Co-funded by the Erasmus+ Programme of the European Union

STATISTICAL ANALYSIS OF ATTENTION, ATTITUDES AND OPINIONS TO SCIENCE AND TECHNOLOGY AT THE LEVEL OF TEACHERS AND STUDENTS IN PARTNERS COUNTRIES

Integration of Educational Robotics to Scientific Learning Teaching Process

2020-1-TR01-KA201-092601

SCIENCE e-ROBOT

CONTENTS

1. INTRODUCTION

1.1. PROJECT GENERAL PURPOSE

In order to increase the level of acquisition of 21st century basic skills, the aim of this project is to increase the quality of education by contributing to the integration of technology into the learning and teaching process; To improve scientific literacy within the consortium by contributing to the development of basic competencies by integrating educational robotics technology into scientific learning and teaching process.

1.2. PROJECT OBJECTIVES

1. Developing an innovative science learning-teaching strategy compatible with the educational context of the partner countries related to the scientific learning teaching process in which educational robotics is integrated for the target groups by developing 3 intellectual outputs,

2. Increasing the knowledge and skills of 42 staff from partner organizations on different teaching models, measurement and evaluation and robotic methods / techniques in interdisciplinary science teaching,

3. By organizing 5 large-scale multiplier activities and other dissemination activities; Improving the knowledge skills of at least 200 Science teachers, 50 teacher candidates and 100 experts on the use of intellectual outputs developed under this partnership,

4. Developing basic competence and scientific literacy of 10-17 age group students through educational robotics,

5. To develop long-term innovative cooperation between partners.

1.3. CONCORTIUM STRUCTURE

Project Coordinator :

P0 - HADİYE KURADACI SCIENCE AND ART CENTER

Partners – Consortium Members :

P1 - MINISTRY OF EDUCATION GENERAL DIRECTORATE OF SPECIAL EDUCATION AND GUIDANCE SERVICES
P2 - MERSİN UNIVERSITY
P3 - LICEUL NATIONAL DE INFORMATICA ARAD
P4 - ISTITUTO ISTRUZIONE SCOLASTICA SUPERIORE “CARLO ALBERTO DALLA CHIESA”
P5 - AGRUPAMENTO DE ESCOLAS DE PORTELA E MOSCAVIDE
P6 - ROBYCODE UG

1.4. MAIN ACTIVITIES IN THE SCOPE OF THE PROJECT

The project will include 3 transnational project meetings, 2 short-term staff training and 5 dissemination activities (multiplier events). As an innovative trend among the project results, we have

3 important intellectual outputs such as e-Workbook open education resource, methodological guide for implementation and comprehensive assessment and evaluation toolset.

1.5. PROJECT INTELLECTUAL OUTPUTS

1- Integration of Educational Robotics into the Scientific Learning Teaching Process Open Education Resource (OER) - It is pedagogically compatible with the target group age levels and triggers the creativity and critical thinking of the student; It can be easily implemented by teachers and students where there are activities that require problem-solving skills to work and enable collaboration; improves the basic competencies of teachers and students, has been adapted to various scientific themes and sub-subject areas in different modern teaching models, and has a positive attitude towards science and has learning and teaching scenarios for individuals. e-Workbook platform, which provides dynamic, personalized teaching - learning and user convenience, which will influence innovative science activities with robotics content.

2- Practical Methodological Guidelines for Robotic Assisted Science Teaching - Helps overcome the obstacles to gain students' acquisition of scientific theme and sub-subject areas for the target group age levels determined by the partners; A practical guide to the project partners and in English, describing the application of robotic pattern science activities in various modern teaching models and providing guidance in the use of the open educational resource.

3- Comprehensive Measurement and Evaluation Toolkit - Testing robotic supported science learning activities; It will provide guidance on assessing their strengths and weaknesses.

1.6. ABOUT THIS STUDY

This statistical study was carried out in order to collect qualitative and quantitative data on the project at the level of students and teachers and to form the basis for the first intellectual output according to the results. The scope of the study is as follows:

Through the survey;
* The tendency of students towards scientific subjects and educational technologies;
* Teachers' tendencies to teach scientific subjects;
* Teachers' competencies in using different teaching models with ICT and instructional technologies in teaching scientific subjects;

With focus group discussions;
* Gathering requested and expected elements of science teaching with robotic technology content by students and teachers.

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2. ON THE BASIS OF TEACHERS

2.1. QUANTITATIVE ANALYSIS RESULTS

2.1.1. Gender of the Participants

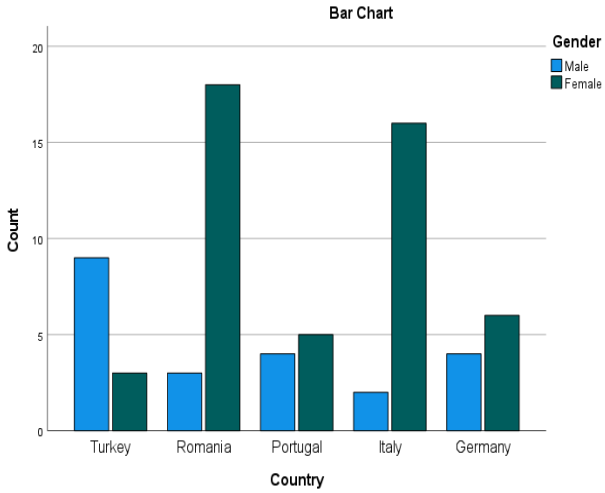
The following table and pie chart gives information about gender of the participants in terms of the countries. As can be seen from the table and pie chart, 68,6% of the participants are women and 31,4% of the participants are male.

The table also shows that 30% of the participants from Romania, 25,7% of the participants from Italy, 17,1% of the participants from Turkey, 14,3% of the participants from Germany and 12,9% of the participants from Portugal.

Table 1. Gender Distributed

		Gender		
		Male	Female	Total
Country	Turkey	12,9%	4,3%	**17,1%**
	Romania	4,3%	25,7%	**30,0%**
	Portugal	5,7%	7,1%	**12,9%**
	Italy	2,9%	22,9%	**25,7%**
	Germany	5,7%	8,6%	**14,3%**
Total		**31,4%**	**68,6%**	**100,0%**

Chart 1. Bar Distributed of the Genders



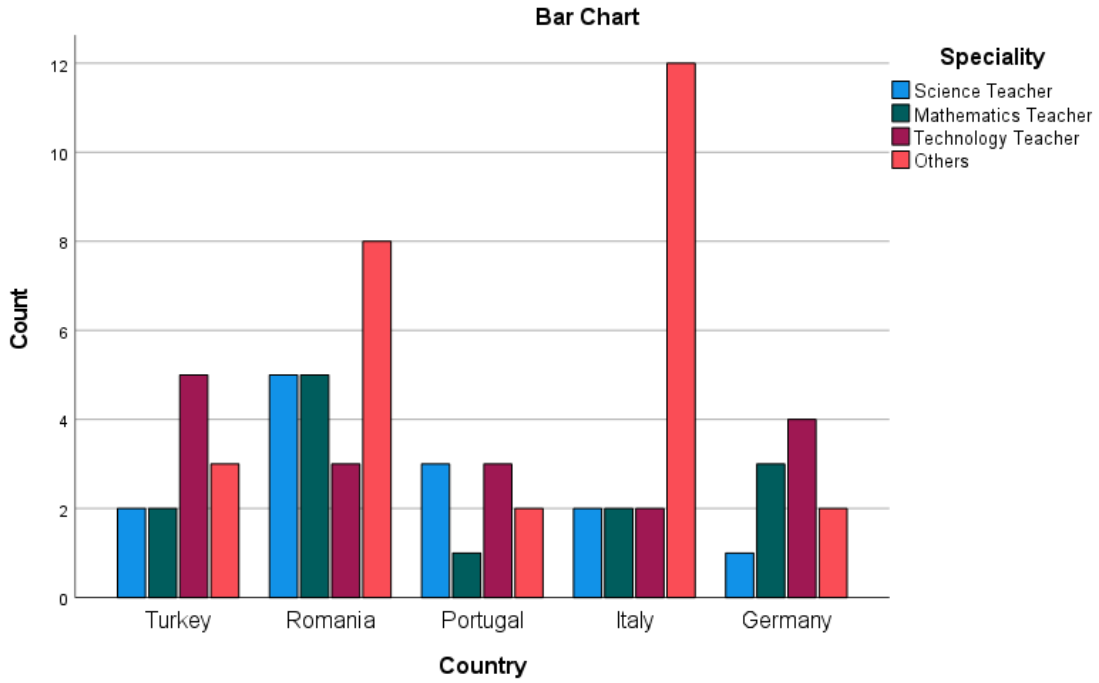
2.1.2. Speciality of the Participants

The following table and pie chart gives information about speciality of the participants in terms of the countries. As can be seen from the table and pie chart, 24,3% of the participants are technology teachers, 18,6% of the participants are science teachers and 18,6% of the participants are mathematics teachers. In addition 38,6% of the participants have other speciality.

Table 2. Speciality

		Science Teacher	Mathematics Teacher	Technology Teacher	Others	Total
Speciality	Turkey	2,9%	2,9%	7,1%	4,3%	**17,1%**
	Romania	7,1%	7,1%	4,3%	11,4%	**30,0%**
	Portugal	4,3%	1,4%	4,3%	,9%	**12,9%**
	Italy	2,9%	2,9%	2,9%	17,1%	**25,7%**
	Germany	1,4%	4,3%	5,7%	2,9%	**14,3%**
Total		**18,6%**	**18,6%**	**24,3%**	**38,6%**	**100,0%**

Chart 2. Bar Speciality



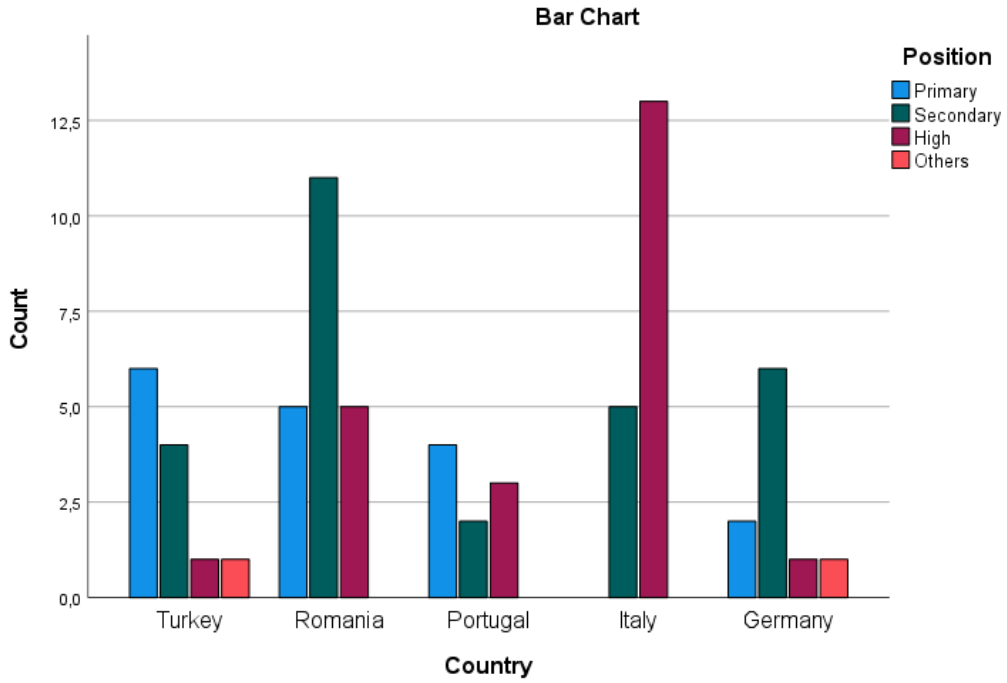
2.1.3. Positions of the Participants

The following table and pie chart gives information about positions of the participants in terms of the countries. As shown in table and pie chart, 40% of the participants are secondary school teacher, 32,9% of the participants are high school teacher, 24,3% of the participants are primary school teacher and 2,9% of the participants have other positions.

Table 3. Position

		Primary	Secondary	High	Others	Total
Position	Turkey	8,6%	5,7%	1,4%	1,4%	**17,1%**
	Romania	7,1%	15,7%	7,1%		**30,0%**
	Portugal	5,7%	2,9%	4,3%		**12,9%**
	Italy		7,1%	18,6%		**25,7%**
	Germany	2,9%	8,6%	1,4%	1,4%	**14,3%**
Total		**24,3%**	**40,0%**	**32,9%**	**2,9%**	**100,0%**

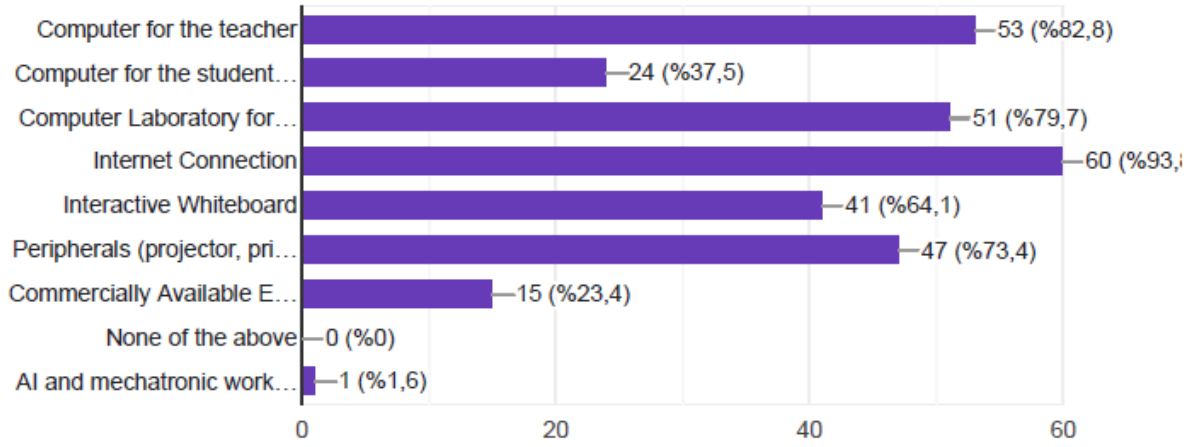
Chart 3. Bar Position



2.1.4. The Facilities at School

Which of the following facilities do you have at your school? *(You can choose more than one options)*

Chart 4. The Facilities at School



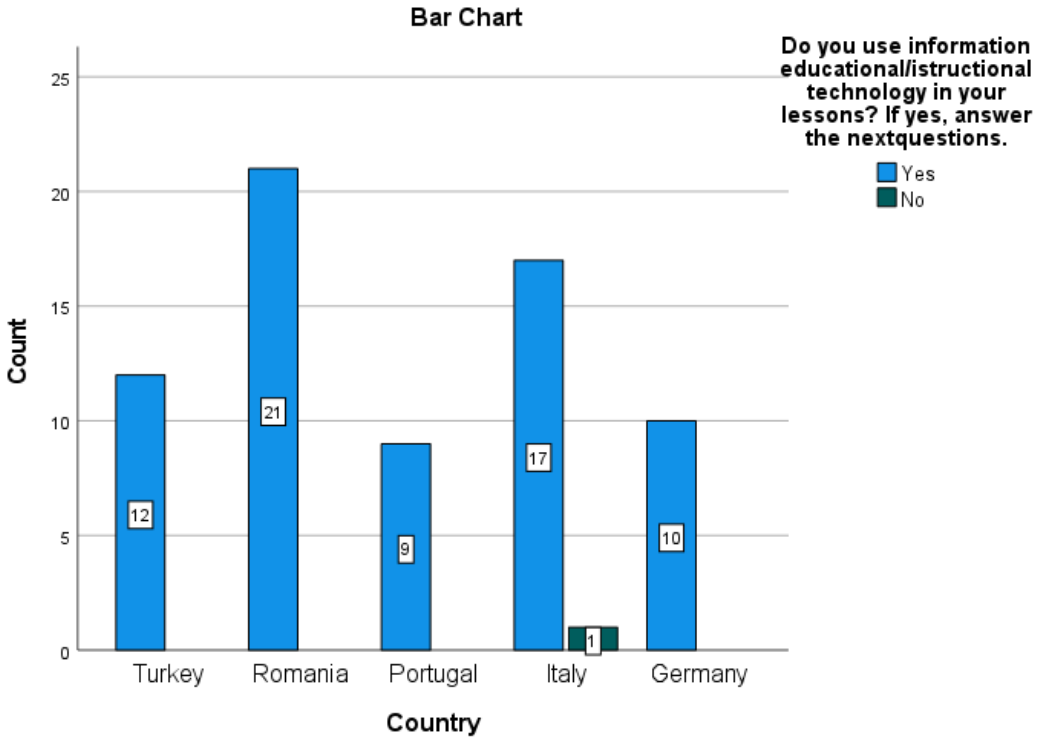
2.1.5. Participants Using Information Technology

The following table and pie chart gives information about if participants are using information / educational / instructional technology in their lessons, It can be seen from the table that 98,6% of the participants are using information / educational / instructional technology in their lessons. Among these participants, the taachers who use information / educational / instructional technology in their lessons the most are in Romania.

Table 4. Do you use information educational/instructional technology in your lessons?

		Yes	No	Total
Using information educational/instructional technology	Turkey	17,1%		**17,1%**
	Romania	30,0%		**30,0%**
	Portugal	12,9%		**12,9%**
	Italy	24,3%	1,4%	**25,7%**
	Germany	14,3%		**14,3%**
Total		**98,6%**	**1,4%**	**100,0%**

Chart 5. Information education / instructional technology usage graph in courses belonging to countries



2.1.6. Participants Using Digital Sources / Platforms

The following table gives information about how often the participants use digital sources/platforms in their teaching.

According to the table, 45,7% of the participants use internet for developing lesson plans and online collaboration tools, 38,6% of the participants use apps for tables, 28,6% of the participants use for assistive technology tools, 48,6% of the participants use for computers, 38,6% of the paticpants use for active board, 34,3% of the participants use for mobile devices, 32,9 of the participants use for tablets and ipads daily. 52,9% of the participants never never use robotics kits and 25,7% of the students never use digital video cameras in their teaching. 40% of the participants use educatioal games, 31,4% of the participants use presentations, Web 2.0 teching tools and management programs, 24,3% of the participants use web design, 32,9% of the participants use social media, 25,7% of the participants use digital video cameras weekly. 32,9% of the participants use test preparation, 31,4% of the participants use learning management system monthly.

Table 5. Participants Using Digital Sources/Platforms

		Never	Daily	Weekly	Monthly	Yearly	
Internet for developing lesson plans/ideas	Turkey		4,3%	2,9%	4,3%	5,7%	**17,1%**
	Romania		18,6%	4,3%	5,7%	1,4%	**30,0%**
	Portugal		2,9%	1,4%		8,6%	**12,9%**
	Italy		11,4%	2,9%	8,6%	2,9%	**25,7%**
	Germany		8,6%	2,9%		2,9%	**14,3%**
Total			**45,7%**	**14,3%**	**18,6%**	**21,4%**	**100,0%**
Online collaboration tools (e.g. Adobe Connect, Zoom, Meet, ..)	Turkey		4,3%	2,9%	1,4%	8,6%	**17,1%**
	Romania		20,0%	4,3%	4,3%	1,4%	**30,0%**
	Portugal		1,4%	4,3%	2,9%	4,3%	**12,9%**
	Italy	1,4%	11,4%	4,3%	2,9%	5,7%	**25,7%**
	Germany		8,6%	2,9%		2,9%	**14,3%**
Total		**1,4%**	**45,7%**	**18,6%**	**11,4%**	**22,9%**	**100,0%**
Apps for tablets	Turkey	1,4%	4,3%	5,7%	2,9%	2,9%	**17,1%**
	Romania	7,1%	11,4%	5,7%	2,9%	2,9%	**30,0%**
	Portugal	1,4%	4,3%	1,4%	2,9%	2,9%	**12,9%**
	Italy	1,4%	11,4%	2,9%	7,1%	2,9%	**25,7%**
	Germany	2,9%	7,1%	2,9%		1,4%	**14,3%**
Total		**14,3%**	**38,6%**	**18,6%**	**15,7%**	**12,9%**	**100,0%**
Assistive Technology Tools	Turkey		4,3%	2,9%	5,7%	4,3%	**17,1%**
	Romania	4,3%	11,4%	8,6%	2,9%	2,9%	**30,0%**
	Portugal	1,4%	2,9%	4,3%		4,3%	**12,9%**
	Italy	4,3%	4,3%	7,1%	8,6%	1,4%	**25,7%**
	Germany	1,4%	5,7%	4,3%		2,9%	**14,3%**

Total		**11,4%**	**28,6%**	**27,1%**	**17,1%**	**15,7%**	**100,0%**
Educational games/simulations/ animations	Turkey		2,9%	5,7%	5,7%	2,9%	**17,1%**
	Romania	1,4%	8,6%	10,0%	7,1%	2,9%	**30,0%**
	Portugal			5,7%	4,3%	2,9%	**12,9%**
	Italy	1,4%	4,3%	10,0%	8,6%	1,4%	**25,7%**
	Germany		2,9%	8,6%	1,4%	1,4%	14,3%
Total		**2,9%**	**18,6%**	**40,0%**	**27,1%**	**11,4%**	**100,0%**
Test Preparation	Turkey	2,9%		2,9%	7,1%	4,3%	**17,1%**
	Romania		7,1%	12,9%	7,1%	2,9%	**30,0%**
	Portugal		1,4%	1,4%	4,3%	5,7%	**12,9%**
	Italy	1,4%	1,4%	8,6%	10,0%	4,3%	**25,7%**
	Germany	1,4%	2,9%	4,3%	4,3%	1,4%	**14,3%**
Total		**5,7%**	**12,9%**	**30,0%**	**32,9%**	**18,6%**	**100,0%**
Presentations	Turkey		4,3%	1,4%	5,7%	5,7%	**17,1%**
	Romania	1,4%	11,4%	11,4%		5,7%	**30,0%**
	Portugal		2,9%	1,4%	2,9%	5,7%	**12,9%**
	Italy		4,3%	12,9%	4,3%	4,3%	**25,7%**
	Germany		7,1%	4,3%		2,9%	**14,3%**
Total		**1,4%**	**30,0%**	**31,4%**	**12,9%**	**24,3%**	**100,0%**
Web Design	Turkey	1,4%	4,3%	4,3%	4,3%	2,9%	**17,1%**
	Romania	8,6%	1,4%	8,6%	7,1%	4,3%	**30,0%**
	Portugal	1,4%	1,4%	2,9%	2,9%	4,3%	**12,9%**
	Italy	10,0%	4,3%	4,3%	5,7%	1,4%	**25,7%**
	Germany	2,9%	2,9%	4,3%	1,4%	2,9%	**14,3%**
Total		**24,3%**	**14,3%**	**24,3%**	**21,4%**	**15,7%**	**100,0%**
Web 2.0 Teaching Tools	Turkey		2,9%	8,6%	4,3%	1,4%	**17,1%**
	Romania	12,9%	2,9%	7,1%	4,3%	2,9%	**30,0%**
	Portugal	1,4%	2,9%	2,9%	1,4%	4,3%	**12,9%**
	Italy	7,1%	5,7%	8,6%	2,9%	1,4%	**25,7%**
	Germany	2,9%	2,9%	4,3%	4,3%		**14,3%**
Total		**24,3%**	**17,1%**	**31,4%**	**17,1%**	**10,0%**	**100,0%**
Social media	Turkey	2,9%	4,3%	5,7%	1,4%	2,9%	**17,1%**
	Romania	1,4%	8,6%	12,9%	2,9%	4,3%	**30,0%**
	Portugal	1,4%	4,3%	2,9%	1,4%	2,9%	**12,9%**
	Italy	2,9%	7,1%	5,7%	5,7%	4,3%	**25,7%**
	Germany	1,4%	4,3%	5,7%		2,9%	**14,3%**
Total		**10,0%**	**28,6%**	**32,9%**	**11,4%**	**17,1%**	**100,0%**
Management programs for student data (e-portfolio, ..)	Turkey	1,4%	1,4%	7,1%	4,3%	2,9%	**17,1%**
	Romania	7,1%	5,7%	8,6%	5,7%	2,9%	**30,0%**
	Portugal	1,4%	4,3%	2,9%	1,4%	2,9%	**12,9%**

	Italy	4,3%	4,3%	7,1%	4,3%	5,7%	**25,7%**
	Germany	2,9%	2,9%	5,7%	1,4%	1,4%	**14,3%**
Total		**17,1%**	**18,6%**	**31,4%**	**17,1%**	**15,7%**	**100,0%**
Computer in the classroom	Turkey	1,4%	5,7%	1,4%	7,1%	1,4%	**17,1%**
	Romania	1,4%	17,1%	8,6%		2,9%	**30,0%**
	Portugal		4,3%		2,9%	5,7%	**12,9%**
	Italy		15,7%		5,7%	4,3%	**25,7%**
	Germany		5,7%	5,7%	1,4%	1,4%	**14,3%**
Total		**2,9%**	**48,6%**	**15,7%**	**17,1%**	**15,7%**	**100,0%**
Learning management system (e.g. EBA, Mooddle ..)	Turkey		1,4%	4,3%	8,6%	2,9%	**17,1%**
	Romania	11,4%	4,3%	4,3%	7,1%	2,9%	**30,0%**
	Portugal	1,4%	2,9%	2,9%	4,3%	1,4%	**12,9%**
	Italy	1,4%	7,1%	8,6%	5,7%	2,9%	**25,7%**
	Germany	2,9%		2,9%	5,7%	2,9%	**14,3%**
Total		**17,1%**	**15,7%**	**22,9%**	**31,4%**	**12,9%**	**100,0%**
Active Board (e.g., White Board)	Turkey		4,3%	2,9%	4,3%	5,7%	**17,1%**
	Romania	7,1%	10,0%	8,6%	2,9%	1,4%	**30,0%**
	Portugal	2,9%	2,9%	2,9%	2,9%	1,4%	**12,9%**
	Italy	2,9%	12,9%	2,9%	5,7%	1,4%	**25,7%**
	Germany		8,6%	2,9%	1,4%	1,4%	**14,3%**
Total		**12,9%**	**38,6%**	**20,0%**	**17,1%**	**11,4%**	**100,0%**
Mobile devices	Turkey	1,4%	4,3%	2,9%	5,7%	2,9%	**17,1%**
	Romania	1,4%	15,7%	8,6%	1,4%	2,9%	**30,0%**
	Portugal		2,9%	1,4%	5,7%	2,9%	**12,9%**
	Italy	1,4%	4,3%	11,4%	4,3%	4,3%	**25,7%**
	Germany		7,1%	4,3%	1,4%	1,4%	**14,3%**
Total		**4,3%**	**34,3%**	**28,6%**	**18,6%**	**14,3%**	**100,0%**
Tablets (e.g., iPads)	Turkey		4,3%	4,3%	2,9%	5,7%	**17,1%**
	Romania	7,1%	11,4%	7,1%	1,4%	2,9%	**30,0%**
	Portugal	4,3%	1,4%		4,3%	2,9%	**12,9%**
	Italy	2,9%	10,0%	7,1%	2,9%	2,9%	**25,7%**
	Germany	1,4%	5,7%	4,3%	1,4%	1,4%	**14,3%**
Total		**15,7%**	**32,9%**	**22,9%**	**12,9%**	**15,7%**	**100,0%**
Robotics kits	Turkey	4,3%	2,9%	2,9%	4,3%	2,9%	**17,1%**
	Romania	20,0%	1,4%		2,9%	5,7%	**30,0%**
	Portugal	5,7%	2,9%		1,4%	2,9%	**12,9%**
	Italy	14,3%	4,3%	4,3%	2,9%		**25,7%**
	Germany	8,6%	1,4%	1,4%	1,4%	1,4%	**14,3%**
Total		**52,9%**	**12,9%**	**8,6%**	**12,9%**	**12,9%**	**100,0%**

Digital video cameras	Turkey	2,9%	2,9%	2,9%	4,3%	4,3%	**17,1%**
	Romania	5,7%	10,0%	8,6%	4,3%	1,4%	**30,0%**
	Portugal	5,7%	1,4%	2,9%	1,4%	1,4%	**12,9%**
	Italy	10,0%	7,1%	5,7%	1,4%	1,4%	**25,7%**
	Germany	1,4%	4,3%	5,7%	1,4%	1,4%	**14,3%**
Total		**25,7%**	**25,7%**	**25,7%**	**12,9%**	**10,0%**	**100,0%**

2.1.7. Participants' Skills

The following table gives information about participants' skills integrating the following in teaching and learning.

As can be seen from the table, 64% of the participants can use internet for developing lessons, 61,4% of the participants can use onlinecollaboration tools, 45,7% of the participants use apps for tablets, 31,4% of the participants use assisstive technology tools and digital video, 38,6% of the participants use educational games and test preparation, 58,6% of the participants use presentations, 30% of the participants use Web 2.0 teaching tools, 31,4% of the participants use management programs for student data, %68,6 of the participants use computer in the classroom, 37,1% of the participants use learning management system and mobile devices, 40% of the participants use active board and tablets very well. However, 25,7% of the participants can use web design, 32,9% of the participants can use social media, satisfactorily. In addition 35,7% of the participants can't use robotic kits.

Table 6. Participants' ability to integrate technology into teaching-learning environments

		I can't use it	I can use it to a small extent	I can use it satisfactorily	I can use it well	I can use it very well	
Internet for developing lesson plans/ideas	Turkey			1,4%	4,3%	11,4%	**17,1%**
	Romania		1,4%	4,3%	8,6%	15,7%	**30,0%**
	Portugal				1,4%	11,4%	**12,9%**
	Italy		2,9%	2,9%	8,6%	11,4%	**25,7%**
	Germany					14,3%	**14,3%**
Total			**4,3%**	**8,6%**	**22,9%**	**64,3%**	**100,0%**
Online collaboration tools (e.g. Adobe Connect, Zoom, Meet, ..)	Turkey				5,7%	11,4%	**17,1%**
	Romania	1,4%	1,4%	4,3%	7,1%	15,7%	**30,0%**
	Portugal				2,9%	10,0%	**12,9%**
	Italy		4,3%	2,9%	4,3%	14,3%	**25,7%**
	Germany				4,3%	10,0%	**14,3%**
Total		**1,4%**	**5,7%**	**7,1%**	**24,3%**	**61,4%**	**100,0%**
Apps for tablets	Turkey		1,4%	4,3%	5,7%	5,7%	**17,1%**
	Romania	2,9%	4,3%	1,4%	8,6%	12,9%	**30,0%**
	Portugal				2,9%	10,0%	**12,9%**
	Italy	1,4%	2,9%	1,4%	11,4%	8,6%	**25,7%**
	Germany		1,4%		4,3%	8,6%	**14,3%**

Total		**4,3%**	**10,0%**	**7,1%**	**32,9%**	**45,7%**	**100,0%**
Assistive Technology Tools	Turkey		1,4%	1,4%	8,6%	5,7%	**17,1%**
	Romania	4,3%	2,9%	2,9%	10,0%	10,0%	**30,0%**
	Portugal	1,4%			1,4%	10,0%	**12,9%**
	Italy	1,4%	5,7%	11,4%	7,1%		**25,7%**
	Germany	1,4%			7,1%	5,7%	**14,3%**
Total		**8,6%**	**10,0%**	**15,7%**	**34,3%**	**31,4%**	**100,0%**
Educational games/simulations/ animations	Turkey		1,4%	4,3%	5,7%	5,7%	**17,1%**
	Romania	1,4%	4,3%	7,1%	7,1%	10,0%	**30,0%**
	Portugal			2,9%		10,0%	**12,9%**
	Italy		1,4%	7,1%	11,4%	5,7%	**25,7%**
	Germany				7,1%	7,1%	**14,3%**
Total		**1,4%**	**7,1%**	**21,4%**	**31,4%**	**38,6%**	**100,0%**
Test Preparation	Turkey	1,4%	1,4%	7,1%	2,9%	4,3%	**17,1%**
	Romania	1,4%	1,4%	5,7%	11,4%	10,0%	**30,0%**
	Portugal			1,4%	1,4%	10,0%	**12,9%**
	Italy		1,4%	4,3%	11,4%	8,6%	**25,7%**
	Germany			4,3%	4,3%	5,7%	**14,3%**
Total		**2,9%**	**4,3%**	**22,9%**	**31,4%**	**38,6%**	**100,0%**
Presentations (e.g. PowerPoint, including from online sources)	Turkey				7,1%	10,0%	**17,1%**
	Romania		2,9%	5,7%	7,1%	14,3%	**30,0%**
	Portugal					12,9%	**12,9%**
	Italy		2,9%	4,3%	7,1%	11,4%	**25,7%**
	Germany			1,4%	2,9%	10,0%	**14,3%**
Total			**5,7%**	**11,4%**	**24,3%**	**58,6%**	**100,0%**
Web Design	Turkey	1,4%	2,9%	5,7%	2,9%	4,3%	**17,1%**
	Romania	7,1%	5,7%	5,7%	5,7%	5,7%	**30,0%**
	Portugal		1,4%	1,4%	1,4%	8,6%	**12,9%**
	Italy	7,1%	4,3%	8,6%	5,7%		**25,7%**
	Germany	2,9%		4,3%	1,4%	5,7%	**14,3%**
Total		**18,6%**	**14,3%**	**25,7%**	**17,1%**	**24,3%**	**100,0%**
Web 2.0 Teaching Tools	Turkey		1,4%	4,3%	2,9%	8,6%	**17,1%**
	Romania	8,6%	5,7%	4,3%	5,7%	5,7%	**30,0%**
	Portugal		1,4%	1,4%	2,9%	7,1%	**12,9%**
	Italy	4,3%	1,4%	7,1%	11,4%	1,4%	**25,7%**
	Germany	1,4%	1,4%	1,4%	2,9%	7,1%	**14,3%**
Total		**14,3%**	**11,4%**	**18,6%**	**25,7%**	**30,0%**	**100,0%**
Social media	Turkey	1,4%	1,4%	7,1%	2,9%	4,3%	**17,1%**
	Romania	1,4%	2,9%	5,7%	10,0%	10,0%	**30,0%**

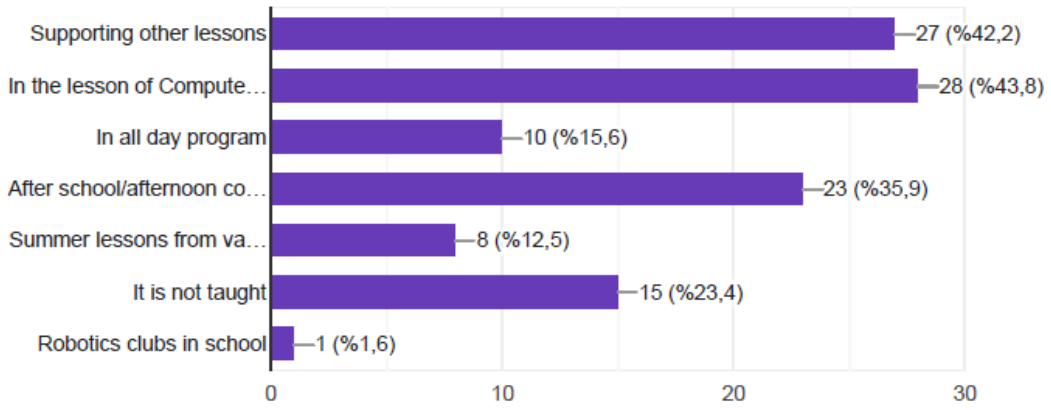
	Portugal			5,7%	1,4%	5,7%	**12,9%**
	Italy	2,9%	2,9%	8,6%	5,7%	5,7%	**25,7%**
	Germany			5,7%	2,9%	5,7%	**14,3%**
Total		**5,7%**	**7,1%**	**32,9%**	**22,9%**	**31,4%**	**100,0%**
Management programs for student data (e-portfolio, ..)	Turkey	1,4%	1,4%	8,6%		5,7%	**17,1%**
	Romania	2,9%	7,1%	4,3%	8,6%	7,1%	**30,0%**
	Portugal			2,9%	2,9%	7,1%	**12,9%**
	Italy	1,4%	2,9%	10,0%	7,1%	4,3%	**25,7%**
	Germany		2,9%	2,9%	1,4%	7,1%	**14,3%**
Total		**5,7%**	**14,3%**	**28,6%**	**20,0%**	**31,4%**	**100,0%**
Computer in the classroom	Turkey	1,4%			5,7%	10,0%	**17,1%**
	Romania		2,9%	4,3%	4,3%	18,6%	**30,0%**
	Portugal				1,4%	11,4%	**12,9%**
	Italy		2,9%	2,9%	4,3%	15,7%	**25,7%**
	Germany				1,4%	12,9%	**14,3%**
Total		**1,4%**	**5,7%**	**7,1%**	**17,1%**	**68,6%**	**100,0%**
Learning management system	Turkey			4,3%	4,3%	8,6%	**17,1%**
	Romania	4,3%	5,7%	5,7%	8,6%	5,7%	**30,0%**
	Portugal			2,9%	1,4%	8,6%	**12,9%**
	Italy	1,4%	4,3%	8,6%	4,3%	7,1%	**25,7%**
	Germany	1,4%	1,4%	1,4%	2,9%	7,1%	**14,3%**
Total		**7,1%**	**11,4%**	**22,9%**	**21,4%**	**37,1%**	**100,0%**
Active Board	Turkey			1,4%	8,6%	7,1%	**17,1%**
	Romania	8,6%	1,4%	2,9%	7,1%	10,0%	**30,0%**
	Portugal			2,9%	2,9%	7,1%	**12,9%**
	Italy	1,4%	1,4%	5,7%	8,6%	8,6%	**25,7%**
	Germany				7,1%	7,1%	**14,3%**
Total		**10,0%**	**2,9%**	**12,9%**	**34,3%**	**40,0%**	**100,0%**
Mobile devices	Turkey			4,3%	8,6%	4,3%	**17,1%**
	Romania	1,4%	4,3%		8,6%	15,7%	**30,0%**
	Portugal			2,9%	4,3%	5,7%	**12,9%**
	Italy		5,7%	8,6%	7,1%	4,3%	**25,7%**
	Germany			1,4%	5,7%	7,1%	**14,3%**
Total		**1,4%**	**10,0%**	**17,1%**	**34,3%**	**37,1%**	**100,0%**
Tablets	Turkey		1,4%	1,4%	7,1%	7,1%	**17,1%**
	Romania	2,9%	5,7%	2,9%	7,1%	11,4%	**30,0%**
	Portugal			1,4%	4,3%	7,1%	**12,9%**
	Italy	1,4%	2,9%	4,3%	10,0%	7,1%	**25,7%**
	Germany		1,4%	1,4%	4,3%	7,1%	**14,3%**

Total		**4,3%**	**11,4%**	**11,4%**	**32,9%**	**40,0%**	**100,0%**
Robotics kits	Turkey	2,9%	2,9%	4,3%	1,4%	5,7%	**17,1%**
	Romania	18,6%	2,9%	4,3%	2,9%	1,4%	**30,0%**
	Portugal		4,3%	2,9%		5,7%	**12,9%**
	Italy	8,6%	5,7%	10,0%	1,4%		**25,7%**
	Germany	5,7%	1,4%	2,9%		4,3%	**14,3%**
Total		**35,7%**	**17,1%**	**24,3%**	**5,7%**	**17,1%**	**100,0%**
Digital video cameras	Turkey	1,4%		10,0%		5,7%	**17,1%**
	Romania	2,9%	7,1%	2,9%	10,0%	7,1%	**30,0%**
	Portugal			4,3%	1,4%	7,1%	**12,9%**
	Italy	2,9%	4,3%	7,1%	5,7%	5,7%	**25,7%**
	Germany	1,4%		4,3%	2,9%	5,7%	**14,3%**
Total		**8,6%**	**11,4%**	**28,6%**	**20,0%**	**31,4%**	**100,0%**

2.1.8. The Ways Robotics Taught in School

In what ways is educational robotics taught in your school? *(You can choose more than one options)*

Chart 6. The Ways Robotics Taught in School



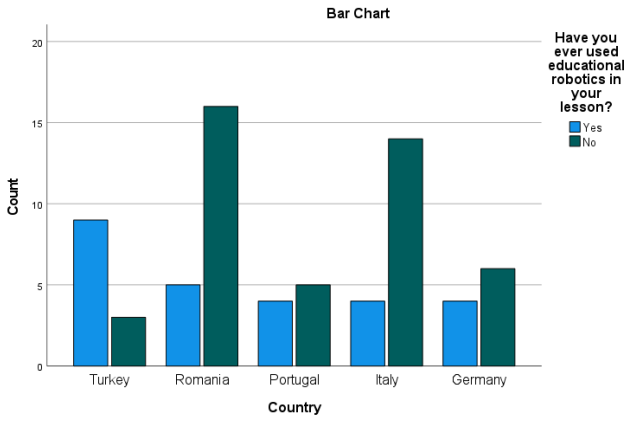
2.1.9. The Participants Using Educational Robotics

The following table gives information about if participants ever used educational robotics in their lessons. This table shows that 62,9% of the participants never used educational robotics in their lessons. On the other hand, 37,1% of the participants had used robotics in their lessons.

Table 7. Have you ever used educational robotics in your lesson?

		Yes	No	Total
used educational robotics in lesson	Turkey	12,9%	4,3%	**17,1%**
	Romania	7,1%	22,9%	**30,0%**
	Portugal	5,7%	7,1%	**12,9%**
	Italy	5,7%	20,0%	**25,7%**
	Germany	5,7%	8,6%	**14,3%**
Total		**37,1%**	**62,9%**	**100,0%**

Chart 7. Have you ever used educational robotics in your lesson?



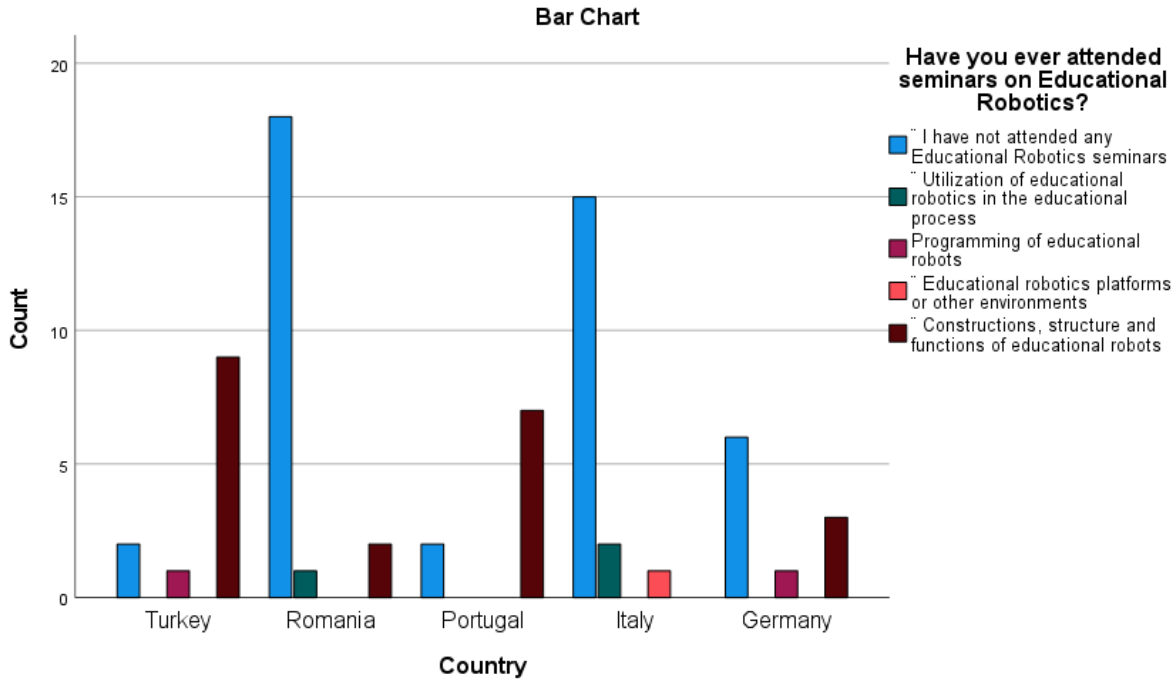
2.1.10. The Participants Attending Seminars on Educational Robotics

The following table gives information about if participants ever attended seminars on educational robotics. The table shows that 61,4% of the participants had not attended any seminars on educational robotics. However, 30% of the participants had attended seminars related to constructions, structure and functions of educational robots.

Table 8. Have you ever attended seminars on Educational Robotics?

		I have not attended any Educational Robotics seminars	Utilization of educational robotics in the educational process	Programming of educational robots	¨Educational robotics platforms or other environments	Constructions, structure and functions of educational robots	Total
Attendeding seminars on Educational Robotics	Turkey	2,9%		1,4%		12,9%	17,1%
	Romania	25,7%	1,4%			2,9%	30,0%
	Portugal	2,9%				10,0%	12,9%
	Italy	21,4%	2,9%		1,4%		25,7%
	Germany	8,6%		1,4%		4,3%	14,3%
Total		61,4%	4,3%	2,9%	1,4%	30,0%	100,0%

Chart 8. Have you ever attended seminars on Educational Robotics?



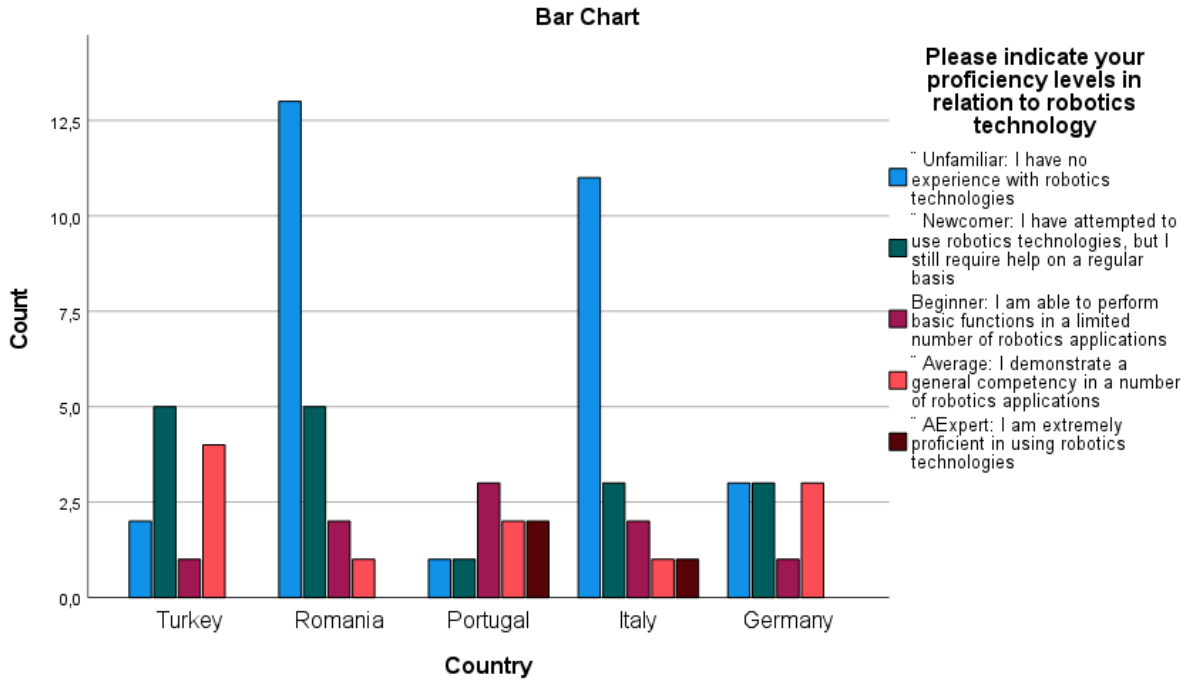
2.1.11. Participants' Proficiency Levels in Relation to Robotics Technology

The following table gives information about if participants' proficiency levels in relation to robotics technology. 42,9% of the participants unfamiliar with robotice education. In other words, they have no experiences with robotics technologies.

Table 9. Please indicate your proficiency levels in relation to robotics technology

		Unfamiliar: I have no experience with robotics technologies	Newcomer: I have attempted to use robotics technologies, but I still require help on a regular basis	Beginner: I am able to perform basic functions in a limited number of robotics applications	Average: I demonstrate a general competency in a number of robotics applications	Expert: I am extremely proficient in using robotics technologies	Total
Country	Turkey	2,9%	7,1%	1,4%	5,7%		**17,1%**
	Romania	18,6%	7,1%	2,9%	1,4%		**30,0%**
	Portugal	1,4%	1,4%	4,3%	2,9%	2,9%	**12,9%**
	Italy	15,7%	4,3%	2,9%	1,4%	1,4%	**25,7%**
	Germany	4,3%	4,3%	1,4%	4,3%		**14,3%**
Total		**42,9%**	**24,3%**	**12,9%**	**15,7%**	**4,3%**	**100,0%**

Chart 9. Proficiency level related to robotics technology



2.1.12. Participants' Descriptions on Integrating Robotics into Teaching Activities

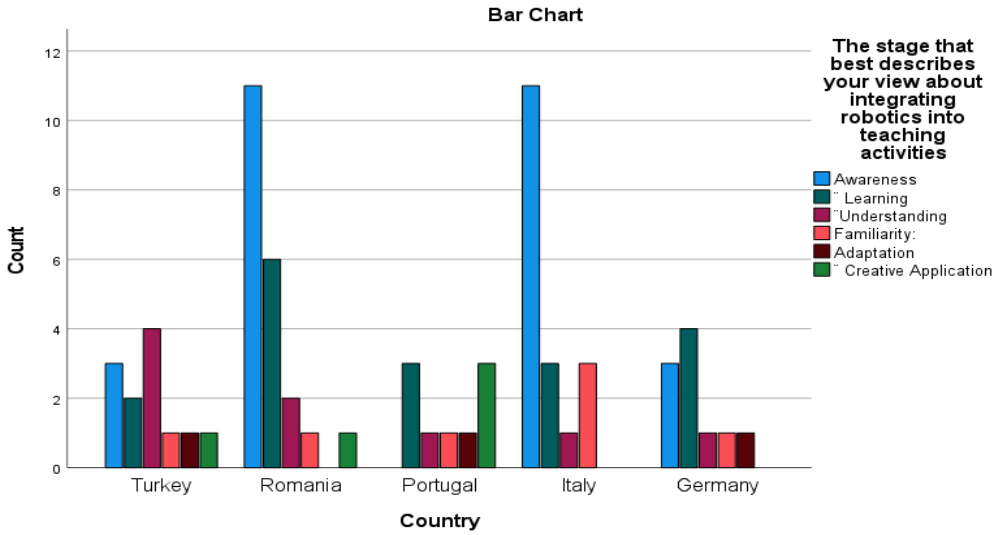
The following table gives information about participants' descriptions on integrating robotics into teaching activities. As seen in the table, 40% of the participants aware that robotics exists, but have not used it – perhaps they are even avoiding it. They are anxious about the prospect of using robotics.

25,7% of the participants indicated that they are currently trying to learn the basics. They are sometimes frustrated using robotics and they lack confidence when using them.

Table 10. The stage that best describes your view about integrating robotics into teaching activities

		Awareness	Learning	Understanding	Familiarity:	Adaptation	Creative Application	Total
Country	Turkey	4,3%	2,9%	5,7%	1,4%	1,4%	1,4%	17,1%
	Romania	15,7%	8,6%	2,9%	1,4%		1,4%	30,0%
	Portugal		4,3%	1,4%	1,4%	1,4%	4,3%	12,9%
	Italy	15,7%	4,3%	1,4%	4,3%			25,7%
	Germany	4,3%	5,7%	1,4%	1,4%	1,4%		14,3%
Total		40,0%	25,7%	12,9%	10,0%	4,3%	7,1%	100,0%

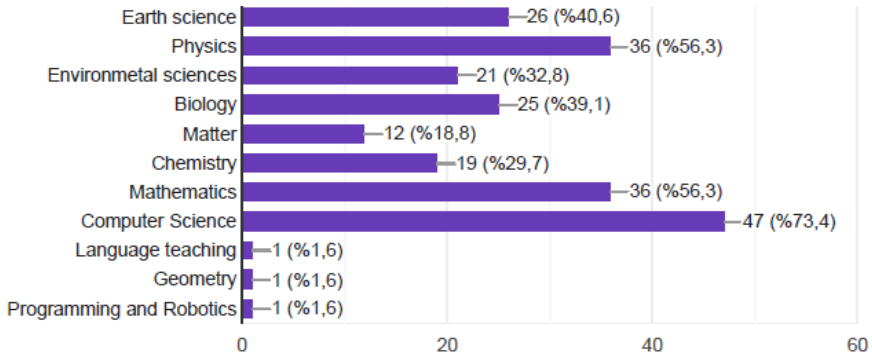
Chart 10. The stage that best describes your view about integrating robotics into teaching activities



2.1.13. Science Subjects Which Might Be Taught Using Robotics

The following graphics gives information about the science subjects teachers' taught using robotics. As seen in the graphics, the most preferred subjects are computer science, mathematics, physics, earth science and biology respectively.

Chart 11. Science Subjects Which Might Be Taught Using Robotics



2.1.14. The Methods Participants Prefer in Their Lessons

The following table gives information about the methods particitants prefer in their lessons. As can be seen from the table, 42,9% of the participants prefer cooperative learning model, 32,9% of the participants prefer computer based learning always. In addition, 54,3% of the participants prefer inquiry based learning, 48,6% of the participants prefer problem based learning, 41,4% of the participants prefer project based learning model frequently and also, 40% of the participants prefer lecture, 32,9% of the participants prefer design based learning, occasionally.

Table 11. The Methods Particitants Prefer in Their Lessons

		Never (1)	Rarely (2)	Occasionally (3)	Frequently (4)	Always (5)	
Lecture	Turkey		2,9%	4,3%	4,3%	5,7%	**17,1%**
	Romania	2,9%	1,4%	15,7%	4,3%	5,7%	**30,0%**
	Portugal	2,9%	1,4%	5,7%	2,9%		**12,9%**
	Italy	4,3%		10,0%	7,1%	4,3%	**25,7%**
	Germany	1,4%	1,4%	4,3%	2,9%	4,3%	**14,3%**
Total		**11,4%**	**7,1%**	**40,0%**	**21,4%**	**20,0%**	**100,0%**
Cooperative learning	Turkey			2,9%	5,7%	8,6%	**17,1%**
	Romania			2,9%	15,7%	11,4%	**30,0%**
	Portugal		1,4%	1,4%	2,9%	7,1%	**12,9%**
	Italy		4,3%	2,9%	11,4%	7,1%	**25,7%**
	Germany			1,4%	4,3%	8,6%	**14,3%**
Total			**5,7%**	**11,4%**	**40,0%**	**42,9%**	**100,0%**
Problem based learning	Turkey			1,4%	7,1%	8,6%	**17,1%**
	Romania			4,3%	15,7%	10,0%	**30,0%**
	Portugal			1,4%	5,7%	5,7%	**12,9%**
	Italy		1,4%	4,3%	14,3%	5,7%	**25,7%**
	Germany				5,7%	8,6%	**14,3%**
Total			**1,4%**	**11,4%**	**48,6%**	**38,6%**	**100,0%**
Inquiry based learning	Turkey			1,4%	10,0%	5,7%	**17,1%**
	Romania		2,9%	10,0%	14,3%	2,9%	**30,0%**
	Portugal			1,4%	5,7%	5,7%	**12,9%**
	Italy		1,4%	5,7%	15,7%	2,9%	**25,7%**
	Germany			1,4%	8,6%	4,3%	**14,3%**
Total			**4,3%**	**20,0%**	**54,3%**	**21,4%**	**100,0%**
Project based learning	Turkey			2,9%	5,7%	8,6%	**17,1%**
	Romania			11,4%	14,3%	4,3%	**30,0%**
	Portugal				5,7%	7,1%	**12,9%**
	Italy		2,9%	8,6%	11,4%	2,9%	**25,7%**
	Germany			4,3%	4,3%	5,7%	**14,3%**
Total			**2,9%**	**27,1%**	**41,4%**	**28,6%**	**100,0%**
Computer based learning	Turkey		1,4%	4,3%	2,9%	8,6%	**17,1%**
	Romania	1,4%	2,9%	10,0%	8,6%	7,1%	**30,0%**
	Portugal		1,4%		5,7%	5,7%	**12,9%**
	Italy		4,3%	8,6%	10,0%	2,9%	**25,7%**
	Germany			2,9%	2,9%	8,6%	**14,3%**
Total		**1,4%**	**10,0%**	**25,7%**	**30,0%**	**32,9%**	**100,0%**

Design-Based Learning	Turkey		2,9%	4,3%	4,3%	5,7%	**17,1%**
	Romania	4,3%	8,6%	10,0%	5,7%	1,4%	**30,0%**
	Portugal		1,4%	5,7%	4,3%	1,4%	**12,9%**
	Italy	4,3%	5,7%	8,6%	5,7%	1,4%	**25,7%**
	Germany	1,4%	2,9%	4,3%	2,9%	2,9%	**14,3%**
Total		**10,0%**	**21,4%**	**32,9%**	**22,9%**	**12,9%**	**100,0%**
Lab activities	Turkey	1,4%		7,1%	1,4%	7,1%	**17,1%**
	Romania	8,6%	2,9%	2,9%	8,6%	7,1%	**30,0%**
	Portugal	1,4%		2,9%	4,3%	4,3%	**12,9%**
	Italy	2,9%	1,4%	11,4%	7,1%	2,9%	**25,7%**
	Germany	4,3%	1,4%		2,9%	5,7%	**14,3%**
Total		**18,6%**	**5,7%**	**24,3%**	**24,3%**	**27,1%**	**100,0%**
Outdoor education	Turkey		5,7%	4,3%	1,4%	5,7%	**17,1%**
	Romania	5,7%	8,6%	10,0%	2,9%	2,9%	**30,0%**
	Portugal	1,4%	1,4%	1,4%	4,3%	4,3%	**12,9%**
	Italy	4,3%	2,9%	11,4%	5,7%	1,4%	**25,7%**
	Germany	1,4%	7,1%	1,4%		4,3%	**14,3%**
Total		**12,9%**	**25,7%**	**28,6%**	**14,3%**	**18,6%**	**100,0%**
Question and answer	Turkey				7,1%	10,0%	**17,1%**
	Romania			5,7%	12,9%	11,4%	**30,0%**
	Portugal	1,4%	1,4%	2,9%	1,4%	5,7%	**12,9%**
	Italy	1,4%		5,7%	15,7%	2,9%	**25,7%**
	Germany				5,7%	8,6%	**14,3%**
Total		**2,9%**	**1,4%**	**14,3%**	**42,9%**	**38,6%**	**100,0%**
Flipped Classrooms	Turkey	1,4%	5,7%	1,4%	2,9%	5,7%	**17,1%**
	Romania	5,7%	5,7%	12,9%	2,9%	2,9%	**30,0%**
	Portugal	1,4%		4,3%	1,4%	5,7%	**12,9%**
	Italy	1,4%	4,3%	11,4%	8,6%		**25,7%**
	Germany	2,9%	2,9%	2,9%	2,9%	2,9%	**14,3%**
Total		**12,9%**	**18,6%**	**32,9%**	**18,6%**	**17,1%**	**100,0%**
Think Pair Share	Turkey	2,9%	1,4%	4,3%	4,3%	4,3%	**17,1%**
	Romania	1,4%	2,9%	14,3%	8,6%	2,9%	**30,0%**
	Portugal			1,4%	7,1%	4,3%	**12,9%**
	Italy	1,4%	1,4%	11,4%	10,0%	1,4%	**25,7%**
	Germany	1,4%		5,7%	2,9%	4,3%	**14,3%**
Total		**7,1%**	**5,7%**	**37,1%**	**32,9%**	**17,1%**	**100,0%**
Discussion	Turkey			4,3%	5,7%	7,1%	**17,1%**
	Romania			2,9%	14,3%	12,9%	**30,0%**
	Portugal		1,4%	1,4%	2,9%	7,1%	**12,9%**
	Italy			5,7%	12,9%	7,1%	**25,7%**
	Germany			1,4%	4,3%	8,6%	**14,3%**

Total			1,4%	15,7%	40,0%	42,9%	**100,0%**
Brainstorming	Turkey			1,4%	7,1%	8,6%	**17,1%**
	Romania			7,1%	11,4%	11,4%	**30,0%**
	Portugal		1,4%	1,4%	4,3%	5,7%	**12,9%**
	Italy	1,4%		4,3%	17,1%	2,9%	**25,7%**
	Germany			1,4%	2,9%	10,0%	**14,3%**
Total		**1,4%**	**1,4%**	**15,7%**	**42,9%**	**38,6%**	**100,0%**
Role play	Turkey	2,9%	1,4%	5,7%	2,9%	4,3%	**17,1%**
	Romania	4,3%	5,7%	8,6%	2,9%	8,6%	**30,0%**
	Portugal	1,4%	1,4%	4,3%	5,7%		**12,9%**
	Italy	2,9%	2,9%	10,0%	8,6%	1,4%	**25,7%**
	Germany	2,9%	1,4%	1,4%	2,9%	5,7%	**14,3%**
Total		**14,3%**	**12,9%**	**30,0%**	**22,9%**	**20,0%**	**100,0%**
Drama	Turkey	2,9%	2,9%	2,9%	4,3%	4,3%	**17,1%**
	Romania	11,4%	2,9%	5,7%	2,9%	7,1%	**30,0%**
	Portugal	1,4%	5,7%	2,9%	2,9%		**12,9%**
	Italy	7,1%	1,4%	10,0%	7,1%		**25,7%**
	Germany	5,7%		1,4%	2,9%	4,3%	**14,3%**
Total		**28,6%**	**12,9%**	**22,9%**	**20,0%**	**15,7%**	**100,0%**

2.2. QUALITATIVE ANALYSIS RESULTS

2.2.1. Teachers' Questionnaire Related Educational / Instructional Technologies

The following table gives information about comments you have about their skills integrating technologies in their classroom. The table shows that teachers mostly integrate robotics kits, computers, 3D modelling in their classrooms.

Table 12. Please list any additional comments you have about your skills integrating technologies in your classroom:	**(f)**
Robotics kits (coding, Scratch..)	5
Computer/Tablet	5
3D modelling /printing	3
Virtual reality and artificial intelligence tools	2
Simulation	2
Powerpoint simulation	1
Active board	1
Formative assessment digital tool	1
Digital book	1
Interactive games	1
No use	12
Uncoded	17

The following table gives information about how educational robotics help students to learn subjects they mentioned. According to the table, significant number of participants thought that robotics education acquire new skills to students including 21th century skills.

Table 13. Please explain, how educational robotics can help students to learn these subjects	**(f)**
Make some content more understandable/ Embodies the theory	7
Attract students' interest/curiosity/motivation	7
Developing knowledge	4
Provide acquire new skills/21th century skills	15
Provide designing skills	*3*
Provide problem solving skills	*2*
Provide analytical thinking skills	*2*
Provide visualising	*2*
Provide coding skills	*1*
Provide analyzing skills	*1*
Provide logical skills	*1*
Provide computational thinking	*1*
Developing imagination	1
Make lessons interactive	1
Help students to solve faster exercises	1
Associated with learning outcomes	1
Blank	9
Uncoded	14

The following table gives information about why participants use teh methods and techniques they mentioned. Table shows that, significant number of participants believe the effectiveness of the methods fort he lessons. They thought that these methods stimulate students' learning and motivate them.

Table 14. Could you please explain why you use these methods and techniques	**(f)**
Provide effective/efficient/stimulating/motivation lessons	19
Useful for students	9
Provide students to acquire skills (21th century)	6
Improve learning/learn easily	3
Provide interdisciplinary work/group	3
Provide students to acquire creative perspectice	2
Provide permanent learning	2
Provide interactivity	2
Provide entertainment	1
Considering students with different intelligences	1
Blank	2
Uncoded	13

2.2.2. Interviews

The following table gives information about if participants' have experience using robotics in their lessons. Table shows that, while significant number of participant no experience using robotics in their lessons, some of them heve experience.

Table 15. Do you have experience you can share about using robotics in your lessons?		
	Yes (f)	**No (f)**
Turkey	4	8
Italy	1	17
Portugal	4	5
Romania	3	18
Germany	-	-
Total	12	28

The following table gives information about if educational robotics make participants' course efficient. As een in the table, participants who answered this question have positive opinion.

Table 16. Does the use of educational robots make your course efficient? Why?	**(f)**
Yes	11
students can develope skills	3
students participate more actively/motivation	2
students can focus/engage the lesson topic	2
students like/interest robots	2
students capable of various task	2

The following table gives information about what kind of support teachers in orders to employ robotics in schools. As seen in the table, significant number of teachers emphesized the importace of in-service education in order to employ robotics in schools.

Table 17. What kinds of support that teachers need in order to employ robotics in secondary/high schools?	**(f)**
Professional development studies/Teacher training/Inservice education	18
Materials (equipment need) are needed	5
Technical support is needed	5
Specific/model lessons/courses needed are needed	5
Laboratory is needed	3
Knowledge is needed	2
Dedicated workers are needed	1
Politics support is needed	1
Educational resources are needed	1
Financial support is needed	1
Specialists are needed in schools	1
Blank	-
Uncoded	-

The following table gives information about the positive and negative aspects of educational robotics in teaching. According to the table, most of the participants have opinion related positive effect of educational robotics. They thought that robotics provide motivation, certain skills, efficient teaching, etc.. On the other hand, significant number of participants' have negative opinions about using robotics in teaching. Some of them thougt that robotics education requires expensive materials and they cause löse interaction with others.

Table 18. What are the positive and negative aspects of using educational robots in teaching?	**(f)**
Positive effects	
Provide motivation	9
Provide certain skills	4
Provide efficient teaching	4
Provide knowledge	3
Enhance imagination/creativity	3
Provides a positive attitude towards the lesson	3
Provide interest to technology	2
Provides realization	1
Provide permanent learning	1
Provide group working	1
Students meet robots	1
Enhance curiosity	1
Students can learn faster	1
Relevant for students	1
Prepare students for the job the future	1

Negative effects	
Expensive materials	7
Losing contact/interaction with others/ No emotions, no empaty	4
Limited access to materials/ Need more robots	3
Takes time	3
Requires knowledge and skills	1
Environment is difficult to prepare	1
Challenging for teachers	1
High number of students in the classroom	1
Blank	-
Uncoded	-

The following table gives information about the effects of robotics on students' attitudes toward science. The table shows, mos of the participants have posivite opinions related robotics effect on students' attitudes. They have opinion that robotics increase interest towards science. They have also opinion that robotics make students acquire skills and increase their motivation.

Table 19. What do you think about the effects of robotics on students' attitudes toward science? Why?	**(f)**
Increase interest/positive attitude towards science	13
Develope skills	6
Increase motivation/engagement	6
Stimulates their curiosity	2
Provides mental development	2
Provide realizaton	2
Better understanding	2
Provide different aspects	1
Interest in robots	1
Enhance creativity	1
Practical for curriculum content	1
Stimulates the students for STEAM subject's	1
Allow students to be constantly updated	1
Different from the usual classroom settings	1
Blank	11
Uncoded	12

The following table gives information about the effects of robotics on students' 21th century skills. As seen in the table, participants have positive opinion related the effects of robotics on students' 21th century skills. They thought that robotics have positive effects on students' communication skills, digital competence, cooperative working, creative thinking, etc.

Table 20. What do you think about the effects of robotics on students' 21th century skills? Why?	(f)
Positive effects	23
Communication skills	6
Digital/Technology competence	6
Collaborarion/Cooperative skills/Team working	5
Creative thinking	5
Critical thinking	2
Problem solving	2
Responsibility	2
Logical/Mental development	2
Socio-cross cultural skills	2
Analytical thinking	1
Self direction	1
Practical skills	1
Fast thinking	1
Higher order thinking skills	1
Self confidence	1
Blank	10
Uncoded	9

3. ON THE BASIS OF STUDENTS

3.1. The Results of Interest in Science Scale

Students' interest in science scale was consists of 27 items was used to investigate students' interset in science. The following table shows the results of one-sample K-S test. As can be seen in Table, the results of the Kolmogorov-Smirnov test indicated that the scores obtained from the scale showed deviation from normality, (p<.05). which means that the distribution was significantly different from a normal distribution. Consequently, non-parametric analysis was used for data analysis.

One-Sample Kolmogorov-Smirnov Test		
		TOTAL_INT
N		98
Normal Parameters[a,b]	Mean	3,3262
	Std. Deviation	,47277
Most Extreme Differences	Absolute	,090
	Positive	,090
	Negative	-,076
Test Statistic		,090
Asymp. Sig. (2-tailed)		,049[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

The following table shows the reliability of the scale.. As shown in this table, the Cronbach alpha reliability values of the scale was found to be .77

Reliability Statistics	
Cronbach's Alpha	N of Items
,776	27

The following table shows descriptive analysis of the scale. Tha table shows that students neither agree nor disagree their interest in science.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
TOTAL_INT	98	2,26	5,00	**3,3262**	,47277
Valid N (listwise)	98				

The Mann Whitney U test was used to find any differences between females' and males' interest in science. As shown in table, no statistically significant differences was found between female and male students' interest in science.

Ranks				
	Gender	N	Mean Rank	Sum of Ranks
TOTAL_INT	Female	46	53,51	2461,50
	Male	52	45,95	2389,50
	Total	98		

Test Statistics[a]	
	TOTAL_INT
Mann-Whitney U	1011,500
Wilcoxon W	2389,500
Z	-1,314
Asymp. Sig. (2-tailed)	,189
a. Grouping Variable: Gender	

The Kruskal Wallis test was used for detecting differences among students' interest in science in terms of countries. According to the results, statistically significant difference ($p<.05$) were found in favor of studenst in Turkey, that means, students are more interested in science in Turkey.

Ranks			
	Country	N	Mean Rank
TOTAL_INT	Turkey	26	63,60*
	Romania	26	39,08
	Italy	22	44,43
	Portugal	18	48,39
	Germany	6	55,50
	Total	98	

Test Statistics[a,b]	
	TOTAL_INT
Chi-Square	10,893
df	4
Asymp. Sig.	,028*
a. Kruskal Wallis Test	
b. Grouping Variable: Country	

3.2. The Results of Students Attitude Scale Towards Technology

Students Attitude Scale Towards Technology developed by Yurdugül and Askar (2008) was used to investigate students' attitudes towards technology. The scale consists of 24 items and 4 dimensions consisted of tendency Towards Technology, Negativity of Tecnology, Contribution and importance of Technology, Technology for Everyone.

A total of 98 students from 5 countries participated in the study. Distribution of the sample is shown in the following tables.

Country * Gender Crosstabulation				
		Gender		**Total**
		Female	Male	
Country	Turkey	14	12	**26**
	Romania	9	17	**26**
	Italy	15	7	**22**
	Portugal	6	12	**18**
	Germany	2	4	**6**
Total		**46**	**52**	**98**

Country * Age Crosstabulation				
		Age		**Total**
		11-14	15-18	
Country	Turkey	22	4	**26**
	Romania	0	26	**26**
	Italy	0	22	**22**
	Portugal	8	10	**18**
	Germany	0	6	**6**
Total		**30**	**68**	**98**

The following table shows the reliability of the scale.. As shown in this table, the Cronbach alpha reliability values of the scale and subdimensions were found to be .77 for the total scale and .84, .83, .80 and .62 for the subdimensions.

Reliability	**Cronbach alpha**
Tendency towards technology	.84
Negatıvıty of Tecnology	.83
Contribution and importance of Technology	.80
Technology for Everyone	.62
Total	.77

The following table shows the results of one-sample K-S test. As can be seen in Table, the results of the Kolmogorov-Smirnov test indicated that the scores obtained from the tendency towards technology scale showed a normal distribution (p>.05). Subsequently, the results of parametric analysis (t-test) for each dimension of the scale and for total of the scale showed a deviation from normality, (p<.05), which means that the distribution was significantly different from a normal distribution. Consequently, non-parametric analysis was used for data analysis.

Results of one-sample K-S test

		Tendency towards Technology	Negatıvity of Tecnology	Contribution and Importance of Technology	Technology for Everyone	Total
N		98	98	98	98	98
Normal Parameters[a,b]	Mean	3,8444	2,0904	4,1769	3,8571	3,4175
	Std. Deviation	,75940	,76296	,63805	,80234	,41391
Most Extreme Differences	Absolute	,083	,164	,114	,162	,110
	Positive	,083	,164	,099	,085	,110
	Negative	-,083	-,076	-,114	-,162	-,078
Test Statistic		,083	,164	,114	,162	,110
Asymp. Sig. (2-tailed)		,092[c]	,000[c]	,003[c]	,000[c]	,005[c]
a. Test distribution is Normal.						
b. Calculated from data.						
c. Lilliefors Significance Correction.						

The following table shows descriptive analysis of the scale. Table shows that, the dimension with the highest mean value was found contribution and importance of technology which means that students have positive attitudes towards contribution and importance of technology compered with other dimensions.

Descriptive Statistics

	N	Minimum	Maximum	**Mean**	Std. Deviation
Tendency towards technology	98	1,75	5,00	**3,8444**	,75940
Negatıvity of tecnology	98	1,00	5,00	**2,0904**	,76296
Contribution and importance of technology	98	2,00	5,00	**4,1769***	,63805
Technology for everyone	98	1,33	5,00	**3,8571**	,80234
Total	98	2,50	5,00	**3,4175**	,41391

The Mann Whitney U test was used to find any differences between females' and males' attitudes towards technology. According to these results, as shown in Table, statistically significant differences were found in Tendency Towards Technology dimension and in the total of the scale, which means that, males have more positive attitudes towards technology. No statistically significant differences were found in negatıvıty of tecnology and technology for everyone dimensions.

Ranks				
	Gender	N	Mean Rank	Sum of Ranks
Tendency towards technology	Female	46	41,57	1912,00
	Male	52	56,52*	2939,00
Negatıvıty of tecnology	Female	46	51,83	2384,00
	Male	52	47,44	2467,00
Contribution and importance of technology	Female	46	48,48	2230,00
	Male	52	50,40	2621,00
Technology for everyone	Female	46	50,16	2307,50
	Male	52	48,91	2543,50
Total	Female	46	43,21	1987,50
	Male	52	55,07*	2863,50

Test Statistics[a]					
	Tendency Towards Technology	Negatıvıty of Tecnology	Contribution and Importance of Technology	Technology For Everyone	Total
Mann-Whitney U	831,000	1089,000	1149,000	1165,500	906,500
Wilcoxon W	1912,000	2467,000	2230,000	2543,500	1987,500
Z	-2,604	-,764	-,336	-,219	-2,064
Asymp. Sig. (2-tailed)	,009*	,445	,737	,826	,039*
a. Grouping Variable: Gender					

The Kruskal Wallis test was used for detecting differences among students' attitudes towards technology in terms of countries. According to the results, as shown in table, statistically significant difference ($p<.05$) were found in tendency towards technology, technology for everyone dimensions in terms of countries which means that students in Portugal have more positive attitudes towards these dimensions compared with other countries. No statistically significant differences were found in negativity of tecnology and contribution and importance of technology dimensions.

Ranks			
	Country	N	Mean Rank
Tendency towards technology	Turkey	26	56,94
	Romania	26	52,50
	Italy	22	30,95
	Portugal	18	59,03*
	Germany	6	43,67
Negatıvity of tecnology	Turkey	26	51,65
	Romania	26	45,98
	Italy	22	56,05
	Portugal	18	39,36
	Germany	6	61,83
Contribution and importance of Technology	Turkey	26	38,73
	Romania	26	57,10
	Italy	22	52,75
	Portugal	18	50,92
	Germany	6	47,08
Technology for everyone	Turkey	26	45,98
	Romania	26	38,35
	Italy	22	58,02
	Portugal	18	65,36*
	Germany	6	34,25
Total	Turkey	26	49,92
	Romania	26	49,54
	Italy	22	43,41
	Portugal	18	57,22
	Germany	6	46,67

Test Statistics[a,b]					
	Tendency towards technology	Negatıvity of tecnology	Contribution and importance of technology	Technology for everyone	Total
Chi-Square	13,763	5,166	6,026	14,003	2,409
df	4	4	4	4	4
Asymp. Sig.	,008*	,271	,197	,007*	,661
a. Kruskal Wallis Test					
b. Grouping Variable: Country					

4. CONCLUSION

The participants of this study; 68.6% are female, 31.4% are male. 24.3% of the participants are technology teachers, 18.6% are science teachers and 18.6% of the participants are math teachers. In addition, 38.6% of the participants have another area of expertise.

40% of the participants are secondary school teachers, 32.9% of them are high school teachers, 24.3% are primary school teachers and 2.9% are other level teachers. It is seen that 98.6% of the participants use information/educational technologies in their lessons. Among these participants, the teachers who use information/educational/instructional technologies the most in their lessons are from Romania.

When examining how often the participants use digital resources/platforms in their teaching processes;

• 45.7% of them use the internet daily to create lesson plans.
• 45.7% of them use it daily for online collaboration.
• 38.6% of them use it daily for tablet applications.
• 48.6% of them use it daily to provide internet connection to the computer in the classroom.
• 38.6% of them use daily for smart board,
• 34.3% of them use daily for mobile vehicles,
conclusion has been reached.

In contrast to these results, it was determined that 52.9% of the participants never used robotic kits and 25.7% never used digital cameras in their teaching processes. 40% of the participants use educational games, 31.4% use presentations, Web 2.0 technologies and management programs, 24.3% use Web design, 32.9% use social media, 25.7% use digital cameras. It was determined that they used weekly in teaching processes. In addition, 32.9% of the participants use the test preparation in their teaching processes, and 31.4% use the learning management system on a monthly basis.

When the participants' ability to include digital tools in their learning and teaching processes is examined within the scope of the study:

• 64% of the participants were able to use the internet very well to develop a lesson plan,
• 61.4% of them can use online collaboration tools very well,
• 45.7% of them can use tablet applications very well,
• 31.4% of them can use assistive technology tools and digital camera very well,
• 38.6% of them can use educational games and test preparation very well,
• 58.6% of them can use the presentations very well,
• 68.6% of them can use the computer very well in the classroom,
• 30% of them can use Web 2.0 tools very well,
• 31.4% of them can use management programs very well for student data,
• 40 of them were found to be able to use active boards and tablets very well.

The results about whether the participants use educational robotics in their lessons show that 62.9% of them do not use educational robotics in their lessons, and 37.1% use robotics in their lessons. 30 of them show that they have attended seminars on the structure and functions of educational robotics.

Results regarding the proficiency levels of the participants in robotics technology indicated that 42.9% of them were not familiar with robotics education; in other words, it shows that they have no experience with robotic technologies.

The results regarding the participants' integrating robotic materials into their teaching activities show that 40% of the participants are aware of robotic applications in their teaching activities, but do not use them – perhaps they avoid it. In addition, they do not feel confident in using robotic materials.

When the results about the subjects taught by the teachers using robotics are examined, the most preferred courses are computer science, mathematics, physics, earth science and biology, respectively.

When the results about the methods preferred by the participants in their courses are examined; 42.9% of the participants always preferred the cooperative learning model and 32.9% of them always preferred the computer-assisted learning model; 54.3% of them preferred inquiry-based learning, 48.6% of them preferred problem-based learning, 41.4% of them preferred project-based learning; it is also understood that 40% of the participants prefer narration and 32.9% prefer the design-based learning model occasionally.

Teachers mostly integrate robotic kits, computers, 3D modeling into their classrooms. A significant portion of the participants think that robotics education provides students with new skills, including 21st century skills. It is seen that a significant part of the participants believe in the effectiveness of the methods of the lessons. They think that these methods encourage and motivate students to learn.

The opinions of the participants about whether the educational robotic materials make the lesson productive or not are positive. An important part of the teachers emphasized the importance of in-service training for the use of robotics in schools. Most of the participants have opinions about the positive effect of educational robotic materials. Robotic materials can be used for motivation, specific skills, efficient teaching, etc. they thought it did. On the other hand, a significant part of the participants have negative opinions about the use of robotics in teaching. Some feel that robotics training requires expensive materials and causes little interaction with others.

Regarding the effects of robotics on students' attitudes towards science, it is dominant that most of the participants have positive opinions about the effect of robotics on students' attitudes. They are of the opinion that robotics has increased interest in science. They also think that robotics provides students with skills and increases their motivation.

About the effects of robotics on students' 21st century skills, the participants have positive views on the effects of robotics on students' 21st century skills. Robotic materials help students' communication skills, digital competence, collaborative work, creative thinking, etc. they consider to have a positive impact on.

There was no statistically significant difference between male and female students' interest in science. A statistically significant difference ($p<.05$) in favor of students in Turkey was found between students' interest in science on the basis of countries, that is, students in Turkey are more interested in science. Considering the results of students' attitudes towards technology; It was found that the highest dimension is the contribution and importance of technology, that is, students have positive attitudes towards the contribution and importance of technology when compared with other dimensions. Considering the difference between the attitudes of girls and boys towards technology; Statistically significant differences were found in the dimension of Tendency towards Technology and the sum of the scale, which means that males have a more positive attitude towards technology. Considering the results of the differences in students' attitudes towards technology on the basis of countries; It means that students in Portugal have more positive attitudes towards these dimensions than others.

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