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Support the international scientific community in its written production Science, Technology and Innovation in the Field of Social Sciences, in Subdisciplines of Health: Analysis of health care markets, Health production: Nutrition, Mortality, Morbidity, Substance Abuse and Addiction, Disability, and Economic behavior, Government policy, Regulation, Public health; Education: Analysis of education, Educational finance, Government policy; Welfare and Poverty: General welfare, Basic Needs, Quality of life, Measurement and analysis of poverty, Government programs, Provision and effects of Welfare programs.

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The works must be unpublished and refer to topics of Health: Analysis of health care markets, Health production: Nutrition, Mortality, Morbidity, Substance Abuse and Addiction, Disability, and Economic behavior, Government policy, Regulation, Public health; Education: Analysis of education, Educational finance, Government policy; Welfare and Poverty: General welfare, Basic Needs, Quality of life, Measurement and analysis of poverty, Government programs, Provision and effects of Welfare programs and other topics related to Social Sciences.

Presentation of the content

In the first article we present, *Evaluation of noise levels in areas and departments of the upper Technological Institute of Guasave*, by BÁEZ-HERNÁNDEZ, Grace Erandy, HUMARÁN-SARMIENTO, Viridiana, RIVERA-RUBIO, Claudia and DELGADO-JIMÉNEZ, Brenda Guadalupe, with affiliation in the Instituto Tecnológico Superior de Guasave, as next article we present, *The importance of interpersonal relationships in pre-school children to promote learning using the NAO Robot*, by APAN-ARAUJO, Karla Cecilia, MARTÍNEZ-TÉLLEZ, Rubelia Isaura, SORIANO-PORRAS, Dulce Maria and HUESCA-LAZCANO, Erick Eduardo, with affiliation in Universidad Politécnica de Amozoc, as next article we present, *Prototype computer system for teaching and reading-writing support for children with motor, hearing and visual disabilities in the state of Aguascalientes*, by HERNÁNDEZ-CHESSANI, David, TAVARES-AVENDAÑO, Juan Felipe, ARRIAGA-MORENO, Isaac and FRAGOSO-RUÍZ, Cindy Liliana, with affiliation in Universidad Tecnológica de Aguascalientes, as next article we present, *Analysis of the relevance of the first year elementary school dynamization*, by GARCÍA-ROJAS, Jesús Alberto, OROPEZA-MENDEZ, José Martín and RODRÍGUEZ-AGUILAR, Raquel, with affiliation in Instituto Tecnológico Superior del Occidente del Estado de Hidalgo.

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Evaluation of noise levels in areas and departments of the upper Technological Institute of Guasave

Evaluación de los niveles de ruido en áreas y departamentos del Instituto Tecnológico Superior de Guasave

BÁEZ-HERNÁNDEZ, Grace Erandy*†, HUMARÁN-SARMIENTO, Viridiana, RIVERA-RUBIO, Claudia and DELGADO-JIMÉNEZ, Brenda Guadalupe

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Abstract

The present experimentation is the evaluation of noise levels in laboratories, classrooms and departments of a Higher Education Institution. Its objective is to identify and evaluate the working conditions to which workers and students are exposed when performing tasks. The study was conducted based on the official Mexican Standard NOM 011-STPS-2001 "Conditions of safety and hygiene in workplaces where noise is generated". Using a TES 1353S sound level meter for 4 weeks, evaluating 16 zones, in 2 periods. As a result, it was obtained that 6 of the 16 zones evaluated exceed the maximum permissible exposure limits. And recording discomfort and lack of concentration in the activities to be carried out on workers and students. As a recommendation, the implementation of periodic medical examinations and personal protective equipment for the personnel, in addition to the evaluation of noise levels in the preventive maintenance of the institution. to make the activities more comprehensive.

Noise, Environmental Conditions, Preventive Maintenance

Resumen

La presente experimentación es la evaluación de los niveles de ruido en laboratorios, aulas y departamentos de una Institución de Educación de Nivel Superior. Tiene como objetivo identificar y evaluar las condiciones de trabajo a las que están expuestos los trabajadores y alumnos al realizar las tareas. El estudio se realizó con base a la Norma oficial Mexicana NOM 011-STPS-2001 "Condiciones de seguridad e higiene en los centros de trabajo donde se genere ruido". Utilizando un sonómetro TES 1353S durante 4 semanas, evaluando 16 zonas, en 2 periodos. Como resultado se obtuvo que 6 de las 16 zonas evaluadas se sobrepasen los límites máximos permisibles de exposición. Y registrando molestias y falta de concentración en las actividades a realizar en los trabajadores y alumnos. Como recomendación la implementación de exámenes médicos periódicamente y equipo de protección personal para el personal, además que se considere la evaluación de los niveles ruido en el mantenimiento preventivo de la institución. Para hacer las actividades más integrales.

Ruido, Condiciones ambientales, Mantenimiento Preventivo

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Introduction

Health at work is the multidisciplinary activity that is used for the protection and promotion of safety and health, identifying and eliminating risk factors or conditions that endanger health, and the productive performance of workers in the company.

In Mexico, the Ministry of Labor and Social Welfare is a government agency responsible for the performance of the powers attributed to it by the Federal Public Administration Organic Law, federal labor law, other laws and treaties, as well as regulations, decrees, agreements and orders of the president of the Republic. Among its functions is: Monitor compliance with the provisions contained in art. 123 and others of the Federal Constitution, in the Federal Labor Law and its regulations. As well as study and order industrial safety and hygiene measures for the protection of workers and monitor their compliance. (STPS, Secretary of Labor and Social Security, 2019).

Within the work centers there are work risks. In this regard, social security can distinguish between two types of risks: generic and specific. The first are those to which every person is exposed, while the second are only thinkable with respect to the workers. Within this last group are occupational disease and the risk of an accident at work. (Alonso Olea, 1981).

Ambient noise is one of the most annoying and persistent pollutants in modern society, affecting the population directly. People subjected to noise constantly develop different physiological disorders, such as loss of hearing, alterations in brain, cardiac and respiratory activity, among others. (Bañuelos Castalleda, 2005).

Noise is one of the risks where the worker is exposed most of the time. Therefore, the STPS, generated the Official Mexican Standard NOM-011-STPS-2001, Safety and hygiene conditions in workplaces where noise is generated, in order to know how to identify, analyze and determine the maximum permissible limits to which the worker must be exposed as the duration, type of noise and condition. (STPS, Official Mexican Standard NOM-011-STPS, 2001)

Development

The Higher Technological Institute of Guasave is committed to improving processes, through compliance with the legal and other requirements of the Integral Management System, in particular the application of OHSAS 18001 (OHSAS-18001: 2007, s.f.). This aims to achieve the orderly management of occupational risk prevention to achieve a work environment, a decrease in absenteeism and increased productivity.

One of the legal requirements is the application of the STPS Legal Framework, within the institution. In accordance with Standard 011-STPS. The evaluation of the work areas and activities carried out by workers who are exposed to the maximum permissible limit was carried out, considering working hours, assigned tasks, duration of activity and frequency.

present health problems due to work risk.

The Institute has been in constant changes, with the implementation of the 5 certifications among them OHSAS 18001. Same that have been developed in the educational process and integral training of the student. Promoting values and culture preventing pollution from damage and deteriorating health and safety at work. Developing strategies to reduce staff turnover, incidents of workers who have presented in some areas, mainly laboratories, classrooms. Based on this, it is necessary to identify, analyze and propose improvements in working conditions in areas where incidents develop, so that workers do not

Overall objective

Evaluate noise levels in areas and departments of the Instituto Tecnológico Superior de Guasave.

Methodology

The research work was developed in 3 stages: The first was the determination of the evaluation areas within the Institute. The second was the characterization of the evaluation and selection of materials. The third stage was data collection in all areas.

Determination of evaluation areas

The workers of the Higher Technological Institute of Guasave carry out their activities in 8-hour days, therefore, Table 1 of Appendix A establishes that for a period of 8 hours of exposure the maximum permissible limit is 90 dB (A). NER is determined.

NER	TMPE
90 dB(A)	8 Hours
93 dB(A)	4 Hours
96 dB(A)	2 Hours
99 dB(A)	1 Hour
102 dB(A)	30 Minutes
105 dB(A)	15 Minutes

Table 1 Maximum Permissible Exposure Limits and NER
Source: NOM-011-STPS-2001

Based on B.6.3. Priority method of evaluation areas, determining the 16 evaluation areas within the institute between classrooms, laboratories, offices, experimental field, teacher's room, green areas, among others.

With a total of 16 zones evaluated, by means of a sensory recognition it was possible to identify stable type noise in all the zones evaluated. Its definition being that which is recorded with variations in its sound level A within a range of 5 dB (A).

The type of noise and the method to evaluate it were classified, identifying a stable noise throughout the institution. The evaluation by means of a sound level meter. It is the applicable method when it has been determined, in the sensory recognition, that the noise is stable throughout the working day, and must be carried out during three observation periods.

Characteristics of the evaluation and selection of materials

A class 1 sound level meter was selected to carry out the experimentation. TES sound meter model 1353S.

The evaluation was carried out for 4 weeks, in the 16 evaluation zones of the Institute. Each observation period lasted a maximum of 5 minutes and 50 readings.

During each observation period the NSA record was taken every 5 seconds.

At each measurement point, the observation periods were carried out approximately every 15 minutes for reasons of staff availability.

The work areas studied were evaluated taking care of a distance between measuring points of no more than 12 meters, in areas below that measure, they were divided into 3 parts and each one was evaluated in different periods.

For the laboratories and areas where the staff is standing, the sound level meter was used at a height of 1.45 ± 0.1 m, in relation to the lift plane; For the workers who perform their work sitting, the microphone height was placed at head level.

For offices and classrooms where the staff is sitting, the sound level meter was used at head level.

To select the orientation of the sound level meter, the highest noise direction was considered in relation to the location of the main source generating the noise.

Results

Area and Posts evaluated

Evaluated Areas	
1. Work Study and Ergonomics Laboratory	2. Manufacturing Laboratory
3. Mechanics Laboratory	4. Biochemistry Laboratory
5. Unit Operations Laboratory	6. Food Technology Laboratory
7. Offices building A	8. Offices building B
9. Offices building C	10. Building classroom E
11. Cafeteria	12. Computer center 1
13. Teachers Room	14. Audiovisual Room
15. Experimental Field	16. Green areas - Act of Intent

Table 2 Areas evaluated in the Institute
Source: Own Creation

Measurements were made throughout the institute, evaluating 16 zones, each of them in 3 periods of time, making 50 readings per period. To obtain the NSA average, from each zone as established by the Official Mexican Standard of NOM-011-STPS-2001.

Num	Ubicación Nivel sonoro A calculado	NSA Calculated
1	Laboratory of Work Study and Ergonomics	73.701 DB
2	Manufacturing Laboratory	80.201 DB
3	Mechanics Laboratory	92.703 DB
4	Biochemistry and Microbiology Laboratory	84.312 DB
5	Chemical Engineering Laboratory	102.418 DB
6	Food Technology Laboratory	101.210 DB
7	Building A offices	68.340 DB
8	Building B offices	66.300 DB
9	C building offices	67.400 DB
10	Classroom building E	68.250 DB
11	Coffee shop	69.300 DB
12	Computer Center 1	68.700 DB
13	Teachers room	68.310 DB
14	Audiovisual room	68.803 DB
15	Experimental field	84.290 DB
16	Green areas	81.200 DB

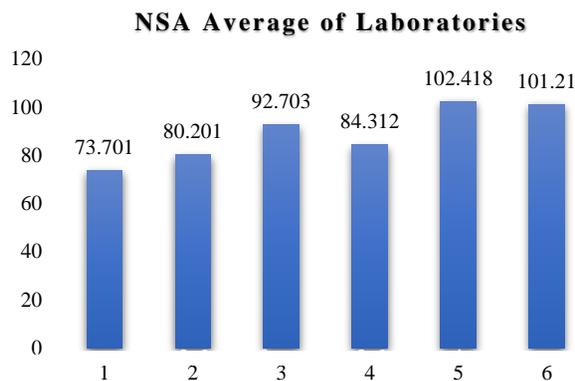
Table 3 NSA table calculated by Zone evaluated in the Institute

Source: Own Creation

Num	Location	NER Calculated
1	Laboratory of Work Study and Ergonomics	73.508 DB
2	Manufacturing Laboratory	80.900 DB
3	Mechanics Laboratory	92.703 DB
4	Biochemistry and Microbiology Laboratory	85.400 DB
5	Chemical Engineering Laboratory	101.210 DB
6	Food Technology Laboratory	101.200 DB
7	Building A offices	68.200DB
8	Building B offices	70.000DB
9	C building offices	67.400DB
10	Classroom building E	68.200 DB
11	Coffee shop	70.000 DB
12	Computer Center 1	68.700 DB
13	Teachers room	68.500 DB
14	Audiovisual room	68.803 DB
15	Experimental field	84.290 DB
16	Green areas	81.700 DB

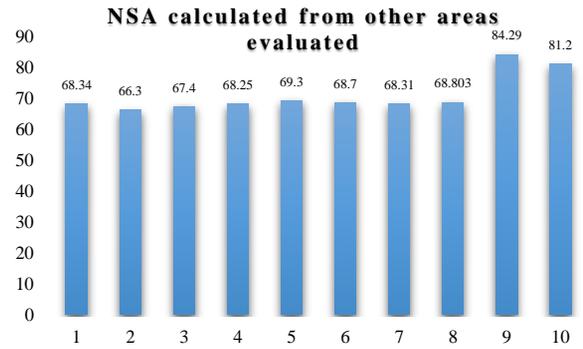
Table 4 NER table calculated by Zone evaluated in the Institute

Source: Own Creation



Graph 1 NSA Average of Laboratories of the Institute

Source: Own Creation



1.- Offices Building A, 2. Offices Building B, 3.- Offices Building C 4.- Classrooms in Building E 5.- Cafeteria 6. Computing Center 1, 7. Teachers Room 8. Audiovisual Room 9. Experimental Field 10. Green

Graph 2 NSA calculated from other evaluated areas of the Institute

Source: Own Creation

It detects 6 zones that go above 80 decibels allowable by NOM-011-STPS-2001. There are 5 mechanics laboratory, technology and food laboratory, chemical engineering laboratory, biochemistry and microbiology laboratory, green areas and experimental field.

Thanks

The research is the product of an internal research project that was developed at the Instituto Tecnológico Superior de Guasave, from January 1, 2018 to December 31, 2018, as well as financing and management was carried out by the authorities of the Institute. I appreciate the support to the 3 collaborators, and participating students.

Conclusions

At the end of the investigation, the NSAs were calculated and 6 zones of 16 were detected that require changes immediately. Mainly in laboratories where it is greater than 80 dB.

Within these areas, 3 of them have decibels above 85, mechanical laboratory, food and technology laboratory, chemical engineering laboratory.

No zone evaluated has dB greater than 105 dB. In general, no person is exposed to hearing problems, because there are no long periods of exposure. 6 people are exposed to considerable noise levels at least during an internship during the holiday season and 3 people at high levels.

Suggestions

One of the suggestions is the use of personal hearing protection equipment, in accordance with the provisions of NOM-017-STPS-1993, to all exposed workers equal to or greater than 85 dB (A), when they carry out their practices in laboratories. As well as conducting specific annual medical exams for each worker exposed to levels above 85 dB. (TO).

Noise exposure time is considered vital to avoid hearing problems and physical and cognitive injuries in workers.

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The importance of interpersonal relationships in pre-school children to promote learning using the NAO Robot

La importancia de las relaciones interpersonales en niños de nivel preescolar para favorecer el aprendizaje utilizando el Robot NAO

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Abstract

The present investigation forms part of the multiple options that can be worked with preschool children to favor their learning in each one of them, taking as a reference interpersonal relations and using the technology with the NAO Robot. In addition, it shows how to link teaching strategies, collaborative work, innovation and technology for the improvement of learning. To promote interpersonal relationships, a work plan was designed divided into three modules with certain planned activities, which were supported both by the teacher in charge of the group and the robot, it should be mentioned that the robot's programming was carried out by software engineering students from the Universidad Politécnica de Amozoc, Puebla. The general objective is to make a plan of activities using technology to promote interpersonal relationships in children and thus improve their learning. Interpersonal relationships are marked by an atmosphere of friendship, respect, understanding, listening and affection; aspects that undoubtedly increase the learning, self-esteem and sense of belonging of children.

Resumen

La presente investigación forma parte de las múltiples opciones que se pueden trabajar con los niños de nivel preescolar para favorecer su aprendizaje en cada uno de ellos; tomando como referencia las relaciones interpersonales y utilizando la tecnología con el Robot NAO. Además, se muestra la manera de vincular las estrategias docentes, el trabajo colaborativo, la innovación y la tecnología; para la mejora del aprendizaje. Para potenciar las relaciones interpersonales se diseñó un plan de trabajo dividido en tres módulos con determinadas actividades planificadas, las cuales fueron apoyadas tanto por la maestra a cargo del grupo y el robot, cabe mencionar que la programación del robot fue realizada por alumnos de Ingeniería en Software de la Universidad Politécnica de Amozoc, Puebla. El objetivo general es realizar un plan de actividades utilizando la tecnología para favorecer las relaciones interpersonales en los niños y así mejorar su aprendizaje. Las relaciones interpersonales están marcadas por un ambiente de amistad, respeto, comprensión, escucha y cariño; aspectos que, sin duda alguna aumentan los aprendizajes, la autoestima y el sentido de pertenencia de los niños.

Learning, Interpersonal relationships, NAO Robot

Aprendizaje, Relaciones interpersonales, Robot NAO

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Introduction

Interpersonal relationships are of vital importance in all areas. In preschool can occur various difficulties due to the developmental characteristics of children of this age, in addition to the fact that these interpersonal relationships reach great value in the socio-emotional and cognitive development of children. Socialization at the preschool level allows children to choose their friends judiciously, create healthy friendships, overcome shyness, share with others, work in teams, etc. The human being is born to be sociable and develops socially relevant experiences; hence the importance of teaching children behavior patterns to maintain good relationships with others, which are the basis of good emotional intelligence and also influence their learning.

This research has as a general objective to generate activities using the NAO Robot to favor interpersonal relationships and improve learning in preschool children. The specific objectives are the following: a) To detect by means of a pretest the type of interpersonal relationships established in the group, b) Develop activities that strengthen interpersonal relationships in the group using the NAO Robot, c) Evaluate through a post test the use of the NAO Robot, through the results obtained from the development of the activities.

Therefore, with the help of a technological tool such as the NAO Robot of the Polytechnic University of Amozoc, Puebla, educational activities are generated in which students interact with said robot according to the activities planned by the teacher, generating new and better ways of working in teams, communication, delegating tasks and responsibilities, among other attitudes and useful skills that they will develop and strengthen during their time in school.

Theoretical framework

Some articles where robots have been used to improve interpersonal relationships using technology are briefly described below.

Advantages of NAO in any Educational Environment. In this article the authors mention that since 2009, there are more than 8000 NAO robots in the educational area and 80% of them are targeted at schools.

This reflects the high rate of implementation that the use of robots in general, as well as that of NAO in particular, is having in the elementary levels of education. On the other hand, it encourages curiosity and stimulates the interest of children in the classroom, regardless of the subject taught. NAO, with its 25 degrees of freedom of movement and its multiple sensors, can interact with children naturally and encourage them to work in groups through specific programs such as NER (NAO Entertainment Robot) V1.1. In this way, students are not only interested in robotics and learn how they work, but also attend classes taught by the robot. In the case of students, NAO motivates the learning process through its multiple sensors and its ability to communicate and interact with students. It becomes a link between theory and practice, since the robot explains the theory while executing it and shows itself as a practical example; in addition, the students program the robot themselves while witnessing the results. (Alive Robots, 2015).

Use of Educational Robotics as a Teaching Strategy in the Classroom. This article deals with a qualitative investigation of action research in the classroom, which proposes recreational activities with educational robots as a pillar of technology education, aiming to motivate students and educators to formulate and apply innovative educational strategy tools that use robotic platforms and technological devices that have concluded their useful life as a didactic instrument, so that the robot itself becomes a strategy within the classroom. In this way, it is sought to promote in preschool education students enthusiasm to develop skills that allow them to build knowledge and to give an informed, responsible and critical use of technology. Additionally, the teaching proposal involves students in recreational activities with educational robots to develop conceptualizations which allow them to address everyday problems related to the proper use of technology. (Barrier, 2014).

What Makes Robots Social?: A User's Perspective on Characteristics for Social Human-Robot Interaction. In this longitudinal study, it is mentioned how the field of robotics has rapidly advanced. There are different types of robots which are built and programmed to perform more and more difficult tasks to such an extent that they can become our assistants or guides and, in the not too distant future, our partners.

APAN-ARAUJO, Karla Cecilia, MARTÍNEZ-TÉLLEZ, Rubelia Isaura, SORIANO-PORRAS, Dulce Maria and HUESCA-LAZCANO, Erick Eduardo. The importance of interpersonal relationships in pre-school children to promote learning using the NAO Robot. *Journal Health, Education and Welfare*. 2019

The robot used was Karotz and its interaction within the home influenced and improved social behaviors among its members. It is shaped like a rabbit connected to the internet, with a height of 30 cm. The relationship occurs verbally, through the LED light on its belly, the movable ears, and by detecting the presence of other nearby objects. As Karotz is permanently connected to the internet, it is capable of reacting and transmitting all types of content available on its network, for example, news, messages, music, texts, alerts and radio. The built-in webcam allows users to communicate with family members at home for surveillance purposes when they are away. (Graaf, 2015).

Educational Robotics, a Tool for the Teaching-Learning of Sciences and Technologies. In this article, educational robotics is presented and analyzed as a support tool for the teaching-learning process, at a pre-media level, mainly oriented to complex subjects such as Mathematics, Physics and Computer Science, among others. The study is limited to secondary schools in the Province of Chiriquí, Republic of Panama. A sample of six schools in the province was taken and, for each school, both students and teachers participated. The main objective of the project was to demonstrate how robotics applied to education, facilitating and motivating the teaching-learning of science and technology. The results showed that robotics can become an excellent tool to understand abstract and complex concepts in subjects related to the area of science and technology. It also allows developing basic skills, such as working in a team. (Moreno, 2012).

Robotics as a Resource to Facilitate Learning and Development of General Skills. The article mentions the growing importance of technology in the world and its continuous development, making technology in itself an integral part of the process of formation during childhood. For this reason, it is important to develop proposals that offer children and young people the possibility of coming into contact with new technologies. This is possible through the management of software and hardware tools, such as robotic prototypes and specialized programs for pedagogical purposes. It also shows the importance of the use of robotics as a learning tool and presents the typical stages that must be faced when implementing educational robotics projects in the classroom. (Bravo, 2012).

Methodology

In the development of practical work regarding the incorporation of the NAO Robot to favor interpersonal relationships through activities in a preschool group, a work plan was proposed, which was intended to provide consistent follow-up through guided activities, divided into two sessions, which start from a methodology using a technological strategy to enhance students' abilities, attitudes and aptitudes which are developed as follows:

Session 1. The activities that were carried out between the educator and the NAO Robot were based on the promotion of interpersonal relationships, considering two interventions at different dates.

On the first day, an activation routine directed by the robot was carried out. The next participation was based on a sequence of activities where the robot collaborated.

First intervention of the NAO Robot. The training class is called Physical Development and Health. The competence is to maintain control of movements that involve strength, speed and flexibility through games and exercise activities. The expected learning is to participate in games that make children identify and move different parts of their body. The didactic sequence was the presentation of a visitor in the classroom, knowing the name, age, origin and the purpose of the visit.



Figure 1 Presentation of the NAO Robot in the classroom
Source: Prepared by the authors

Thus, the activity was developed as follows: The visitor and new friend invited to start the activation routine with a sequence of movements, such as moving the head both sides, raising and lowering the shoulders, bringing the arms to the sides, arms up and down, movement from the waist to the sides and in circles, alternating legs, kicking with alternating legs, jumps and finally breathing. It was completed by the new friend giving a present to each of the 23 students.



Figure 2 Physical activation routine led by the NAO Robot
Source: Prepared by the authors

Second intervention of the NAO Robot. The training class is called Personal and Social Development. The favored aspect is interpersonal relationships. The competence is to establish positive relationships with others, based on understanding, acceptance and empathy. The expected learning is to gradually accept the norms of relationship and behavior based on fairness and respect, and put them into practice.

The didactic sequence was divided into three moments. In the first one, the following activities were carried out: Greeting by NAO, activation routine directed by NAO, helping to remember the rules of the classroom, asking students to brainstorm and, with support of the teacher, writing the comments of the students on the board. The second moment consisted of NAO mentioning the importance of following the rules of the classroom, showing and mentioning the images that represented the action of each rule in the classroom.



Figure 3 Importance of the classroom rules by the NAO Robot
Source: Prepared by the authors

The group was divided in teams according to the number of rules. NAO assigned to each student one of the rules, so that they monitored its compliance, and also provided material to each child to make badges according to the assigned rule. The last moment corresponded to the closure, which included the evaluation and farewell by the Robot.

NAO took out from a magic box different elements and classified them into two groups: one of them was for girls and the other for boys. Each group mentioned the elements that NAO assigned to each of them; the robot asked each group to explain each item and how it can help them be better classmates and friends. In the evaluation, NAO developed a plenary session with the students and the teacher reinforced what they learned on that day, providing recommendations to follow the rules. As for the farewell, NAO sang with the students a farewell song.



Figure 4 Farewell by the NAO Robot
Source: Prepared by the authors

Session 2. A software for the NAO Robot was designed with the Software Engineering students of the Polytechnic University of Amozoc to develop activities that would be implemented with the preschool group, in order to investigate the needs and applications in interpersonal relations, considering the two interventions.

In addition, tests were carried out at the Polytechnic University of Amozoc prior to the application of activities with the NAO Robot. In this section, the main activity was the application of activities designed with the NAO Robot and the educator (1st and 2nd intervention).

It should be noted that in the programming tests for the second intervention, more movements were attached to the robot for physical activation, in addition to extensive dialogue so that the children paid more attention to the activities. A narrated story by the robot was also implemented to have greater interaction with the children.

Tests were also carried out where the robot mentioned the classroom rules and in the end asked the children to make a drawing. The tests consisted on the robot having to identify a logo on the edge of a sheet, which was subsequently delivered to each child in the classroom and so the robot could congratulate each child at the completion of the activity. These tests were carried out in three sessions so that the robot would identify them successfully.



Figure 5 Software design and testing with the NAO Robot
Source: Prepared by the authors

Results

To obtain quantitative results with respect to integration activities, two evaluations were carried out: one prior to the visit of the NAO Robot and a second after its intervention. Hence, the design of these activities was divided into two sessions based on the same elements of the current Preschool Program. The first intervention consisted on a greeting and presentation, activation routine and incentives provided by NAO in order to know the impact and reactions that it had on the students. The second NAO intervention consisted on a greeting, activation routine, presentation of school regulations, dynamics of collaboration between boys and girls, a plenary of what was learned, farewell and gifts.

In each evaluation, the children were asked to perform different activities as presented previously by the robot, as well as collaborative work done by the educator. The results of these activities during the first intervention applied to 23 children are shown in Table 1, where it can be observed that the social integration by the children improved.

1st. intervention				
	They do it	They do it with help	They have difficulties	They do not do it
They accept their classmates as they are and understand that they have the same rights as well as responsibilities.	20%	40%	20%	20%
They understand that people have different needs, points of view, culture and that they should be treated with respect.	50%	20%	15%	15%
They learn about the importance of friendship and understand the value of trust, honesty and mutual support.	50%	15%	20%	15%
They internalize the rules of relationship and behavior based on fairness and respect.	40%	30%	15%	15%
They become aware of others and establish communication and group integration relations.	30%	50%	15%	5%
They establish attitudes and relationships of respect and collaboration.	45%	25%	20%	10%

Table 1 Activities during the 1st. Intervention
Source: Prepared by the authors

The results of these activities during the second intervention are shown in Table 2, where it can be observed that social integration improved even more, but also influenced attitudes and aptitudes not only individually, but also at the group level.

2nd intervention				
	They do it	They do it with help	They have difficulties	They do not do it
They accept their classmates as they are and understand that they have the same rights as well as responsibilities.	70%	25%	2.5%	2.5%
They understand that people have different needs, points of view, culture and that they should be treated with respect.	80%	20%	0%	0%
They learn about the importance of friendship and understand the value of trust, honesty and mutual support.	95%	5%	0%	0%
They internalize the rules of relationship and behavior based on fairness and respect.	90%	10%	0%	0%
They become aware of others and establish communication and group integration relations.	80%	20%	0%	0%
They establish attitudes and relationships of respect and collaboration.	90%	10%	0%	0%

Table 2 Activities during the 2nd. Intervention

Source: Prepared by the authors

Conclusion

This research showed how working with interpersonal relationships using technology, such as the NAO Robot, can help preschool students' learning. In addition, with the help of the intervention of the NAO Robot, these educational activities were adapted, which generated other ways of planning, organizing and changing attitudes and skills not so favorable in the classroom.

The attitudes and behaviors of the students were observed after the first intervention of educational activities, identifying gradual changes in the children. At the beginning of the final intervention, they were paying attention, following directions, listening and recording changes or results. With the development of the session with the NAO Robot, they reinforced and learned how to use the school rules and their benefits, as well as the development of empathy and values.

The next day, the students' attitudes were different, as they remembered the recommendations of the NAO Robot, in addition to presenting progress in their language development, oral and plastic productions like drawing, listening skills, respecting turns, among others, in reference to various training fields, such as exploration and knowledge of the world and physical development and health.

Therefore, we consider that this research contributed a scientific improvement in the educational area, since interpersonal relationships favor learning in preschool children and technology was also used.

Next, we present evidence of the work implemented to strengthen what was learned by the use of the NAO Robot to promote children's learning and generate and potentiate interpersonal relationships through certain activities.



Figure 6 Materials selection

Source: Prepared by the authors



Figure 7 Construction of buildings with the help of my Friends

Source: Prepared by the authors

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Prototype computer system for teaching and reading-writing support for children with motor, hearing and visual disabilities in the state of Aguascalientes

Prototipo de sistema informático para la enseñanza y apoyo en lecto-escritura de niños con discapacidades motoras, auditivas y visuales en el estado de Aguascalientes

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Abstract

The present research aims to identify predictive relationships of an IT success model with levels of statistical significance, between a set of organizational, technological, individual and environmental variables, and variables of the individual and organizational impacts perceived by the Educators specializing in sign language of some institutions like DIF (state and municipal), Threshold of Educational Technology of the State of Aguascalientes and the Association of Deaf of the State of Aguascalientes. The study consisted in evaluating, through reliability, validity and sensitivity, a prototype of a web development created by students of stay for the Threshold of Technology of the State of Aguascalientes. The pilot study was applied with the application of the measurement instrument to 20 people between educators, directors, language experts and advanced users of the Deaf Association of Aguascalientes.

Software, Hearing disability, Sign language, Web

Resumen

La presente investigación tuvo como propósito identificar relaciones de tipo predictivo de un modelo de éxito de TI con niveles de significancia estadística, entre un conjunto de variables organizacionales, tecnológicas, individuales y del medio ambiente, y variables de los impactos individuales y organizacionales percibidos por las educadoras especialistas en lenguaje de señas de algunas instituciones como DIF (estatal y municipal), Umbral de Tecnología Educativa del Estado de Aguascalientes y la Asociación de Sordos del Estado de Aguascalientes. El estudio consistió en . El estudio piloto se realizó con la aplicación del instrumento de medición a 20 personas entre educadoras, directoras, expertos en el lenguaje y usuarios avanzados de la Asociación de Sordos de Aguascalientes.

Software, Discapacidad auditiva, Lenguaje de señas, Web

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Introduction

Currently there are students who have reached middle and higher levels without knowing how to read and write, without the purpose of analyzing this problem. The objective of this project is to analyze the existing solutions that support this problem and to design a prototype in the first instance. to an application that serves as support in the teaching-learning process aimed at "Special Children", the different techniques used in teaching special children are investigated, to develop a computer application that serves as support to reinforce the learning of the vowels, numbers, geometric figures and primary colors, these topics correspond to the educational program of children from four to six years. The design of the application will be based on the pedagogical models used in Special Education and guided by the criteria of Human Machine Interaction.

Deafness is the difficulty or inability to use the sense of hearing due to: (1) a loss of partial hearing ability (hearing loss) or (2) total (cofosis), so the deaf person will be unable or will have trouble hearing. This disability can be an inherited trait or it can be a consequence of: (a) a disease, (b) trauma, long-term exposure to noise, (c) or aggressive medications to the auditory nerve. (Wikipedia, 2019)

Justification

According to the results of the Population and Housing Census 2013 - in its expanded questionnaire (INEGI, 2011a) -, 5 million 739 thousand people (figure representing 5.1% of the total population of the country) in the national territory declared having difficulty perform at least one of the seven activities evaluated: walking, moving, climbing or lowering (hereinafter walking or moving); see, even wearing glasses (see), talk, communicate or talk (talk or communicate); hear, even using hearing aid (listen); dress, bathe or eat (take care of personal care); pay attention or learn simple things and mental limitation; that is, they are people with disabilities.

In Aguascalientes there are approximately, according to the census, 1,468 children with mental disabilities, 224 children with speech disabilities, which results in 1,692 children.

Of those deployed, those who are old enough to know how to read and write but do not have the aptitude, among those who attend schools, are 888 children. And the number of children with intellectual disabilities who are of age to go to school and do not go, are 1258 children. A 51.23% within this disability are men and 48.77%, women. To this information it is necessary to add the number of the registered ones, that their option is, is not specified.

Paying attention or learning simple things is a disability that has a greater intensity in Aguascalientes than in the rest of the Country. We have almost 3 thousand people who present it, which means an overrepresentation of 50% in this area, since with 1% of the general population and the population with disabilities, in the case of attention deficit deficiency or to learn, the values rise to 1.49% in the case of men and 1.36% in the case of women. At 3 thousand we can add another 5,500, derived from counting people with mental disabilities, thus adding 8,500.

More than 1% (1.09%) is in Aguascalientes; with a particular masculine inclination, since males represent 4.12% of the national group, but 4.29% in the case of the state level. That is, in Mexico and Aguascalientes, there is more disability among men than among women.

If we put the total number of disabled people as 100%, the population under 18 is approximately 58.63% according to INEGI statistics. This shows us that there are people who are at an early age to improve their education, through new technologies.

Children who have an intellectual disability tend to have limits when learning, resulting in a slow learning process with respect to a regular child, so you must use principles and methodologies to optimize your academic performance, and Let it develop in a better way.

Thanks to the great advance that technology has had, now it is possible to reach other sectors in which this can be a tool that, when implemented, facilitates the teaching and learning process. Technology allows integration into society for their university studies.

Problem

Students with different abilities are people with limited learning abilities and their learning is slower than that of a regular child. Therefore, methodological principles should be used to optimize their academic performance, in almost all sectors of society. a change in the education of the future is being necessary due to the presence of technology. Currently few people come to study at higher levels, most of them do not know how to read and / or write relatively enough so that it does not mean an obstacle in the culmination of their studies.

Problem Statement

More than 1% (1.09%) is in Aguascalientes; with a particular masculine inclination, since men represent 4.12% of the national group, but 4.29% in the case of the state level. That is, in Mexico and Aguascalientes, there is more disability among men than among women. If we put the total number of disabled people as 100%, the population under 18 is approximately 58.63% according to statistics. (INEGI, 2019) This shows us that there are people who are at an early age to improve their education, through new technologies.

Children who have an intellectual disability tend to have limits when learning, resulting in a slow learning process with respect to a regular child, so you must use principles and methodologies to optimize your academic performance, and allow you to develop in a better way.

Hypothesis

The use of computer system prototypes for teaching and reading support for children with motor, hearing and visual disabilities in the state of Aguascalientes as a teaching tool, positively impacts the learning of reading and writing, encouraging them to develop your literacy skills when using digital tools.

Objectives**Overall objective**

Know the impact of prototypes for teaching and reading support for children with motor, hearing and visual disabilities in the state of Aguascalientes

Specific objectives

- Know the impact of prototypes for teaching and support in reading and writing.
- Implement prototypes for each disability and measure results.

Theoretical framework

The General Assembly of the United Nations proclaimed in 1971, the Declaration of the Rights of the Mentally Retarded and in 1975, the Declaration of the Rights of the Disabled, documents that highlighted the importance of adopting measures for the protection of the political and civil rights of persons with disabilities, including the right to medical care and physical treatment, as well as the right to education, training, rehabilitation and guidance to maximize their capacity and skills.

Since then, countries were urged to recognize the rights of persons with disabilities and their families, without exception, without distinction or discrimination on the grounds of race, color, sex, language, religion, political or other opinions, origin national or social, fortune, birth or any other circumstance.

The General Education Law that regulates the education provided by the State (Federation, federative entities and municipalities), its decentralized agencies and individuals with authorization or with recognition of official validity of studies.

In its Article 39, this Law indicates that the initial education, special education and adult education are included in the national education system. Likewise, in its Article 41 it mentions that special education is intended for individuals with temporary or definitive disabilities, as well as for those with outstanding aptitudes and will serve students adequately to their own conditions, with inclusive social equity and with a gender perspective.

There are few studies that have been carried out in the world to assess the situation of persons with disabilities based on the model promoted by the United Nations Convention on the Rights of Persons with Disabilities.

An exploratory study carried out in 2004 by the International Network on Disability, documented that most of the countries of the Region of the Americas continued to use the definition of disability of the CIDDM.

According to this study, Mexico was classified in the category of “moderately inclusive” countries, because the Government has had an outstanding participation in the promotion and protection of the rights of persons with disabilities before the United Nations and, in addition, National legal framework emphasizes the equality of persons with disabilities and the non-discrimination of this group of the population in all aspects of social life. However, it is in practice that the lack of a culture of disability is observed through which society perceives this social group as part of itself and accepts it with all its characteristics. This study also revealed some contradictions, since much of the internal laws have not been updated or regulated, which indicates the enormous challenge facing our country to realize the exercise of the rights of persons with disabilities.

Today, it is necessary to be able to provide support in terms of learning refers to people with motor, hearing and visual disabilities. For this reason and in search of joint progress so that its integration in the student and later labor sector is possible, joint work has begun between the UTA (ICT Academic Corps) and the IEA, especially the area dedicated to “Special Education ”To carry out these actions that contribute to the educational growth of this area.

Research carried out in the area about the existing software and hardware for this purpose has led us to find that the sale of software and hardware that supports the learning of children with diverse disabilities is currently available in the markets, and that in addition They are extremely expensive, however, it has been found that for the attention to the area of hearing impairment there is no development of software and devices that can support this problem. It was then sought to start with software developments, through the CETIC (UTA), which support the orientation of the efforts towards the "Reading and Writing Learning" of people with hearing disabilities. There are some images of the prototypes obtained in the final annex.

Research Methodology

The method of data collection used in the research is quantitative and was the questionnaire (measuring instrument) structured via surveys via the Internet through a sample of the population. For the purposes of this investigation, the descriptive and correlational statistical method was used. Because the study presented falls in the field of Information Systems, the PLS (Partial Least Squares) package [4] will be used.

PLS is a second generation multivariate technique that facilitates the testing of psychometric properties of the scales used to measure a variable, as well as the estimation of the structural model parameters [5]. This study considers only the questionnaires applied to twenty people taking into account the objectivity and proximity with the ICT and the usability of the system.

PLS generates a multivariate analysis by incorporating multiple dependent constructors, explicit error recognition, and integrating the theory with empirical data. PLS is mainly oriented to predictive causal analysis in situations of great complexity but with little theoretical information; It is recommended for research of predictive models where the emphasis can be mainly on the development of theory [4].

PLS allows testing the relationship between the variables / builders of the research model and the hypothetical relationships between the variables / builders simultaneously. The model is analyzed and interpreted in two stages:

- The assurance of the reliability and validity of the measured model.
- The assurance of the structure of the model.

In relation to descriptive statistics, a T-means test was used through the SPSS statistical package to see if the means are significantly different from each other.

Below is a summary of the validity of each variable that makes up each constructor, as well as the validity of the latter:

Constructor	Variables	Reliability	Validity
C1. System Quality	V1.1. The information system adapts to the new conditions or demands. V1.2. You have access to the system when you need it. V1.3. It's easy to use. V1.4. The system shares information with other functional areas or with other systems. V1.5. The answers to your requests are adequate in time.	0.92	0.75 to 0.93 Only the range of validity results of all variables was specified
C2. Quality of the information	V2.1. Provide accurate information. V2.2. The information provided by the system is exactly what you need. V2.3. It is enough to perform the task. V2.4. You are satisfied with the answers. V2.5. It is clear enough. V2.6. The options offered by the system to visualize the information are sufficient.	0.88	0.88 0.89 0.85 0.67 0.60 0.45
C3. Service Quality	V3.1. Communication with the system is effective. V3.2. The service time in which the service staff attends your requests is adequate. V3.3. The relationship with the service staff is cordial. V3.4. The training received for the use of the system was adequate. V3.5. Staff training and capacity is adequate.	0.87	0.64 0.79 0.77 0.73 0.78
C4. Utilization	V4.1. Use the system with children	0.7	0.75
C5. User satisfaction	V5.1. You are looking for the use of the system to do your job. V5.2. The system provides greater value to the organization. V5.3. You get personal benefits from the system. V5.4. The system really improves the performance of your work.	0.77	0.72 0.74 0.63 0.86
C6. perceived usefulness	V6.1. The use of the system allows you to perform your activities faster. V6.2. The use of the system improves		0.80 0.89

	performance in your work. V6.3. The use of the system improves your efficiency in your work. V6.4. Using the system makes your job easier.	0.96	0.94 0.88
C7. Speed in decision making	V7.1. You can make quick decisions. V7.2. The speed of special attention decision making is increased. V7.3. Reduces the time of the channeling decision making. V7.4. The decision time in meetings is less.	0.85	0.79 0.80 0.86 0.72
C8. Communication	V8.1. Decreased time in organizational communication. V8.2. Increase in organizational communication. V8.3. Help to exchange inter-organizational information	0.8811	0.63 0.82 0.84
C9. Organizational effectiveness in decision making	V9.1. Effectiveness in decision making has increased. V9.2. Quality improvement in organizational decision making. V9.3. Organizational decisions can be implemented more quickly.	0.83	0.75 0.68 0.82
C10. Goal achievement	V10.1. Support for setting organizational goals and objectives. V10.2. Support for the fulfillment of organizational goals and objectives. V10.3. Support for monitoring and evaluation of compliance with organizational objectives	BFL: Budget for literature (Torkzadech and Doll 2001)	BFL: Budget for literature (Torkzadech and Doll 2001)
C11. Size	V11.1. Number of employees currently working in your company.	ND: No availability of the constructor or validity of the variable in the studies	ND: No availability of the constructor or validity of the variable in the studies
C12. Maturity	V12.1. The rules and procedures are well defined and enforced for the system and software factory. V12.2. The administrative practices of the system and the development cell are well defined and carried out in an appropriate manner. V12.3. The development cell is conducted properly.	ND: No availability of the constructor or validity of the variable in the studies	ND: No availability of the constructor or validity of the variable in the studies
C13. Resources	V13.	ND: No availability of	ND: No availability of

	Amount of resources invested in the system and in the software factory.	the constructor or validity of the variable in the studies	the constructor or validity of the variable in the studies
C14. Dynamism	V14.1 It is quickly or intensely changing your marketing practices to maintain the software.	0.85	0.7
	V14.2 The degree of obsolescence of SW products is fast.		0.66
	V14.3 It is easy to predict the actions of changes in the SW.		0.6
	V14.4 It is easy or difficult to predict the demand and tastes of users.		0.74
	V14.5 The changes in this type of technology are intense.		0.71
C15. Heterogeneity	V15.1 There are big differences between existing products.	0.85	0.84
	V15.2 There are technological differences between the SW developed.		0.82
	V15.3 There are advantages in the SW developed.		0.74
C16. Hostility	V16.1 The cost benefit is profitable.	0.82	0.68
	V16.2 The degree of acceptance is adequate.		0.76
	V16.3 The opposition is strong..		0.71

Table 1 of validity and reliability of each variable

Results

The results presented below were obtained using the SPSS statistical package. Reliability is reported for each builder by calculating Cronbach's alpha and the validity of its variables through a correlation and an analysis of the factor load.

Constructor	Variables	Validity	Reliability
C1. System quality	V1.1	0.887	0.733
	V1.2	0.615	
	V1.3	0.661	
	V1.5	0.772	
C2. Quality of the information	V2.1	0.810	0.8433
	V2.2	0.910	
	V2.3	0.705	
	V2.4	0.770	
	V2.5	0.738	
	V2.6	0.674	
C3. Quality of service	V3.1	0.804	0.8549
	V3.2	0.771	
	V3.3	0.840	
	V3.4	0.790	
	V3.5	0.835	

C5. User Satisfaction	V5.1	0.816	0.8292
	V5.2	0.917	
	V5.3	0.767	
	V5.4	0.825	
C6. Perceived profit	V6.1	0.954	0.9545
	V6.2	0.924	
	V6.3	0.958	
C7. Speed in decision making	V7.1	0.931	0.9183
	V7.2	0.879	
	V7.3	0.925	
C8. Communication	V8.1	0.962	0.8494
	V8.2	0.940	
	V8.3	0.716	
C9. Organizational effectiveness in decision making	V9.1	0.937	0.9488
	V9.2	0.963	
	V9.3	0.952	
C10. Goal achievement	V10.1	0.942	0.9376
	V10.2	0.960	
	V10.3	0.928	
C12. Maturity	V12.1	0.913	0.7719
	V12.2	0.950	
	V12.3	0.616	
C14. Dynamism	V14.1	0.709	0.6219
	V14.2	0.508	
	V14.3	0.572	
	V14.4	0.663	
	V14.5	0.767	
C15. Heterogeneity	V15.1	0.719	0.7245
	V15.2	0.918	
	V15.4	0.788	
C16. Hostility	V16.1	0.931	0.8987
	V16.2	0.812	
	V16.3	0.932	
	V16.4	0.807	

Table 2 Reliability results by calculating Cronbach's alpha and the validity of its variables by means of a correlation and an analysis of the factor load

Finally, questionnaires were distributed to 189 people, above the initial sample of which 124 answered instruments were recovered, obtaining a response rate of 66%. The purification was done and the invalid ones were discarded, 116 questionnaires were left for the statistical analysis and the following results were found.

Higher quality of the system is associated with greater use of the system, there is no statistical evidence to show that higher quality of the system is associated with greater user satisfaction, there is slightly significant statistical evidence to state that there is a relationship between the quality of information offered by the system and the use of information systems and user satisfaction. None of the institutions are accustomed to continually use commercial software to support reading and writing for hearing impairments and therefore although it is reflected that there is greater speed in decision making, fieldwork does not fully certify this statement. The individual impact of the software affects an individual impact, as well as the dynamism.

The positive aspects of the software are its portability and accessibility from any platform, including mobile devices. The videos were made by personnel of the Technological University of Aguascalientes with the contribution of personnel of the deaf association of Aguascalientes, which are the only ones that can authorize their release.

As negative situations we find the lack of dissemination of the software due to situations of intellectual property, copyright and somewhat political situations within the State of Aguascalientes. In addition there were problems related to hosting and support and maintenance.

Finally, in order to raise the level of reliability or representativeness of an environment, it is recommended to explore possible independent variables that may increase the reliability of the model, as well as contribute to new knowledge about the success of information systems, as well as updating the model. It was found that there is sufficient statistical evidence that a higher quality of the system is associated with a greater use of it, a higher quality of information is associated with a greater use of the system and user satisfaction, there is a correlation between the quality of service and user satisfaction, greater use of information systems is associated with greater individual impact.

Conclusions

The most important aspect for user satisfaction is the information provided by information systems. Although the use of the systems and the quality of service were also found, this last aspect considered as a fundamental component for user satisfaction [6]. In addition, statistical evidence was found that reflects an influence of the environment in which the organization is immersed in the individual but especially organizational impact derived from the use of the system.

Measuring the degree of acceptance and advantages of software developed and implemented by the Technological University to be used in the educational processes of reading and writing of children with hearing disabilities is being implemented in the primary schools of the municipality of Aguascalientes.

It was difficult to establish the same process with other disabilities such as motor, visual and intellectual due to factors such as lack of cooperation between institutions and the very nature of disabilities.

Acknowledgments

A deserved recognition is extended to the students of the ICT educational program of the UTA who participated throughout this research during the development of the prototype in collaboration with the Institute of Education of Aguascalientes. Likewise, the support and dedication of the professors, from both the UTNA and the UT of Aguascalientes for the realization of this project, is appreciated.

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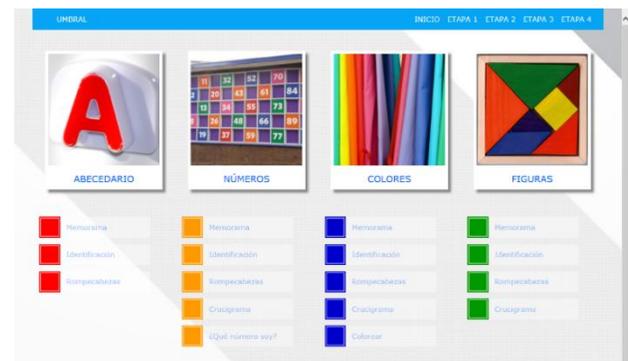
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Annexes

Web system screen for reading-writing learning



- The software consists of a website that contains several sections (by families) by levels that measure the learning of children with disabilities in the reading-writing process through games (puzzles, completing the words, finding and ordering the phrases, etc. .) and was developed with HTML, CSS, JQUERY and JQUERY UI.
- Compatible with IE6 and later versions, Chrome, Firefox, Opera and Safari.
- Not adaptable to mobile devices with minimum resolutions at 1024x600 pixels.
- Made up of four modules, each module contains specific semantic topics that help children with different ages learn to read and write.

Analysis of the relevance of the first year elementary school dynamization**Análisis de la pertinencia de la dinamización educativa de primer año de primaria**

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Abstract

The objective of the present paper is to introduce dynamization through ICT on the subject of “knowledge of the environment” for the first year of basic education. Since it is currently handled through books and knowledge is not implemented through interactions, understanding the environment lies in precisely recognizing the elements that surround the student so that they can interact with it. If we show the students videos, animations and audios on how the environment is comprised, their academic growth can be more significant and be better inserted to its context. The methodology that was used was experimental, from which the prototype shown in this article was built, contributing to generate the tools that improve educational quality. The circulation of the article will be the missing step to have an impact on the elementary schools of Valle del Mezquital and Mexico, where projects like this are needed.

ICT, Environment, Continuous Improvement

Resumen

El presente objetivo de investigación es la dar a conocer la dinamización mediante TIC de la materia de conocimiento del ambiente para el primer año de educación básica, ya que actualmente se maneja mediante libros y no se implementa un conocimiento donde el alumno pueda interactuar, el conocimiento del ambiente radica en precisamente conocer los elementos que rodean al alumno para que se vaya involucrando e interactuando con el mismo y si le mostramos por medio de videos, animaciones, audio como es que este se compone puede tener mayor significatividad su crecimiento académico y se inserte en mejor forma a su contexto. La metodología que se utilizó fue la experimental con la cual se fue construyendo el prototipo mostrado en este artículo, con lo cual se contribuye a generar las herramientas que mejoren la calidad educativa, solo faltará la difusión del artículo para tener impacto en las primarias del Valle del Mezquital y de México, proyectos así hacen falta.

TIC, Ambiente, Mejora Continua

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Introduction

The environment is in constant change and innovation, which is why the educational field should not move away from that. The implementation of Information and Communication Technologies can achieve significant progress in the way students learn and teachers educate. The main idea is to innovate the way of imparting knowledge to elementary school children through an educational platform, where each student can have access to a device through which they receive information and/or knowledge in a fast, didactic and fun way, as well as serving as a starting point in the face of a technological world, so that children begin to know the use and implementation of technology and devices such as computers.

The objective of the educational platform is that students can, to some extent, control the time they take to learn a subject and if they do not understand a subject, they can solve it quickly with a single click, thanks to the fact that, aside from offering exercises to solve, the education platform can provide attractive tutorials or support tools to help and advise the students.

State of the art

New technologies have substantially changed the way in which we approach knowledge. Cell phones, tablets and computers connected to the internet opens the door to a world of information. There are more than 10 educational web platforms which elementary school children can use to learn; they are free and require an internet connection.

Mundo Primaria: This platform contains hundreds of games and resources to promote learning in subjects such as Mathematics, languages and knowledge of the environment.

Smartick: it offers the student numerical comprehension and explanation from an interactive point of view, making it all related to mathematical operations.

Childtopia: This platform specializes in online games and resources for children in primary and secondary education.

Innovation description:

IntelEdu's goal is that elementary students who are in marginalized areas of Mixquiahuala can access an education platform, through a WiFi connection without the use of the Internet, which allows them to learn and provide feedback to the topics taught in class.

Benefits of innovation:

It provides access of many technologies to children of primary level who do not have enough resources to access the internet.

- Safe and healthy content
- Low costs
- The contents of the platform are very dynamic
- The contents reinforce the knowledge learned in class from a playful perspective to encourage fun and interaction
- The Raspberry's WiFi technology connects several computers, tablets and cell phones wirelessly.

Methodology:

In order to develop this research project, a comparative study analysis was used, in which we analyzed the various applications that exist in the education market for primary level. A documentary analysis was also conducted, where the evolution of education at a national level was reviewed. Finally, a documentary investigation of the context of Mixquiahuala was carried out in order to generate a research or software prototype, using spiral programming methodology.

Potential market:

Students: 12,824,766 elementary students registered in the Secretariat of Public Education.

Target market:

Elementary students from the three locations with the highest level of marginalization in Mixquiahuala (Monte Grande, El Colorado and El Tumba).

Competing technologies and competitors (substitute competition):

There are three platforms that are widely used in primary schools, although there are more than 20 educational platforms on the Internet that elementary school children can use.

Name	Description	Price
Mundo Primaria	-Offers educational games in the different elementary subjects, in all educational levels. -Needs internet connection. -Directed to children between 6 and 12 years old. It offers virtual games, children's stories, PDFs and video books.	Free
Smartick	-Fully customized Online Math Platform. Develops a method to identify strengths and weaknesses of each child -It has infinity of exercises to solve.	Requires payment
Childtopia	-Digital educational leisure space for children, has a catalog of constantly growing activities and games. -Needs Internet	Free

Table 1 Applications

Intellectual Property Strategy:

The protection of the IntelEdu image is essential, so we will rely on one of the legal figures offered by the IMPI; occupying a patent in order to maintain the identity of this product with its unique and distinctive characteristics within the country market. This patent will help us so that the commercial image is easily identified by the consumer, making unique its distinctive elements, such as the characteristics and cost that the card will have, also the feasibility of its use and operation.

The label and packaging will be protected so that it is not available for sale in other markets, affecting the image of the original product, and the most important point is ensuring the security of the information contained in IntelEdu; since it is an educational platform created for students of elementary level, it is our concern that this platform can be manipulated for misuse.

The requested patent will help us to ensure that the information offered cannot be plagiarized because names will be registered and protected by copyright, making it difficult to obtain data within this system.

Another benefit we have when obtaining the patent is that it assigns us exclusive use for 10 years and it can be renewable.

Obstacles to enter the market:

IntelEdu is an educational platform that will reach the hands of low-budget institutions which will help students have a complete education with more practical and dynamic activities that will allow them to develop a better understanding and learning of their subjects, leaving behind a system that does not improve their performance.

<p>Strengths Card price is very accessible for low-budget institutions</p> <p>-Unique educational platform -Practical -Dynamic -It doesn't need Internet to work</p>	<p>Opportunities Being a new favorable trend in the educational market. -To have the possibility of establishing strategic alliances to carry out platforms at more educational levels.</p>
<p>Weaknesses We use government support so that students have the electronic equipment for the card. - That the advancement of technology affects the platform's operating system.</p>	<p>Threats Entry of new competitors who want to sell cards with other educational platforms. -RASPBERRY cards that have a lower price for programming these platforms</p>

Tabla 2 FODA

Technical-economic pre-feasibility:

Suppliers

- Suppliers must have relevant experience.
- Suppliers must comply with the deliveries granted on the corresponding dates.
- Suppliers must not exceed product budgets.
- Suppliers must deliver quality materials to develop a premium product.
- Suppliers will maintain a relationship of discretion to the company about product information.
- Suppliers must be aware of reimbursement insurance for product damage.

Manufacturers

- Manufacturers must continue with the design order established by the company.
- Manufacturers must follow a certain budget established by the company.
- Manufacturers must prevent unskilled workers from participating in the production chain.
- Manufacturers must have a base of skilled workers to solidly support the product.
- Manufacturers must have supplier development tools that do not reach the required qualification.
- Manufacturers must avoid risks of brand deterioration due to avoidable failures.
- The workers must make constant tests to avoid future failures in the creation of the product.

Viabilidad financiera:**IMPI**

IntelEdu has requested financial support from IMPI. The support offered is to provide specialized and free advice so that we can be part of the patents, in order to provide tools for the protection of our inventions, use and export exclusively in accordance with the Mexican legal framework. Among the services that this program offers are patentability analysis, which consists of a study of the state of the art and technique, as well as advice regarding the writing of the application, free of charge. Within the program, workshops have been considered to disseminate the culture of intellectual property, the relevance of the protection and commercialization of developed inventions, including topics on competitive, commercial, technology and environmental monitoring.

Secretariat of Public Education

Support was requested for low-budget schools to have computer equipment so that these cards can be installed and children can adapt to a new fun and dynamic way of learning, making their development faster and their learning better. Also they will be more connected to the technology and facilities offered, helping them to try new things.

Interview with experts:

For the initiative of this project we had the support of Dr. Jesús Alberto García Rojas, who had the idea of creating a platform that could help students with limited resources to improve their way of learning in a simpler and more practical way, so that they no longer get frustrated with long textbooks and get involved with technology by showing them the benefits that it provides. Dr. Jesus teamed up with a professor at his institution, who showed him that this platform could be installed on a RASPBERRY card, it would not need the Internet, so as not to generate an expense to the institution, much less to parents.

- STUDENT: How will this project benefit students and how will it improve their learning?

-DR. JESUS: This card would benefit you in many ways, first you have to know that the card is made up of several ports that can be used to add memories that contain information of any kind, and apart from that, with a single card other teams can connect via Wifi. As a second important fact, students who do not have these services may be the first to try this way of learning.

Analysis:

Spanish is a subject aimed at the students' performance in a dynamic and physical way, making them obtain knowledge in person and in group dynamics, and because the beginning of the prototype cannot cover the amount of the number of students in a classroom (a complete group) is not viable.

The subject of Mathematics comprises dynamic learning. Since it is one of the most studied fields, there are more prototypes both computerized and digitally for smartphones, through games and applications; perhaps because it has been extensively explored, it could not be viable for starting the prototype. In the subject of Knowledge of the Environment, there could be an opportunity to start the prototype, since it has been neglected and it turns out to be dynamic to acquire knowledge by digital means; in addition, the block units turn out to have a sufficient amount of information, that is, not too short nor too extensive to be able to create the content.

While in the Civics and Ethics subject, as well as with Knowledge of the Environment, has been little explored in digital knowledge and/or prototypes, its contents are somewhat extensive to start working at the moment.

Knowledge of the environment	
Start	<ol style="list-style-type: none"> 1. Presentation 2. Know your book
Block 1	I know myself and I know where I live <ol style="list-style-type: none"> 1. I learn to live with my group. 2. I am a unique person 3. I learn in my environment. 4. The world around me. 5. Knowing the animals. 6. My daily activities. 7. Evaluation.
	I observe my changes and those of my community <ol style="list-style-type: none"> 1. I learn to live together in my school. 2. I take care of my body and my diet. 3. Light is important in my life. 4. I take care of myself and the environment where I live. 5. The plants of my community. 6. How do I change? 7. Evaluation
Block 3	I experiment in my environment <ol style="list-style-type: none"> 1. Agreements to live as a family. 2. I know and take care of the place where I live. 3. How are objects? 4. Change and movement. 5. My family and I. 6. Evaluation
End	<ul style="list-style-type: none"> • Bibliography • Iconographic credits • Cut-out material

Tabla 3 Subject

Below is an example of Topic 5: Knowing the animals:

Topic 5: Knowing the animals

Objective: Generate curiosity and amazement when exploring the different types of animals and their characteristics, as well as raising awareness about how to care for animals.

Description: The theme is focused on presenting the domestic and non-domestic animals, and their characteristics, as well as knowing how to care for an animal.

Suggestion: Presenting a video about what are "wild" (non-domestic) and domestic animals.



Figure 1 Animal screen

Presenting a video of several animals that mention their name and what sound they make.



Figure 2 Multimedia

In the end, presenting all the animals in the video and sorting them into domestic or non-domestic with the mouse.

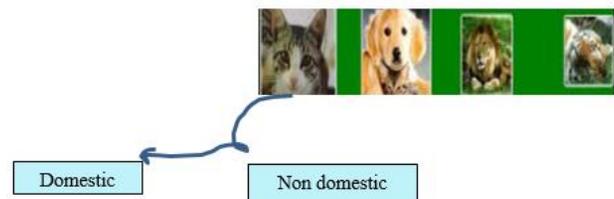


Figure 3 Animals

Sending a question that says: What is the difference between domestic and non-domestic animals? And answering it with the keyboard. Sending a video about how to care for animals.



Figure 4 Animal care

As an activity, they can make a drawing about what they learned on how to care for an animal.



Figure 5 Animal care

Sending a video about the characteristics of animals.

Los animales vertebrados tienen columna vertebral y huesos internos.
Los animales vertebrados se clasifican en cinco grupos:

Mamíferos	Peces	Aves	Anfibios	Reptiles
CUERPO Pelos *	Escamas	Plumas	Piel húmeda	Escamas
RESPIRACIÓN Pulmones	Branquias	Pulmones	Pulmones	Pulmones
EXTREMIDADES Patas *	Aletas	Alas y Patas	Patas	Patas o No tiene
DESPLAZAMIENTO Caminan *	Nadan	Vuelan	Nadan o Saltan	Reptan o Caminan
REPRODUCCIÓN Vivíparos	Ovíparos	Ovíparos	Ovíparos	Ovíparos
HÁBITAT Tierra *	Agua	Tierra	Agua / Tierra	Tierra

* Excepto los mamíferos acuáticos como las ballenas y los delfines

Figure 6 Animal characteristics

Placing 4 boxes on some characteristics so that they write 2 or 3 examples.

With feathers	With scales
With fur	With moist skin

Table 4 Feature chart

Learning:

Identify that it is a domestic and non-domestic animal.

Know the sounds they produce.

Know what are the characteristics of animals.

Índice

Presentación
Conoce tu libro

Bloque 1

Me conozco y conozco el lugar donde vivo

- Aprendo a convivir con mi grupo
- Soy una persona única
- Me ubico en mi entorno
- El mundo que me rodea
- Conocemos a los animales
- Mis actividades diarias
- Evaluación

Figure 7 Table of Contents

Conclusion

Due to the interests of the prototype, it can be deduced that the subject of Knowledge of the Environment turns out to be more feasible, since there is not so much app development in this matter, and that the subjects are not so extensive or short to address them with the development of this application. It is worth mentioning that although the research methodology used to develop this project is not innovative, few studies exist worldwide addressing this problem, but the utility and impact that it has on society is even better, since this must be the goal of any investigation.

Recommendations

It is advisable to continue working on the link between technology and education, since there are many marginalized places in Mexico, which need modernization of technology, so that students develop digital skills that allow them to compete in the labor market. This low-cost project achieves it overcoming so many obstacles that do not allow the modernization of classrooms across the country.

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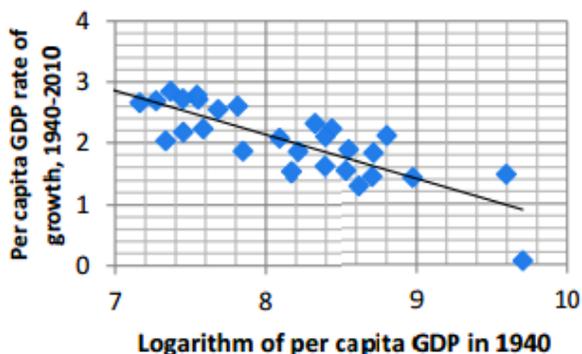
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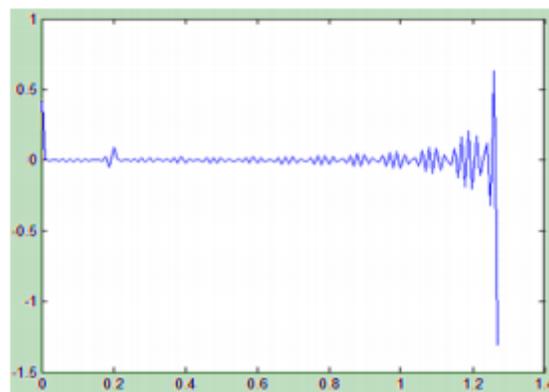


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