers and also being able to express them themselves; With the proper use of technology aimed at the field of education of children or adolescents who suffer from ASD, we can obtain better results in their learning.

1. Introduction

We are going through a global pandemic where unfortunately the classes were affected by this, and virtual platforms had to be chosen which makes learning more difficult for children and adolescents, in the face of all this situation we will rely specifically on children suffering from Disorder Autistic Spectrum which in its acronym would be ASD, because these children cannot pay the necessary attention because they are not aware of their surroundings since they stop in their own world and apart from that some cannot distinguish very well the emotions that children can express. teachers or other peers, these factors indicate that the child or adolescent has ASD. The study to be carried out through this project aims to be able to observe the child's behavior through interviews, behavior monitoring, and other tools that can be used to detect it [1].

Today there is no specific cure to treat Autism Spectrum Disorder, but there are different ways to further expand the child's imagination and capabilities. The earlier we start, the better the chances that we can have better positive effects on the patient's aptitudes and symptoms. Some of the treatments consist of communication and therapies to be able to make the child stimulate her abilities, to be able to develop her abilities and some medication so that the symptoms can be better controlled; At present it is known that these children who suffer from ASD, belonging to national and/or private schools, mean that they can have a better stimulus since they witness the emotions and behaviors of their other classmates [2]. At

present, it is very difficult to attend to schools since Peru is going through a very delicate situation in the face of this pandemic, this being the main reason for the closure of schools, which is why classes are held virtually.

In the year 1943, the investigations began when the psychiatrist Kenner was able to recognize the ASD syndrome through studies that he carried out on a child of approximately 11 years of age, the investigations began in this child since he had objective interests such as getting upset for any reason, have specific routines or that their toys are very well ordered among other more important things such as being indifferent when being with other children. Autism Spectrum Disorder is part of neurodevelopment, this affects with the deviation of brain development, this disorder begins in the childhood stage which causes our brain not to develop correctly. In 2013 the Center for Disease Control said that ASD develops more in men than in women since the brain structure of most ASD patients is more male than female, it develops more testosterone when the embryo is in development during pregnancy, for this reason Autism Spectrum Disorder is more common in men than in women.[3].

So that children can have a better education, software focused on multimedia programs adapted to ASD[4], will be developed, where it is based on videos where emotions can be recognized, so that they can better manage their emotions with their environment, through this software it will be possible to help children to understand their studies in a better way and that they do not get stressed at home, it is known that we are in a health emergency where

children stay at home and do not go out in order to avoid contagion of this virus, for this reason help will be provided to teachers, parents and children or adolescents so that with the development of the website they can be more entertained and that children do not get stressed by staying at home.

1. METHODOLOGY

1.1. Autism Spectrum Analysis

The investigation of the Autistic Spectrum Disorder is important because it will be possible to make a little more known about this disease so that the parents or relatives of the child can be detected in time and can obtain the appropriate treatment through an interview with the whole family [5]. In the image Fig. 1. we can appreciate some deficiencies in the child's compartment, of the symptoms that ASD can present [6].

Fig. 1. 5 Warning signs in autism.

This section will detail what are the steps to follow to be able to carry out our Web Software for children with Autism Spectrum Disorder, using the SCRUM methodology since it would help us a lot to be able to carry out our software thanks to its rules that are perfectly for web developments apart from of being a highly organized process that allows good teamwork practices to be carried out and is also open to changes that may occur during the project [7].

In this agile methodology is the use of time periods for the delivery of project progress. Each of these advances are called Sprints, the same ones that are presented to clients after their completion. In addition, regular and constant meetings are highlighted throughout the development of the project in order to reach agreements.

For the development of the software, it will be carried out through some iterations, called Sprint, which will last approximately 30 days. Each result obtained from this will be displayed to the client. Among the most important points of this stand out the 15 minutes of meetings that will be held in order to better integrate the group and be better coordinated [8].

Therefore, the speed on which this method of development is based must be denoted. With the time limitation provided, the members of each team must adjust the work to the previously defined time. This work is reinforced with constant meetings, because by having constant communication you can know the problems and errors through which the development of the project passes and provide quick solutions.

Taking into account the above, the delivery of the sprint is proposed as a life cycle of the deliverables which will be accompanied by a repetitive cycle of daily meetings. This is better understood by observing Fig. 2. Where the project requirements enter the sprint cycle until it is finished or the deadline is reached [7].

Fig. 2. SCRUM Roles, Artifacts, and Main Events.

1.2. Start Stage

A) Description and prioritization of user stories:

This section mentions the people who will be involved in the web software development process for children and young people who suffer from ASD, and also have learning difficulties; Taking into account the aforementioned, the people involved will be the developers in charge of launching this software, they will be in constant communication, as established in the Scrum Methodology as shown.

In TABLE I you can see the user stories.

TABLE I User Stories

N°	USER STORIES
1.	As an administrator, I want the program to have a video panel so that the user has an easier time selecting a video.
2	As an administrator, I want the videos to be fun and educational for the learning of children with autism.
3	As an administrator, I want the user to learn to differentiate emotions and in turn improve their leve lof learning so that they can function better.

1.3. Planning Stage

a) Estimated time: In this part you can see the duration of the project be carried out in TABLE II.

TABLE II. Sprint Duration

Name	Duration	Sprint
Web Application	2 Months	
Homepage	2 weeks	1
Video Creation	4 weeks	1
Video Panel	3 weeks	2

1.4. System flow

This section saw the construction of a page that would help children with autism spectrum disorder through a web page and the planning of the Sprint with the estimates of the time it would take to carry out each Sprint in the development of this project.

Next, we can see Fig. 3 to better understand the process of the page
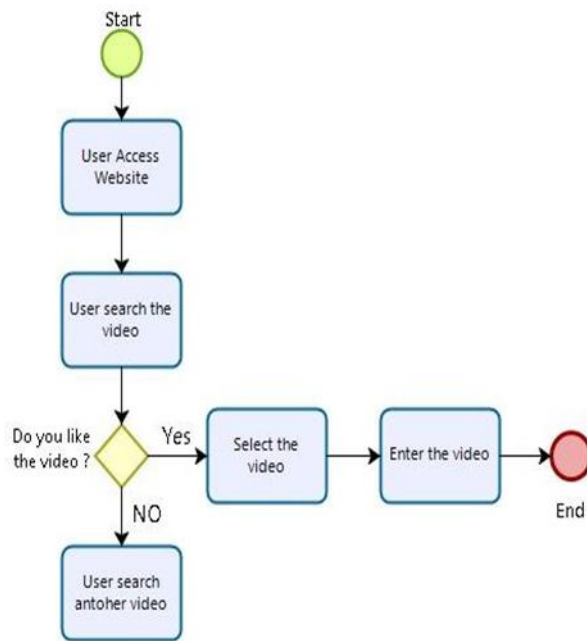
Fig. 3. Flow of the Operating system.

2. Results and Discussions

In this section you will be able to appreciate the web page of the project in which you will be able to appreciate the images of the finished web page and a survey that was carried out to be able to know about the satisfaction caused in each one of the users that use the web page, apart from of this you can also see a small section where we can see about the difficulties that arose for the realization of the project.

In Fig. 4 you can see the main cover of the page that has been made where we will see the button called WHO WE ARE that will take you to the section where you can see a small review about us and another button which will send you to the home that It is the cover that is to be observed.

Fig. 4. Main cover of the Web page.

Next, in Fig.5 you can see a brief description of who we are.

Fig. 5. About us on the Website.

Following this in Fig. 6 you can see some small images with the corresponding names which refer to the emotions.

Fig. 6. Web Page Emotions.

In Fig. 7 you can see the section where the recreational videos are found and in each video you can see a small circle in which the time that each video lasts will go, this section was named Videolandia.

Fig. 7. Videoland of the Website

In Fig. 8 you can see the section where the names of the developers of the web page are found.

Fig. 8. Partner of the Website.

In the last Fig. 9 you can see a small section where you can find out more information about the page by leaving your email so that the page can contact that person as soon as possible.
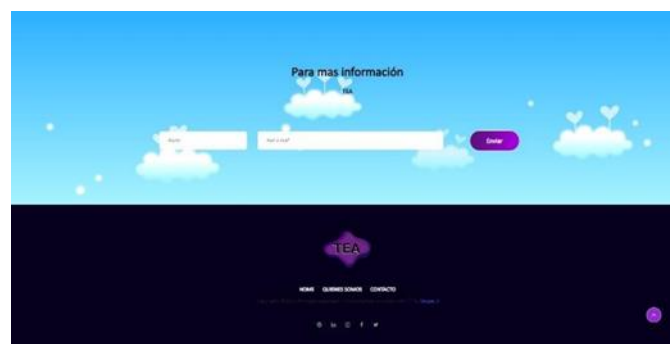

Fig. 9. For more information about the Website.

In the following figures you can see a small survey that was carried out on the children on the web to see if it met their expectations. The form consists of 4 questions.

In Fig. 10 you can see some emoticons which you can select depending on the question and your satisfaction.

Fig. 10. Emoticons according to your preference.

In Fig. 11 you can see the questions that will be given to the children so that they can answer with the help of their parents.

Fig. 11. Survey on the page.

The satisfaction survey was sent to some people to help us with the results, which will be of great help to improve the page in the future and have it better implemented with the suggestions of our users.

Next, in Fig. 12 you will be able to see the emails of the people who have responded to the survey, which in total were 13 people.

Fig. 12. Users who responded to the survey carried out on the website.

In Fig. 13 you can see the graph of the people who answered the first question, which is: What theme would you like us to add to Videolandia? The 46.2% in red indicated in the image are the people who would like that we add the theme of planets on the page, 38.5% of blue color indicated that they would like to see the theme of dinosaurs and 15.4% of orange color indicated that they would like the theme of animals.
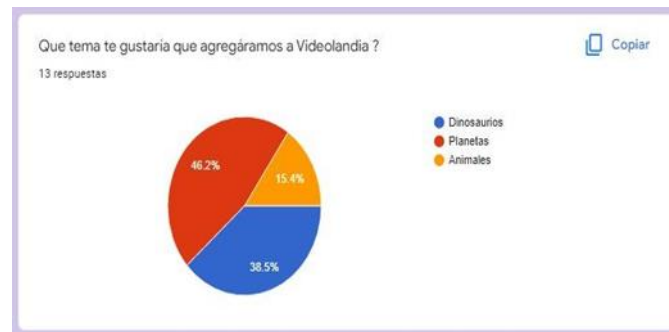

Fig. 13. Answers to the first question of the survey.

In Fig.14 you can see the graph of the people who answered the second question, which is How satisfied are you with our page? 92.3% of people in blue indicate that they like the page and 7.7% of people in red indicated that they are regularly satisfied with the page and that they may have a suggestion.

Fig. 14. Answers to the second question of the survey.

In Fig. 15 you can see the graph of the people who answered the third question, which is Do you consider that the page meets your expectations? 76.9% in blue indicate that they meet the user's expectations while 23.1% in red do not meet 100% expectations.
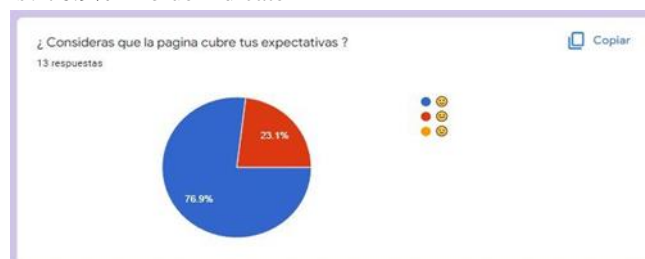

Fig. 15. Answers to the third question of the survey.

In Fig. 16 you can see the graph of the people who answered the last question of the survey which is Do you think that the videos used on the page facilitate your learning?, 84.6% of blue color think that the videos of the page facilitate their learning, while orange and red have a percentage of 7.7.

Fig. 16. Answers to the fourth question of the survey.

Unlike the thesis [9], the web page does not have the option of being able to register users, the web page is simply freely accessible, nor does it have a games section for children, but in comparison to this, the website has recreational videos that can help their development.

In the thesis [10], there is a section of exercises in which there are different options such as routines, expressions, dangers and socializing. Which has been added as open sections around the created web page.

In the thesis [11], the page provides a section where the child can choose a character with which he feels identified, it also has a memory aid section with games and object identification and it has a section where the child will have to associate the words, compared to our web page that has a section where you can appreciate the emotions but in a global way and recreational videos.

The findings that we have obtained have made an improvement in the behavior and education of children and young people with autism spectrum disorder, this implies a great advance for science since it facilitates their learning and helps them control their emotions remotely from the comfort of your home through a website.

In the progress of the work there were some small inconveniences when looking for some videos since there was not enough information, then when the page was developed a brainstorm was carried out and progress was made according to the estimated time, a survey was also carried out to that they help us by contributing what they would like us to improve and what things we could add to improve the page, then we finish the details and the entire page itself and we agree among the members of the group that in the future we would improve the page by adding video games that interact with the children in order to achieve an improvement with the page and be able to help children with autism.

3. Conclusion

In conclusion, children and adolescents who suffer from ASD (Autism Spectrum Disorder), can improve and even be cured of this disease through virtual games given by web software properly developed for these children, as in this case TEA KID'S, web software designed for children and adolescents who suffer from ASD and/or have learning difficulties in their school stage, since thanks to well-developed web software it can be very helpful for children and adolescents who suffer from ASD and/or have some difficulty of learning in the school stage; Thanks to today's technology many things can be achieved, as well as in the health and daily life of human beings. Finally, it should be clarified that thanks to the proper use of the technology that we have today we can achieve many productive things that make our day to day easier, in turn benefiting the health of us and the following generations, such as our children, grandchildren, nephews, among others.

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