Design and development of integration activities at preschool level using technology

Diseño y desarrollo de actividades de integración a nivel preescolar utilizando la tecnología

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Abstract

The present investigation shows the way of designing educational activities according to the Preschool Program supported with the use of technology. In such a way, that with the strategies, the specific objectives, the competences; which are indicated in said Program and together with the collaborative work and the technology; strengthen meaningful learning in a group of first grade of preschool. To enhance the skills, attitudes and skills of the students, a work plan was designed in which the way to use technology with the use of the Robot NAO from the Universidad Politécnica de Amozoc, Puebla is described and thus design and develop planned activities as established by the Preschool Program; which start from a methodology using a technological strategy. The general objective is to carry out the design to develop integration activities at the preschool level using technology. The results obtained were the improvement of skills, attitudes and aptitudes among the children, the educator, the rules established in the classroom, their empathy among peers and sometimes in the subsequent tasks they perform at home.

Educational activities, Preschool Program, Technology

Resumen

La presente investigación muestra la manera de diseñar actividades educativas conforme al Programa de Preescolar apoyadas con el uso de la tecnología. De tal forma, que con las estrategias, los objetivos específicos, las competencias; los cuales están señaladas en dicho Programa y junto con el trabajo colaborativo y la tecnología; fortalecen los aprendizajes significativos en un grupo de primer grado de preescolar. Para potenciar las habilidades, actitudes y aptitudes de los alumnos, se diseñó un plan de trabajo en el cual se describe la manera de utilizar la tecnología con el uso del Robot NAO de la Universidad Politécnica de Amozoc, Puebla y así diseñar y desarrollar actividades planificadas como lo establece el Programa de Preescolar; las cuales parten de una metodología utilizando una estrategia tecnológica. El objetivo general es realizar el diseño para desarrollar actividades de integración a nivel preescolar utilizando la tecnología. Los resultados que se obtuvieron fue la mejora de habilidades, actitudes y aptitudes entre los niños, la educadora, las reglas establecidas dentro del aula, su empatía entre pares y en ocasiones en las tareas posteriores que realizan en casa.

Actividades educativas, Programa de Preescolar, Tecnología

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Introduction

Currently, the use and incorporation of technology within basic education schools in Mexico has been increasing and gaining day by day greater relevance and attention for most teachers as well as students. We must not forget that school education begins in preschool and it is important to take into account that young children often tend to use from a cell phone to a tablet and that sometimes they only use them for entertainment or play at home.

Hence, that the integration of these technologies within the teaching-learning process has become part of the classroom planning by the teacher. In the teaching area, it is also necessary to take into account the contents established in the Early Childhood Education Program 2011 where the teacher must use each of its tools and strategies, such as the set of methods, techniques and resources used by the teacher to assess the student's learning and thus achieve the objectives established in it.

Another point that should not be forgotten is the socialization at the preschool level, since it allows children to choose their friends with judgment, create healthy friendships, overcome shyness, share with others, work as a team, etc. The human being is born to be sociable, since we are in the womb of our mother until the last day of our life we have to develop socially relevant experiences, hence the importance of teaching preschool children behavioral patterns to maintain good relations with others, which are the basis of good emotional intelligence.

With all the above, if we add the use of technology and socialization to encourage, develop and strengthen these skills and attitudes in preschool children we will have better results. For this reason, the use of the NAO Robot of the Polytechnic University of Amozoc was integrated into this technology to design and develop integration activities based on socialization and thus demonstrate how technology strengthens along with the teacher's act the integration of children from a group of first grade of preschool of the Municipality of Chignahuapan, Puebla.

This research aims to incorporate technology using the NAO Robot as the design and development of social integration activities at the initiative of the teacher and thus generate new teaching-learning practices, creating dynamic environments in which students develop new skills.

Theoretical framework

Below are brief descriptions of some articles where robots have been used to improve social integration using technology.

Use of educational robotics as a didactic strategy in the classroom. This article deals with qualitative research, action research in the classroom, which proposes recreational activities with educational robots as a pillar of technology education, and which aims to motivate students and educators to formulate and apply strategies innovative educational systems that use as a didactic tool robotic platforms and technological devices that have completed their useful life, in such a way that the same robot becomes a strategy within the classrooms.

In this way it seeks to provoke in the students of preschool education, enthusiasm for developing skills that allow them to build knowledge, to give a well-founded, responsible and critical use of technology. Additionally, the didactic proposal involves students in playful activities with educational robots to develop conceptualizations that allow them to address everyday problems related to the appropriate use of technology. (Barrera, 2014).

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

The robot used was Karotz, in such a way that its interaction within the home influenced and improved the social behaviors among its members. It has the shape of a rabbit which is connected to the internet with 30 cm of height. The relationship occurs through the verbal, the LED light in his belly, the movable ears, and by detecting the presence of other nearby objects. As the Karotz is permanently connected to the internet, it is able to react and transmit all kinds 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).

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Educational robotics, a tool for the teaching-learning of science and technology. 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 Chiriqui, 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 facilitates and motivates the teaching-learning of sciences and technologies. The results showed that robotics can become an excellent tool to understand abstract and complex concepts in subjects in the area of science and technology; as well as it allows to develop basic skills such as working as 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 today and its continuous development, makes technology, in itself, becomes an integral part of the training process in childhood and youth. For this reason, it is important to develop proposals in which children and young people are offered the possibility of coming into contact with new technologies; This is possible through the use of software and hardware tools, such as robotic prototypes and specialized programs for pedagogical purposes. At the same time it 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).

Advantages of NAO in any educational environment. In this article he mentions that since 2009, there are more than 8,000 NAO robots in the educational area and 80% of them are aimed at schools. This reflects the high level of implementation that the use of robots in general and the NAO in particular is having at the elementary levels of education. On the other hand, motivates 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 it works, 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 nexus between theory and practice since the robot explains the theory while executing it and shows itself as a practical example, and students also program the robot themselves while witnessing the results. (Alive Robots, 2015)

Methodology

In this section are the educational activities through a work plan based on the 2011 Preschool Education Program, which describes how to use technology with the use of the NAO Robot of the Polytechnic University of Amozoc; divided into two sessions which start from a methodology using a technological strategy to enhance skills, attitudes and aptitudes of students in a first grade of preschool. The objective is to develop social integration activities at the preschool level by incorporating technology using the NAO Robot to generate new teaching-learning practices, creating dynamic environments in which students develop new skills.

The general contents are the design of activities with the NAO Robot, the educator and the software programs, which are described below in two sessions that include different activities.

Session 1. The activities that were carried out between the educator and the NAO Robot were designed, based on the favoring of social relations, considering two interventions on different dates. On the first day, an activation routine was conducted by the Robot; the following participation was based on a sequence of activities where said Robot collaborated.

First intervention of the NAO Robot. The training field is called Physical Development and Health. The competition is to maintain control of movements involving strength, speed and flexibility in games and physical exercise activities. The expected learning is to participate in games that make you identify and move different parts of your body.

The didactic sequence was the presentation of a visitor to our room and knowing their name, age, origin and the purpose of their visit.

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Figure 1 Presentation of the NAO Robot in the lounge
Source. Own Elaboration

In such a way, that the development of the activity was the following: The visitor and new friend invites to initiate the activation routine with the sequence of movements such as moving the head for both sides, raising and lowering the shoulders, bringing the arms to the sides, arms up and down, waist movement to the sides and in circles, alternate leg movement, kicking with alternating legs, clown jumps and finally breathing. It was finalized by giving the new friend a present to each of the 23 students.

Figure 2 Physical activation routine directed by the NAO Robot
Source. Own Elaboration

Second intervention of the NAO Robot. The training field is called Personal and Social Development. The aspect that is favored are interpersonal relationships. The competition is to establish positive relationships with others, based on understanding, acceptance and empathy.

And the expected learning is to gradually accept the norms of relationship and behavior based on equity and respect, and put them into practice.

The didactic sequence was divided into three moments. In the first, the following activities were carried out: Greeting by the NAO, activation routine directed by the NAO, as well as helping to remember the classroom regulations, asking the students to brainstorm with the teacher's support write the comments of the students on the board.

The second moment was where NAO mentioned the importance of following the rules of the room and showed and mentioned the images that represent the action of each rule in the classroom and so the group was divided according to the number of rules, forming teams. To each student, NAO assigned one of the slogans to monitor compliance with them, also provided material to each child to make badges according to the rule that each one touched.

Figure 3 Importance of the classroom regulations by the NAO Robot
Source. Own Elaboration

The last moment corresponded to the closing where the evaluation and dismissal by the Robot was included. Inside a magic box NAO took out different elements classifying them into two groups, one of them was for girls and the other for children, each group mentioned the elements that NAO assigned for each of them, in turn asked for groups to be refers to each element and how it can help them be better companions and friends. In the evaluation NAO developed a plenary with the students and the teacher reinforced what they learned on that day, giving recommendations to follow the rules. Regarding the farewell NAO sang a farewell song with the students.

Figure 4 Farewell by the NAO Robot
Source. Own Elaboration

Session 2. It was designed with students of the Polytechnic University of Amozoc that belong to Software Engineering a computer program for the NAO Robot, with the purpose of developing activities that would be carried out with the preschool group, to investigate needs and applications in matter of interpersonal relationships, considering the two interventions. In addition, tests were carried out prior to the application of activities with the NAO Robot at the Polytechnic University of Amozoc. 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 added to the Robot for physical activation, in addition to a greater dialogue with the aim of giving children more attention to the activities and an additional story on the part of the Robot so that there was more interaction with children.

Figure 5 Software design and testing with the NAO Robot
Source. Own Elaboration

There were also tests where the Robot mentioned the rules of the room and at the end asked for a drawing to the children.

The evidence was that the Robot had to identify a logo which was on the edge of a sheet that was later to be given to each child in his room and so he could congratulate the activity done by each child at its end. These tests were conducted in three sessions to be successfully identified by the Robot.

Results

To obtain quantitative results with respect to the integration activities, two evaluations were carried out prior to the visit of the NAO Robot and a second after the intervention with the same. Hence, the design of these activities to develop them with NAO were divided into two participations based on the same elements of the current Preschool Program; The first intervention consists of a greeting and presentation, activation routine and incentives provided by NAO, in order to know the impact and reactions to the students. The second NAO intervention consists of a greeting, activation routine, presentation of school rules, collaboration dynamics between boys and girls, a plenary of what has been learned, farewell and gifts. In each evaluation the children were asked different activities as programmed by the Robot previously done, as well as the collaborative work by the educator. The results of these activities during the first intervention that were applied to 23 children are shown in Table 1, where it can be seen that the children's social integration improved.

1st intervention				
	He/she does it	He/she does it with help	He/she presents difficulty	He/she does not perform it.
Accept his/her colleagues as they are and understand that they have the same rights, as well as responsibilities.	20%	40%	20%	20%
Understand that people have different needs, points of view, culture and that they should be treated with respect.	50%	20%	15%	15%
Learn about the importance of friendship and understand the value of trust, honesty and mutual support.	50%	15%	20%	15%
Internalize the rules of relationship and behavior based on equity and respect.	40%	30%	15%	15%
Become aware of others and establish communication relationships and group integration.	30%	50%	15%	5%
Establish attitudes and relationships of respect and collaboration.	45%	25%	20%	10%

Table 1 Activities during the 1st. intervention
Source. Own Elaboration

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

2nd intervention				
	He/she does it	He/she does it with help	He/she presents difficulty	He/she does not perform it.
Accept his/her colleagues as they are and understand that they have the same rights, as well as responsibilities.	70%	25%	2.5%	2.5%
Understand that people have different needs, points of view, culture and that they should be treated with respect.	80%	20%	0%	0%
Learn about the importance of friendship and understand the value of trust, honesty and mutual support.	95%	5%	0%	0%
Internalize the rules of relationship and behavior based on equity and respect.	90%	10%	0%	0%
Become aware of others and establish communication relationships and group integration.	80%	20%	0%	0%
Establish attitudes and relationships of respect and collaboration.	90%	10%	0%	0%

Table 2 Activities during the 2nd. intervention.
Source. Own Elaboration

Conclusion

This research provides a tool for teachers to make use of technology in their educational planning and applications, as in the generation of new meaningful learning for students to strengthen them. In this case, with the help of the intervention of the NAO Robot, these educational activities were adapted according to the Preschool Program, which generated other ways of planning, organizing and even changing attitudes and aptitudes not so favorable within the classroom and which impacted the the students.

In addition, the attitudes and behaviors of the students were observed after the first intervention of educational activities, identifying gradual changes in the children that make up the group; at the beginning of the final intervention they were attentive, following directions, listening, recording these changes or results, with the development of the session with the NAO Robot, they reaffirmed and learned how to use the school rules and its usefulness, together to this the development of empathy and the use of values were gradually cemented.

The following day the attitudes of the students were different because they remembered the recommendations of the NAO Robot, besides having advances in their language development, oral, plastic productions referring to drawing, listening skills, respect of turns, among others; in reference to various training fields, such as exploration and knowledge of the world and physical development and health.

Next, there is evidence of the work done which was used to strengthen what was learned in the children, through the implementation of the use of the NAO Robot to generate and potentiate the interpersonal relationships in the first grade of preschool students.

Figure 6 Selección de materiales.
Source. Own Elaboration

Figure 7 Construction of buildings with the help of my friends.
Source. Own Elaboration

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