INVESTIGATION OF TEACHERS' PERSPECTIVES FOR ROBOTIC APPLICATIONS

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ABSTRACT: In this study, it was aimed to determine the opinions of teachers about robotics. This research aims to explore knowledge level and opinions of teachers in regard with robotic applications. In this research one group pretest-posttest design is used. The study group of this research consists of 20 teachers. "Robotic Pre-test", "Robotics Satisfaction Test", "Personal Information Form" and a semi-structured interview from developed in accordance with the literature were used to collect the data. In the analysis of the data obtained, descriptive statistics (frequency and percentage distribution) were used to evaluate Robotics Pre-Test and Robotics Satisfaction Test; inductive content analysis was used to analyze the interview data. According to the findings of this study, knowledge level and opinions of teachers in regard with robotics and how they see robotics as a method in education were determined. At end of the study, it was eventually found that teachers have very positive thoughts about robotics. Robotic applications appear to increase their self-belief and confidence.

Key words: Teacher, robotic

INTRODUCTION

In the 21st Century, there is a very rapid change and development process in the fields of science and technology and the idea of having these changes and developments with education has not been changed (Açışlı, 2010). There is a close relationship between technology, society and education. The overall skill levels of people change with changing technology and their expectations from education also change (Kurtdede Fidan, 2008). In the process of teaching and learning, "teacher" and "technology" are the two key elements of the teaching-learning environment. Because these two elements have great effect in the learning process of students. In today's education system, teachers should use technology and teach students how to use technological tools (Güzel Türk, 2012).

Countries providing conscious and systematic training of Robotics use Legos. Legos turn building, design and programming development process of students into more fun, educational and collaborative activities (Fidan and Yalçın, 2012). In design-based activities, where legos are used as teaching tools, more meaningful activities are realized since students use their knowledge in a form that is both physically and mentally active (Marulcu and Sungur, 2012). The use of legos as study materials allows students to question real life problems, work with scientific concepts and use educational technologies beyond learning science (Sungur Gül and Marulcu, 2014).

Considering the studies conducted on robotics in the literature; Büyük (2015) states that robotics significantly affect scientific process skills and motivations of elementary school students towards science and technology course; Fidan and Yalçın (2012) state that science and mathematical intelligence as well as hand skills of minor designers are improved by designing and programming robots with Legos; Koç Şenol (2012) states that elementary school students have positive thoughts about robotics and having robotic-assisted science experiments improves science process skills of students and their motivations towards Science and Technology courses.

Therefore, in this study, it was aimed to determine thoughts of teachers about the robotic applications since it is believed that students may have a better learning if robotic technologies are used in the education system and teachers transfer their knowledge about robotics to the students. For this purpose, the opinions of teachers about robotic applications were investigated before and after the study.

METHOD

This study aims to reveal teachers' knowledge and views about robotics. The study was carried out as a single group pretest-posttest experimental design. Study group of the study consisted of 20 teachers. The Robotic Pre-Test was administrated on teachers prior to the study. The study lasted for 20 hours in 3 stages. First, Lego Mindstorms Education EV3 Robotics Education Sets, which will be used in Robotics course and activities along with presentations and videos, were introduced to the teachers. In the second stage, they were informed about the use of robotic programming interface. In the last stage, teachers were asked to design a robot by using lego parts and perform various activities such as moving robot forward-right and make right-left turns by programming, moving car forward without crashing the obstacles by using some sensors and tracking the black line.

Data Collection Tools

In the present study, the "Robotics Pre-Test", which was developed by Riberio (2006) and translated into Turkish by Koç Şenol (2012), as well as "Robotics Satisfaction Test", which was developed by Silva (2008) and Gibbon (2007) and translated into Turkish by Koç Şenol (2012), and "Personal Information form" and a semi-structured interview form developed by the researcher after reviewing the relevant literature were used to collect the data.

FINDINGS

A total of 20 teachers including 11 women and 9 men participated in the study. 11 of these teachers were Science Teachers, 4 of them were Information Technology Teachers, 3 of them were Mathematics Teacher, 1 of them was Technology and Design Teacher and the remaining 1 was a Classroom Teacher, respectively. 12 of the teachers participated in the study were in the 25-30 age range and 8 of them were in the 30-40 age range.

Before the applications, "Robotics Pre-test" was applied on teachers in order to determine their thoughts about robotics and "Robotics Satisfaction Test" was applied after the applications to see their satisfaction. The answers of teachers in response to both "Robotics Pre-test" and "Robotics Satisfaction Test" are presented in the tables below.

Table 1. Frequency and Percentage Distributions of 1st and 2nd Questions of Robotics Pre-test

	Yes		No	
	f	**%**	**f**	**%**
Question 1: Have you ever used Lego parts before?	7	35	13	65
Question 2: Do you have any information about Lego Mindstorms Robotic System?	4	20	16	80

As it can be seen in Table 1, 35% of the teachers said yes and 65% of them said no in response to the question "Have you ever used Lego parts before?"

20% of teachers said that they have information about Lego Mindstorms Robotic System and 80% of them said that they have no information about the System.

In the study, 95% of the teacher said that they are using computer every day in response to the question "How often do you use a computer" and the remaining 5% said they never use computer.

Table 2. Frequency and percentage distributions of 4th and 5th questions of robotics pre-test and robotics satisfaction test

	Yes				I Haven't Decided Yet				No			
	Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test	
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Question 4: Do you think that you can teach science and technology and other courses by using computers and robots?	18	90	20	100	2	10	0	0	0	0	0	0
Question 5: Do you think that you can design appropriate robots for future activities?	12	60	19	95	8	40	1	5	0	0	0	0

As it can be seen in Table 2, 90% of the teachers participated in the pre-test said yes and the remaining 10% teachers said I haven't decided yet in response to the question "Do you think that you can teach science and technology and other courses by using computers and robots?" and 100% of the teachers participated in the post-test said yes in response to this question.

On the other hand, 60% of the teachers participated in the pre-test said yes and the remaining 40% of the teachers said that they haven't decided yet in response to the question "Do you think that you can design appropriate robots for future activities?" and 95% of the teachers participated in the post-test stated that they can design the appropriate robots and the remaining 5% said they haven't decided yet.

Table 3. Frequency and percentage distributions of 6th, 7th and 8th questions of robotics pre-test and robotics satisfaction test

	Partly Difficult				I haven't decided yet				Easy			
	Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test	
	f	%	f	%	f	%	f	%	f	%	f	%
Question 6: What do you think about the use of computers in the activities that you perform/will perform?	1	5	3	15	3	15	0	0	16	80	17	85
Question 7: What do you think about the use of robots in the activities that you perform/will perform?	0	0	7	35	14	70	2	10	6	30	11	55
Question 8: What do you think about programming robots in the activities that you perform/will perform?	4	20	4	20	8	40	1	5	8	40	15	75

As shown in Table 3, 5% of the teachers participated in the pre-test said it will be partly difficult for them, while 15% of them said that they haven't decided yet and the remaining 80% said that it would be easy in response to the question "What do you think about the use of computers in the activities that you will perform?" and 15% of the teachers participated in the post-test said that it will be partly difficult for them, while 85% of them said that it would be easy, respectively.

70% of the teachers participated in the pre-test said that they haven't decided yet and 40% of them said that it would be easy in response to the question "What do you think about the use of robots in the activities that you perform/will perform?" and 35% of the teachers participated in the post-test said that it will be partly difficult, 10% said that they haven't decided yet and the remaining 55% said that said that it would be easy, respectively.

20% of the teachers participated in the pre-test said that it would be partly difficult, 40% of them said that they haven't decided yet and the remaining 40% said that it would be easy in response to the question "What do you think about programming robots in the activities that you perform/will perform?", while 20% of the teachers participated in the post-test said that it will be partly difficult, 5% of them said that they haven't decided yet and 75% of the teachers said that it would be easy, respectively.

Table 4: Frequency and percentage distributions of 1st question of robotics satisfaction test

	Not Satisfied		Satisfied		Very Satisfied	
	f	%	f	%	f	%
Question 1: Are you interested in robotic applications?	0	0	3	15	17	85

As seen in Table 4, 15% of the teachers said they are satisfied and the remaining 85% said that they are very satisfied in response to the question "Are you interested in robotic applications?".

In the Robotics Satisfaction Test, 100% of the teachers said that they are more interested in response to the question "How you are interested in robotics currently when compared to your previous thoughts before the project?"

100% of the teachers said yes in response to the questions "Would you recommend your colleagues to use robotic?", "Once you start using robotics, would you follow innovations about it?", and "Do you think you would use robotics in your future courses?".

Some of the answers of teachers in response to the questions "Does the use of robotics affect professional development of the teacher? How?" are as follows:

CONCLUSION and RECOMMENDATIONS

In this study, it was aimed to determine the opinions of teachers about robotics. The Robotic Pre-Test was administrated on teachers prior to the study in order to receive their pre-knowledge about robotics. According to the results of pre-test, 65% of the teachers have never used Legos before the study. In addition, 40% of the teachers said that they haven't decided yet in response to the question "Do you think that you can design appropriate robots for future activities?" This suggests that teachers may have difficulties in making robots with Legos.

In addition, 80% of the teachers said they have no information about Lego Mindstorms Robotic System. Apparently, the majority of teachers participated in the study have no information about robotics and they have never used lego parts.

Before the application, 90% of the teachers think that they can teach science, technology and other courses by using computers and robots, while all teachers said that they can teach the course with these tools after the study. 60% of the teachers believe that they can design the appropriate robots for the course prior to the study and this ratio increased up to 95% after the study. On the other hand, 60% of the teachers stated that they can design the appropriate robots to be used in the classroom before the study and this ratio increased up to 95% after the study. This shows that although they have no information about the robotic applications prior to the study, these applications improve their self-belief and confidence.

Before the application, 95% of the teachers said that they use computer every day and 5% of them stated that they will have difficulties in the activities, while 15% of them said that they haven't decided yet and the remaining 80% of the teachers said that it will be easy to use computer during the robotic applications. At the end of the application, 15% of the teachers said that they will have difficulties and the remaining 85% said that it will be easy to use computer during robotic applications. Although 20% of the teachers thought that programming would be partly difficult prior to the application, 75% of them stated that it would be easy in the post-test.

According to the data and findings obtained in the present study, which has aimed to present knowledge level and thoughts of teachers about robotics, various seminars and courses should be organized in order to raise awareness of students and teachers, who are educating the guarantee of our future children, about robotics emerging with technological developments.

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