Robotics Coding from the Perspective of Science Teachers[1]

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Abstract
This study aims to determine the opinions of science teachers on robotics coding, which is one of the prominent applications in recent times and is expected to be integrated into education. The research was designed as a case study, one of the qualitative research methods. The study group of the research consists of 12 science teachers. Semi-structured interviews were conducted with the participating science teachers to determine their opinions on robotics coding, using a semi-structured interview form developed by the researchers. The interview form consists of two sections. The first section includes the demographic characteristics of the teachers. The second section includes open-ended questions aimed at determining the definitions of science teachers regarding robotics coding, the usability of robotics coding in science classes, teachers' experiences with robotics coding, and their suggestions. The collected data were analyzed using the descriptive analysis method and interpreted according to thematic order. As a result, it can be said that robotics coding applications are usable in science education, play an important role in developing various skills in students, and contribute to efficient and permanent learning in classes. However, it was concluded that support for teachers and students in terms of knowledge and equipment, provision of material support, or resources are necessary for its use in classes.

Keywords: Science Teachers, Science Education, Robotic Coding

Introduction

With the advancement of science and the widespread use of technology, innovations have entered our lives in many areas, and changes have occurred. Education is one of the fundamental points of the development of science and technology and the progress of countries. The use of technology in education has become inevitable in the 21st century. In this context, education, science, and technology support each other. For this reason, over the years, some innovations have begun to be made in education and learning environments.

The desired outcomes from individuals and the skills expected to be acquired have changed parallel to the developments in technology and science. It is envisaged that active learning, the reorganization and development of cognitive structures to be constructed through individuals' own experiences, will be achieved through the integration of education and technology (Uğurlu, 2009).

The technological advancements that have occurred have become indispensable not only in many disciplines but also in the field of science. We see the reflections of this both in the changes made in the curriculum and in the teaching-learning process. Science enables people to understand the world and explain the events occurring in nature. In this process of understanding

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and explanation, students conduct experiments, questions, and try to evaluate within the framework of logic (Aladağ, 2019). In science education, it is necessary to move away from traditional methods where knowledge is presented ready-made to students, and instead present new methods that include technology, where students are active participants, and where knowledge is permanent, meets the expectations of the era, and develops individuals' problem-solving skills (Güney, 2015). These methods play an important role in students' perception of the world, developing solutions to the problems they encounter, using scientific process skills while developing solutions, and increasing their experiences (Sözbilir et al., 2019). Science education aims to cultivate individuals who can critically approach events, question the causes and consequences of events, enjoy research, produce creative products, and adapt to technology (Göhner & Krell, 2022). The use of technological materials in learning environments has facilitated students' ability to visualize scientific knowledge in their minds (Eroğlu & Hamzaoğlu, 2021). To facilitate learning, increase student motivation, observe abstract knowledge concretely, and make learning enjoyable, robotics coding applications are also used in science education (Şimşek, 2019).

Virtual learning environments increase students' motivation for the class (Ryan & Poole, 2019). The act of practicing learning makes it more qualitative (Shreeve, 2008). Being active in a virtual environment with robotics coding enables students to understand technological developments and create innovative ideas. Individuals can thus gain critical thinking, problem-solving, leadership, access to information, ability to use information correctly, and collaboration skills (Wagner et al., 2013). The aim of robotics-supported learning environments is not only to provide educators with a robotics teaching program integrated with science and technology but also to ensure that learning is more meaningful and permanent by integrating robotics-supported technology applications with education (Wood, 2003). Robotics coding applications allow students to quantify concepts such as sound, heat, light, distance, humidity, which they can characterize with sensory organs through sensors, and thus enable them to measure situations they encounter in daily life through their own research (Güven, 2020). Thus, individuals who learn through experiencing daily life practices can make sense of scientific knowledge. Şabanoviç and Yannier (2003) stated that with the use of robotics in education, students will increase digital literacy, increase interest in the field of science, be more willing to engage in scientific research and exploration, develop teamwork skills, and produce innovative and questioning individuals.

When considering the inevitable importance of using robotics coding in the educational process, it is important to determine teachers' views on robotics coding to transfer these skills to students by ensuring technology education integration. Upon reviewing the literature, it is seen that there are few and inadequate studies for adapting robotics coding to science classes, and there is a lack of teaching and application related to robotics coding (Yumbul & Sulak 2022; Tekerek et al., 2023; Özel, 2018). This study aimed to determine the opinions of science teachers regarding robotics coding. It aimed to identify the perceptions of science teachers regarding the familiarity and applicability dimensions of robotics coding in science education and to determine their recommendations based on their experiences.

To achieve this goal, the following sub-objective questions were addressed:

1. How do science teachers define robotics coding?
2. What are the opinions of science teachers regarding the usability of robotics coding in their classes?
3. What are the experiences of science teachers regarding robotics coding?
4. Do science teachers have any recommendations regarding the use of robotics coding?

Methodology

Research Model

In this study, a case study, one of the qualitative research designs, was applied. Case studies are a longitudinal approach that explains the current situation or examines and analyzes the communication between the factors affecting change and development in depth and shows the development in the process (Best & Kahn, 2017). In addition, a case study is defined as a research design that describes and explains the events in a situation or situation and in which the researcher collects detailed information about the situation (Yin, 2011; Creswell, 2007). It was tried to determine the existing situations of teachers regarding robotic coding that they face as a result of technological developments.

Study Group

Twelve science teachers working in different regions and institutions in the 2023-2024 academic year participated in the study. Purposive sampling was used for the sample group. The criterion was determined as science teachers actively working in the current academic year. As shown in Table 1, 12 teachers participated in the study, 9 (75%) of whom were female and 3 (25%) of whom were male.

Table 1 Demographic Information of Participants

	Gender	Education Level	Length of Experience	Work for
T1	Female	University Graduate	1-5 years	State Institution
T2	Female	University Graduate	6-10 years	State Institution
T3	Female	University Graduate	6-10 years	State Institution
T4	Female	University Graduate	1-5 years	State Institution
T5	Female	University Graduate	11-15 years	State Institution
T6	Female	University Graduate	11-15 years	State Institution
T7	Male	University Graduate	11-15 years	State Institution
T8	Male	University Graduate	11-15 years	State Institution
T9	Female	University Graduate	11-15 years	State Institution
T10	Female	University Graduate	6-10 years	Private Institution
T11	Male	Master's Degree Graduate	16-20 years	State Institution
T12	Female	University Graduate	6-10 years	State Institution

Data Collection

Within the scope of the study, data were collected with an interview form developed by the researcher. In order to determine the views of science teachers on robotic coding, a semi-structured interview form was developed with questions related to the sub-objectives. The interview form was developed by a science teacher and an expert academician in the field in line with the data obtained from the literature review. In the first stage, a pilot study was conducted with three participants using the interview form. After the pilot application, the questions were revised and finalized and the application was started. The reason why the interview method was preferred in the data collection phase of the study was to reveal the thoughts and experiences of the participants in-depth and detail (Yıldırım & Şimşek, 2013). The interviewed science teachers participated in the study voluntarily. The participants were asked to answer the questions in detail and freely without any restrictions.

Data Analysis

In the study, the descriptive analysis method, one of the qualitative analysis techniques, was used to analyze the data. The descriptive analysis method is a type of qualitative data analysis that involves the creation and interpretation of data in a thematic order. In this type of analysis, direct quotations are frequently used to reflect opinions. The main purpose of descriptive analysis is to present the findings to the reader in a summarized and interpreted form (Yıldırım & Şimşek, 2013). The data obtained as a result of the research were organized within the framework of the descriptive analysis method. Then, the data were determined according to the thematic order in line with the sub-objectives of the study and analyzed and evaluated by the researchers to ensure reliability. After the analysis, the data were defined and supported with direct quotations. Finally, the organized data were interpreted.

Results

The findings of this study, which aimed to determine science teachers' views on robotic coding, were grouped under the categories of science teachers' definitions of robotic coding, the usability of robotic coding in science courses, teachers' experiences and suggestions regarding robotic coding, as shown in Table 2.

Table 2 Theme, Category, Code and Frequency Distribution of Science Teachers' Views on Robotic Coding

Theme	Category	Code
Science Teachers' Views on Robotic Coding	Definitions of Robotic Coding	Coding Language and Robots (T2, T3, T4, T5, T6, T7, T11, T12) Facilitating systems (T3, T8, T10) Skill-building practices (T5, T6, T9) Interdisciplinary practices (T1)
	Usability of Robotic Coding in Science Lessons	Skill development (T3, T5, T6, T7, T8, T9, T10, T11) Efficient learning (T1, T2, T4, T5, T11, T12) Relevance to science lesson (T1, T2, T3, T4, T9) Lack of time (T4, T5, T6, T12) Lack of knowledge and equipment (T6, T7, T8, T10) Classroom management difficulties (T2, T12)
	Their Experiences on Robotic Coding	Experienced (T2, T9, T10) Inexperienced (T1, T3, T4, T5, T6, T7, T8, T11, T12)
	Suggestions on the Use of Robotic Coding	In-service training (T1, T2, T3, T4, T5, T6, T8, T9, T10) Provision of resources (T2, T4, T5) Curriculum change (T5, T6)

The views of science teachers on robotic coding, the themes, categories and codes created, as well as examples of direct quotations from the statements of pre-service teachers were given and interpreted.

Science Teachers' Definitions of Robotic Coding

It was seen that science teachers made different definitions of the concept of robotic coding. When the data obtained were analyzed, the definitions made were grouped under four different codes coding language and robots, facilitating systems, skill-building applications and interdisciplinary applications and given in Figure 1.

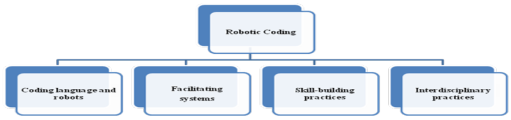

Figure 1 Science Teachers' Definitions of Robotic Coding

Coding Language and Robots

In the definitions made by science teachers about robotic coding, the majority of the participants made definitions in the form of making applications with robots with coding language. Some of the statements reflecting the definitions of the teachers are as follows;

'Various systems are created with applications prepared for the robotization of coding language.' (T2),

'Coding used to control the movements and functions of robots with certain coding by adding innovations.' (T3),

'Transferring science subjects to technology and making applications with coding and robots in lessons.' (T4) is in the form of.

Facilitating Systems

In the definitions made by science teachers about robotic coding, some of the participants defined robotic coding as systems that make people's lives easier. Examples of teachers' statements are given below.

'Making the necessary programs to make it easier for people and robots to work and move, in other words, creating some systems that can make human life easier.' (T8),

'I think it refers to systems that can be used in all kinds of areas in daily life by supporting mechanical parts with software. These are the technologies of the future, and there are ready-made systems in this way in some of the tools we use even in our homes that make our work easier.' (T10).

Skill-building Practices

A few teachers stated in their definitions that robotic coding is an exercise that develops skills, and sample statements are given below.

'I can express it as an effective learning method that develops students' various skills, allows them to solve problems, develops their creative thinking skills, enables them to use scientific research steps and develops their engineering skills. While doing this, I can say that it is a system in which coding is done by utilizing various computer environments.' (T5),

'...I can say that robotic applications develop students' creative thinking skills and coding while doing this.' (T6),

'I think robotics and coding refers to the development of certain skills. These can be problem-solving, creativity, multidimensional thinking and engineering. I also think that communication and interaction are practices to raise technology-literate individuals.' (T9) They expressed their opinions as follows.

Interdisciplinary Practices

One teacher defined robotic coding by associating it with STEM.

'Robotic coding is a program that has become effective in the field of science and is included in STEM education. When we consider science, I see robotic coding as a union of disciplines integrated with STEM and science.' (T1) in the form of.

The Usability of Robotic Coding in Science Courses According to Science Teachers

When the data obtained for the category of the usability of robotic coding in science courses according to science teachers were analyzed, six different codes were formed. These codes are given in Figure 2 as skill development, efficient learning, suitability for science courses, lack of time, lack of knowledge and equipment, and difficulty in classroom management.

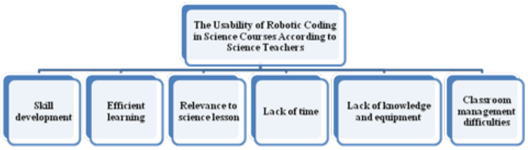

Figure 2 Usability of Robotic Coding in Science Lessons

Skill Development

Science teachers stated that the use of robotic coding in their lessons had effects on improving some skills of students. Examples of teacher statements are given below.

'The advantages of the course are that students gain the ability to correctly identify the cause-effect relationship of events. They gain skills such as analyzing, problem, problem, producing results. It can be effective when applied.' (T3),

'I think it is very effective for psychomotor and cognitive development in terms of students. When students use robotic coding, it enables them to look at different aspects of problems, find solutions, and implement these solutions by experimenting with analytical thinking skills. This has a great impact on the development of various skills in students.' (T5),

'I think it is effective in gaining research and inquiry skills for solving problems in daily life by using science subjects. I think that since it makes the student active in the system, it will increase their interest and motivation in the lesson, and I think it will help them gain the entrepreneurship skills specified in the curriculum.' (T10),

'...I think it can improve students' creativity and high-level skills.' (T8),

'I think that it contributes significantly to students' learning by experimenting, designing and doing, creating rich learning environments for students, developing their creativity, increasing their academic success and developing their coding skills. In this regard, I see it in direct proportion to science' (T9) is in the form of.

Efficient Learning

Participants stated that the use of robotic coding in lessons will increase the efficiency of lessons and learning. In this context, teachers stated that with the use of robotic coding in science education, permanent learning will take place, students' participation and interest in the lessons will increase, their motivation and self-confidence will increase, and their academic achievement will also increase. Sample expressions related to these codes;

'...it makes the subjects more fun for students and enables them to learn by doing and experiencing. If practices are done, students gain self-confidence and become successful. Lessons are productive.' (T4),

'By integrating robotic coding into the science course, I think it increases students' interest and motivation and provides permanent learning.' (T5),

'The use of robotic coding in science courses can offer students the opportunity to understand science concepts through concrete experiences. For example, students can seek answers to scientific questions by designing, programming and controlling robots. By adding a little artificial intelligence to the work, it can help them concretely experience abstract concepts and increase their interest in science.' (T11) is in the form of.

Relevance to Science Lesson

The participants who stated that the science course is a suitable course for robotic coding in terms of field, subject and acquisitions stated the following about the suitability of the course and the use of robotic coding in the courses;

'Robotic coding can be used in many subjects in the science course because the science course is very suitable for this in terms of its subjects and achievements. For example, in designing an electrical circuit, students can design different circuits using robotic coding. By changing the variables in the circuits, they can realize their effects on the circuit. Here, they also gain features that will also affect the student's skills. They research, learn by doing and experimenting, make inquiries and make inferences.' (T1),

'As a field, science is a very suitable course for this. At the middle school level, it is a situation where learning will be enriched with simple techniques and students will be more enthusiastic about the lessons. At these levels, students process it as a playful process. When we apply robotic coding activities in our lessons, participation in the lesson increases for students, lessons are active for us, and the lesson is fun for them.' (T2),

'Robotic coding is suitable for our program, it is also related to our field subjects. In fact, if we look at it as multidimensional thinking and the ability to transfer thinking to algorithms, many achievements can be given to students.' (T4) They have used the expressions.

Lack of Time

While some of the science teachers stated that the science course was suitable for robotic coding, others emphasized that they could not allocate time for this subject because the curriculum was intense. Some of these statements are;

'Due to the intensity of the curriculum, it is very difficult to carry out these applications, especially in the 6th grade.' (T5),

'I don't think it will be very efficient because the curriculum is very intensive. There are also few subjects to practice on. However, it can be effective if the curriculum is prepared accordingly.' (T6) is in the form of.

Lack of Knowledge and Equipment

Some of the participants stated that teachers and students do not have sufficient knowledge and equipment for the use of robotic coding in science education.

'Lessons can be rich, but first of all, teachers and students should be made aware.' (T6),

'In my opinion, to ensure the use in this field, first of all, students should be developed in this field. In addition, teachers should also have a good education.' (T7),

'...the teachers who will provide the training do not have sufficient equipment and knowledge' (T8).

When the teacher statements are examined, it is seen that some teachers stated that the lack of teacher-student knowledge and equipment negatively affected the use of robotic coding.

Classroom Management Difficulties

Science teachers also emphasized that classroom management would become difficult with the use of robotic coding in lessons. Participants stated that robotic coding applications in science education increase students' interest and participation in the classroom environment, but sometimes they also stated that this situation would make classroom management difficult in both cases with the idea that not every student would be able to pay attention equally.

'...yes, students actively participate in the lessons, their interest increases, but in these situations, classroom management becomes difficult, you need to be in control. Children get attached quickly' (T2),

'...it may cause reluctance in students who are not interested. In addition, since it will not attract the interest of all students, it may not provide integrity while making classroom management difficult' (T12).

Science Teachers' Experiences on Robotic Coding

When the data obtained in category of science teachers' experiences on robotic coding were analyzed, two different codes were created as experienced and inexperienced explained in Figure 3.

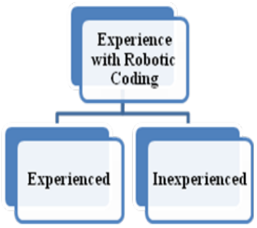

Figure 3 Science Teachers' Experiences with Robotic Coding

Experienced

In the interviews with science teachers, it was observed that very few of them had experience with robotic coding. Teachers with robotic coding experiences stated that students learned better by having fun, contributed to scientific process skills and positively affected the attitude towards the lesson as follows.

'...when I used it in my lessons, I saw that students learn better by having fun. They are enthusiastic and curious. Student interest is intense.' (T2),

'I have used robotic coding a few times in my lessons. I have seen that the lessons I realized with robotic activities positively affected students' scientific process steps and attitudes towards science lessons.' (T9),

'I received training on robotic coding at the university, I participated in projects, and I had a 2-year experience in an institution I used to work in.' (T10).

Inexperienced

The results of the interviews show that the majority of the teachers do not have experience in robotic coding. Some of the inexperienced teachers stated that although they received training on robotic coding, they did not apply it in the lessons.

'I received robotic coding training in 2015 and we created a project with coding in the TUBITAK project. I don't have any practice in the lessons or at school.' (T3),

'At the university I graduated from, informatics was taught instead of a course and I was directed to various courses to improve myself in this subject. So I can say that I only have theoretical knowledge. I did not have experiences such as using it in lessons.' (T4),

'I received robotic coding training in my master's degree courses. I did not have the chance to do robotic coding with students because I could not find a suitable environment in the school during my tenure.' (T5),

'I have taken a basic level course in the field of robotic coding and I have a certificate. I have not used robotic coding in my lessons' (T7).

Some Participants only Stated that they Had No Experience

'I have no experience' (T6),

'I have no experience' (T8),

'Unfortunately, I did not have any experience in this regard' (T11),

'I do not have any experience.' (T12).

Science Teachers' Suggestions on the Use of Robotic Coding

When the data obtained for the category of science teachers' suggestions on the use of robotic coding were examined, it was seen that they were grouped under three different codes. These codes are given in Figure 4 as in-service training, resource provision, and curriculum change.

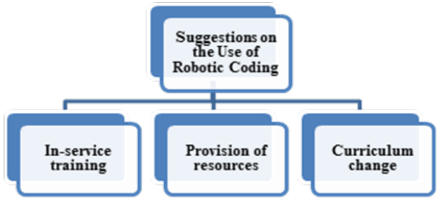

Figure 4 Science Teachers' Suggestions on the use of Robotic Coding

In-Service Training

In the interviews with the teachers, it was seen that all of them, except for a few, stated that in-service trainings are needed, courses can be opened, and trainings should be taken so that the implementation of robotic coding will become widespread.

'Robotic coding courses is not yet widespread in our schools. This is also the case in our school. It can be given as an elective course to both teachers and students in every school. Teachers can be given in-service training opportunities.' (T2),

'Since we do not have experience, it can be added to in-service courses. But it would be useful if its efficiency and the effects of the course are monitored, again teachers need to be guided.' (T4),

'Awareness-raising in-service training can also be organized for teachers' (T5).

Provision of Resources

Science teachers emphasized that the materials and supplies required for robotic coding applications should be financially supported or resources should be provided.

'When teachers become aware and the necessary materials are provided by institutions, it can be used in lessons' (T4),

'It should be given importance because it is a practice that requires a lot of labor and time. It should also be covered because it is costly' (T5).

Curriculum Change

Some of the teachers emphasized that they had difficulty in the implementation of the robotic coding course due to the intensity of the curriculum and that the curriculum should be organized in this sense.

'If the application is to be done, the curriculum should be organized accordingly. The intensity should be removed' (T6).

Discussion, Conclusion and Recommendations

In our study, which aimed to determine the views of science teachers on robotic coding, the results were formed by supporting the sample statements of the teachers according to the thematic order determined for the sub-objectives of the study as a result of semi-structured interviews. In this section, the results of the teachers' views on robotic coding are supported by the literature and suggestions are presented.

Accordingly, the opinions of science teachers were categorized as definitions of robotic coding, the usability of robotic coding in science courses, teachers' experiences and suggestions regarding robotic coding.

The majority of the participants defined robotic coding as moving robots with coding and making applications with robots. Some of the teachers defined robotic coding as systems that make people's lives easier. A few teachers also stated that robotic coding is an application for developing skills. One teacher defined robotic coding by associating it with STEM. Considering the teachers' definitions of robotic coding, it can be said that they have a general knowledge about robotic coding. In the literature, robotic coding is a type of coding that students create by combining mechanics and coding. It refers to ensuring that robotic objects have the desired function with the help of programming languages, codes and programming. Educational applications are realized by using different kits in robotic applications (Calao et al., 2015).

After defining robotic coding, it was concluded that teachers' views on the use of robotic coding in their lessons were positive. In our study, science teachers stated that when robotic coding is used in their lessons, it will increase students' problem solving, creativity, entrepreneurship, research-inquiry, analytical thinking and high-level skills. It was concluded that these skills facilitate the association of knowledge with daily life as a result of learning by doing and experiencing. Çömek and Avcı (2016) stated in their study that robotic coding is effective in students' skill development. At the same time, in Özdoğru's (2013) study with students, it was found that robotic coding applications increased students' interest in the course and improved their science process skills. Costa and Fernandes (2005) stated in their study that as a result of robotic applications, students improved many skills such as working in teams, applying theoretical knowledge and logical reasoning. Tapus et al. (2007) concluded that robotic coding had positive effects on students' questioning, critical thinking, problem solving and discovery learning skills and stated that it is a multidisciplinary teaching method that includes science, technology, engineering and mathematics concepts. In another similar study, it is seen that robotic coding supports children's multidimensional development in subjects such as critical thinking, concretizing the abstract, following the steps of the process (Akpınar & Altun, 2014), technology literacy, analytical thinking, creativity, & cooperation (Karabak & Güneş, 2013).

In addition, in teacher opinions, it was emphasized that it contributed to the cognitive development of students, increased participation, interest and motivation in the lesson, provided students with rich learning environments, ensured permanent learning, and increased academic achievement. With the integration of robotic coding into the lessons, it is seen that students' interest and participation in the lesson increases, their motivation and self-confidence increase, and accordingly their academic achievement increases (Klassen, 2006). This situation supports that the effects of robotic coding applications on efficient and permanent learning are positive (Güleryüz, 2023). Based on the opinions of the teachers participating in the study on this issue, the findings of the relevant studies in the literature are parallel to each other. In addition to using robotic coding education and science education as separate training, using it as an educational tool, especially in science lessons will create a more effective and efficient educational environment.

As a result of the interviews with science teachers, some of the teachers stated that robotic coding can be used in science courses and that science is an appropriate course in terms of course content, subjects and achievements. Some teachers, on the other hand, emphasized the lack of time by stating that although it can be applied in science courses, the curriculum is intense. Participants stated that although it is appropriate to be used in science courses, students and teachers do not have sufficient knowledge and equipment. From this point of view, it can be concluded that this situation negatively affects the use of robotic coding in lessons. A few of the teachers also stated that the fact that some of the students were overly interested and some were not interested during the robotic coding application would make it difficult for the teacher to control classroom management.

After the interview conducted to determine the robotic coding experiences of the teachers, it was concluded that very few of them had a certain experience and the majority of them were inexperienced, including the teachers who thought it was applicable. Experienced teachers stated that students learned better by having fun, that it contributed to their science process skills, and that their attitudes towards the course changed positively. It was observed that some of the inexperienced teachers did not apply the robotic coding approach in the lessons even though they had sufficient knowledge and equipment, and some of them did not use the robotic coding approach in the lessons because they had no experience.

After the interview with the suggestions of science teachers regarding the use of robotic coding, all but a few of them stated that in-service trainings on robotic coding should be possible. In the 21st century, teachers have a great role in acquiring the competencies required by the 21st century. In this context, it is very important for science teachers to receive the necessary training and information about coding teaching by both expert academics and experienced teachers in this field (Pala & Türker, 2019) and to gain competence.

Teachers stated that they need to be supported or provided with resources in terms of materials and materials to carry out robotic coding applications. Similar to the research results, Erten (2019) concluded that robotic sets are expensive in his study with preschool teachers. It overlaps with the research results of the study conducted by Wong et al. (2015). In the study, teachers stated that they had problems with the robotic coding program due to deficiencies. In addition, as a suggestion, teachers emphasized that the curricula are dense and when they are made appropriate, they will provide convenience in terms of implementation.

In conclusion, science is an interdisciplinary course and there are various methods and approaches used in its teaching. Robotic coding applications are also included in the science course but have not yet become widespread. The results of the study showed that the education provided with robotic coding has a positive effect on the development of many skills and achievements of students. It was seen to be useful in enriching the lessons, creating various learning environments in education and learning by appealing to different senses. It can be said that lessons are more efficient and learning is more permanent. However, it has been observed that the application is not yet at the point where it should be in terms of equality of opportunity in learning, dissemination and awareness. Although robotic coding is known by teachers, its application is at a low level. Its place in institutions is limited. In the light of these issues and the data obtained in the study, the intensity in the curriculum should be eliminated most appropriately and robotic coding education should be included in the science curriculum. Accordingly, teachers should have robotic coding education during their undergraduate education and those who become teachers should receive in-service training and compulsory robotic coding courses. Institutions should be provided with infrastructure and material support for robotic applications. Equality of opportunity in education should be considered. Teachers, students and parents should be made aware of this issue. Curricula should be updated and appropriate learning environments should be created.

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