

The Opinions of Classroom Teachers about Robotics Applications

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Abstract: In this study, it was aimed to determine views of classroom teachers about robotic applications. This study was carried out with 48 classroom teachers during the 2017-2018 educational year. In the 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. In the analysis of the data obtained, descriptive statistics (frequency and percentage distribution) were used to evaluate Robotics PreTest 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.

Keywords: Classroom teachers, Robotics

Introduction

When the change in the field of technology and the evolution it brought to our lives in every aspect is considered, it can be said that there must be some changes related to the teaching profession especially when the technology is integrated into education such as the use of robots in classroom environments (Yaşaroğlu, 2018). According to Akkoyunlu (1998), teachers of the future should be raised as individuals who understand the importance of technology, use the technology effectively and productively to reach the information or produce new information as well as use and share this information through communication media, communicate effectively with students, adapt to changing learning environments and can solve the problems faced during learning process (Silik, 2016).

According to Korkmaz, Altun, Usta, and Özkaya, (2014), with the development of information and communication technologies in today's world, not only computers but also robot applications have been used frequently in education (Yolcu and Demirer, 2017). These robotic applications teach individuals, algorithmic thinking, collaborative work, creativity and problem-solving, as well as scientific method, programming logic, and engineering design processes (Zengin, 2016). In this context, besides many educational technologies, robotics kits which can be developed and programmed by the students that can be easily utilized also have been used often in education (Yolcu and Demirer, 2017). According to Burket et al., (2008), one of the purposes of using robots in education is to increase students' interest in technology, computer, and engineering fields, indeed, robots help students to increase their interest in these areas and to help them select engineering careers (Üçgül, 2013). The children talk, make, and question to make robots in collaboration, and realize these ideas to express themselves in an artistic way (Temizkan, 2014). According to Doppelt and Armon (1999), the education system should give students the opportunity to improve their abilities and their sense of curiosity. The use of Lego in the teaching environment allows students to participate actively (Özdoğan, 2013). Lego Mindstorms projects and practices offer children the opportunity to question the thinking of the other through social interaction and to reflect their own prejudices and theories. Thus, at each stage, children reconstruct their ideas and conceptual understandings they developed in the previous stage (Temizkan, 2014). In this context, the role of the teacher is to support students' own discoveries, ideas, and projects. Students studying in the learning environment created with the Lego Mindstorms NXT 2.0 robot kits are given a real-life problem and have

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created their own solution processes by trial and error. As a result, they have realized the stages of thinking about the problems, analyzing, formulating the results, accessing information, and searching for answers (Özdoğan, 2013). Lego is a powerful material that is used to make students willing to learn, entertain them while learning, and draw their attention to the subject learned. Increasing the success of the students will provide motivation to teachers towards the course they are lecturing (Sungur Gül and Marulcu, 2014). In this regard, in this study, it is aimed to determine the opinions of teachers about the educational use of robots.

Method

This research aims to reveal the opinions of the class teachers about the robotics. The study was carried out in the form of a single group pretest-posttest experimental design. The study group consisted of 48 classroom teachers. The application lasted 40 hours in 2 stages. During the practice, teachers were given separate trainings by groups of 24. In the first stage, the Lego® Mindstorms Education EV3 Set was introduced to teachers. In the second stage of the application, robotic programming-related activities were made. The set used in the training consists of a total of 541 pieces including 1 brain, 3 motors as 2 large and 1 medium, 2 touch sensors, 1 color sensor, 1 ultrasonic sensor, and 1 gyro sensor. There are 4 inputs for sensors and 4 inputs for motors on the brain. When connecting motors to ports A, B, C, and D, sensors are installed on ports 1, 2, 3, and 4. During the programming places where the sensors and motors are installed should be paid attention.

Data Collection Tools

In the research, as data collection tools, “Robotic Pre-Questionnaire” that was developed by Riberio (2006) and adapted to Turkish by Koç Şenol (2012), and “Robotic Satisfaction Test” that was developed by Silva (2008) and Gibbon (2007) and adapted to Turkish by Koç Şenol (2012) were used, moreover, semi-structured interview forms were used to determine classroom teachers opinions and suggestions about robotic supported implementations.

Findings

The research was carried out with 48 classroom teachers working in primary schools during the 2017-2018 academic year. To determine the opinions of the teachers about robotic-assisted applications “Robotics Pre-Survey” -before the application and “Robotics Satisfaction Survey” -after the application, as well as semi-structured interview form to determine the opinions and suggestions of the teachers were used. The answers of the teachers who participated in the research to “Robotics Pre-Survey” and “Robotics Satisfaction Survey” are presented in the tables below.

Table 1. Frequency and percentage distributions of Robotic Pre-Questionnaire Question 1 and Question 2

	Yes		No	
	f	%	f	%
Have you ever used Lego parts?	14	29,16	34	70,84
Do you have any information about Lego Mindstorms Robotic System?	8	16,66	40	83,34

As seen in Table 1, for the question, “Have you ever used Lego parts?”, 29,16% of classroom teachers who participated to this research replied as “Yes” while 70,84% of them replied as “No”. Moreover, 16,66% of classroom teachers who participated to this research stated that they had information about Lego Mindstorms Robotic System while 83,34% of them stated that they did not know about this system.

Table 2. Frequency and percentage distributions of robotic pre-questionnaire and robotic satisfaction questionnaire question 3

	Difficult		Undecided				Easy					
	Pre test		Post test		Pre test		Post test					
	f	%	f	%	f	%	f	%				
What do you think about use of Legos in the activities that you did/ you will do?	21	43,75	12	25	5	10,41	2	4,16	22	45,83	34	70,83

As seen in Table 2, for the question, “What do you think about use of Legos in the activities that you did/ you will do?”, in pre-test, 10,41% of classroom teachers who participated to this research replied as undecided for use of Legos in the activities that would be done, 45,83% of them replied as easy for use of Legos and 43,75% replied as difficult for use of Legos; on the other hand, in post-test, 25% of classroom teachers replied as difficult, 4,16% of them replied as undecided while 70,83% of them replied as easy.

Additionally, for the question, “What is your satisfaction level for the activities you did?”, 100% of classroom teachers replied as satisfied.

Table 3. Frequency and percentage distributions of Robotic Pre-Questionnaire Question 4

	Yes		No		Partially	
	f	%	f	%	f	%
Do you use technology effectively in your lessons?	14	29,16	21	43,75	13	27,08

As shown in Table 3, 29.16% of the teachers answered the question “Do you use technology effectively in your lessons?” as ‘yes’, while 43.75% answered ‘no’ and 27.08% responded ‘partially’.

In addition, almost all of the teachers who used technology in their classes stated that they used computers and smart boards to watch videos.

To the question “For what reasons do you use technology in your courses?”, the teachers stated they use these technologies mostly to attract attention to the subject in lessons, to provide more permanent learning, to repeat the subject, and to make the lessons more enjoyable.

Moreover, to determine the opinions and suggestions of the teachers about the robotic-assisted applications, all of the teachers who were asked in the posttest the question of “Does using robotics affect the professional development of the teacher?” responded as it would affect positively, and some of these answers are as follows:

T-1: “It will affect positively. However, factors such as curriculum density, concern for catching up with the subjects, lack of sets, etc. will adversely affect the process. And as a primary school teacher, is it possible to be provided the appropriate environment in the school so that I can give this training? (I think no)”

T-2: “Affects positively. The technology of the new era is based on robots.”

T-3: “[It would] affect, it can gain a lot to themselves in terms of programming.”

T-4: “[It would] affect, it encourages to think more and be creative.”

T-5: “Fun and lasting.”

T-6: “[It would] affect, because, the teacher would follow the technology of the age and does not fall behind. [This would] increases the success of the course. As the course will be fun, the lesson and the teacher becomes more popular.”

T-7: “It definitely affects, it would make the teacher a more qualified and respected person.”

T-8: “Of course [it would] affect, following the technology, to be updated, is perfect in terms of polishing our creativity that is blinded :)”

T-9: “[It would] affect, lessons would become more attractive.”

T-10: “Absolutely [it would] affect, I am sure that it will attract students’ attention, entertain them, and increase their motivation among the classical teaching methods.”

Some of the teachers’ answers to the question “What kind of advantages using robotics in your lessons provide to you?” is as follows:

T-1: "Problem-solving and creative thinking skills are the most challenging areas to me. This will be an indispensable blessing for children with interest and curiosity."

T-2: "It provides active participation of students in the lessons. A positive attitude [behavior] is shown to the lessons."

T-3: "It provides the environment to enable students to use different areas, intelligence, and creativity rather than lecturing from the blackboard."

T-4: "It will enable students to come to my lesson more willingly, and let me and them leave the classroom with the perception "I learned"."

T-5: "Our lessons would become more fun and useful."

T-6: "It provides fun and permanent learning. Students are not limited and their creativity develops."

T-7: "Mobility, excitement, willingness to learn, wonder, etc. increase..."

All teachers who were asked the question "Would you recommend using robotics to your colleagues?" in the posttest answered as "I would recommend", and some of the answers are given below:

T-1: "Of course I would, the more teachers learn it, the more we benefit students."

T-2: "I would because the teachers should always improve themselves."

T-3: "Yes, it's nice to produce ..."

T-4: "Absolutely I would recommend it because a teacher who has a good command of the subject is respected by both the students and the society."

T-5: "I would, [it is] fun, improving, and impressive ..."

T-6: "I would recommend. But just to those who are really interested and enthusiastic about it."

T-7: "Yes I would, I think it will provide a professional advantage."

T-8: "Yes I would because it is necessary to involve technology in our age."

T-9: "Definitely yes, because I am sure that these activities will change the attitudes and behaviors of the students towards their teachers."

All teachers who were asked "Would you follow the updates about the robotics after start using it?" in the posttest stated that they would follow.

In addition, almost all the teachers who were asked "Do you consider using robotics in your lessons in the future?" responded that they would consider it.

Discussion and Conclusions

Within the scope of the study, the opinions of the class teachers about robotics were examined. 29.16% of the class teachers participating in the study answered the question "Have you ever used Lego parts before?" as 'yes', while 70.84% responded 'no'. In addition, 83.34% of the teachers stated that they do not have any information about the Lego Mindstorms Robotics System and 16.66% stated that they do have information about it. In the pretest, 10.41% of the teachers stated that they were hesitant to use of Lego in their activities, 45.83% said it will be easy to use them, as well as 43.75% said they will have difficulty to do it so. Nonetheless in the posttest, 25% claimed to have difficulty, 4.16% were hesitant about it, and 70.83% stated that they were easy to use. In this context, it is determined that those who think that they will have difficulties before the activity stated that they were easy to practice after the application. Among the participant teachers, 29.16% of them responded positively to the question "Do you use technology effectively in the courses?", while 43.75% answered negatively and 27.08% claimed they use it partially. Almost all of the teachers who used technology in their classes stated that they used computers and smart boards to watch videos. Teachers also stated that they mostly use these technologies to draw attention to the subject in lessons, to make learning more permanent, to make revisions, and to make lessons more fun. In the study, all of the teachers stated that using robotics would affect the professional development of the teacher positively and claimed that they would recommend the robotics to their colleagues and they would follow the innovations about it.

References

- Koç Şenol, A. (2012). Science and technology laboratory applications supported by robotic: ROBOLAB. *Master Thesis, Erciyes University, Graduate School of Education Sciences.*
- Korkmaz, O., Altun, H., Usta, E. & Ozkaya, A. (2014). The effect of activities in robotic applications on students' perception on the nature of science and students' metaphors related to the concept of robot. *International Journal on New Trends in Education and Their Implications*, 5(2), 44-57.

- Özdođru, E. (2013). The Effect of Lego Programme Based Science and Technology Education on the Students' Academic Achievement, Science Process Skills and Their Attitudes Toward Science and Technology Course for Physical Facts Learning Field. Master's Thesis, Dokuz Eylül University, İzmir.
- Silik, Y. (2016). Effect of Educational Robotics Applications on Problem Solving Skills of Science Teacher Candidates. Master's Thesis, Karadeniz Technical University, Trabzon.
- Sungur Gül, K. & Marulcu, İ. (2014). Yöntem Olarak Mühendislik-Dizayna ve Ders Materyali Olarak Legolara Öğretmen ile Öğretmen Adaylarının Bakış Açılarının İncelenmesi. *Electronic Turkish Studies*, 9(2).
- Temizkan, M. (2014). Eğitimde yenilikçi yaklaşımlar Robot uygulamaları. *Yüksek Lisans*, Gazi Üniversitesi, Ankara.
- Üçgül, M. (2013). History and Educational Potential of LEGO Mindstorms NXT, *Mersin University Journal of the Faculty of Education*, Vol. 9, Issue 2, August 2013, pp.127-137.
- Yaşarođlu, C. Öğretmenlik Mesleğinin Geleceği Üzerine Bir Öngörü Denemesi. *Akademik Matbuat*, 2(1), 16-29.
- Yolcu, V. & Demirer, V. (2017). A review on the studies about the use of robotic technologies in education. *SDU International Journal of Educational Studies*, 4(2), 127-139.
- Zengin, M. (2016). İlkokul, ortaokul ve lise öğrencilerin disiplinlerarası eğitim & öğretiminde robotik sistemlerinin kullanımına yönelik görüşleri. *Üstün Yetenekliler Eğitimi ve Araştırmaları Dergisi (UYAD)*, 4(2).

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