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Investigation of Middle School Students' Attitudes Towards Robotic Coding According to Different Variables

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SUMMARY

In this study, the purpose of which was to examine the attitudes of middle school students towards robotic coding, the attitudes of students towards robotic coding were discussed in terms of different variables. The research group consists of 120 secondary school students studying in the 7th and 8th grades of public schools in the central district of Konya. In this research, quantitative research method was adopted and scanning model was used. “Demographic data form” and “Robotic Attitude Scale”, which was adapted by Şişman and Küçük (2018), were used to collect the data. Cronbach alpha coefficient of this 5-point likert type scale consisting of 24 items and four factors was determined as α = .932. The research data obtained were analyzed with the SPSS 22.0 statistics program and it was seen that the attitudes of middle school students towards robotic coding differ according to their classes and technology usage time. In addition, there is no difference between attitudes towards robotic coding according to gender and daily internet usage hours.

Keywords: Robotic Coding, attitude, middle school.

INTRODUCTION

Rapid development and change in information and communication technologies caused differences in societies' needs and lifestyles. All these technological developments have created different expectations in all areas of life and in line with these expectations, gaining new skills in social life has come to the agenda. Education plays an important role in the acquisition of these skills, which are called 21st century skills. For the reason that, the change and development of societies are only possible with a qualified and quality education process. As a matter of fact, increasing the quality of education and training, contributing to social economic activities also passes through the integration of education with technology (Çengel, et al., 2018). In order to keep up with the globalizing world and developing technologies, to raise people who can criticize, question, and solve problems, technologies are used again and they are handled as a whole throughout the education and technology learning process. Because the educators stated that the basic information about how to use the technological tools is missing and the problems of this basic need can be solved by including this information in the learning processes of the students. (Graham et al., 2009). For this reason, technological tools are tried to be included in education (Doukakis et al., 2010).

From this point of view, it is important to train generations that can solve problems, think analytically and most importantly, use technology, unlike generations that do not memorize, question, criticize. In this process, the importance given to robotic coding has increased. Today, coding skills are mentioned about problem solving and logical reasoning skills, which is a must-have skill within the context of 21st century skills that are shaped and changed according to today's conditions. (Sayın and Seferoğlu, 2016). In fact, robotic coding education, which is based on questioning, is the most basic education that all students should gain in the name of technology in today's conditions.(Arslan and Akçelik, 2019; Saygıner and Tüzün, 2017).

There have been different developments for robotic coding in recent years. For example, various visual programs and games have been developed to make programming easier and more understandable, and robotic coding training sets have been developed that enable students to transfer programming information to the physical environment. (Maloney et al., 2004; Numanoğlu and Keser, 2017).In addition, the Ministry of National Education changed the name of the course to "Information Technologies and Software" (Çatlak, et al., 2015). With the need for informatics, the course has ceased to be an elective course and has become a compulsory subject with the public spot titled “Let's Learn Children to Learn Coding” and its importance has been emphasized (MEB, 2018).

Robotic coding training has many advantages and this training can be given even in young age groups. In fact, Bers, González and Torres (2019) have confirmed that robotic coding training can start at a very early age and increases creativity and autonomy thanks to the fact that robotic coding supports communication. Ceylan and Gündoğdu (2018) stated that developing and implementing coding and robotics education programs in educational institutions will make important contributions to individuals' future professions. Karahoca, et al.

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(2011) Stated that learning robot programming increases students' perception of abstract concepts, supports their success in lessons and also encourages them to learn by increasing their motivation.

Considering all these advantages and the report of the New Media Consortium organization, which reveals the current trends in educational technologies in 2017, in which the robotic technology has a greater place in the educational environment, it is important to examine the attitudes towards robotics and coding. Because our attitudes affect our reactions, behaviors and thoughts on a subject. In this sense, determining the attitudes of middle school students who will shape our future towards robotic coding, which plays an important role in the 21st century, will contribute to the planning of the trainings that will be given.

Purpose of the research

The aim of this research is to determine the attitudes of secondary school students towards robotic coding by considering different variables. For this purpose, answers were sought for the following questions:

- Do middle school students' attitudes towards robotic coding differ significantly according to their classes?
- Do middle school students' attitudes towards robotic coding differ significantly according to their gender?
- Do middle school students' attitudes towards robotic coding show a significant difference in terms of their use of technology according to their degree of vision?
- Do middle school students' attitudes towards robotic coding differ significantly according to their daily internet usage time?

METHOD

Model of the Research

In this research, quantitative research method was adopted and descriptive research method and scanning model were used. Quantitative research methods base the events objectively on the numerical data to identify various similarities and differences that can be evaluated by statistical analysis (Öztürk, 2018). While descriptive research is a research model used to find the current state of the current problem, screening models are the research approach that aims to define a situation as it was in the past or still. (Sönmez ve Alacapınar, 2011).

Working Group

The study group of this research consists of 7th and 8th grade students studying in public schools in Konya central districts in 2019-2020 academic year. A total of 120 secondary school students participated in the study, as well as information about students' classes, gender, degree of self-perception of using technology and daily internet usage times are given in Table 1.

Table 1. Demographic data of the participants

	Variable	f	%
Gender	Female	63	52,5%
	Male	57	47,5%
Grade	7th grade	87	72,50%
	8th grade	33	27,50%
Technology Proficiency Degree Sufficient	Qualified	14	11,6%
	Quite Qualified	39	32.5%
	Very Qualified	67	55.8%
Daily Internet Usage Time	3-6 hours	65	54,10%
	6-9 hours	37	30,80%
	9 hours and above	18	15,1%
	Total	120	100

Data Collection Tool and Data Analysis

The demographic data form and “Robotic Attitude Scale”, which was adapted by Şişman and Küçük (2018), were used in the data collection phase. The demographic data form includes questions such as gender, age, class, daily internet usage time, technology proficiency degree.

The Robotic Attitude Scale is a scale adapted to Turkish by Şişman and Küçük (2018). It is a 5-point Likert type, and a rating method was used for each question as strictly disagree, disagree, indecisive, agree, strongly agree. The scale consisting of a total of 24 items was collected under four factors. These factors were named as "Learning to Learn" (α = .925), "self-confidence" (α = .860), "computational thinking" (α = .815) and "teamwork" (α = .732). The total variance of the scale was calculated as 61.744% and also the reliability coefficient of the scale was determined as Cronbach α = .932.

At the stage of analyzing and interpreting the data, the data was first transferred to the computer. All data obtained within the scope of the study were analyzed using the SPSS 22 (The Statistical Package for The Social Sciences) package program and all hypotheses were tested at 0.95 confidence level (p = 0.05).

RESULTS

Secondary school students' scores on the attitude scale towards robotic coding; they were examined according to their class, gender, technology, and their daily use of internet.

Investigation of Secondary School Students' Attitudes towards Robotic Coding by Classes

The attitudes of secondary school students towards robotic coding were examined according to the classes in which they are studying. The findings regarding whether the score obtained by the secondary school students from the attitude scale towards robotic coding varies according to the class variable are given in Table 2.

Table 2. T-Test Results of the Attitudes of Secondary School Students towards Robotic Coding by Class

	Class	N	$\bar{X}$	S	Sd	t	p
Robotic Attitude Scale	7th grade	87	176,1800	17,33326	118	2,783	,006
	8h grade	33	167,2000	16,05330			

When Table 2 is analyzed, it is seen that there is a significant difference between middle school students' attitude scores towards robotic coding and the class they are studying ($t_{(118)}$= 2,78, p<.05). It can be said that 7th grade students ($\bar{X}$=176, 18) have higher robotic coding attitude scores than 8th grade students ($\bar{X}$=167, 20).

Investigation of Secondary School Students' Attitudes towards Robotic Coding According to Gender

Attitudes of secondary school students towards robotic coding were examined according to their gender. The findings regarding whether the scores obtained by the secondary school students' attitude scale towards robotic coding show a significant difference according to gender variable are given in Table 3.

Table 3. T-Test Results of Attitudes of Secondary School Students towards Robotic Coding by Gender

	Gender	N	$\bar{X}$	S	Sd	t	p
Robotic Attitude Scale	Female	63	169,6667	16,23603	118	-,774	,508
	Male	57	171,8673	18,65714			

When Table 3 is examined, *p <.05 is, 508 >, 05 for significance level and the result is not significant. In other words, attitudes of secondary school students towards robotic coding do not differ significantly according to their gender. It can also be said that the robotic coding attitude scores of the female students ($\bar{X}$=169, 66) are at the same level compared to the male students ($\bar{X}$=171, 86).

Investigation of Secondary School Students' Attitudes Towards Robotic Coding According to the Sufficiency of Using Technology

Attitudes of secondary school students towards robotic coding were examined according to their ability to use technology. The findings regarding whether the score obtained by the secondary school students from the attitude scale towards robotic coding shows a significant difference according to the variable of using technology is presented in Table 4.

Table 4. Results of the Attitudes of Secondary School Students towards Robotic Coding According to the Competence of Using Technology

	Degree	N	$\bar{X}$	S
Robotic Attitude Scale	Qualified	14	165,4913	10,47961
	Quite Qualified	39	164,8155	10,18501
	Very Qualified	67	177,0200	18,08334
	Total	120	168,7900	15,45643

	Total of Squares	sd	Average of squares	F	p
Between groups	3121,541	2	3351,579	13,770	,001
In-groups	20356,049	116	204,714		
Total	23710,590	118			

*p>.05

As can be seen in Table 4, whether the attitudes of middle school students towards robotic coding differ according to their responses to adequate vision in technology, was examined by one-way analysis of variance and a significant difference was found between the scores [F(2-116)= 13,770, p<,05]. Secondary school students' attitudes towards robotic coding differ according to their level of vision to use technology. It is determined that this difference is between secondary school students who consider themselves very adequate according to their degrees and secondary school students who see themselves as sufficient and quite sufficient.

Investigation of Secondary School Students' Attitudes Toward Robotic Coding According to Daily Internet Usage Times

According to the attitudes of secondary school students towards robotic coding, daily internet usage times were examined. Accordingly, whether there is a significant difference between the answers given by middle school students and the results obtained are given in Table 6.

Table 6. Results of Attitudes of Secondary School Students towards Robotic Coding According to Daily Internet Usage Times

	Degree	N	$\bar{X}$	S
Robotic Attitude Scale	3-6 hours	65	130,8000	17,12351
	6-9 hours	37	132,2000	10,30212
	9 hours and above	18	138,1175	18,05324
	Total	120	136,2100	16,65522

	Total of Squares	sd	Average of squares	F	p
Between groups	751,857	2	325,954	1,354	,327
In-groups	12231,663	116	170,510		
Total	28083,390	118			

*p>.05

As can be seen in Table 6, whether the attitudes of middle school students towards robotic coding differ according to their responses to daily internet use levels were examined by one-way analysis of variance and no significant difference was observed between the scores [F (2-116) = 1.354, p>, 05]. In other words, the attitudes of middle school students towards robotic coding do not differ according to their daily internet usage levels.

CONCLUSION AND DISCUSSION

In this study, the attitudes of secondary school students towards robotic coding were examined by considering different variables.

As a result of examining the scores of secondary school students from the attitude scale towards robotic coding according to the classes they are studying, it was observed that 7th grade students had higher robotic coding attitude scores than the 8th grade students and it differs according to the level of the class they study. The reason why 7th grade students have a higher attitude than 8th grade students may be that 8th grade students are preparing for the exam due to the class period they are in and their attention and time are spent on the exam in this process.

The scores of secondary school students on the attitude scale towards robotic coding were handled according to the Gender variable. As a result of the analysis, the attitudes of secondary school students towards robotic coding did not differ significantly by gender. This finding differs with the studies in the literature. Moore (1985) found that male students showed a more positive attitude towards computers and robots than girls in their study, which examined secondary school students' attitudes towards computers and robotics. However, Rogers (2003) found that female secondary school students have more positive attitudes towards their careers in robotics than men.

When the attitudes of secondary school students towards robotic coding according to their ability to use technology were examined, a significant difference was found. In other words, the attitudes of middle school students towards robotic coding differ according to their level of vision to use technology. A significant

difference was found between middle school students who considered themselves very competent in using technology and secondary school students who considered themselves sufficient and quite sufficient. Researches show that people with high self-efficacy beliefs are more willing to participate in computer-related activities and have higher expectations for these activities. (Akkoyunlu & Orhan, 2003). The high self-efficacy of students towards technology may also have positively affected their attitudes towards robotic coding.

When the relation of daily internet usage time towards robotic coding attitudes is examined, it is obtained that internet usage times do not make a significant difference regarding attitude. In other words, attitudes of secondary school students towards robotic coding do not differ according to their internet usage time. In a study conducted by Kasalak, 2017, it was found that self-efficacy perceptions regarding Block Based Programming did not change according to the status of having internet access at home. The reason that internet usage does not affect the variables such as attitude towards robotic coding and self-efficacy may be because the internet has a wide content and user interest shifts in different directions.

This difference can be examined by age. This research was carried out with a limited number of participants. It is suggested that this research will be studied with a wider audience in the future.

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