



# Use of AR in Environmental Education to Increase Green Awareness Survey Report

Green Deal Awareness through Augmented Reality in Primary  
School Education  
2022-1-BG01-KA220-HED-000087414

SOFIA UNIVERSITY  
ST. KLIMENT OHRIDSKI



LATVIJAS  
UNIVERSITĀTE



UNIVERSITATEA  
LUCIAN BLAGA  
— DIN SIBIU —



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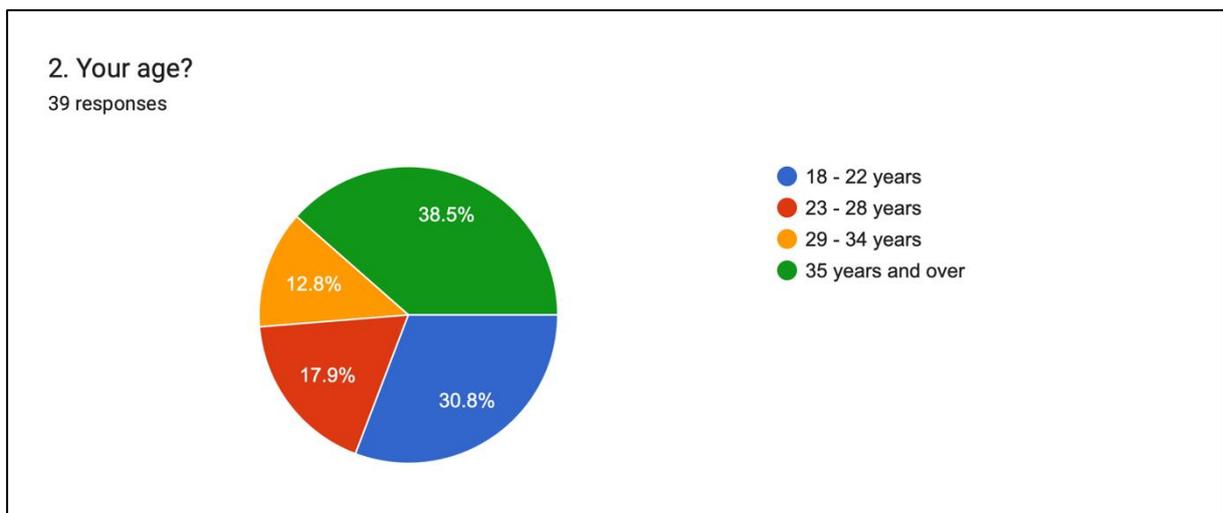
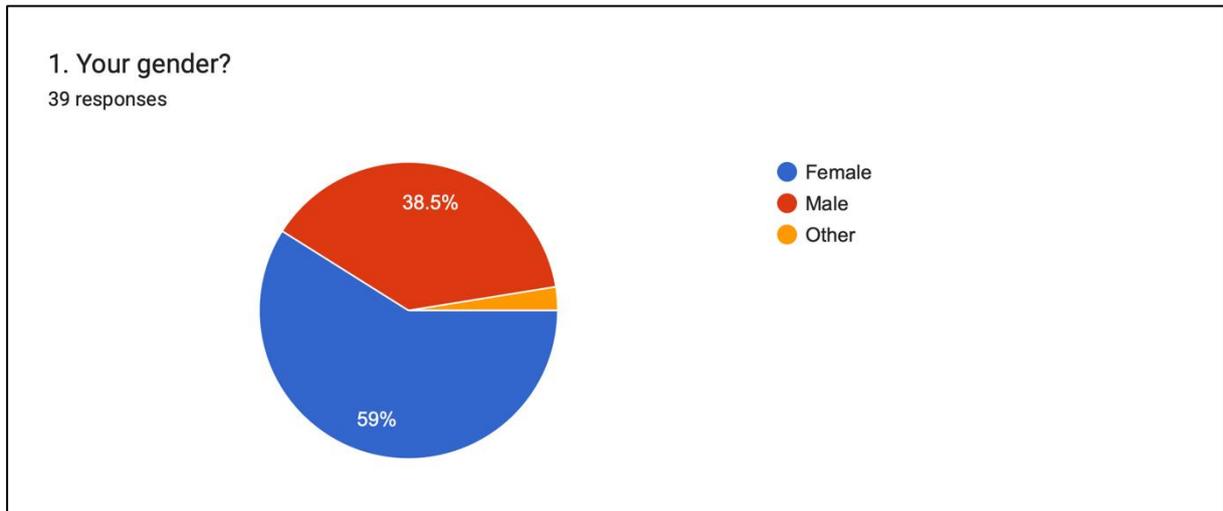
## INTRODUCTION

This report was prepared within the scope of the project of Green Deal Awareness through Augmented Reality in Primary School Education in order to determine the views of pre-service teachers and teachers on the use of augmented reality applications in environmental education. For this purpose, this report includes the evaluation of the results of the Use of AR in Environmental Education to Increase Green Awareness Survey applied to pre-service teachers and teachers. In this study, which was designed based on scientific principles, it is aimed to determine the opinions of pre-service teachers and teachers about the use of augmented reality applications in environmental education. Pre-service teachers' and teachers' responses were collected through an online survey created in Google Forms. In the first part of the survey, gender, age and status information was requested from the participants. In the second part, answers were collected about the use of augmented reality applications in environmental education. In this section, 24 questions prepared according to a 5-Point Likert Scale were asked to the participants. Participants were asked to give their answers between "1. Strongly disagree" and "5. Totally Agree". The answers were collected between 16.08.2023 and 05.01.2024.

# 1. BULGARIA

## 1.1. Number of Participants and Profile

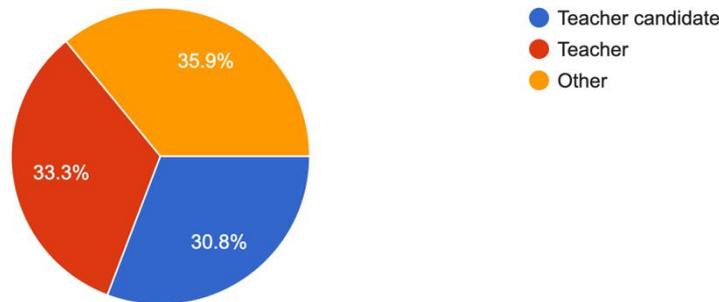
The survey was conducted by Sofia University “St. Kliment Ohridski“, FEBA, project coordinator, with 49 participants. 59 % of the participants were female and 38,5% were male.



33,3 % of the participants who participated in the survey was a teacher, 30,8% Teacher candidate and 35,9% were different profession.

### 3. Your occupation/profession?

39 responses

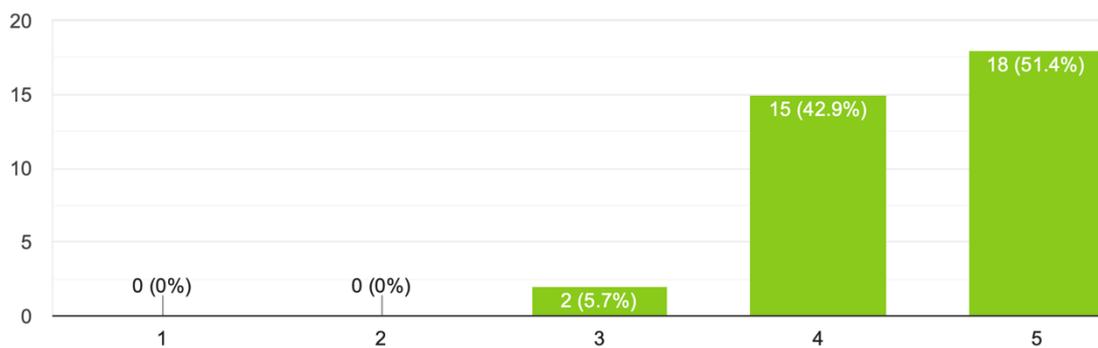


## 1.2. Summary of Results

### Question – 1:

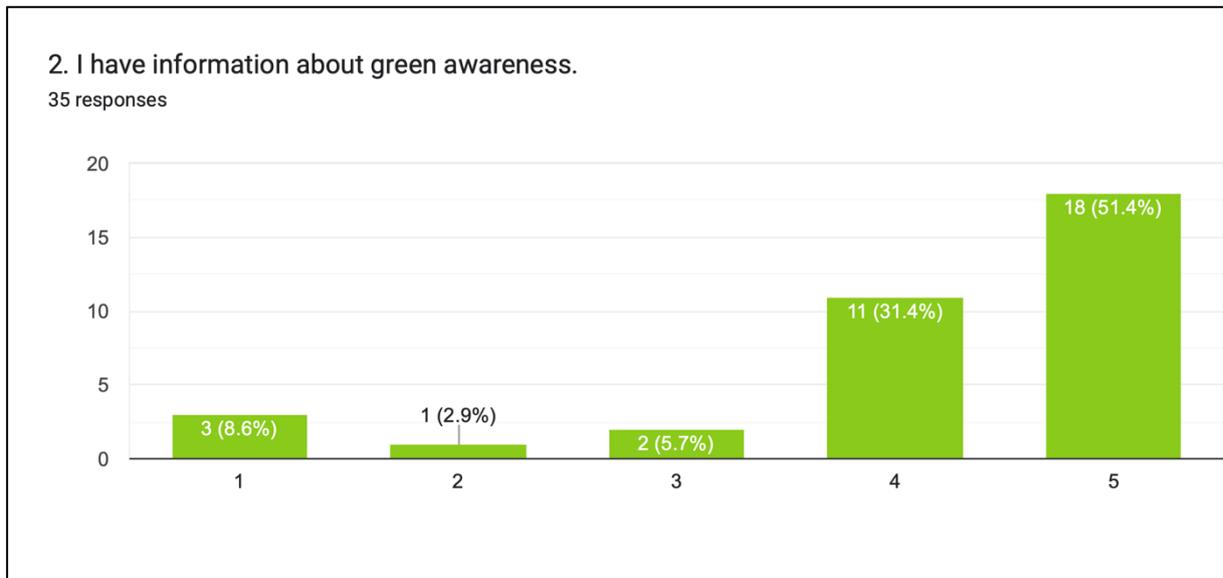
#### 1. I fulfill my responsibility to protect the environment.

35 responses



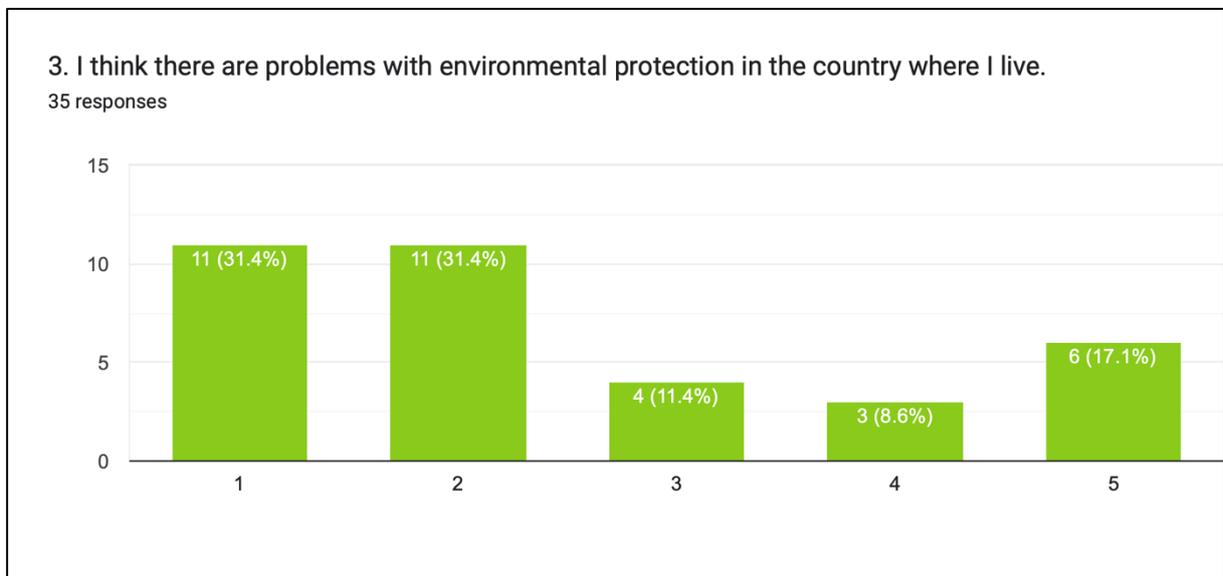
While 54,4% of the participants said “Totally Agree” to I fulfill my responsibility to protect the environment, 42,9 % said “Mostly Agree”. This shows that 97, 3% of all participants think that they fulfill their responsibilities to protect the environment. 2 participants stated that he definitelydisagreed with this statement.

## Question – 2:



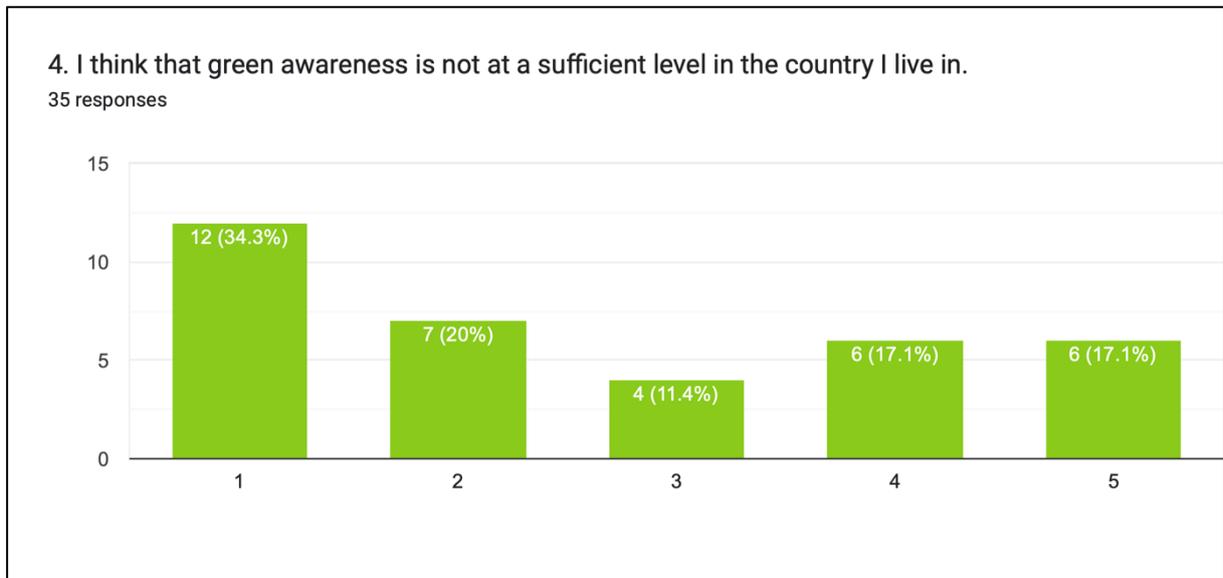
While 51,4% of the participants said “Totally Agree” to the statement I have information about green awareness, 31,4 % said “Mostly Agree”. The remaining 17,2 % of the participants stated that they thought negatively or „Moderately agreed“. This result shows that 82,8 % of all participants have information about Green awareness.

## Question – 3:



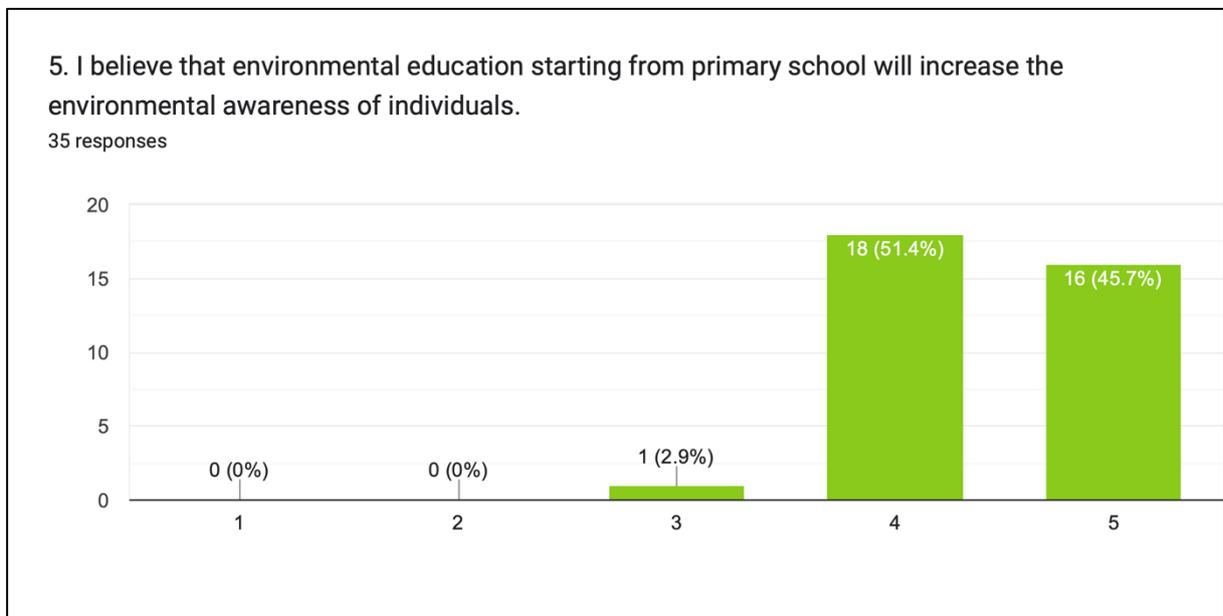
The participants were then presented with the statement I think there are problems with environmental protection in the country where I live, 17,1 5% of the participants responded as “Totally Agree” and 8,6 % of them responded as “Mostly Agree”. This shows that only 25,7% of the participants think that there are problems related to environmental protection in the country where they live.

#### Question – 4:



17,1% of the participants said “Totally Agree” to the statement about the lack of green awareness in the country they live in, while 17,1% said “Mostly Agree”. This result shows that 34.3% of all participants think that green awareness is not at a sufficient level in the country they live in.

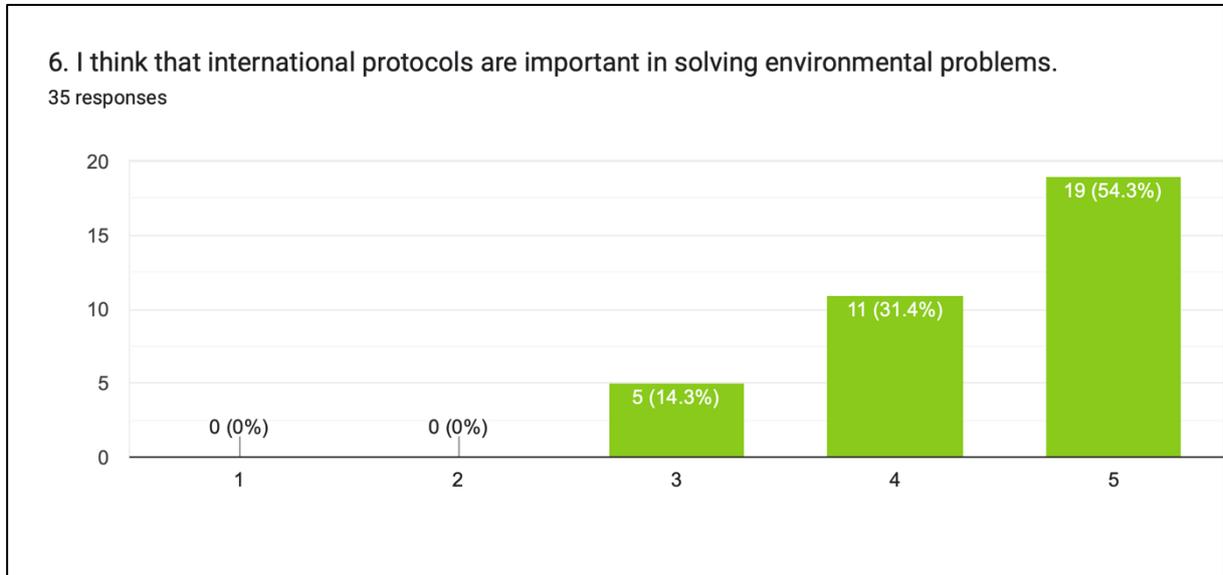
#### Question – 5:



To the statement that environmental education given starting from primary school will increase individuals; environmental awareness, 45.7% of the participants said “Totally Agree”, while 51,4% answered “Mostly Agree”. This shows that 95.2% of the participants think that

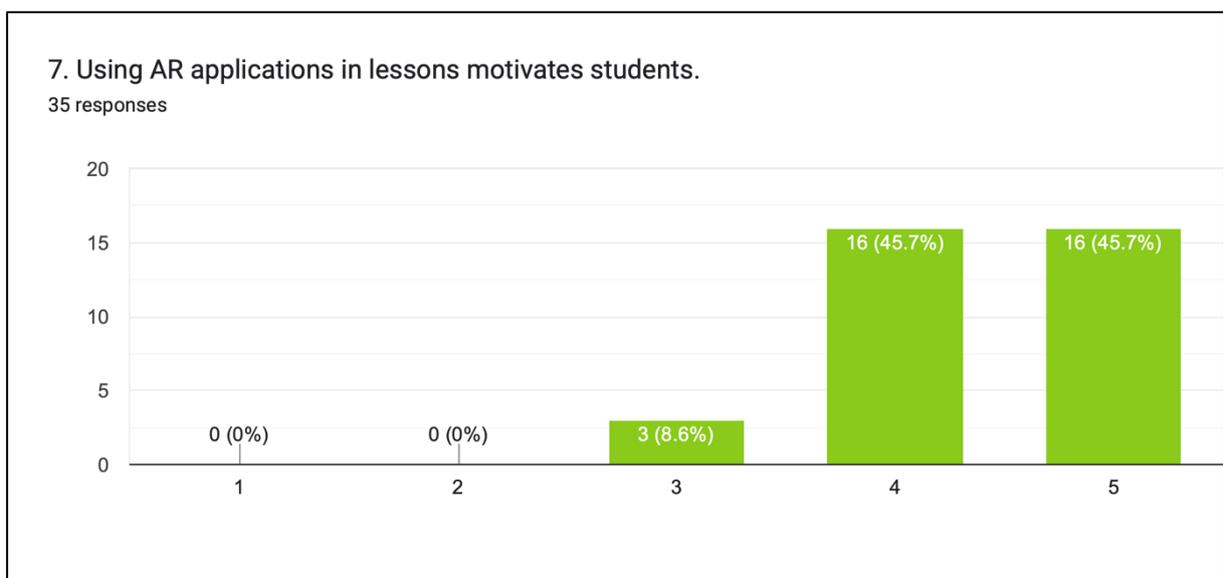
environmental education starting from primary school will increase individual and environmental awareness.

**Question – 6:**



Then, the statement “I think that international protocols are important in solving environmental problems; was presented to the participants. To this statement, 54,3% of the participants responded „Totally Agree“ and 31.4% responded „Mostly Agree“. This shows that the participants think that international protocols are important in solving environmental problems.

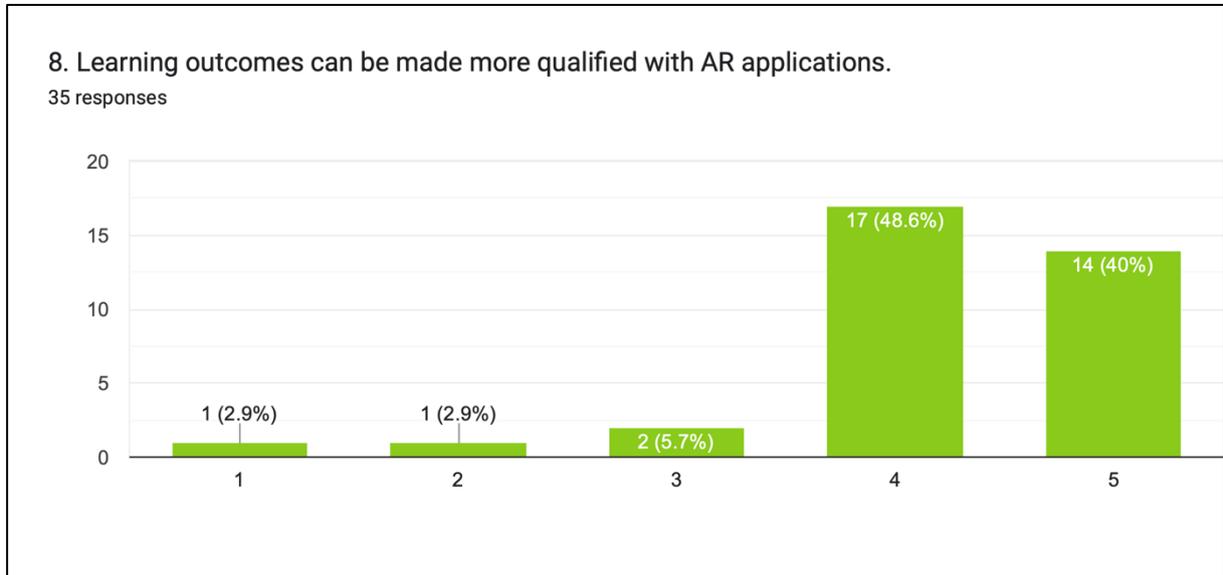
**Question – 7:**



To the statement about the use of AR applications in the lessons motivating the students, 45,7% of the participants answered „Totally Agree“ and 45,7% answered „Mostly Agree“. This

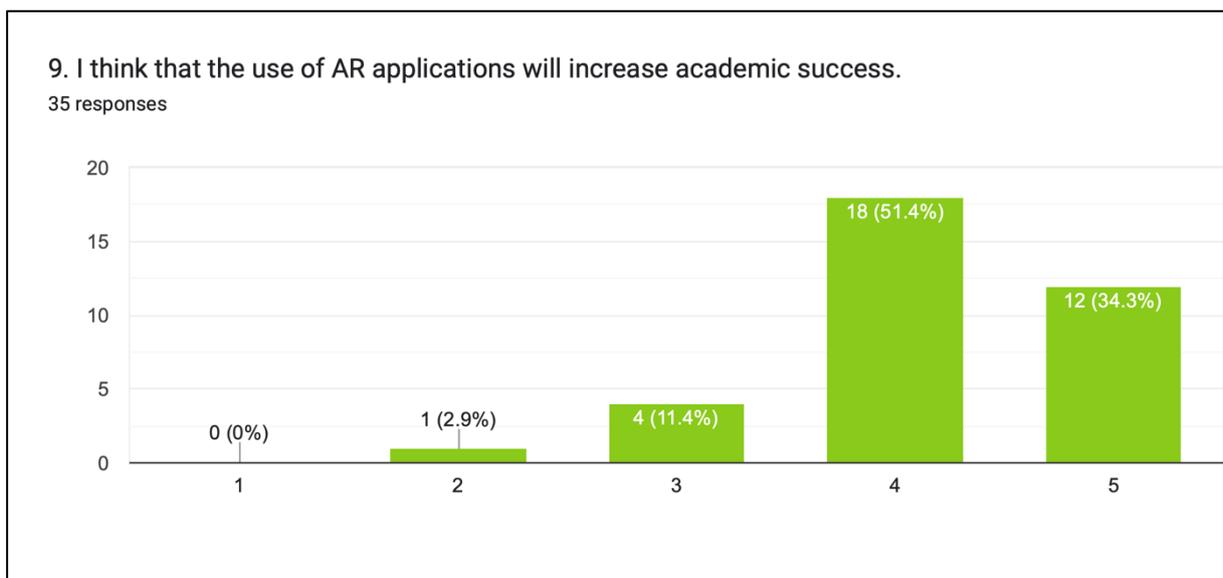
shows that 91,4% of the participants think that the use of AR applications in lessons will motivate students.

**Question – 8:**



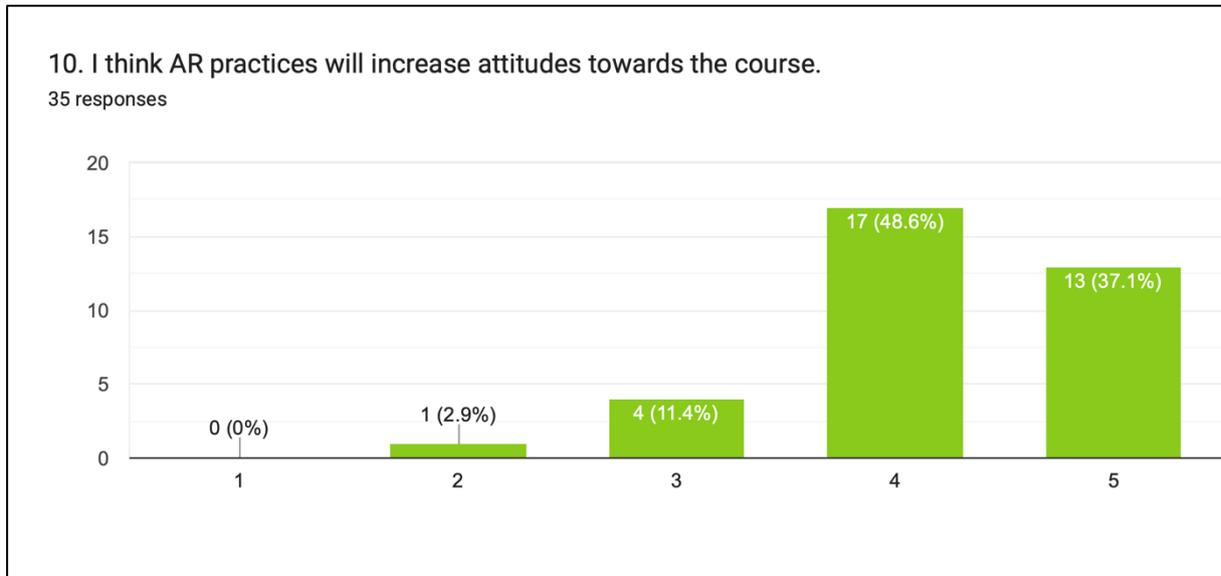
40% of the participants “Totally Agree” with the statement that learning outcomes become more qualified with AR applications, while 48,6% of the participants “Mostly Agree”. This result shows that a large part of the survey participants think that learning outcomes will become more qualified with AR applications.

**Question – 9:**



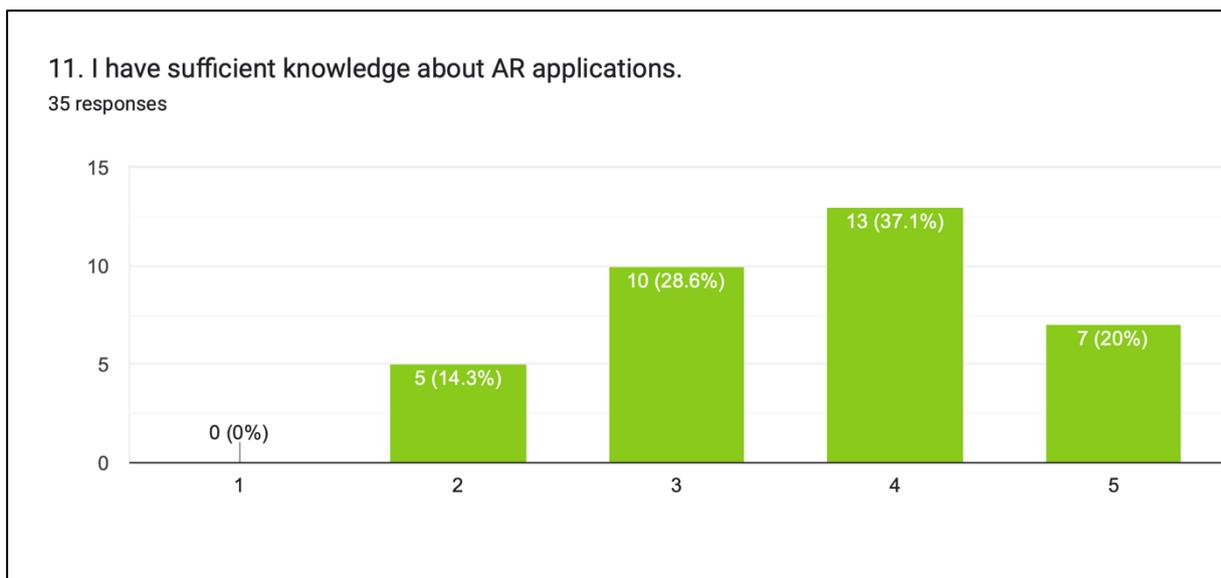
34,3% of the participants „Totally Agree“ with the statement I think that the use of AR applications will increase academic success 51,4% of the participants „Mostly Agree“. This result shows that 85,7% of all participants think that the use of AR applications will increase academic success.

**Question – 10:**



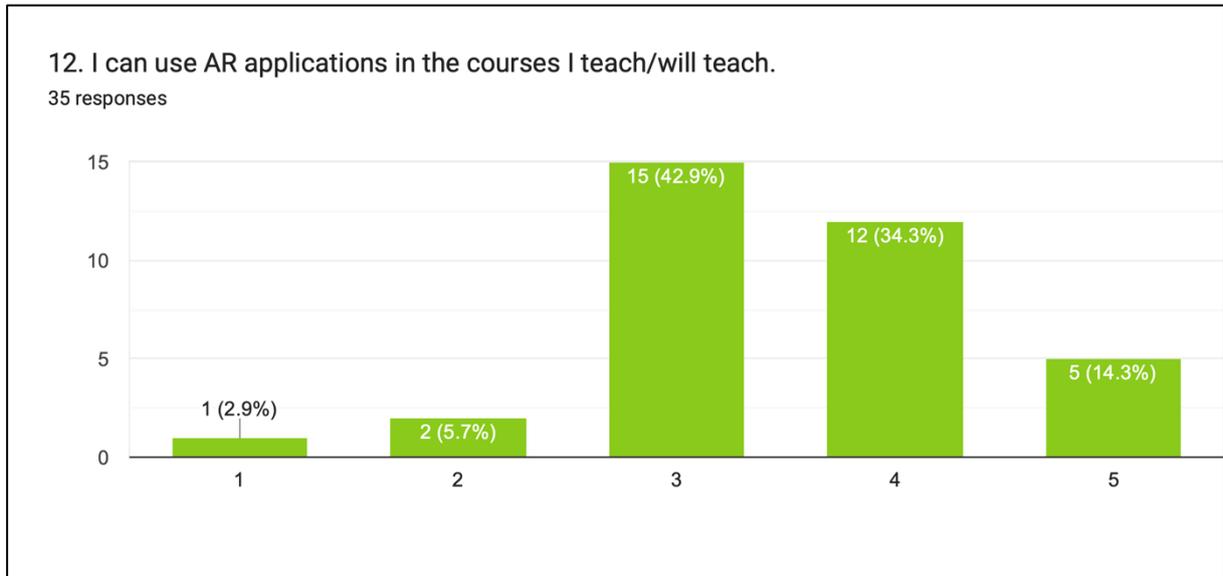
Participants think that using AR practices will increase attitudes towards the course - 37,1% “Totally agree” and 48,6% “Agree”. 11,4% of participants answered “Moderately agree”. No participant disagreed with the statement.

**Question – 11:**



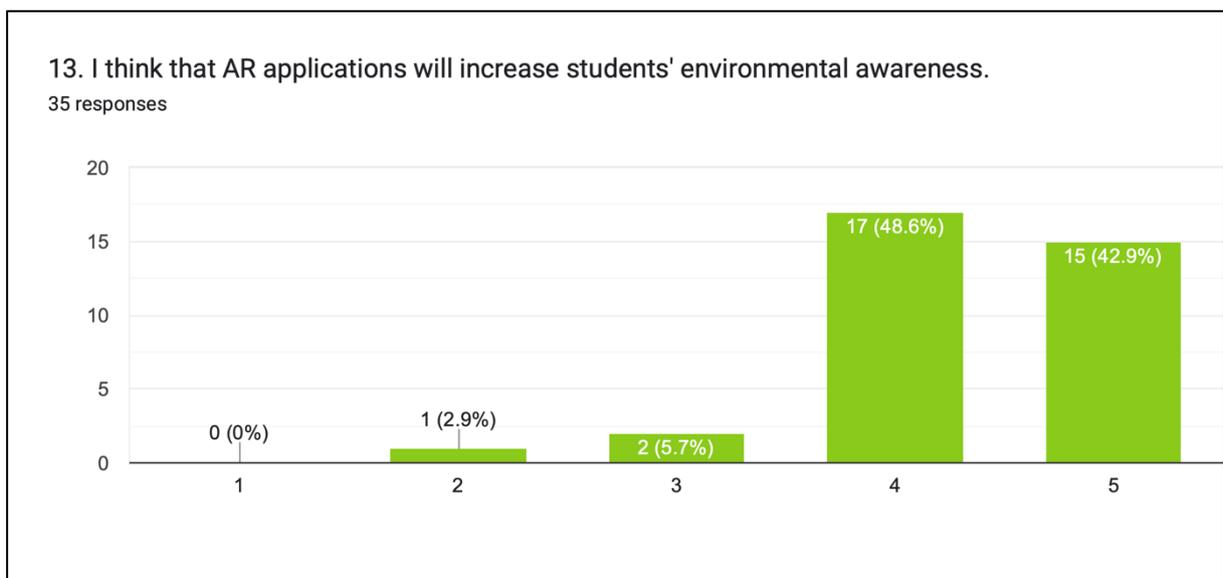
Most participants “Agree” with the statement that they have sufficient knowledge about AR applications - 37,1%, 20% „Totally Agree“, 28,6% answered “Moderately agree”, 14,3% „Disagree”.

**Question – 12:**



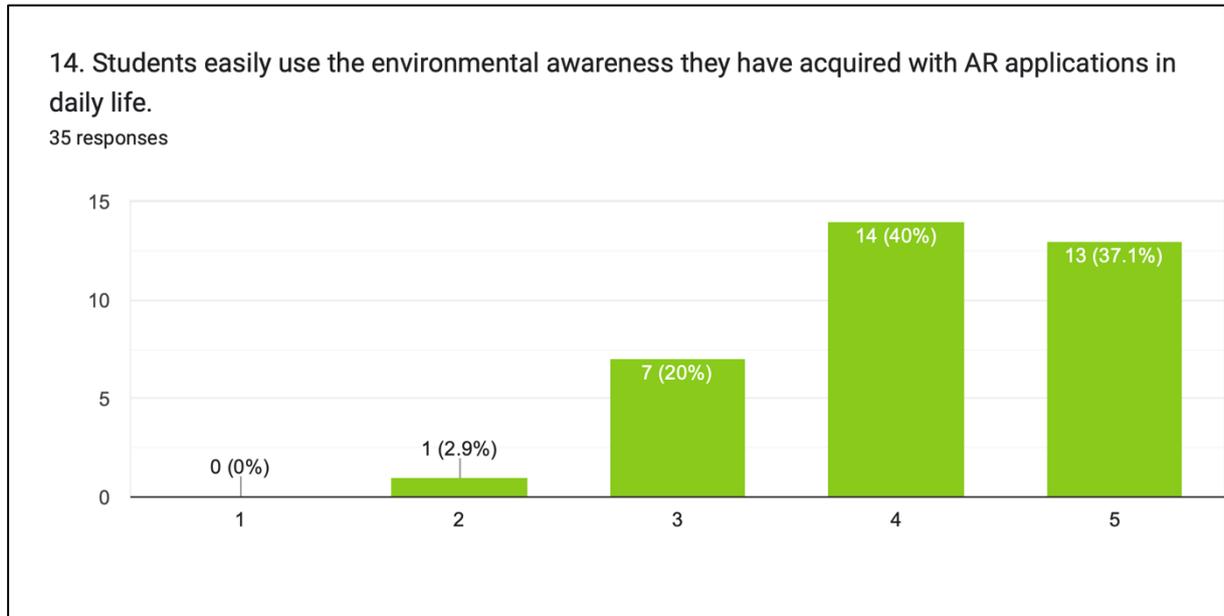
Most participants think they could use AR applications in the course they teach - 42,9% of participants answered “Moderately agree”, 34,3% „Agree“, 14,3% „Totally Agree“, 2 participants “Disagree” and 1 participant „Totally disagree” with the statement.

**Question – 13:**



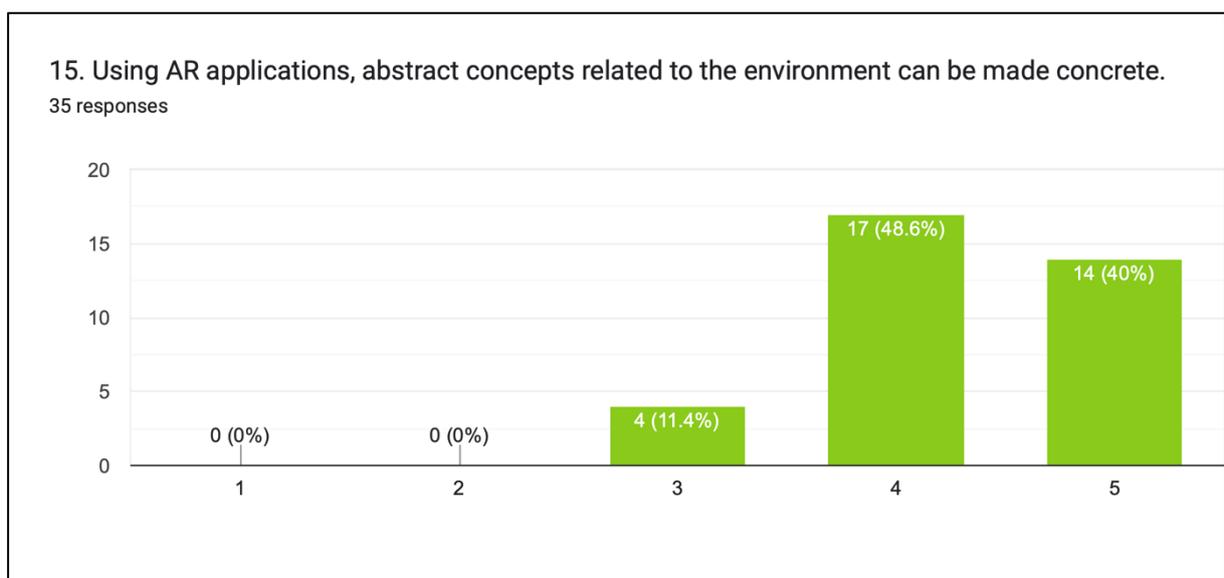
Most participants think that AR applications will increase students' environmental awareness – 42,9%) “Totally agree” and 48,6% “Agree”. 5,7% answered “Moderately agree” and 1 participant (2,9%) disagreed with the statement.

**Question – 14:**



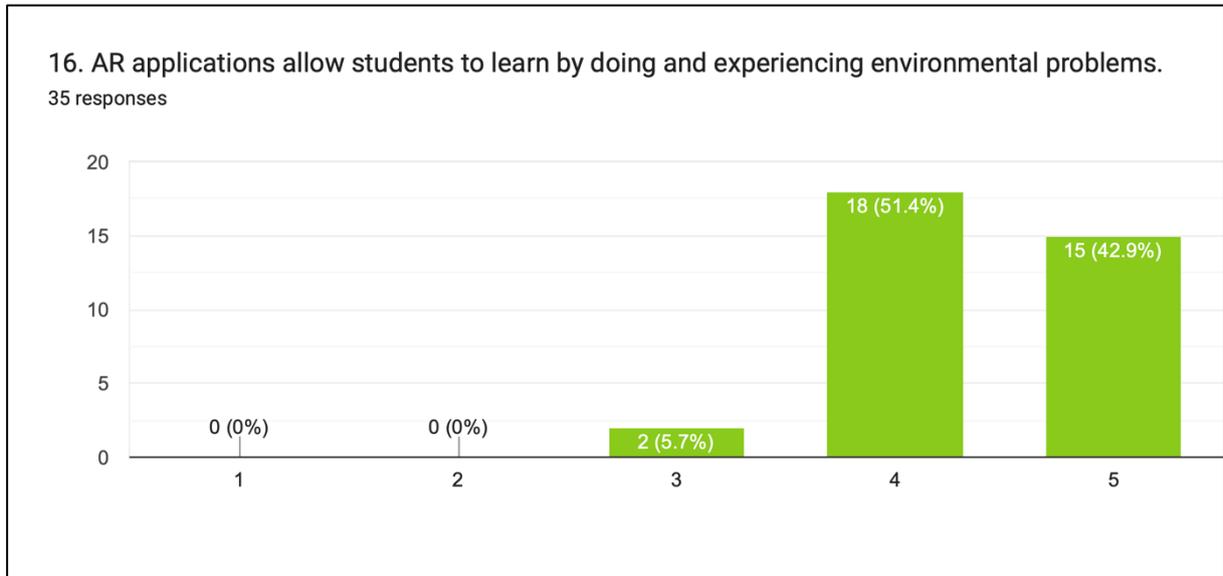
Most participants think that students easily use the environmental awareness they have acquired with AR applications daily life – 37,1% “Totally agree” and 40%) “Agree”. 20% answered “Moderately agree”, 1 participants (2,9%) disagreed with the statement.

**Question – 15:**



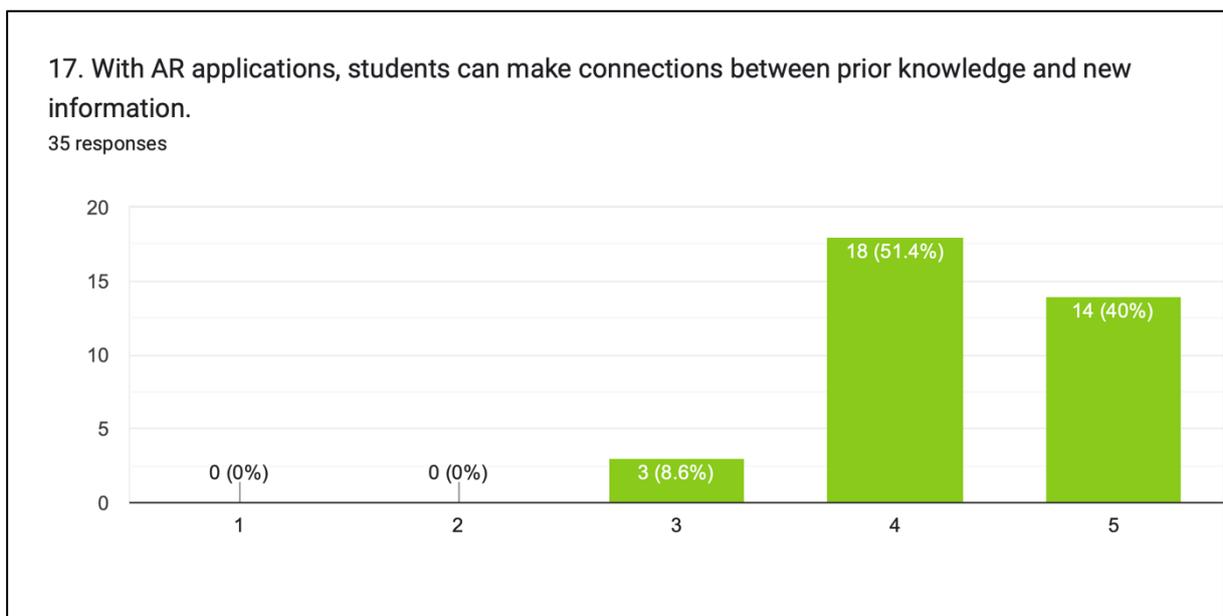
Most participants think that using AR applications, abstract concepts related to the environment can be made concrete - 40% “Totally agree” and 48,6% “Agree”. 11,4% answered “Moderately agree”. No participant disagreed with the statement.

**Question – 16:**



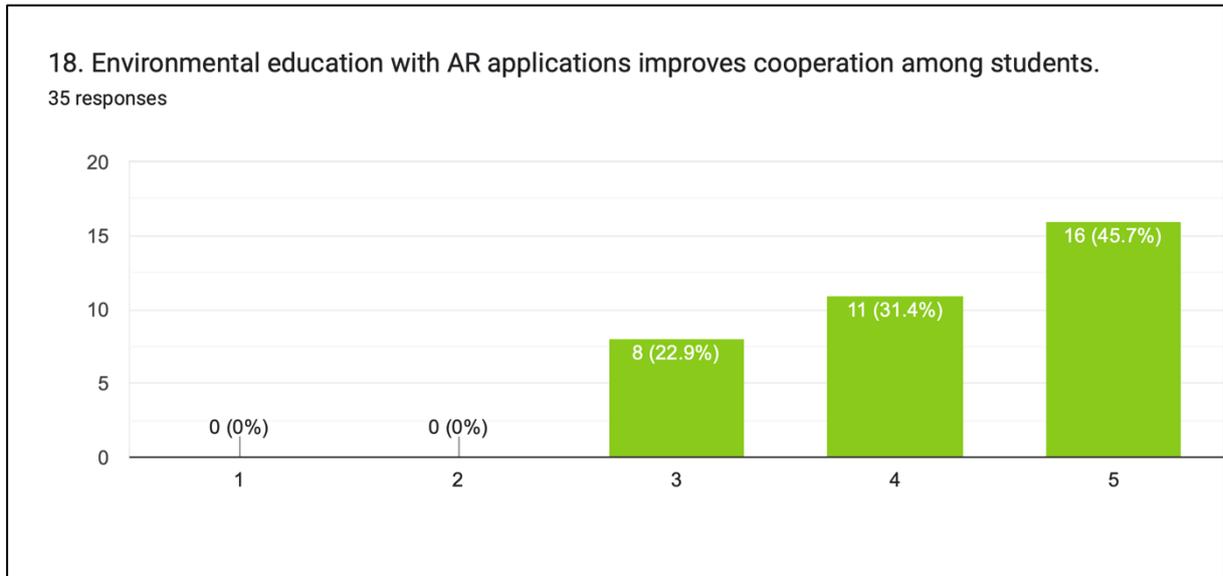
Most participants think that AR applications allow students to learn by doing and experiencing environmental problems - 42,9% “Totally agree” and 51,4% “Agree”. 2 participants (5,7%) answered “Moderately agree”.

**Question – 17:**



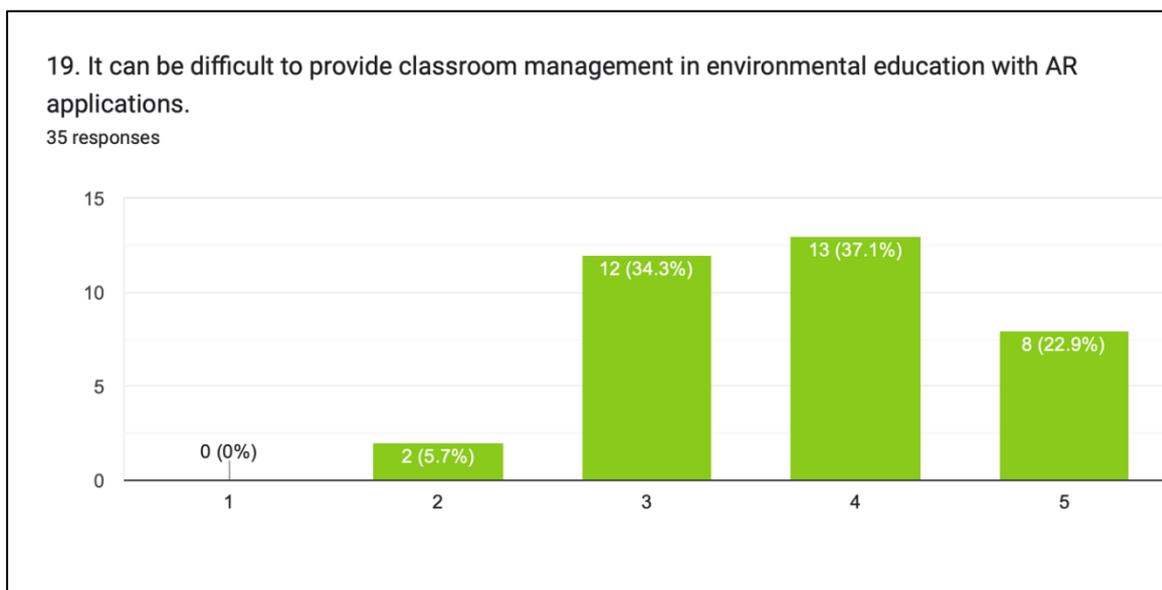
Most participants think that with AR applications, students can make connections between prior knowledge and new information - 40% “Totally agree” and 51,4% “Agree”, 3 participants 8,6% answered “moderately agree”.

**Question – 18:**



Answers to the statement that environmental education with AR applications improves cooperation among students varies. Most participants agree with the statement - 10 participants (45,7%) “Totally agree” and 31,4% “Agree”, 22,9% answered “Moderately agree”.

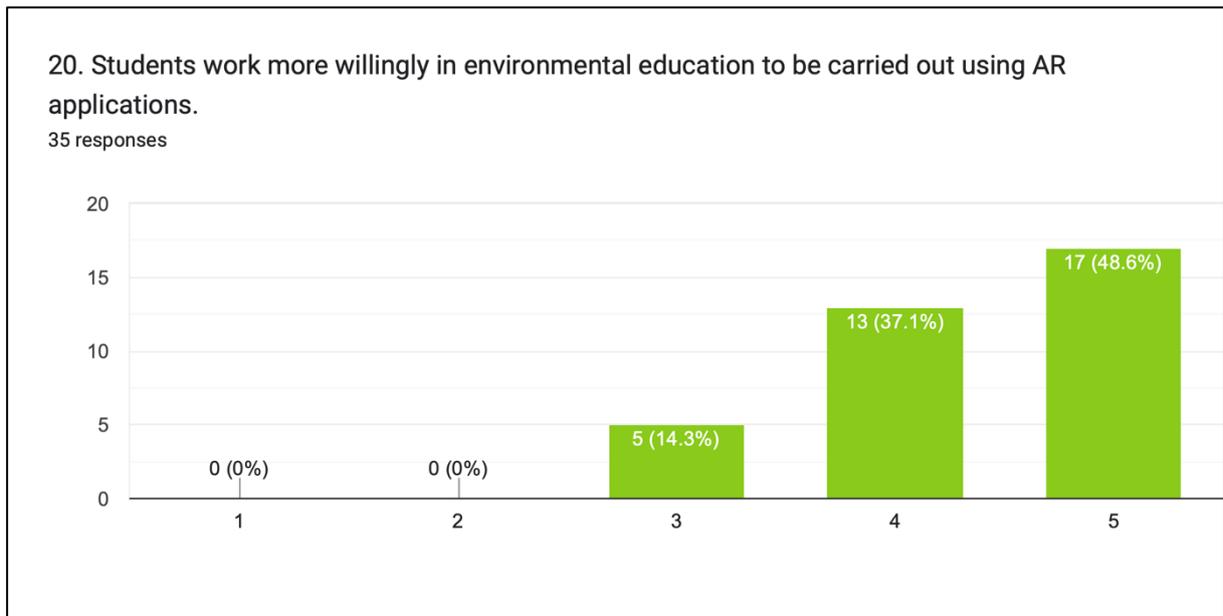
**Question – 19:**



Answers to the statement that it can be difficult to provide classroom management in environmental education with AR applications varies widely - 22,9% “Totally agree”,

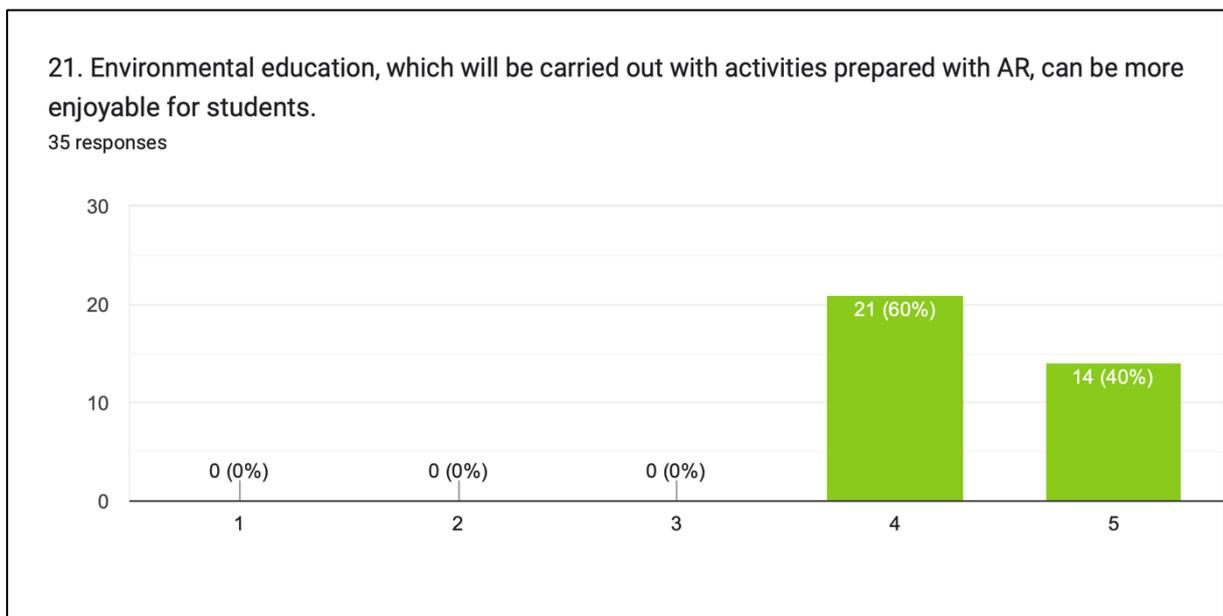
37,1% “Agree”, 34,3% answered “Moderately agree”. 5,7% disagreed with the statement.

**Question – 20:**



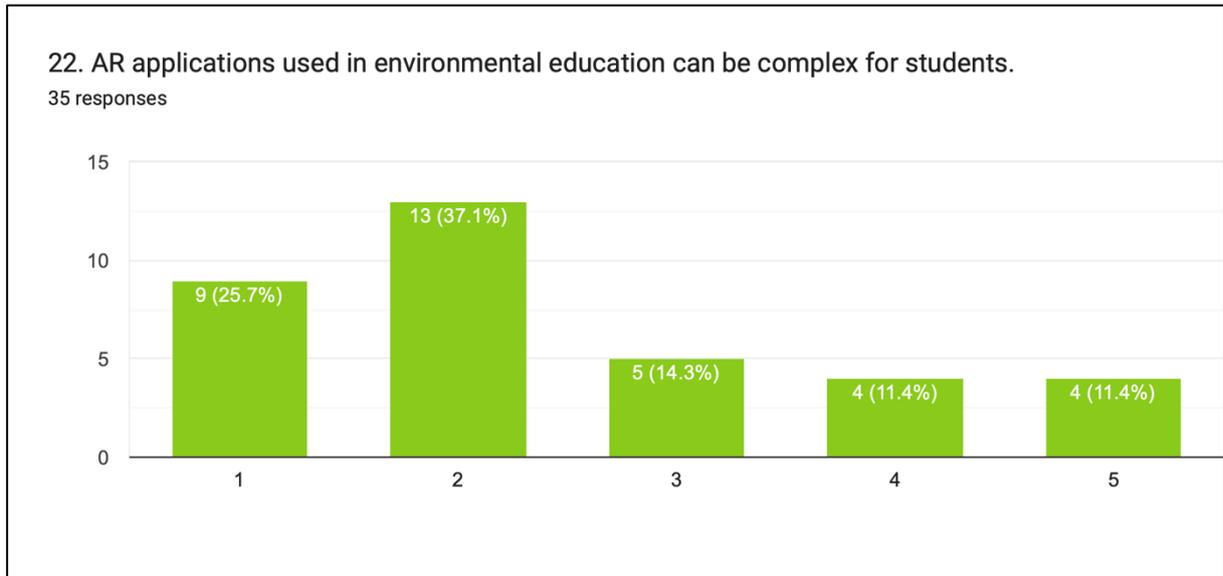
Most participants think that students work more willingly in environmental education to be carried out using AR applications - 48,6% “Totally agree” and 37,1% “Agree”, 14,3% answered “Moderately agree”.

**Question – 21:**



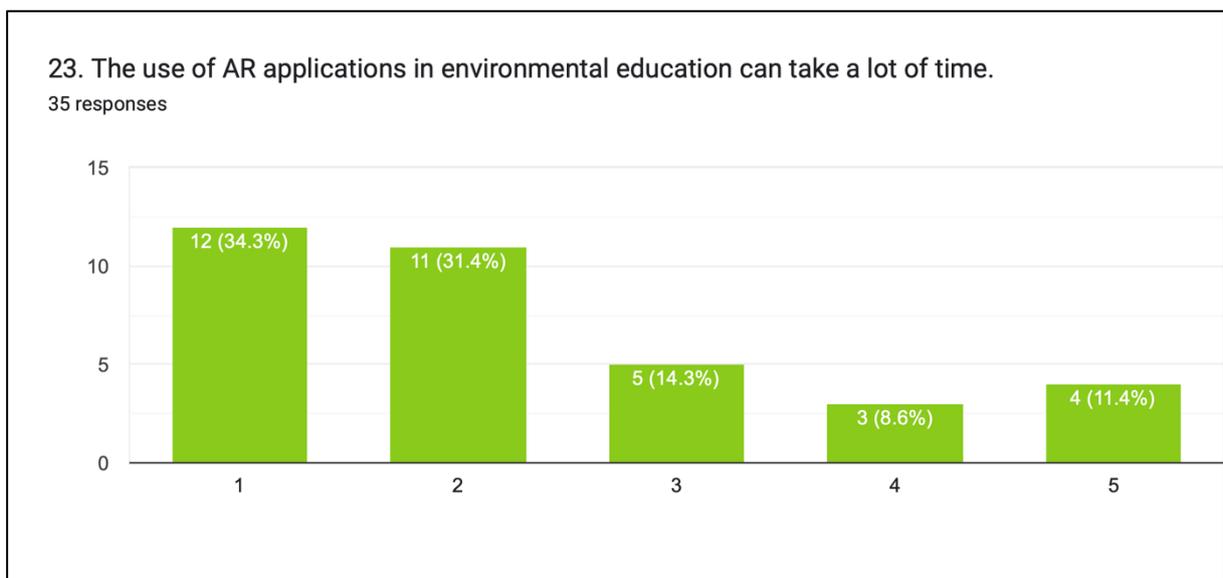
Most participants think that environmental education, which will be carried out with activities prepared with AR, can be more enjoyable for students – 40% “Totally agree” and 60% “Agree”. No participant disagreed with the statement.

**Question – 22:**



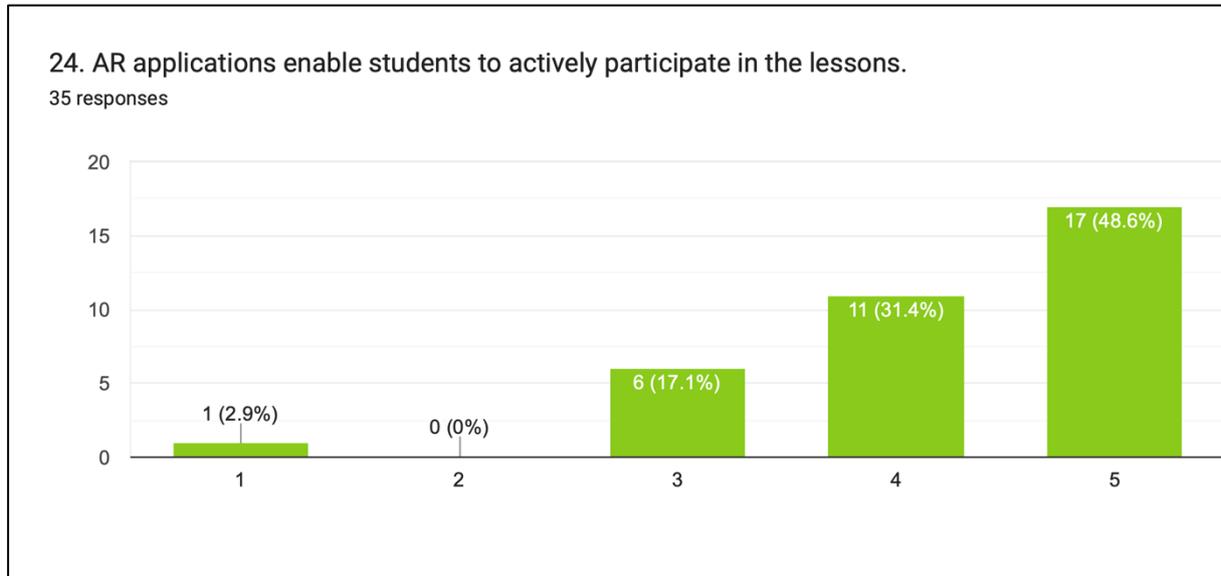
Answers to the statement that AR applications used in environmental education can be complex for students, varies - 11,4% “Totally agree”, 11,4% “Agree”, 14,3% answered “Moderately agree”. 37,1% „Disagreed“ and 25,7% „Totally disagree“ with the statement.

**Question – 23:**



Answers to the statement that AR applications in environmental education can take a lot of time varies - 11,4% “Totally agree”, 8,6% “Agree”, 14,3% answered “Moderately agree”. 31,4% „Disagreed“ and 34,3% „Totally disagree“ with the statement.

#### Question – 24:



Most participants think that AR applications enable students to participate in the lessons – 48,6% “Totally agree” and 31,4% “Agree”. 17,1% answered “Moderately agree” and 1 participant (2,9%) answered „Totally disagree“.

### 1.3. Conclusion

This survey represents the qualitative and effective implementation of the project “Green Deal Awareness through Augmented Reality in Primary School Education”, as it provides objective assessment and recommendations, guaranteeing the effectiveness and efficiency of the remaining planned project activities and the sustainability of the project results after its completion. The conducted survey covers 35 respondents. The purpose of the study is to identify the attitudes and needs for implementation of AR in the classroom. According to the results of the survey, most participants believe that AR can implement theory and practice in environmental education.

The participants have been informed about green awareness and feel sure for implementation AR in education and lessons. Most respondents think there are no problems with environmental protection in the country, but green awareness is not at a sufficient level in Bulgaria.

Respondents shared the view that the courses would benefit both their career development and students and the completion of their curriculum. Respondents are unanimous that it will increase students' knowledge and skills and AR applications give opportunities for students to learn by doing and experiencing environmental problems and can easily accept and process new information.

A large part of the respondents find a connection in the learning process and Augmented reality and specific examples and topics for this. The review of the respondents shows the positive attitude and awareness of changing the educational process.

## 2. GERMANY

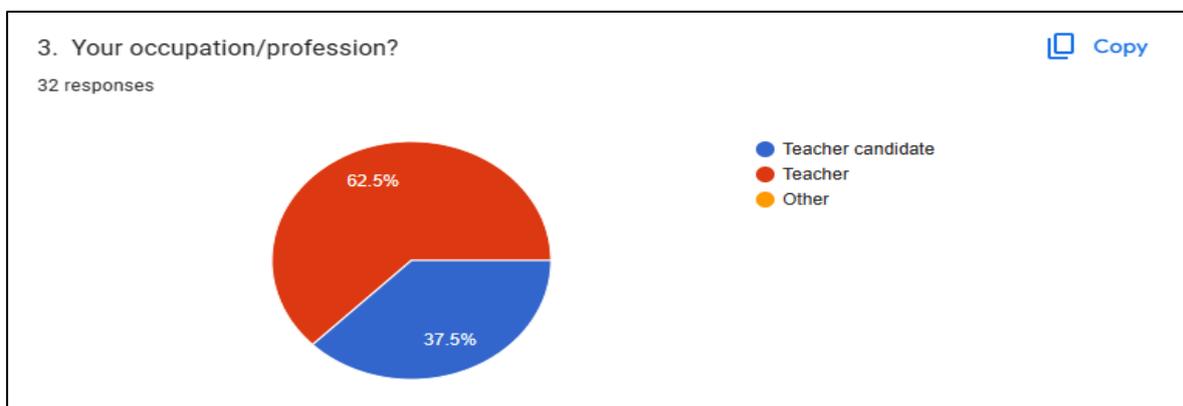
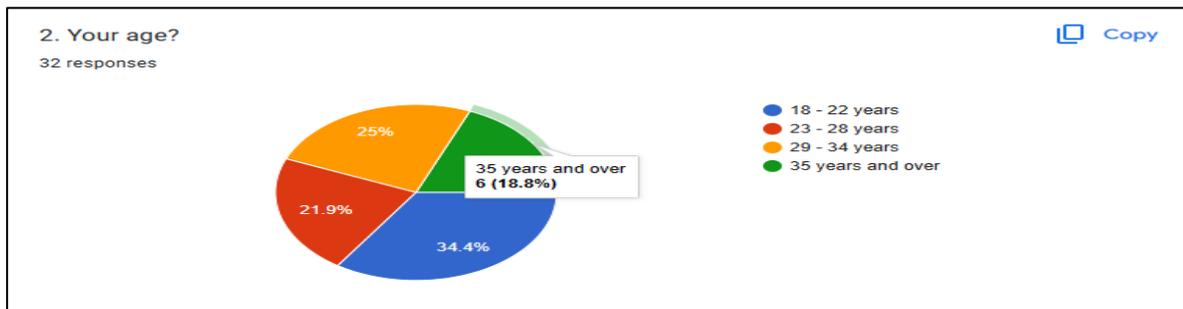
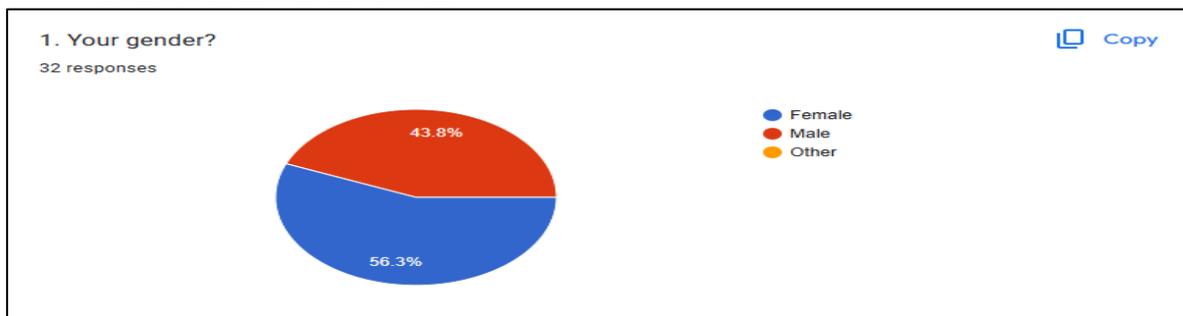
### 2.1. Number of Participants and Profile

The survey was conducted by GEDONSOFT Company, one of the project partners, with 32 participants. 56.3% of the participants were female and 43.8 % were male.

- 21.9% are between 23-28 years old
- 25 % are between 29-34 years old
- 18.8% are 35 years old and over
- 34.4% are between 18-22 years old

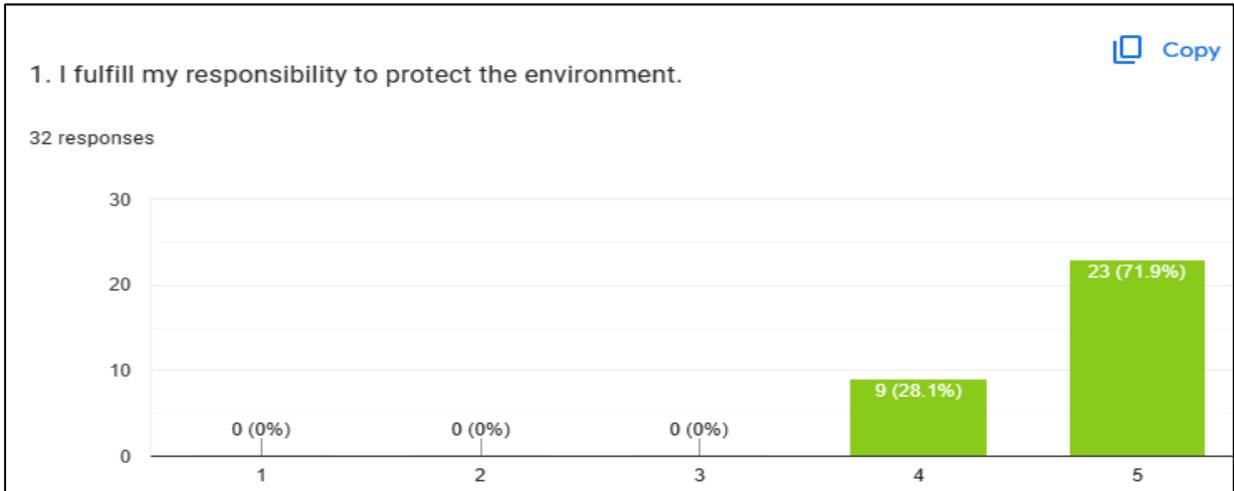
- 62.5% are Teacher

37.5% are Teacher Candidate



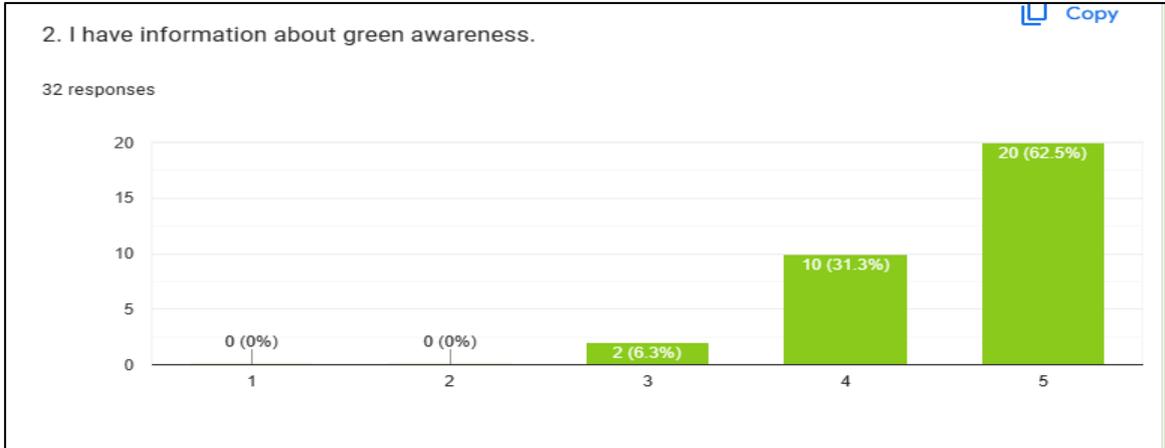
**2.2. Summary of Results**

**Question – 1:**



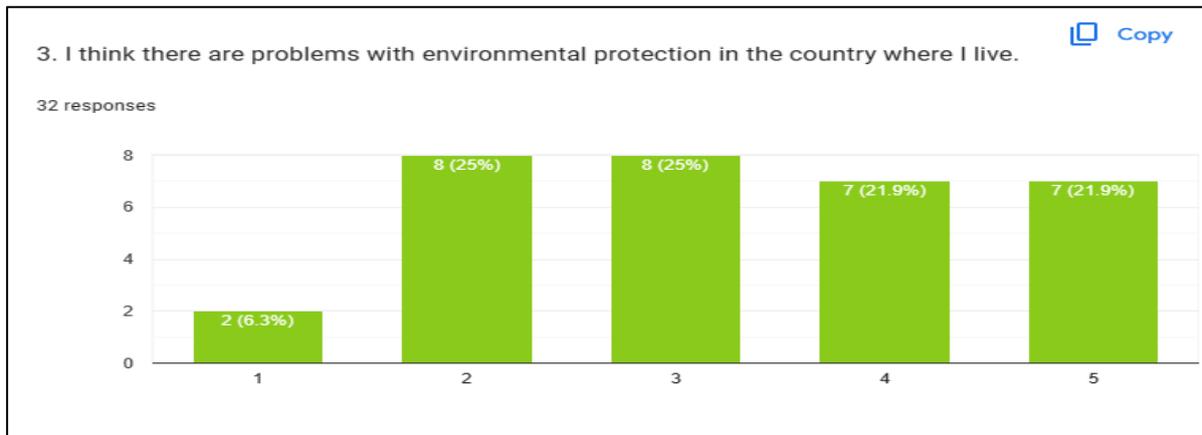
The first question of the survey was responded as “Totally Agree” by 71.9% of the participants and as “Mostly Agree” by 28.1% .

**Question – 2:**



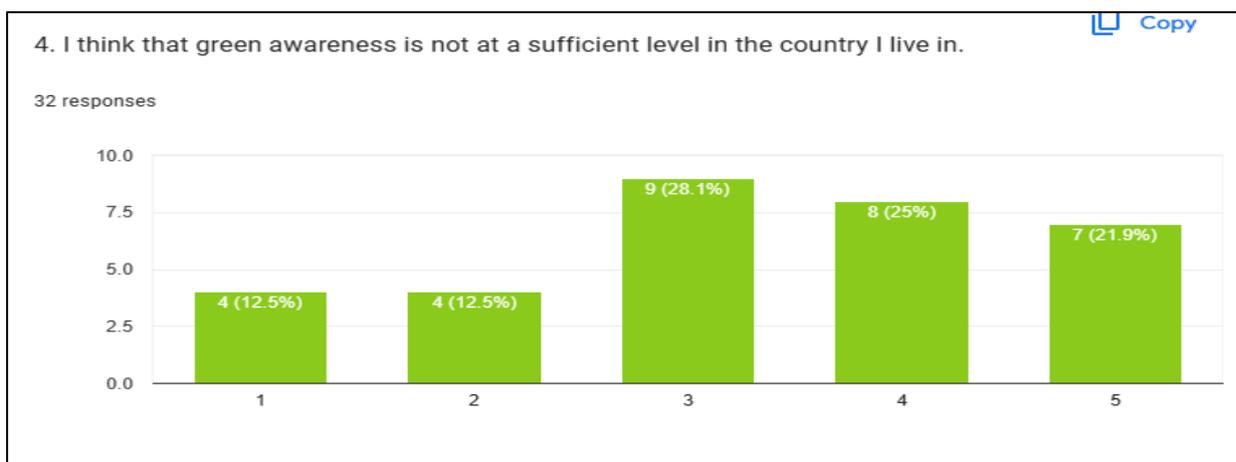
The second question of the survey was responded as “Totally Agree” by 62.5% of the participants , as “Mostly Agree” by 31.3% and as “Moderately Agree” by 6.3% .

### Question – 3:



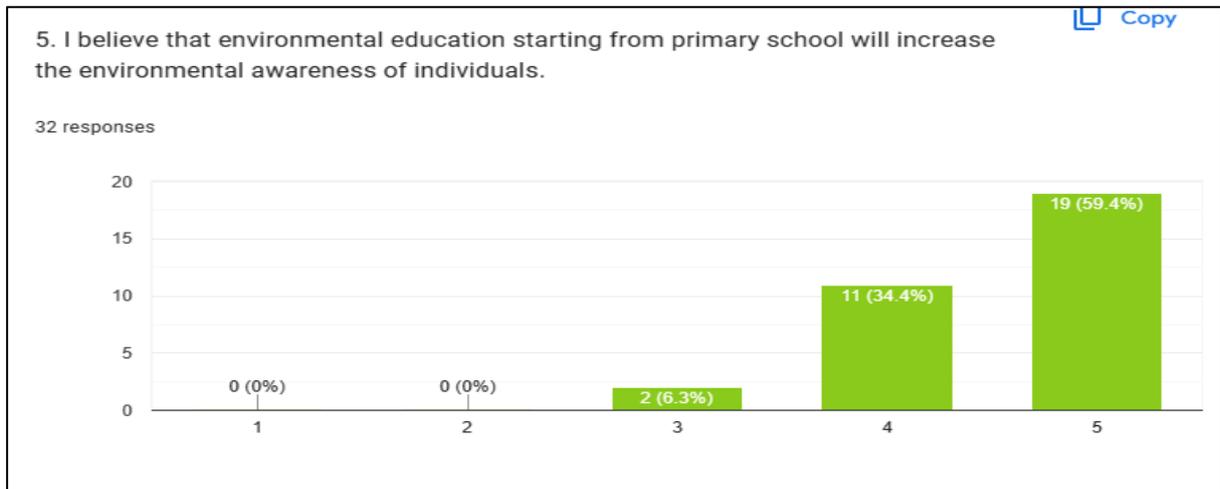
The 3rd question of the survey was responded as “Totally Agree” by 21.5% of the participants and as “Mostly Agree” by 21.9% , as “Moderately Disagree” by 25%, as “Disagree” by 25% again and as “Definitely Disagree” by 6.3% .

### Question – 4:



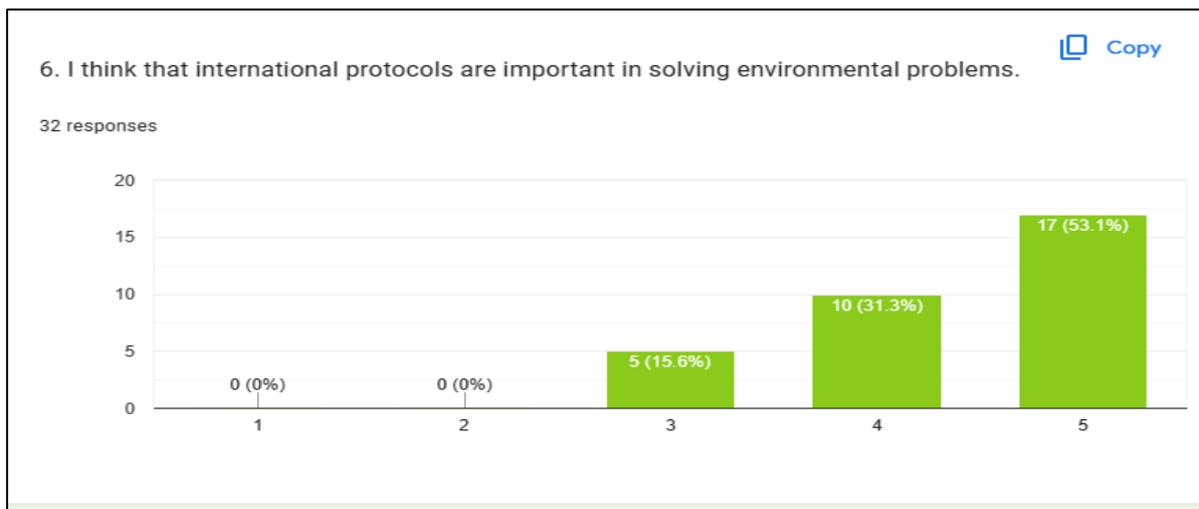
The 4th question of the survey was responded as “Totally Agree” by 21.9% of the participants and as “Mostly Agree” by 25% , as “Moderately Disagree” by 28.1%, as “Disagree” by 12.5% again and as “Definitely Disagree” by 12.5% .

### Question – 5:



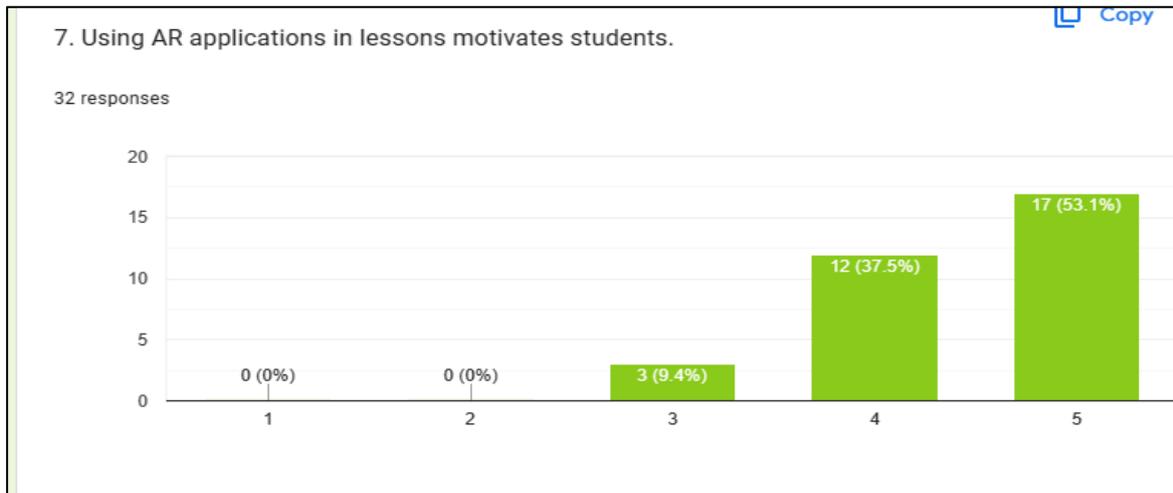
The 5th question of the survey was responded as “Totally Agree” by 59.4% of the participants and as “Mostly Agree” by 34.4% , as “Moderately Disagree” by 6.3%.

### Question – 6:



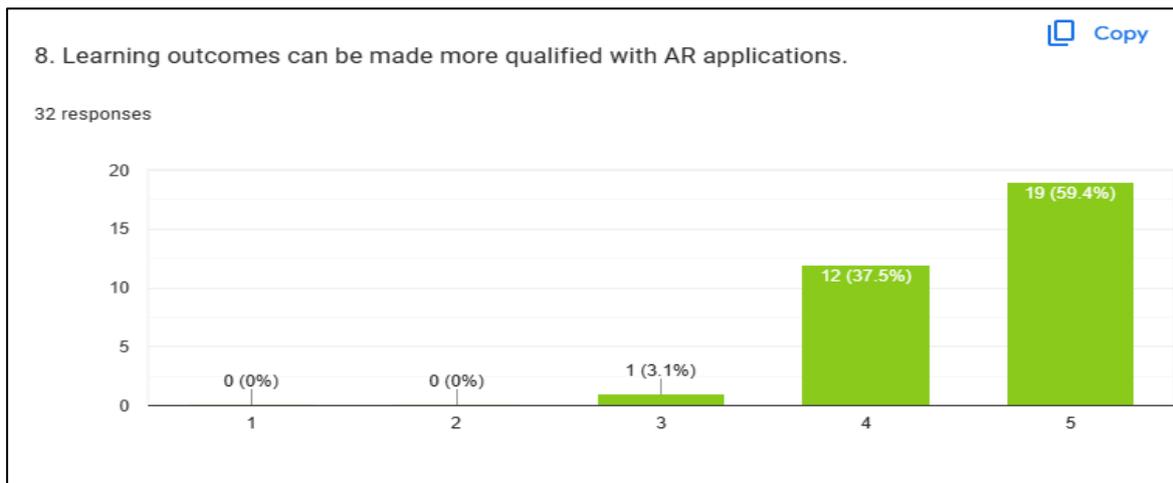
The 6th question of the survey was responded as “Totally Agree” by 53.1% of the participants and as “Mostly Agree” by 31.3% , as “Moderately Disagree” by 15.6%.

### Question – 7:



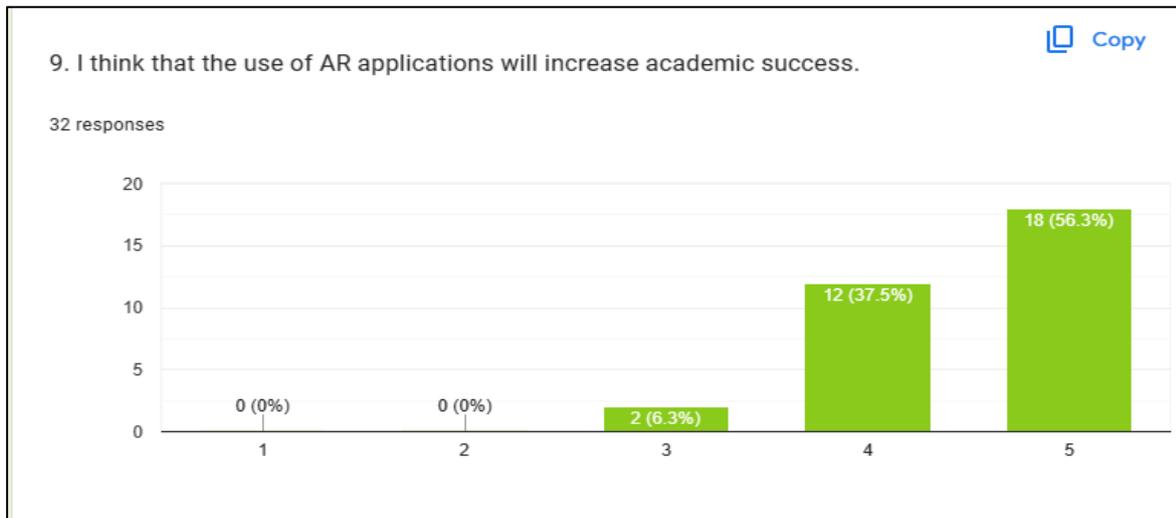
The 7th question of the survey was responded as “Totally Agree” by 53.1% of the participants and as “Mostly Agree” by 37.5% , as “Moderately Disagree” by 9.4%

### Question – 8:



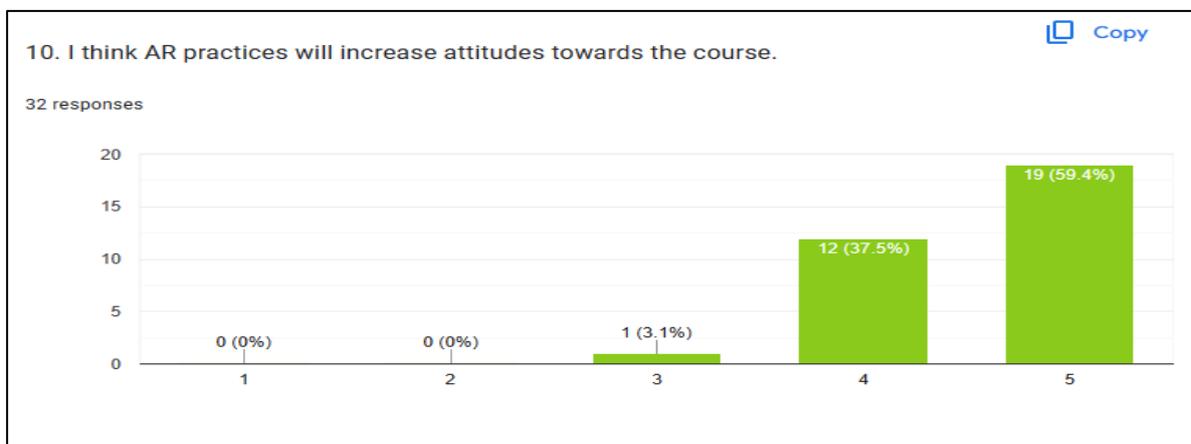
The 8th question of the survey was responded as “Totally Agree” by 59.4% of the participants and as “Mostly Agree” by 37.5% , as “Moderately Disagree” by 3.1%

### Question – 9:



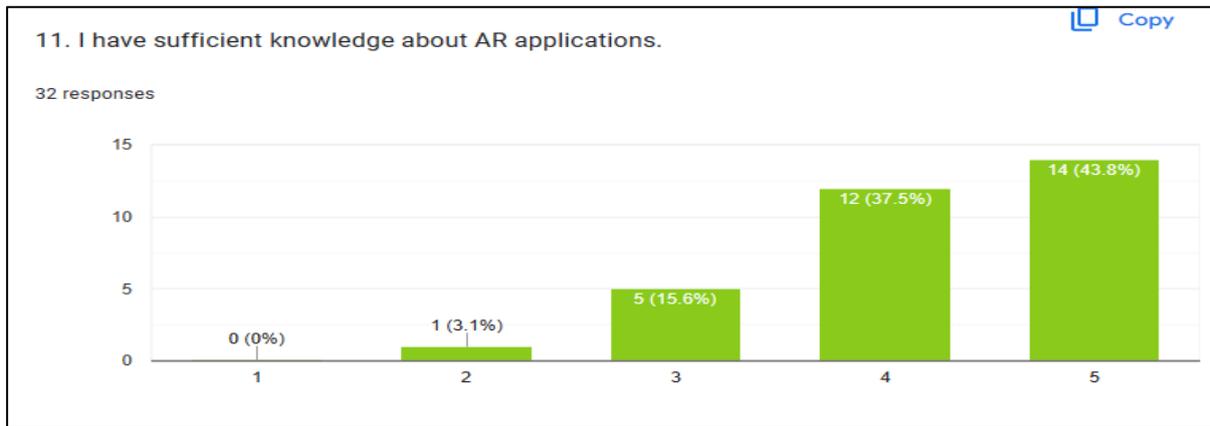
The 9th question of the survey was responded as “Totally Agree” by 21.5% of the participants and as “Mostly Agree” by 21.9% , as “Moderately Disagree” by 25%, as “Disagree” by 25% again and as “Definitely Disagree” by 6.3% .

### Question – 10:



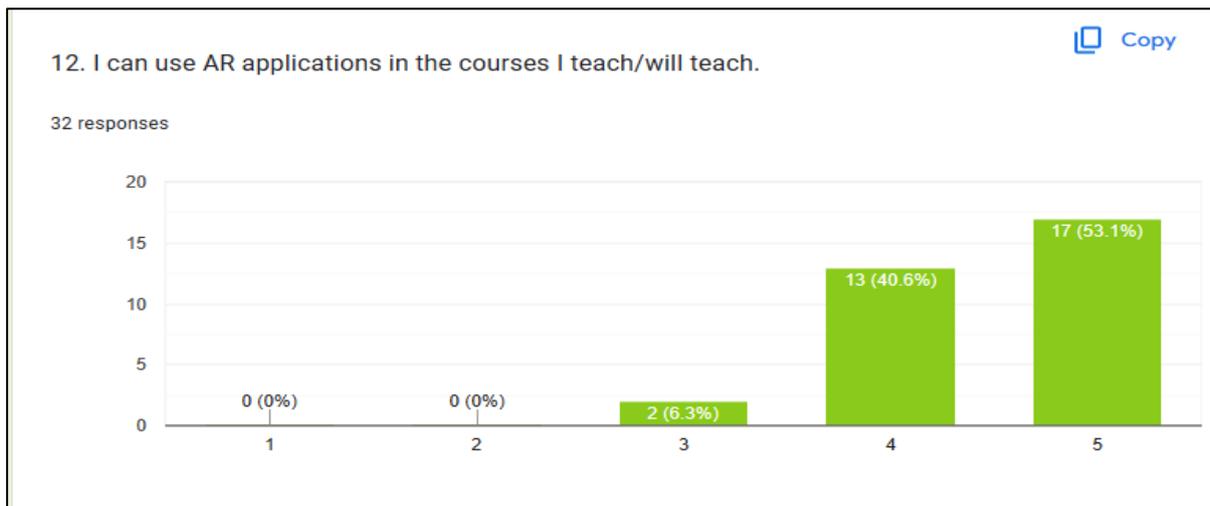
The 10th question of the survey was responded as “Totally Agree” by 59.4% of the participants and as “Mostly Agree” by 37.5% , as “Moderately Disagree” by 3.1%

**Question – 11:**



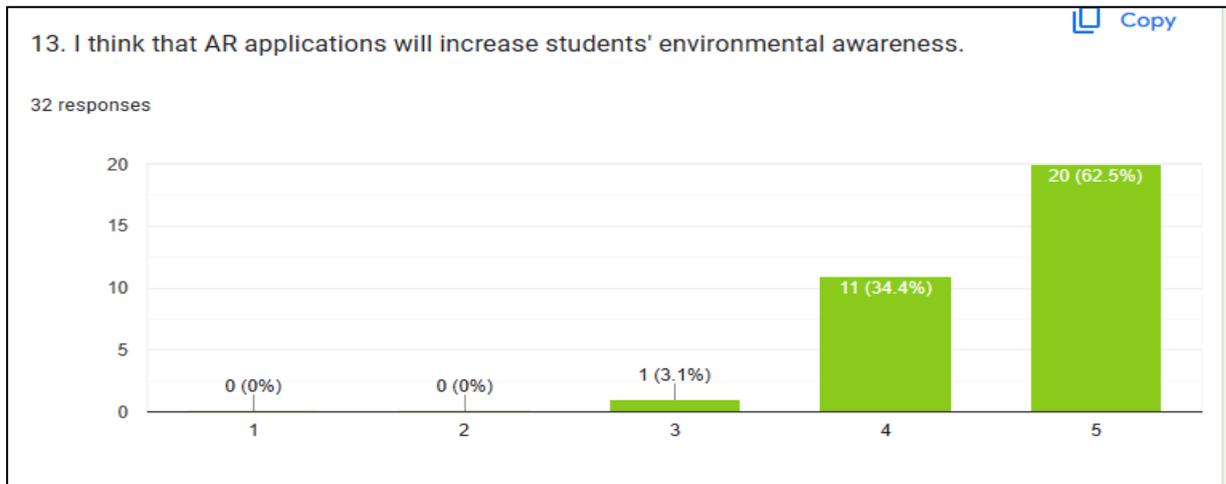
The 11th question of the survey was responded as “Totally Agree” by 43.8% of the participants and as “Mostly Agree” by 37.5% , as “Moderately Disagree” by 15.6%

**Question – 12:**



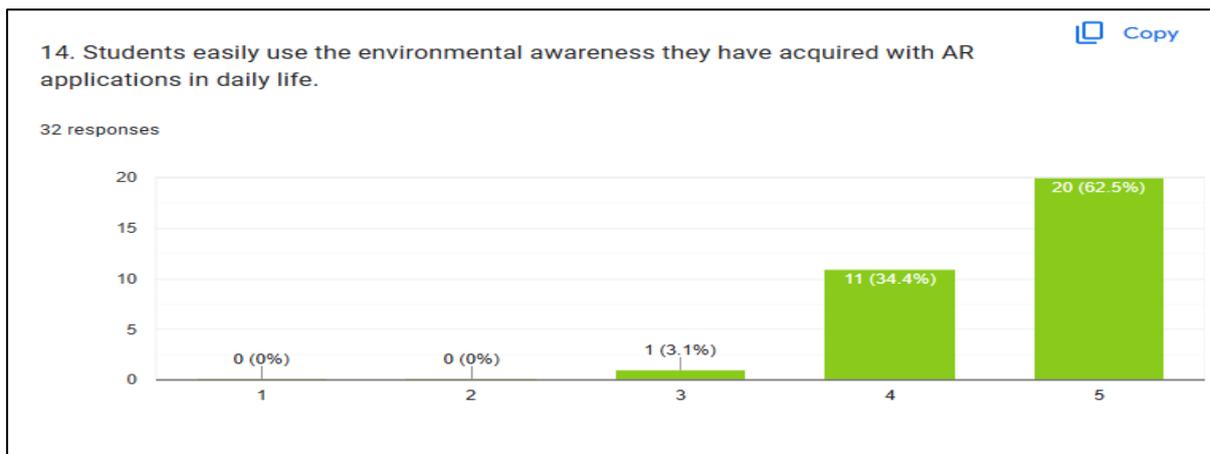
The 12th question of the survey was responded as “Totally Agree” by 53.1% of the participants and as “Mostly Agree” by 40.6% , as “Moderately Disagree” by 6.3%.

### Question – 13:



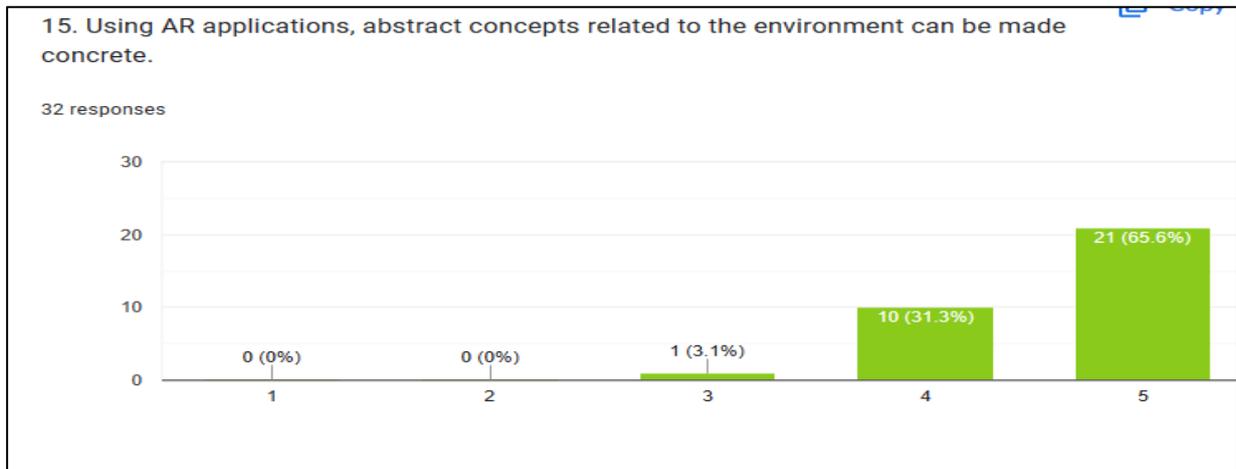
The 13th question of the survey was responded as “Totally Agree” by 62.5% of the participants and as “Mostly Agree” by 34.4% , as “Moderately Disagree” by 3.1%.

### Question – 14:



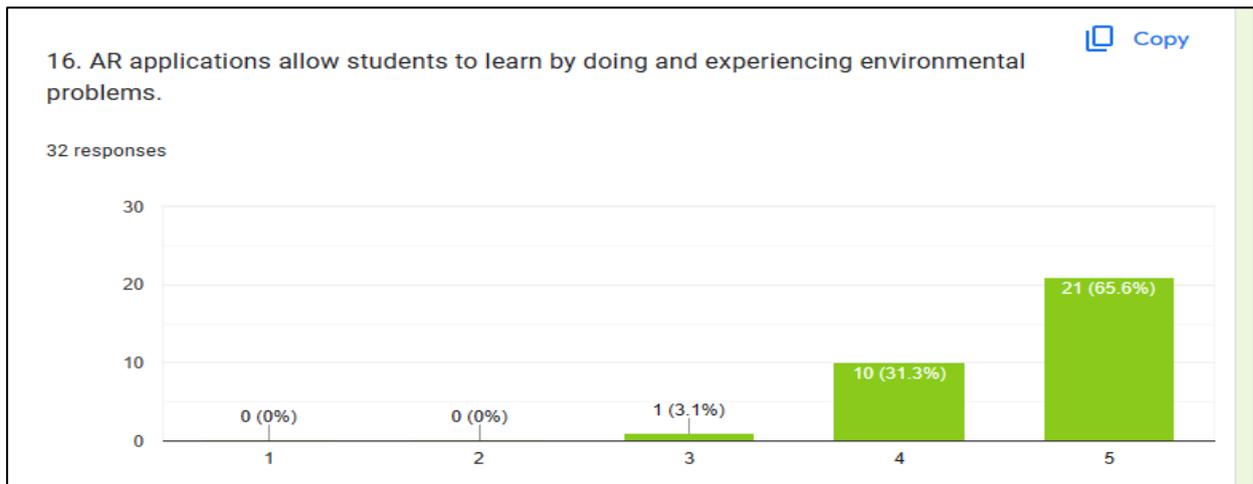
The 14th question of the survey was responded as “Totally Agree” by 21.5% of the participants and as “Mostly Agree” by 21.9% , as “Moderately Disagree” by 25%, as “Disagree” by 25% again and as “Definitely Disagree” by 6.3% .

### Question – 15:



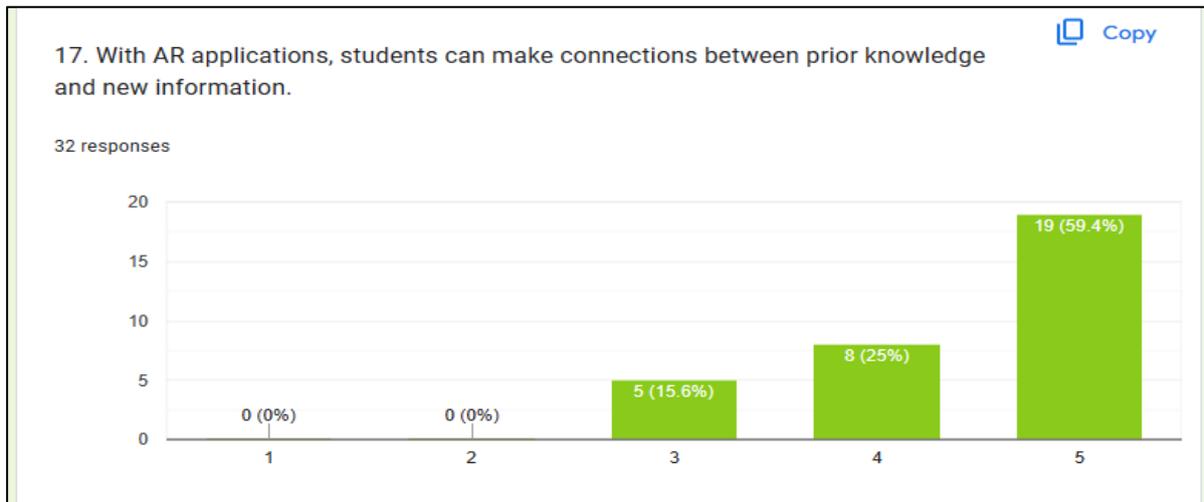
The 15th question of the survey was responded as “Totally Agree” by 65.6% of the participants and as “Mostly Agree” by 31.3% , as “Moderately Disagree” by 3.1%.

### Question – 16:



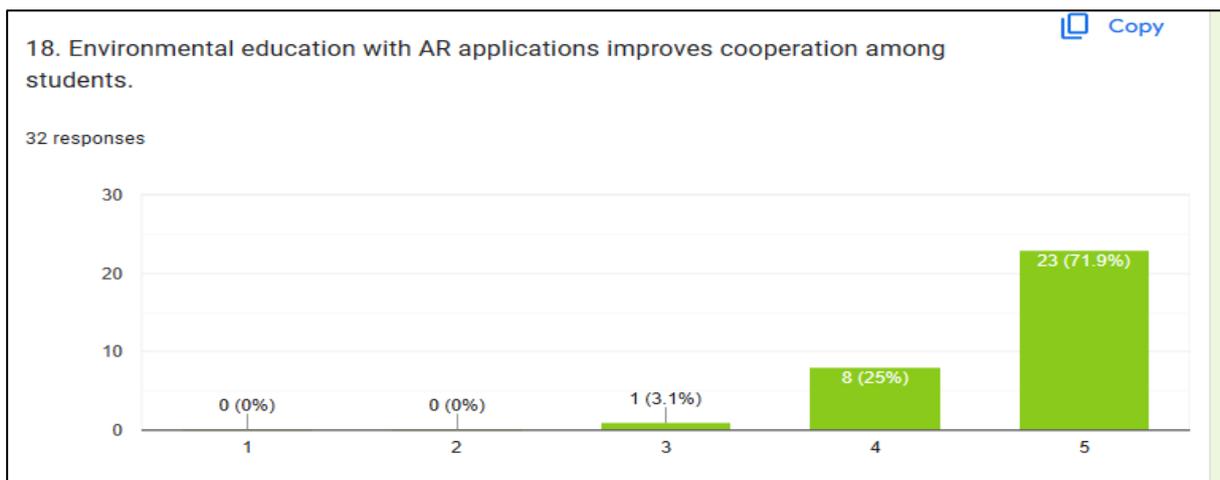
The 16th question of the survey was responded as “Totally Agree” by 65.6% of the participants and as “Mostly Agree” by 31.3% , as “Moderately Disagree” by 3.1%.

**Question – 17:**



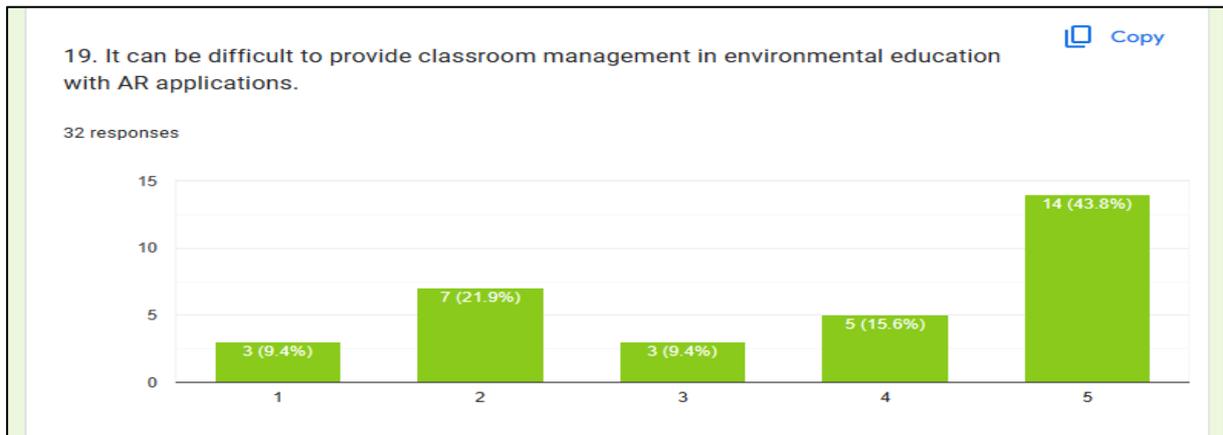
The 17th question of the survey was responded as “Totally Agree” by 59.4% of the participants and as “Mostly Agree” by 25 % , as “Moderately Disagree” by 15.6%.

**Question – 18:**



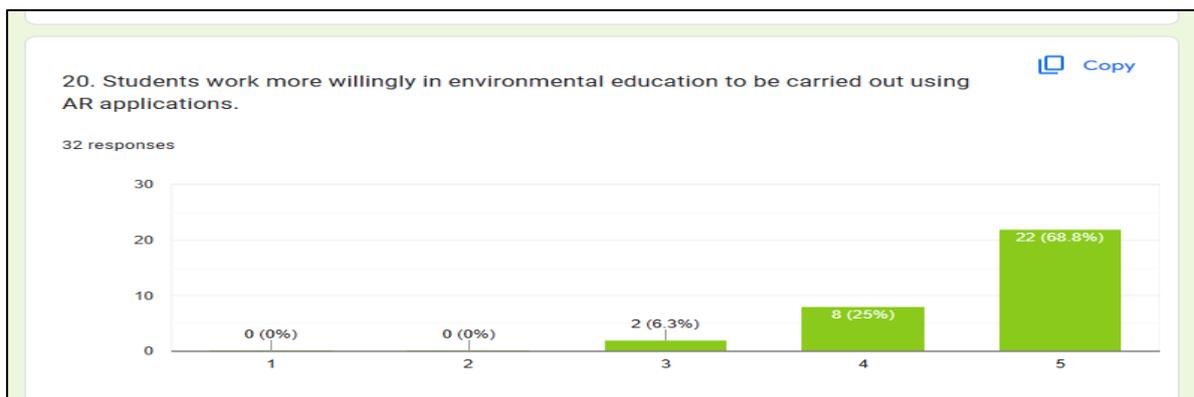
The 18th question of the survey was responded as “Totally Agree” by 71.9% of the participants and as “Mostly Agree” by 25% , as “Moderately Disagree” by 3.1%.

### Question – 19:



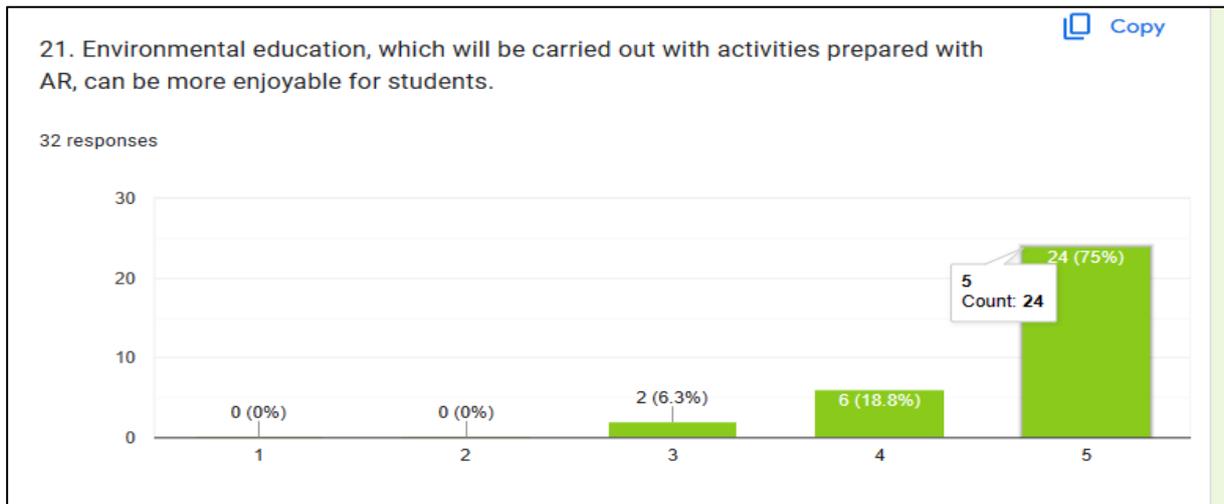
The 19th question of the survey was responded as “Totally Agree” by 43.8% of the participants and as “Mostly Agree” by 15.6% , as “Moderately Disagree” by 9.4%, as “Disagree” by 21.9% again and as “Definitely Disagree” by 9.4% .

### Question – 20:



The 20th question of the survey was responded as “Totally Agree” by 68.8% of the participants and as “Mostly Agree” by 25% , as “Moderately Disagree” by 6.3%

### Question – 21:



The 21st question of the survey was responded as “Totally Agree” by 75% of the participants and as “Mostly Agree” by 18.8% , as “Moderately Disagree” by 6.3 %

### Question – 22:



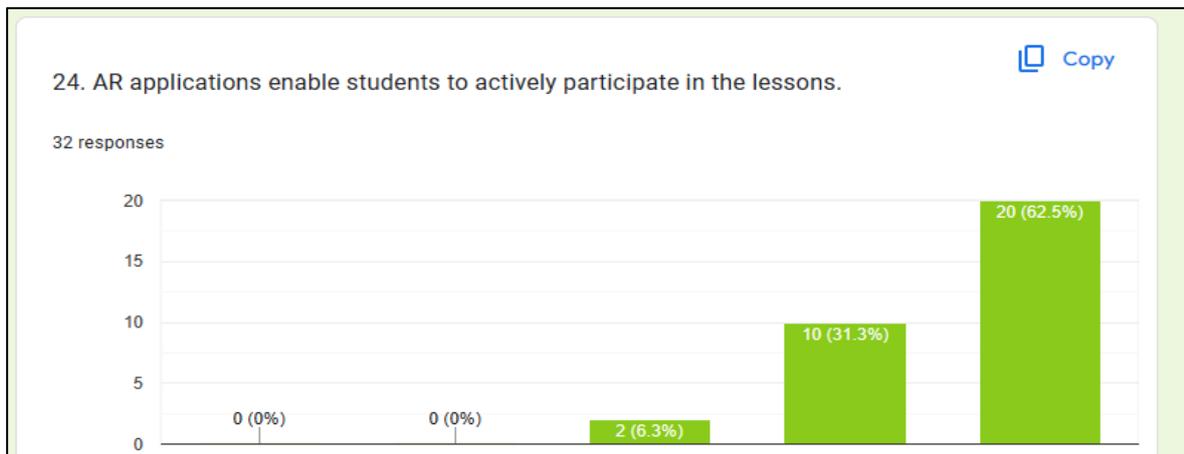
The 22nd question of the survey was responded as “Totally Agree” by 21.9% of the participants and as “Mostly Agree” by 18.8% , as “Moderately Disagree” by 15.6%, as “Disagree” by 21.9% again and as “Definitely Disagree” by 21.9% .

### Question – 23:



The 23rd question of the survey was responded as “Totally Agree” by 9.4% of the participants and as “Mostly Agree” by 12.5% , as “Moderately Disagree” by 18.8%, as “Disagree” by 21.9% again and as “Definitely Disagree” by 37.5% .

### Question – 24:



The 24th question of the survey was responded as “Totally Agree” by 62.5% of the participants and as “Mostly Agree” by 31.3% , as “Moderately Disagree” by 6.3%

## 2.3. Conclusion

According the results of the survey , most participants believe that AR can help to bridge the gap between theory and practice in environmental education. It provides a platform for experiential learning, where students can apply their knowledge in real-world contexts and also leads the students to collaborate. By bringing innovative teaching methods into the classroom, education professionals can spark interest and enthusiasm in many subjects

among students. Importantly, adopting augmented reality doesn't require significant investment as the majority of today's smartphones are capable of supporting AR applications. Educational institutions should take advantage of the current situation and start exploring AR's possibilities in classes, further stirring up interest among students and app developers.

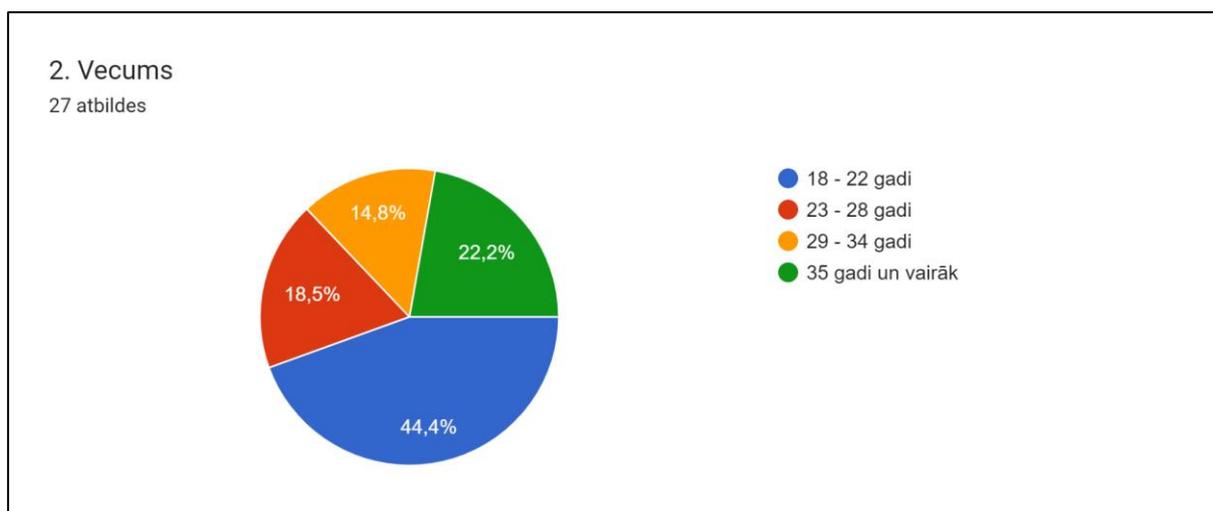
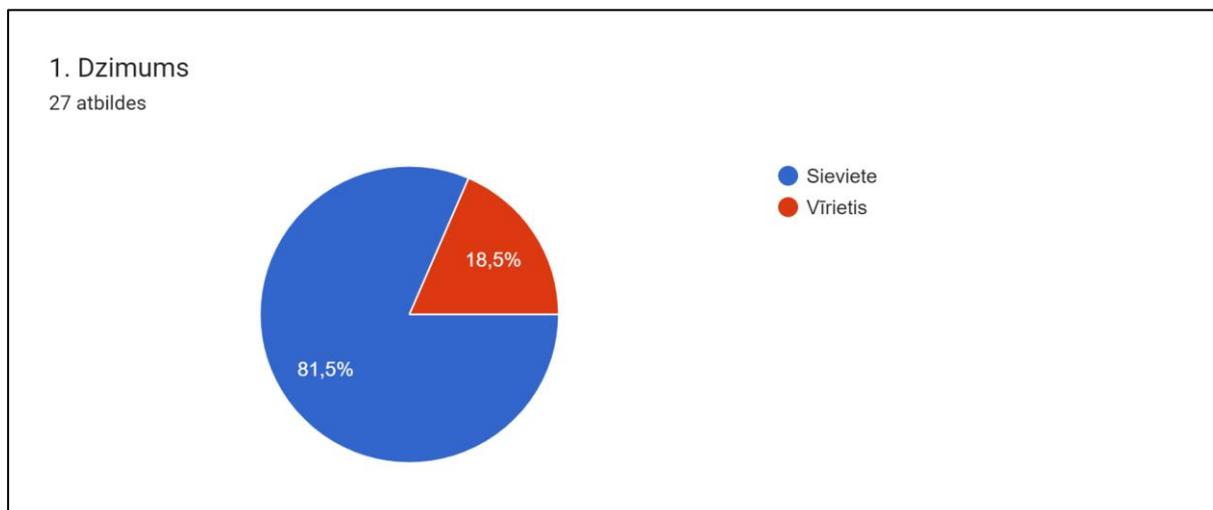
In conclusion, the majority of the participants agree that Augmented Reality holds great promise in advancing environmental education and sustainability. Its ability to create immersive, interactive learning experiences can enhance our understanding of environmental issues and foster a culture of sustainability. Furthermore, its potential to reduce our environmental footprint and promote sustainable behaviours makes it a powerful tool in our fight against climate change. As we continue to explore and harness the potential of this technology, we can look forward to a more sustainable future.



## 3. LATVIA

### 3.1. Number of Participants and Profile

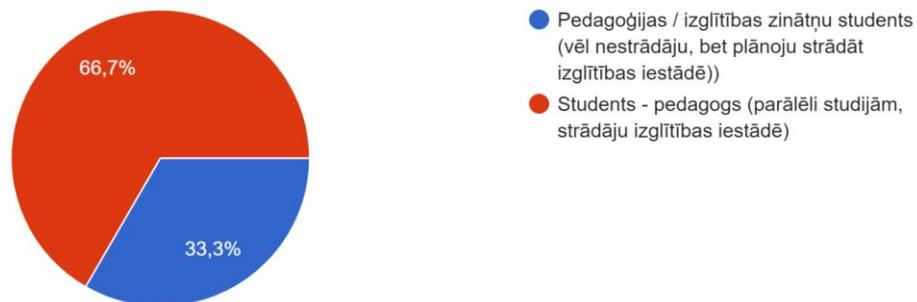
The survey was conducted by University of Latvia, one of the project partners, with 27 participants. 81.5% of the participants were female (22) and 18.5% were male (5).



44.4% (12) of participants were age 18-22, 18.5% (5) of participants were age 23-28, 22.2% (6) of participants were age 35 and more, 14.8% (4) of participants were age 29-34.

### 3. Nodarbošanās

27 atbildes



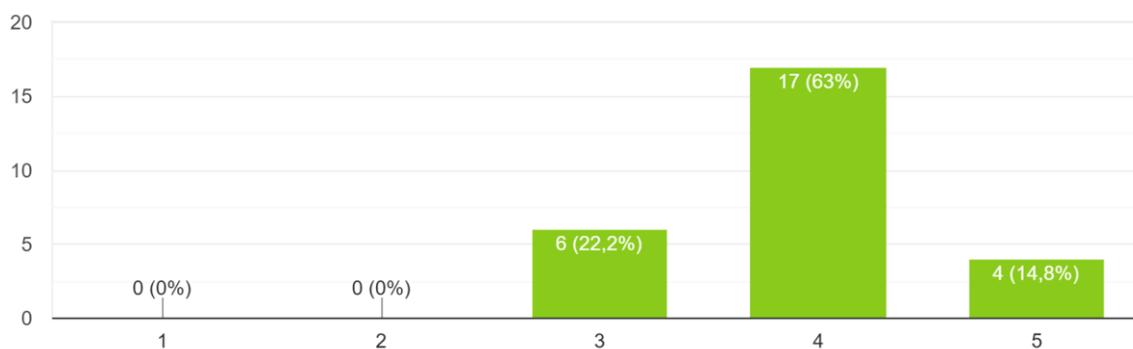
33,3% (9) of the participants who participated in the survey was a pre- teacher and the others were teachers (18)

### 3.2. Summary of Results

#### Question – 1:

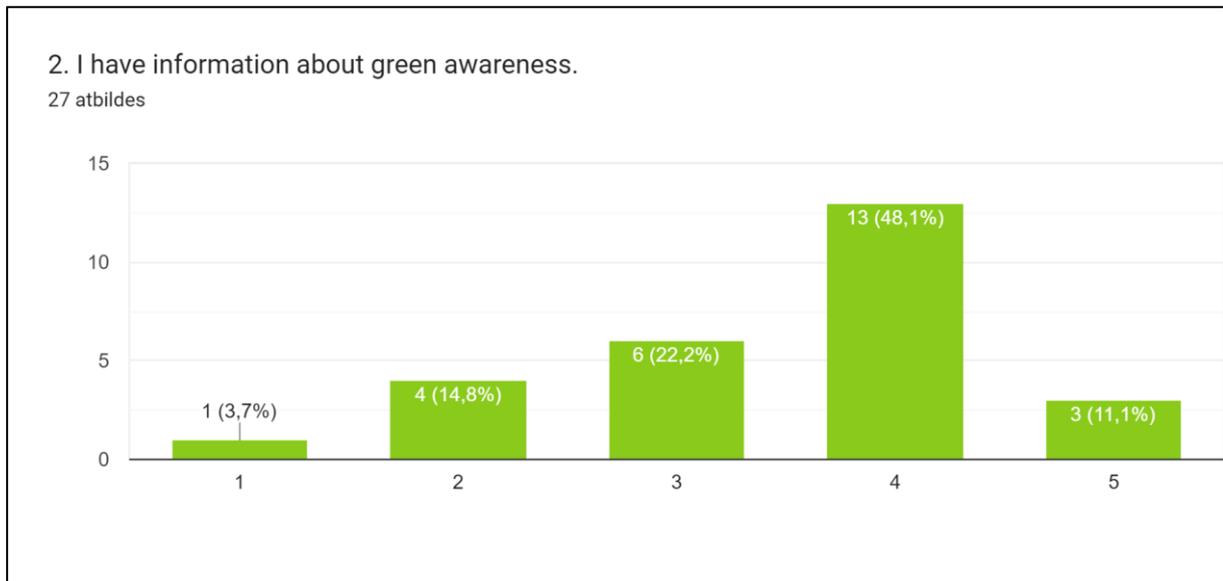
1. I fulfill my responsibility to protect the environment.

27 atbildes



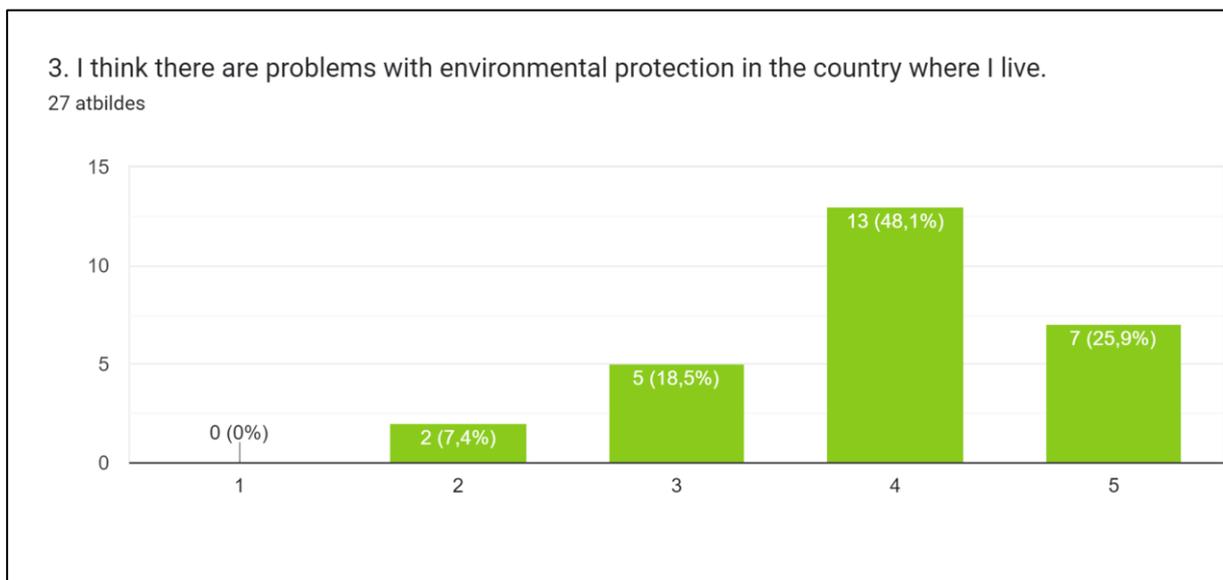
4 participants (14.8%) answered “Totally agree” and 17 participants (63%) answered “agree” to the statement “I fulfill my responsibility to protect the environment”. Only 6 (22,2%) participants answered “moderately agree”.

## Question – 2:



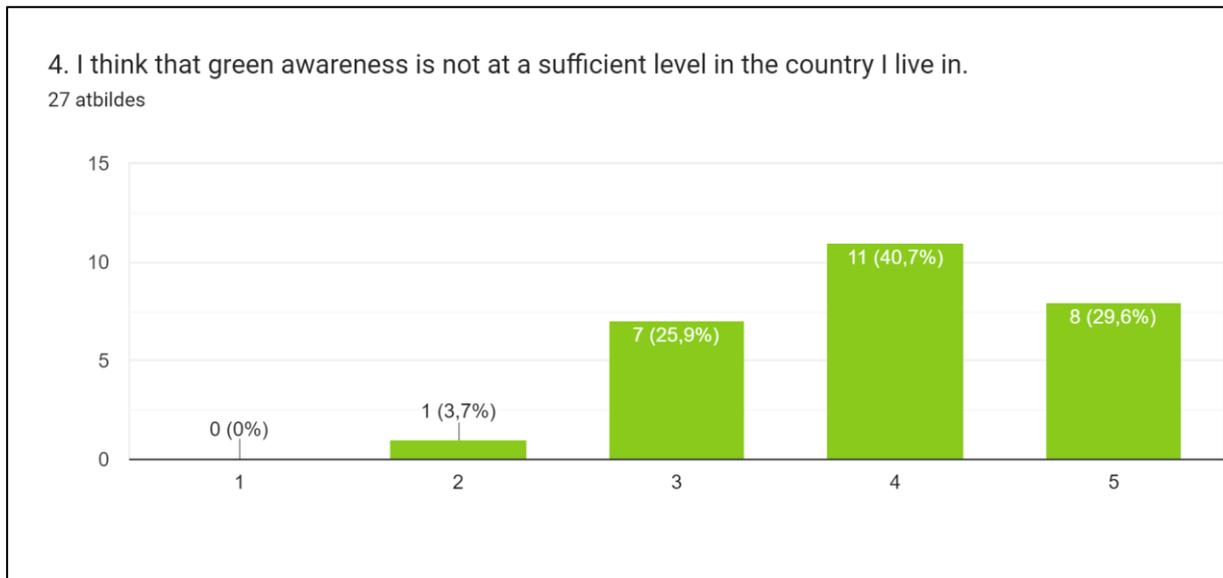
Most of participants answered, that they have information about green awareness - 3 participants (11,1%) “totally agree” and 13 participants (48,1%) “agree”. 6 participants (22,2%) answered “moderately agree” and only 4 participants “disagree” and 1 participant “definitely disagree”

## Question – 3:



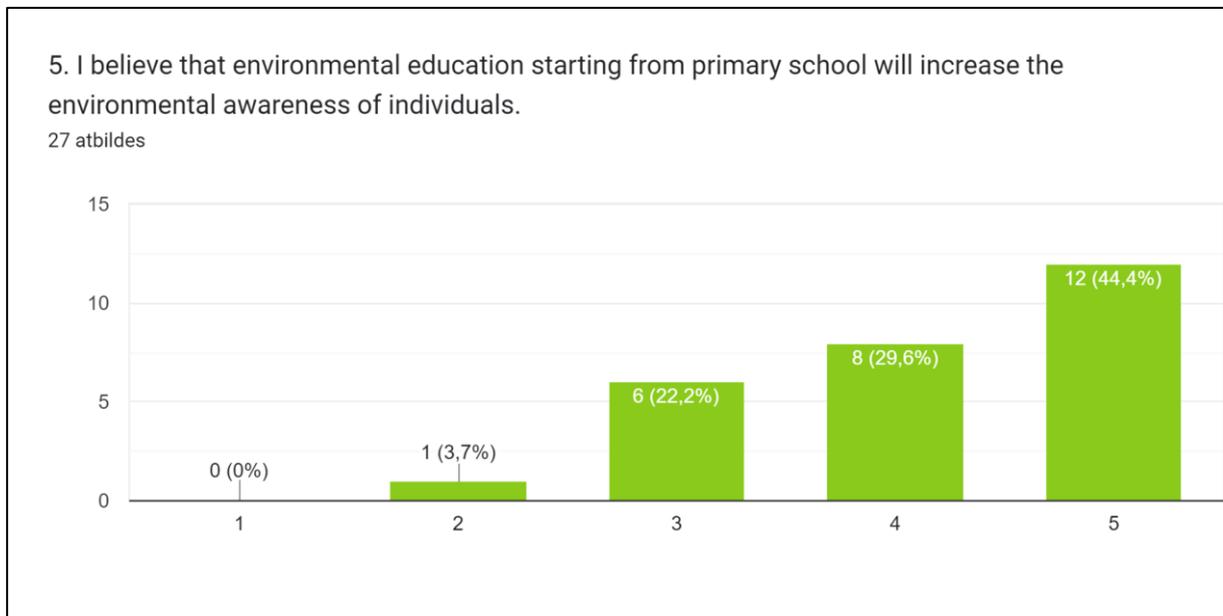
Most of participants agree that there are problems with environmental protection in Latvia (residency country) - 7 participants (25,9%) “totally agree” and 13 participants (48,1%) “agree”. 5 participants (22,2%) answered “moderately agree” and only 2 participants “disagree”.

#### Question – 4:



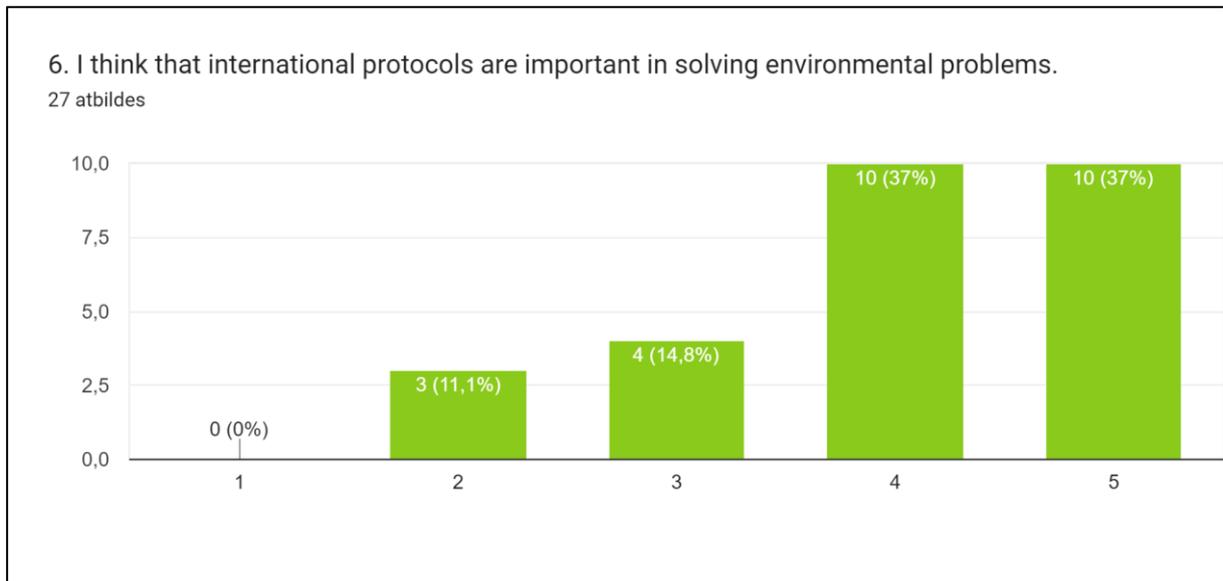
Most of participants agree that green awareness is not at a sufficient level in Latvia (residency country) - 8 participants (29,6%) “totally agree” and 11 participants (40,7%) “agree”. 7 participants (25,9%) answered “moderately agree” and only 1 participant “disagree”.

#### Question – 5:



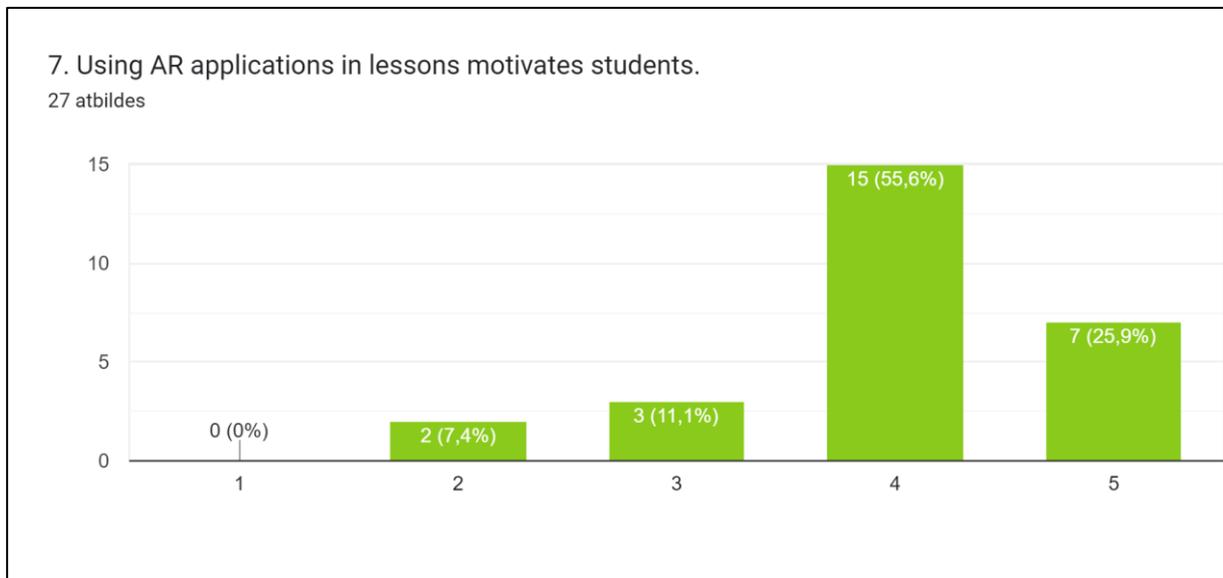
Most participants believe that environmental education starting from primary school will increase the environmental awareness of individuals - 12 participants (44,4%) “totally agree” and 8 participants (29,6%) “agree”. 6 participants (22,2%) answered “moderately agree” and only 1 participant “disagree”.

### Question – 6:



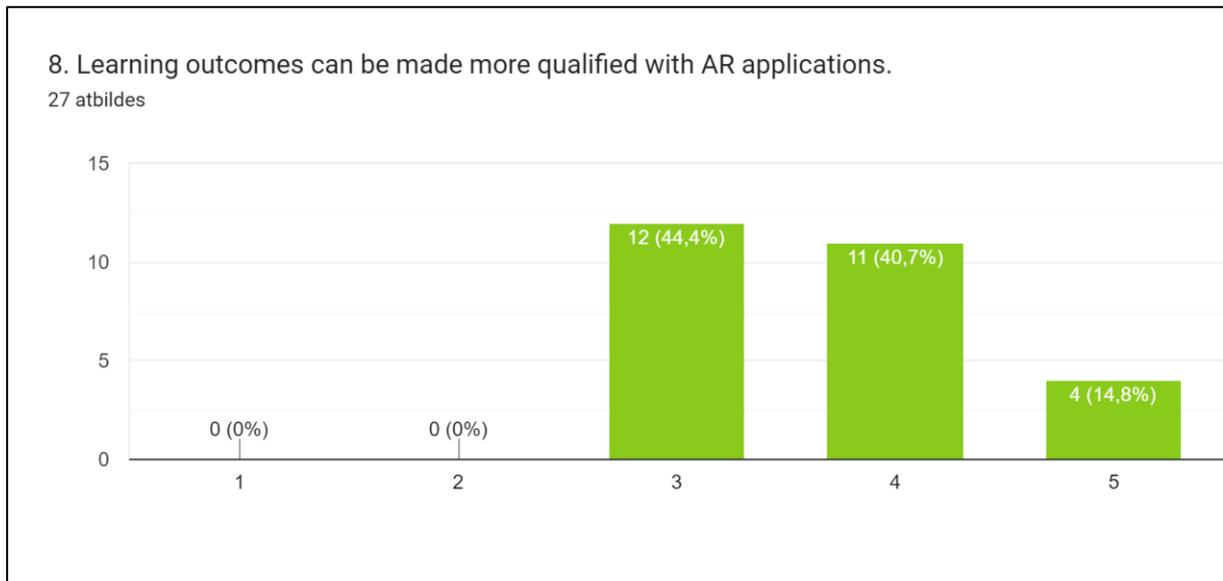
Most participants think that international protocols are important in solving environmental problems - 10 participants (37%) “totally agree” and 10 participants (37%) “agree”. 4 participants (14,8%) answered “moderately agree” and only 3 participants (11,1%) “disagree”.

### Question – 7:



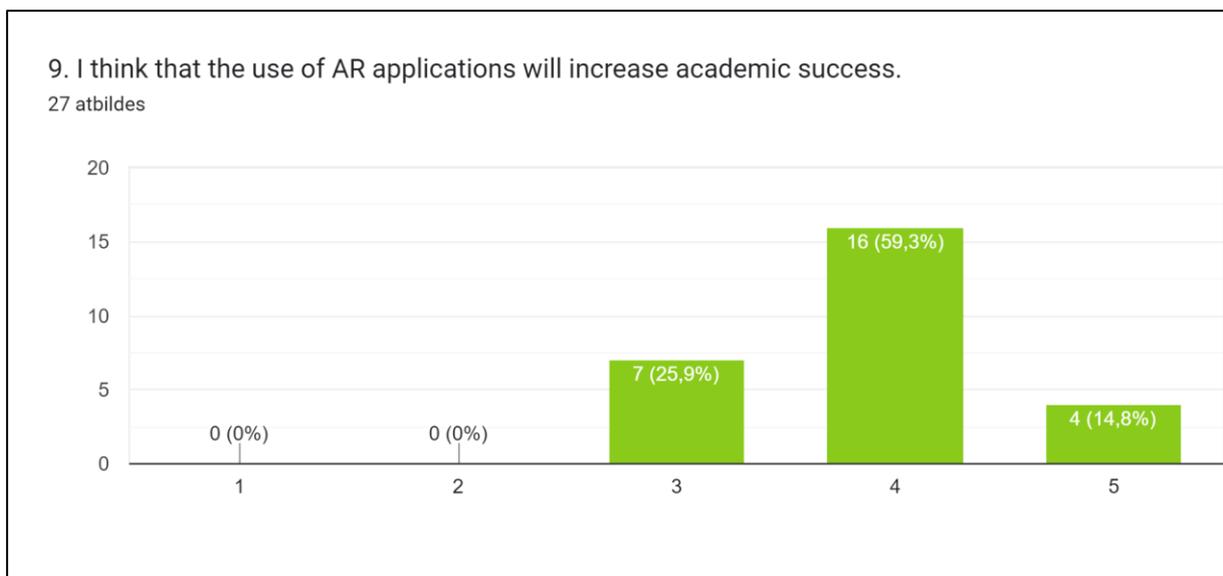
Most participants think that using AR applications in lessons motivates students - 7 participants (25,9%) “totally agree” and 15 participants (55,6%) “agree”. 3 participants (11,1%) answered “moderately agree” and only 2 participants (7,4%) “disagree”.

### Question – 8:



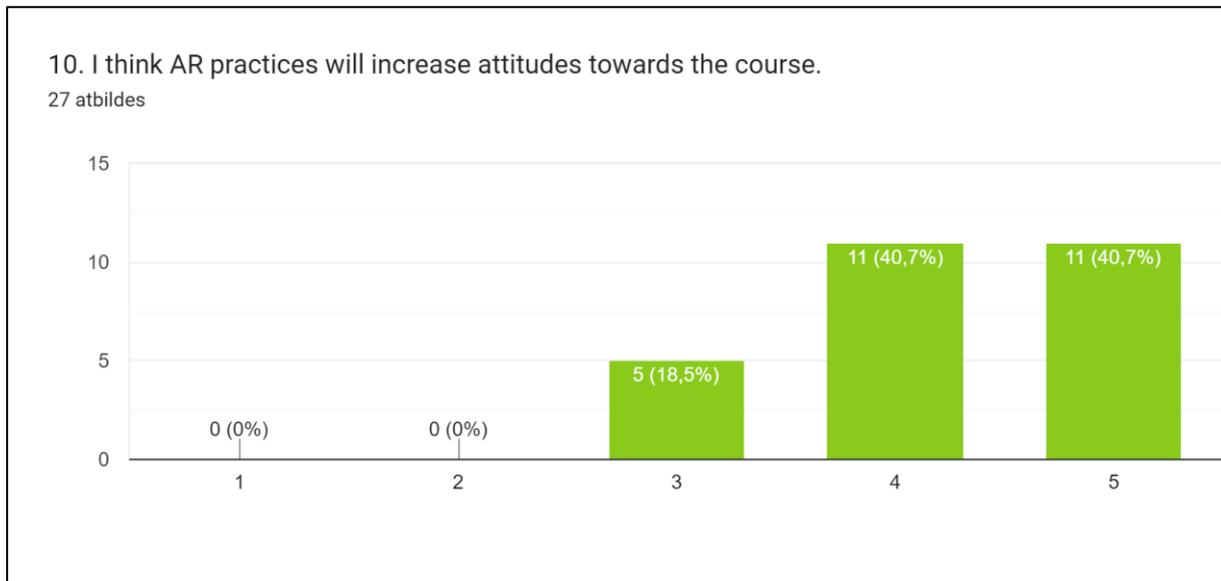
Answers to the statement that learning outcomes can be made more qualified with AR applications varies. Most participants agree with the statement - 4 participants (14,8%) “totally agree” and 11 participants (40,7%) “agree”, but also 12 participants (44,4%), almost half of participants, answered “moderately agree”. No participant disagreed with the statement.

### Question – 9:



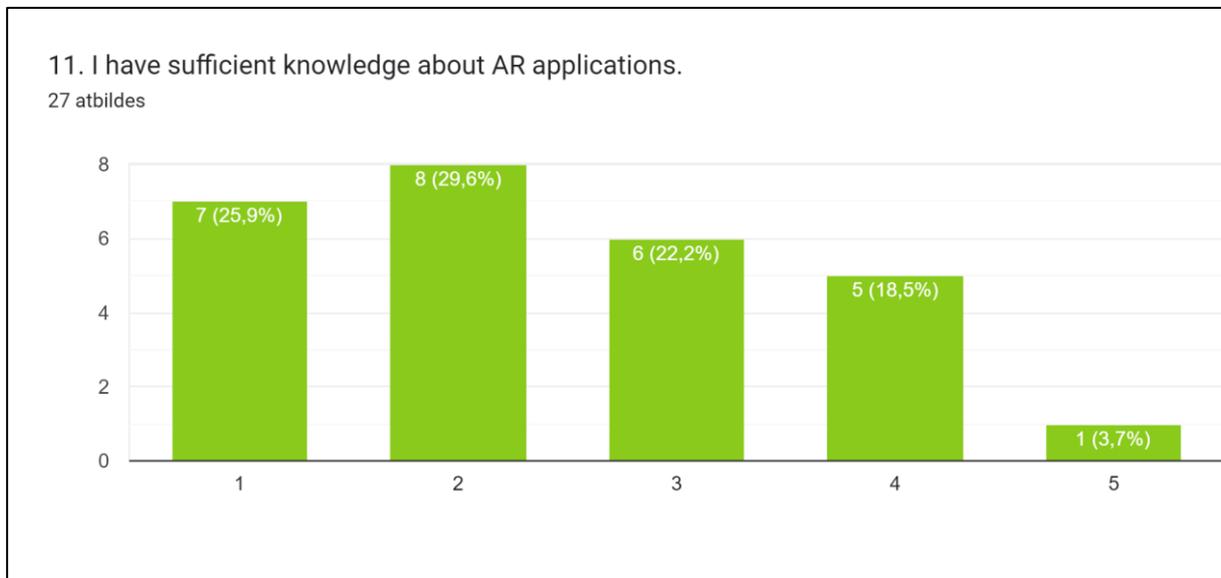
Most participants think that using AR applications will increase academic success - 4 participants (14,8%) “totally agree” and 16 participants (59,3%) “agree”. 7 participants (25,9%) answered “moderately agree”. No participant disagreed with the statement.

**Question – 10:**



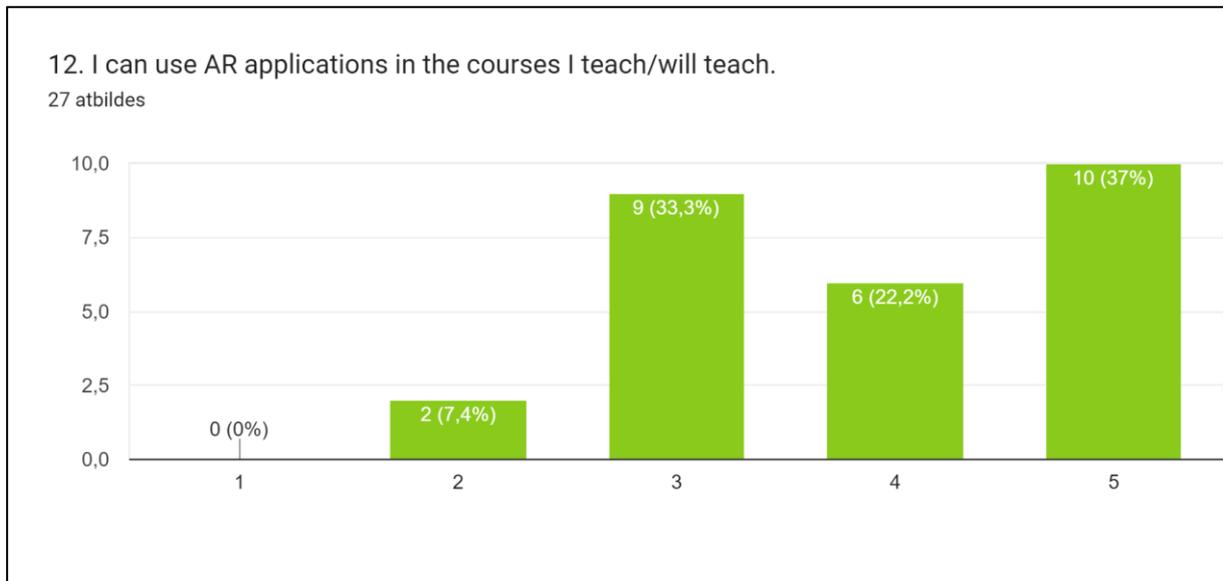
Most participants think that using AR practices will increase attitudes towards the course - 11 participants (40,7%) “totally agree” and 11 participants (40,7%) “agree”. 5 participants (18,5%) answered “moderately agree”. No participant disagreed with the statement.

**Question – 11:**



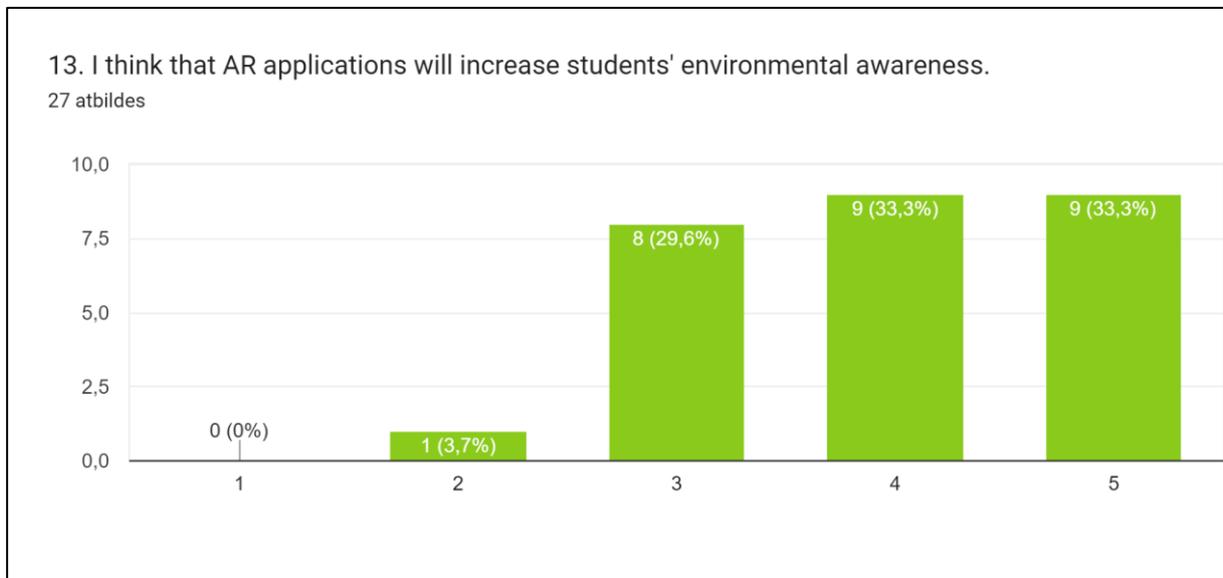
Most participants disagree with the statement that they have sufficient knowledge about AR applications - 7 participants (25,9%) “definetly disagree” and 8 participants (29,6%) “disagree”. 6 participants (22,2%) answered “moderately agree”. Only few participants think they have sufficient knowledge about AR applications - 5 participants (18,5%) “ agree” and 1 participant (3,7%) “ totally agree”

### Question – 12:



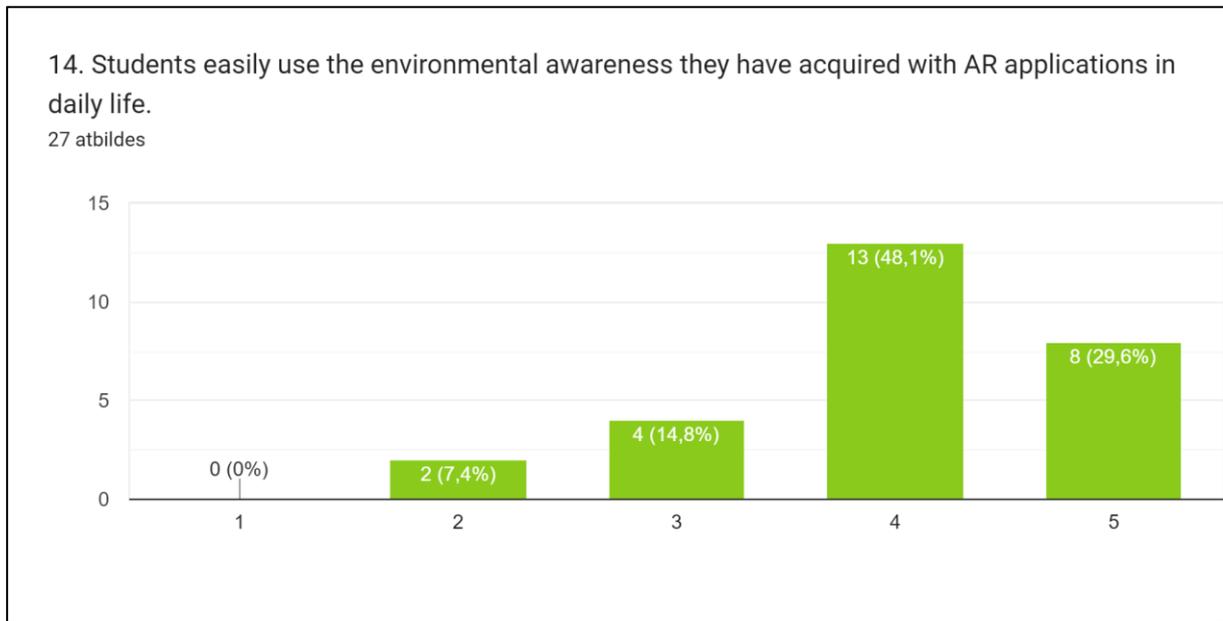
Most participants think they could use AR applications in the course they teach - 10 participants (37%) “totally agree” and 6 participants (22,2%) “agree”. 9 participants (33,3%) answered “moderately agree”. 2 participants (7,4%) disagree with the statement.

### Question – 13:



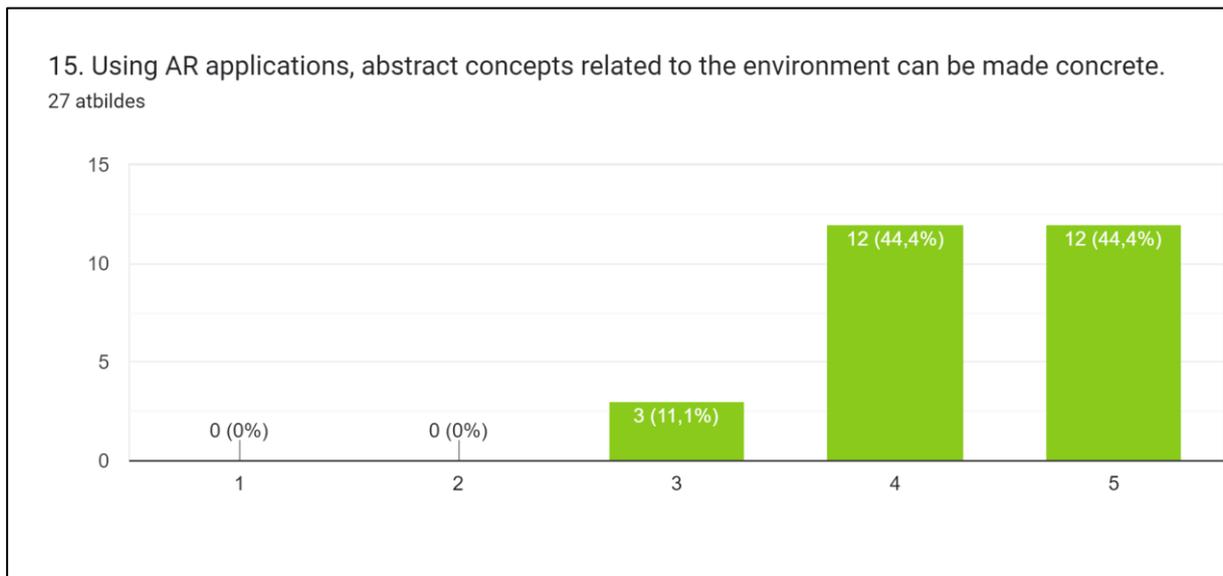
Most participants think that AR applications will increase students' environmental awareness - 9 participants (33,3%) “totally agree” and 9 participants (33,3%) “agree”. 8 participants (29,6%) answered “moderately agree”. 1 participant (3,7%) disagreed with the statement.

**Question – 14:**



Most participants think that students easily use the environmental awareness they have acquired with AR applications daily life - 8 participants (29,6%) “totally agree” and 13 participants (48,1%) “agree”. 4 participants (14,8%) answered “moderately agree”. 2 participants (7,4%) disagreed with the statement.

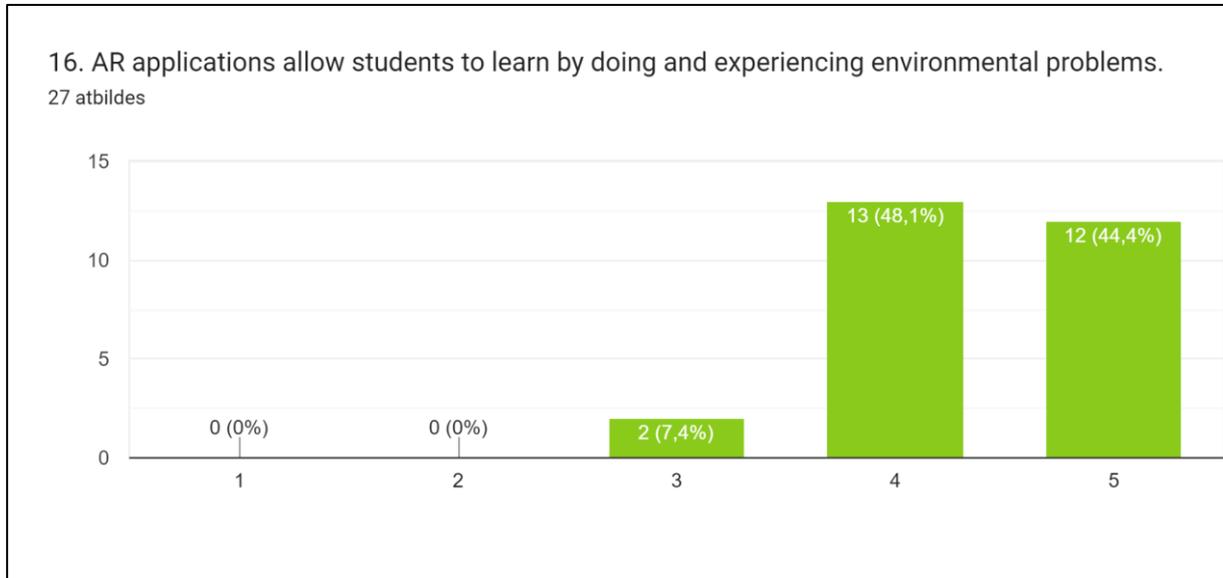
**Question – 15:**



Most participants think that using AR applications, abstract concepts related to the environment can be made concrete - 12 participants (44,4%) “totally agree” and 12

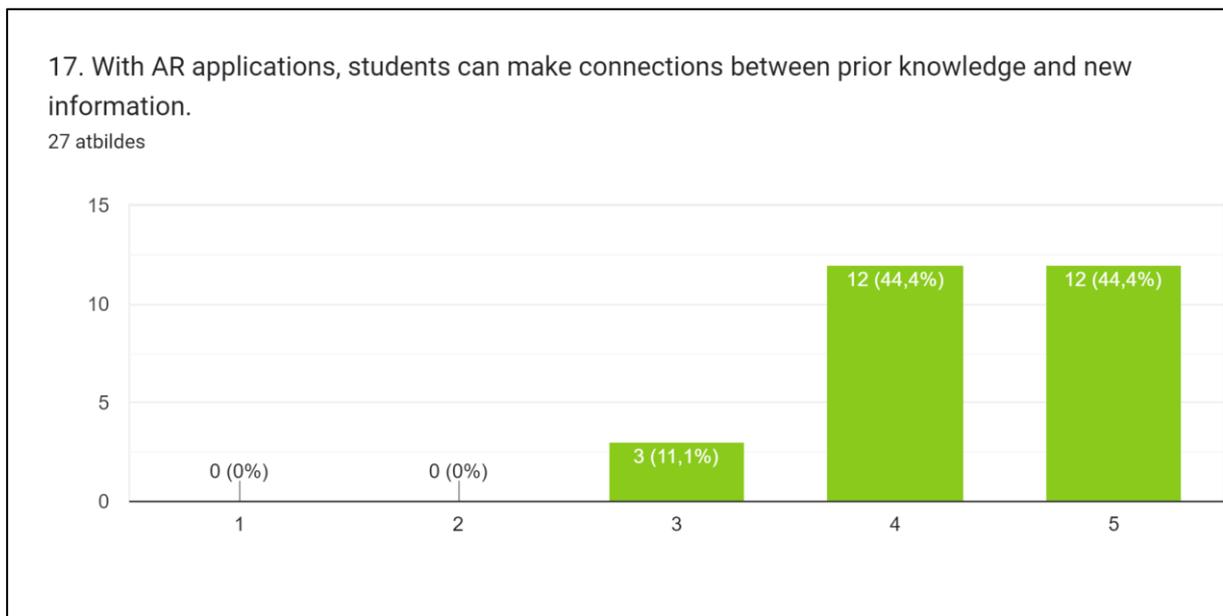
participants (44,4%) “agree”. 3 participants (11,1%) answered “moderately agree”. No participant disagreed with the statement.

**Question – 16:**



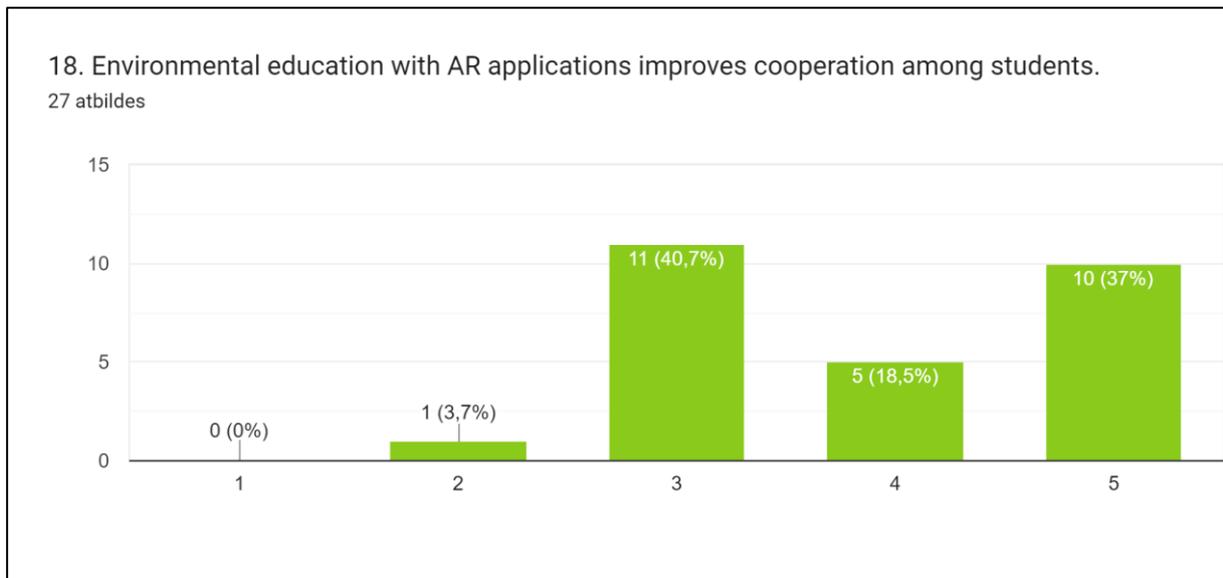
Most participants think that AR applications allow students to learn by doing and experiencing environmental problems - 12 participants (44,4%) “totally agree” and 13 participants (48,1%) “agree”. 2 participants (7,4%) answered “moderately agree”. No participant disagreed with the statement.

**Question – 17:**



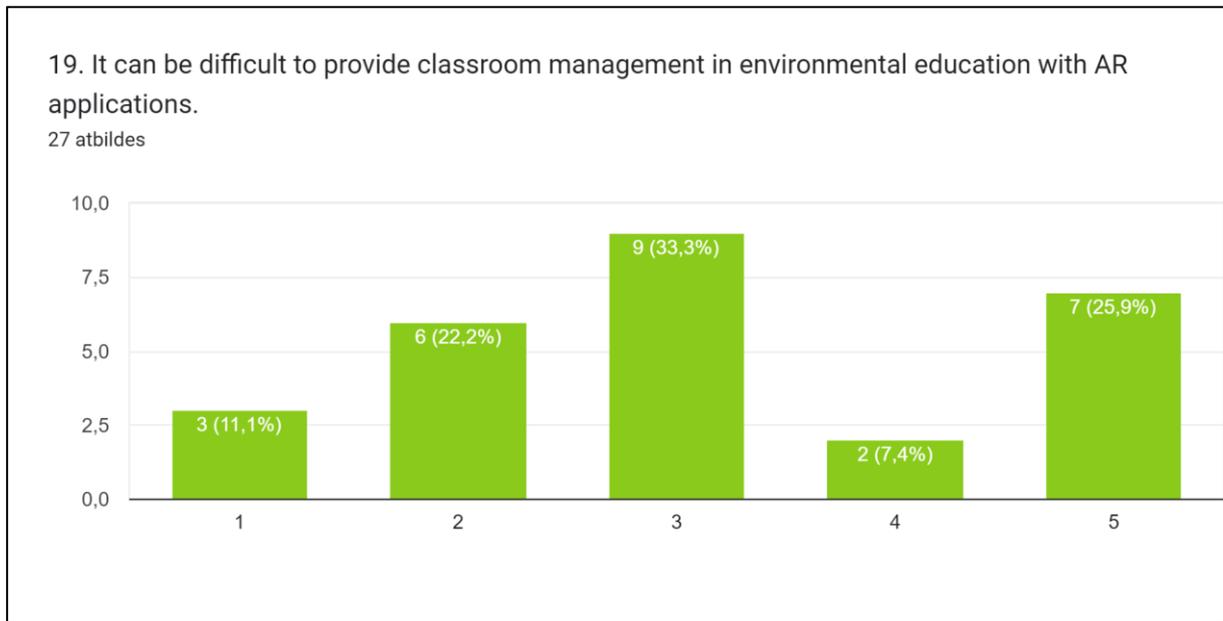
Most participants think that with AR applications, students can make connections between prior knowledge and new information - 12 participants (44,4%) “totally agree” and 12 participants (44,4%) “agree”. 3 participants (11,1%) answered “moderately agree”. No participant disagreed with the statement.

**Question – 18:**



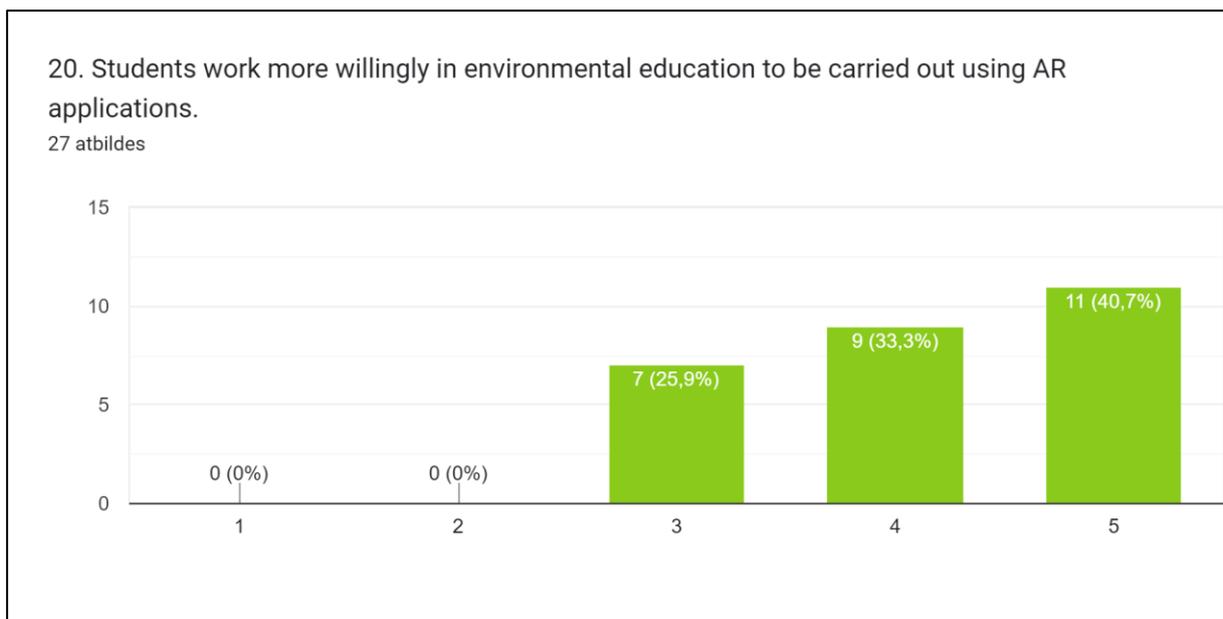
Answers to the statement that environmental education with AR applications improves cooperation among students varies. Most participants agree with the statement - 10 participants (37%) “totally agree” and 5 participants (18,5%) “agree”, but also 11 participants (40,7%), a little less than half of participants, answered “moderately agree”. 1 participant (3,7%) disagreed with the statement.

**Question – 19:**



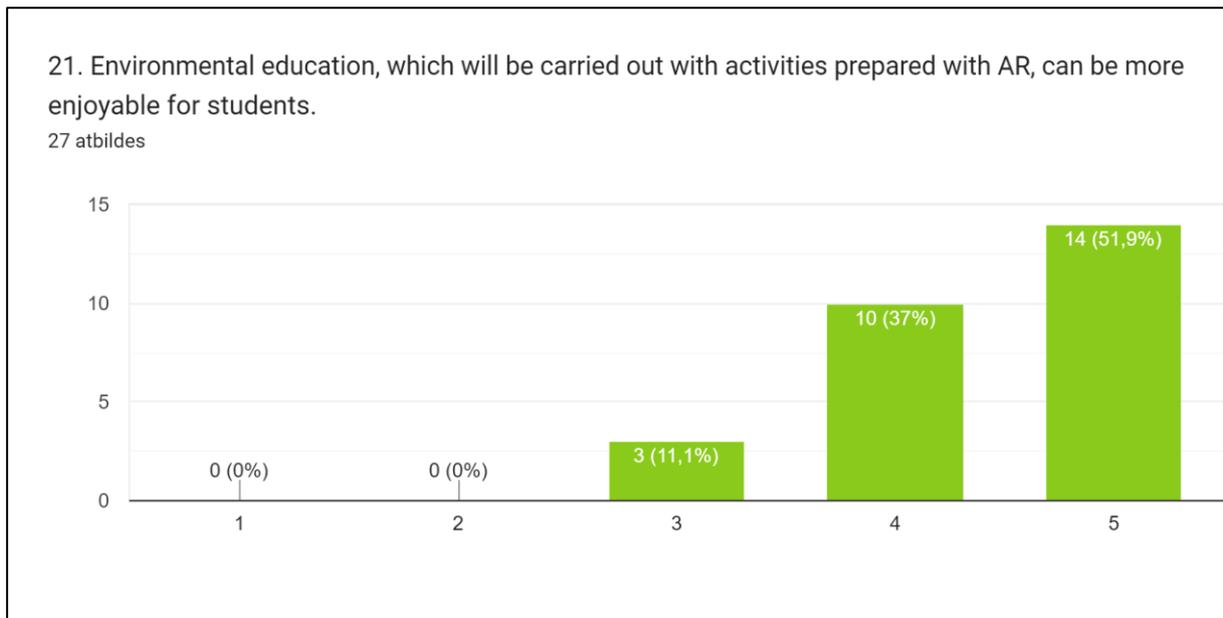
Answers to the statement that it can be difficult to provide classroom management in environmental education with AR applications varies widely - 7 participants (25,9%) “totally agree”, 2 participants (7,4%) “agree”, 9 participants (33,3%) answered “moderately agree”. 6 participants (22,2%) disagreed with the statement and 3 participants (11,1%) disagreed with the statement.

**Question – 20:**



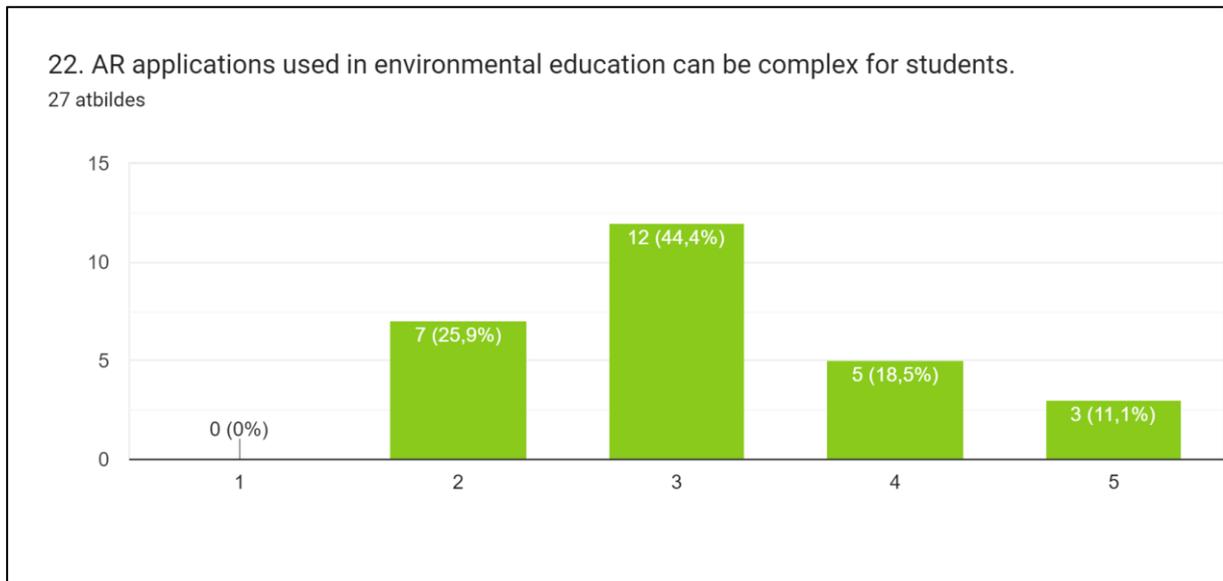
Most participants think that students work more willingly in environmental education to be carried out using AR applications - 11 participants (40,7%) “totally agree” and 9 participants (33,3%) “agree”. 7 participants (25,9%) answered “moderately agree”. No participant disagreed with the statement.

**Question – 21:**



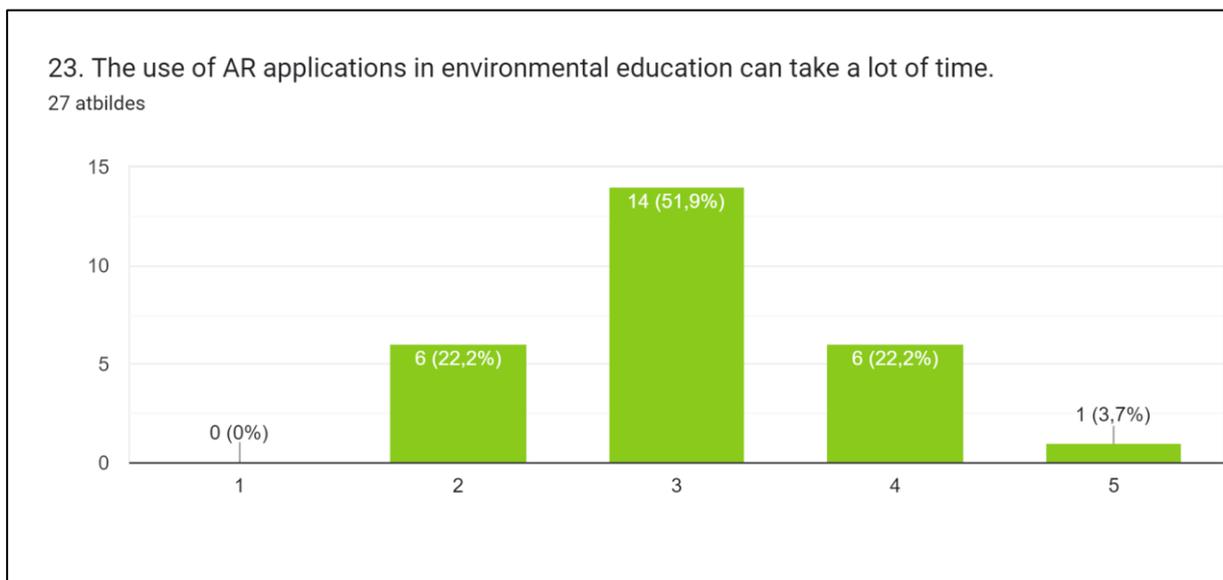
Most participants think that environmental education, which will be carried out with activities prepared with AR, can be more enjoyable for students – 14 participants (51,9%) “totally agree” and 10 participants (37%) “agree”. 3 participants (11,1%) answered “moderately agree”. No participant disagreed with the statement.

**Question – 22:**



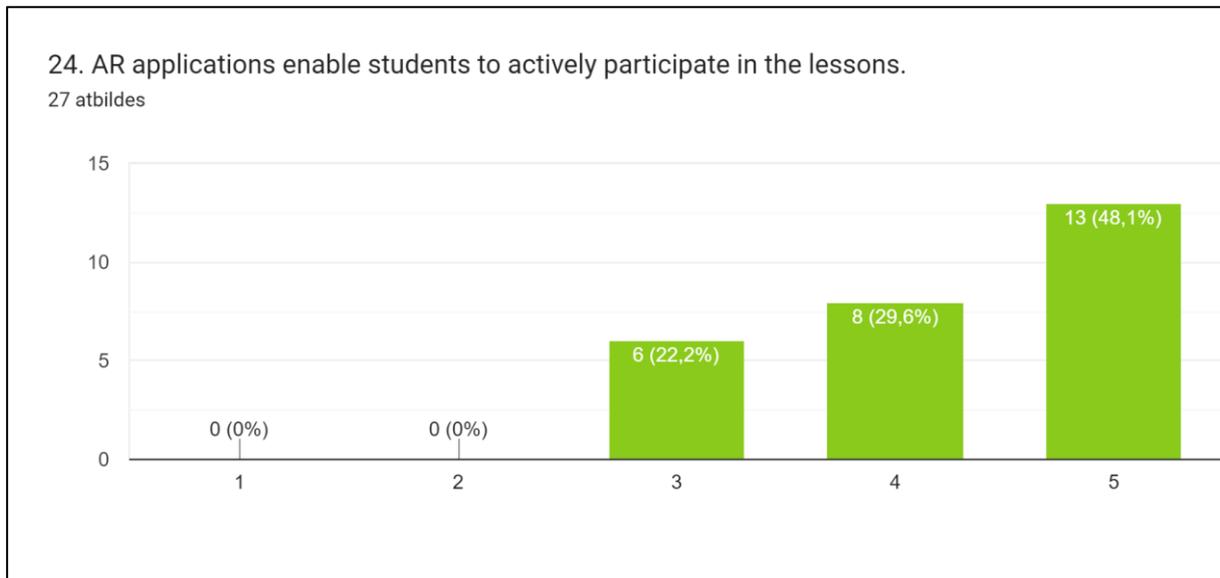
Answers to the statement that AR applications used in environmental education can be complex for students, varies - 3 participants (11,1%) “totally agree”, 5 participants (18,5%) “agree”, 12 participants (44,4%) answered “moderately agree”. 7 participants (25,9%) disagreed with the statement.

**Question – 23:**



Answers to the statement that AR applications in environmental education can take a lot of time varies - 1 participant (3,7%) “totally agree”, 6 participants (22,2%) “agree”, 14 participants (51,9%) answered “moderately agree”. 6 participants (22,2%) disagreed with the statement.

### Question – 24:



Most participants think that AR applications enable students to participate in the lessons – 13 participants (48,1%) “totally agree” and 8 participants (29,6%) “agree”. 6 participants (22,2%) answered “moderately agree”. No participant disagreed with the statement.

### 3.3. Conclusion

In the questionnaire, teachers and pre-service teachers were asked about their personal understanding of environmental protection issues and their relevance, as well as about the possibilities of integrating AR applications into the learning process, teaching about environmental protection topics. The participants themselves believe that they are informed about environmental protection and the necessary measures to be taken, and they also believe that they are informed about environmental protection. The participants of the survey believe that it would be necessary to inform more about nature protection measures in Latvia, in addition, if public education started already in primary school, then society's environmental education would be more sustainable and over time society would be more informed about environmental protection measures.

The survey participants believe that AR applications would be a good way to motivate students to get involved in the learning process (question 7), as well as such a learning process would increase interest in the subject (questions 10 and 13). Also, the participants believe that the use of AR applications in the learning process can contribute to the academic success of students (question 9). The participants' opinions are divided when the question is asked

whether AR applications help to better achieve learning goals (question 8). From the results of the interviews, it could already be concluded that AR applications should be included in the learning process as part of the lesson or as a small activity, thus the results of the survey with the average agreement of the participants to the statement could indicate that the AR application as a separate learning tool does not necessarily mean a better progress towards the result to be achieved. However, it is essential for students in primary school to learn by doing and to be involved in the learning process. The results of the survey show that the use of AR applications in the learning process can provide an opportunity to learn by doing and experiencing practical, real-life situations (questions 14 and 16). Also, with the help of AR applications, the student can create a connection between the previously learned and the new, as well as learn abstract topics that would be impossible to learn or see in other ways (questions 15 and 17).

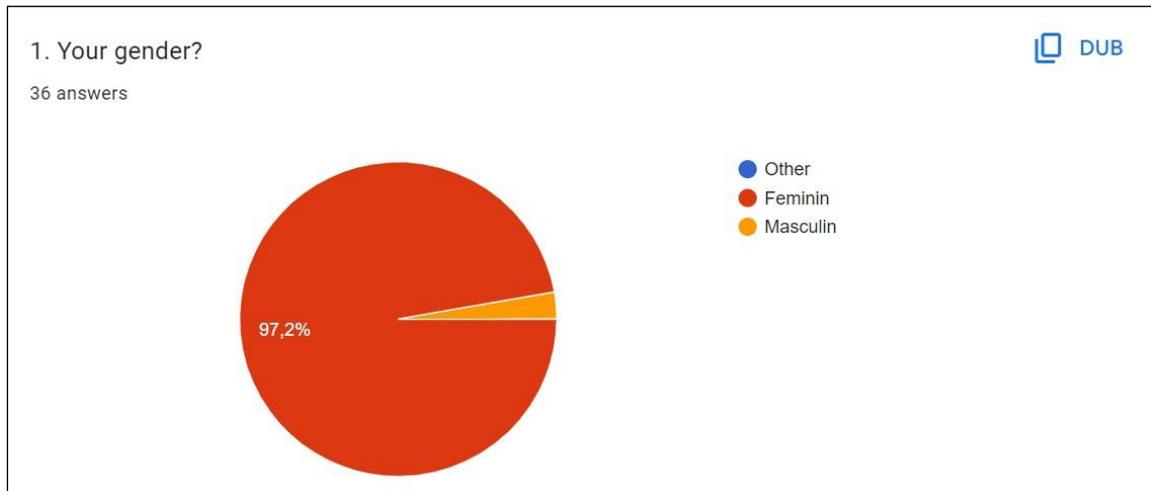
An important section of the survey is about teachers' own knowledge about the use of AR applications (question 11). Survey participants rate their knowledge of AR applications and their use in the learning process quite low. Therefore, in order to meaningfully include AR in the learning process, it is also necessary to train educators in working with technology. Respondents' lack of confidence in their knowledge could also affect their understanding of time consumption in using AR applications (question 23) - some respondents believe that using AR applications in the learning process would be time-consuming. However, a large number of respondents believe that there is an opportunity to use AR applications in the subject taught by them (question 12).

In general, it can be concluded that the use of AR applications in the learning process could be an excellent tool for achieving learning goals, which would motivate and engage primary school students and create interest in the subject to be learned - environmental protection. However, it should be taken into account that the development of the tool may not be enough, it is necessary to increase the knowledge of pedagogues and pedagogy students about the meaningful use of AR applications in the learning process, creating the idea that the use of technology facilitates the teaching and learning process.

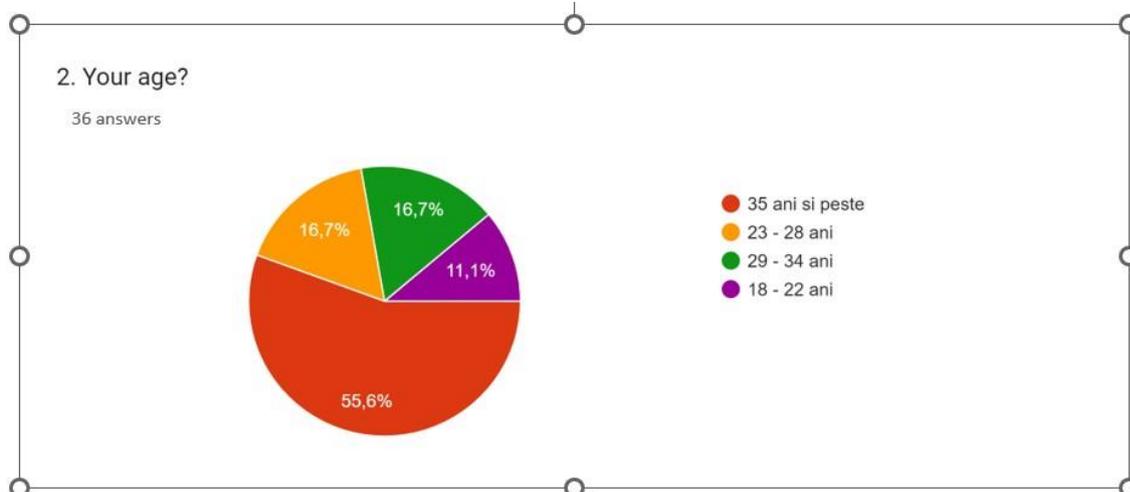
## 4. ROMANIA

### 4.1. Number of Participants and Profile

The survey was conducted by LBUS team, one of the project partners, with 36 participants. 97,2 % of the participants were female and 2,8% were male.



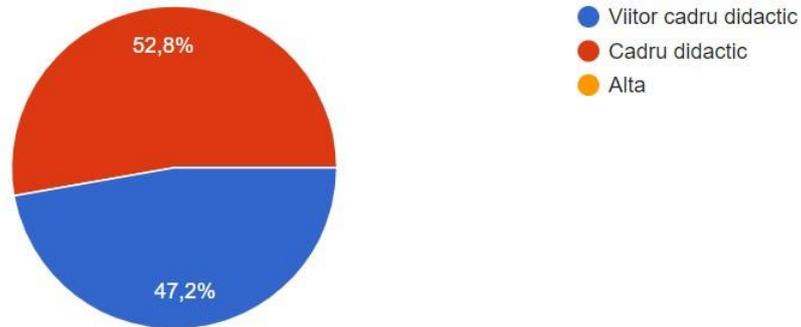
55,6% of the participants are between 35 years old and over, 16,7% are between 23 -28 years old, 16,7% are between 29 34 years old and 11,1% are between 18 – 22 years old.



52,8 % of participants are teacher and 47,2 % are teacher candidate.

### 3. Your occupation/profession?

36 answers

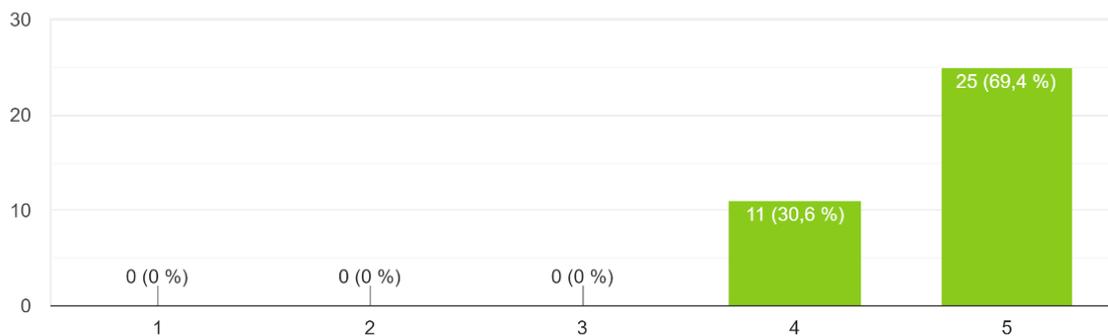


## 4.2. Summary of Results

### Question - 1:

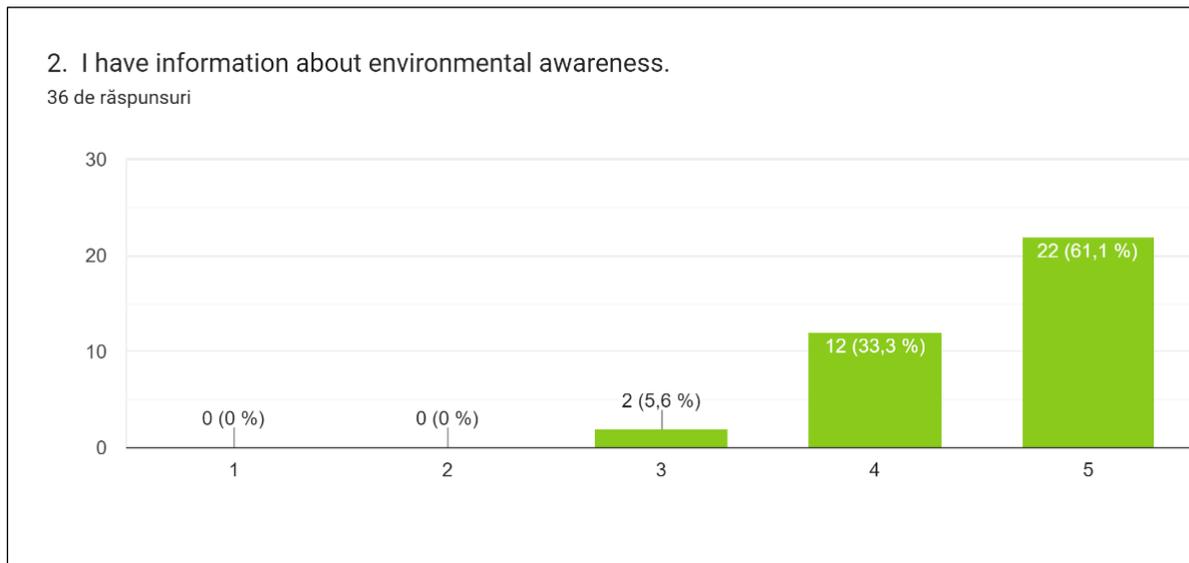
1. I fulfill my responsibility to protect the environment.

36 de răspunsuri



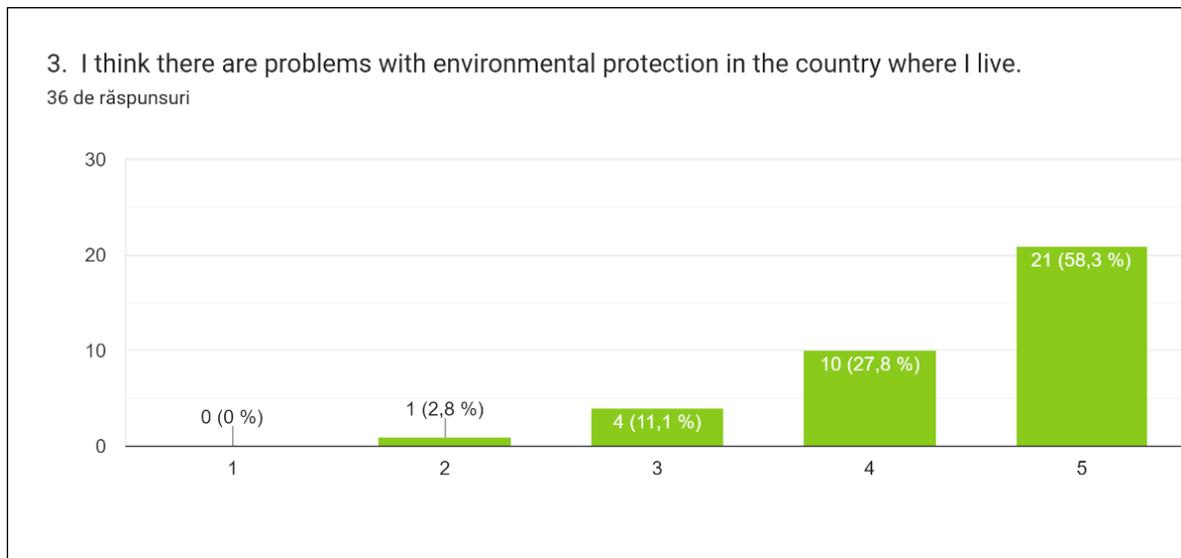
To the first statement of the survey 69,4% of participants answered, “totally agree” and 30,6% answered “mostly agree”.

### Question - 2:



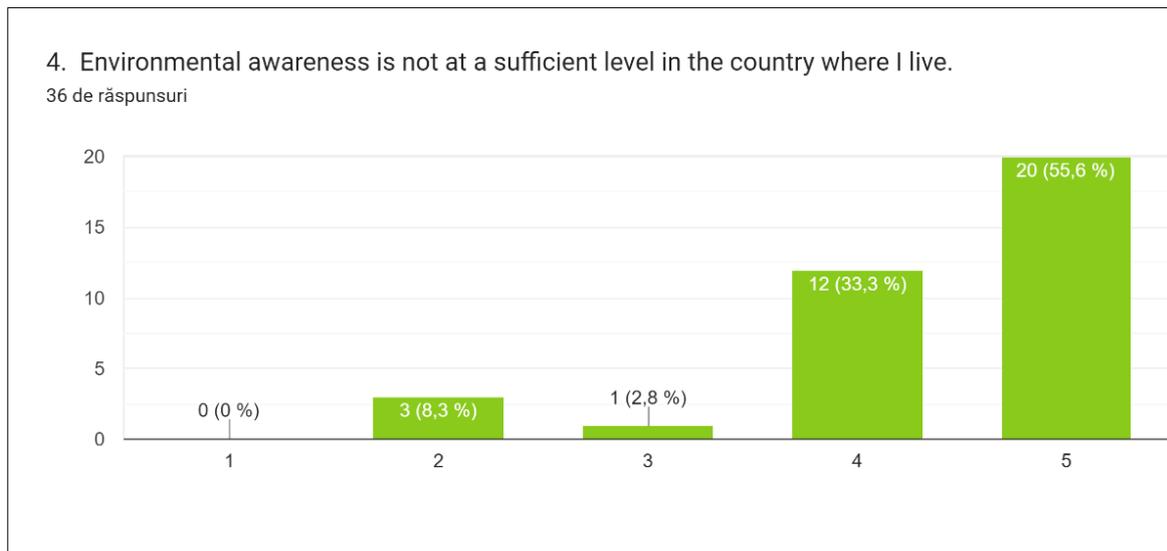
The second statement of the survey received answers as: 61,1% - “totally agree”, 33,3% - “mostly agree” and 5,6% - “moderately agree”.

### Question - 3:



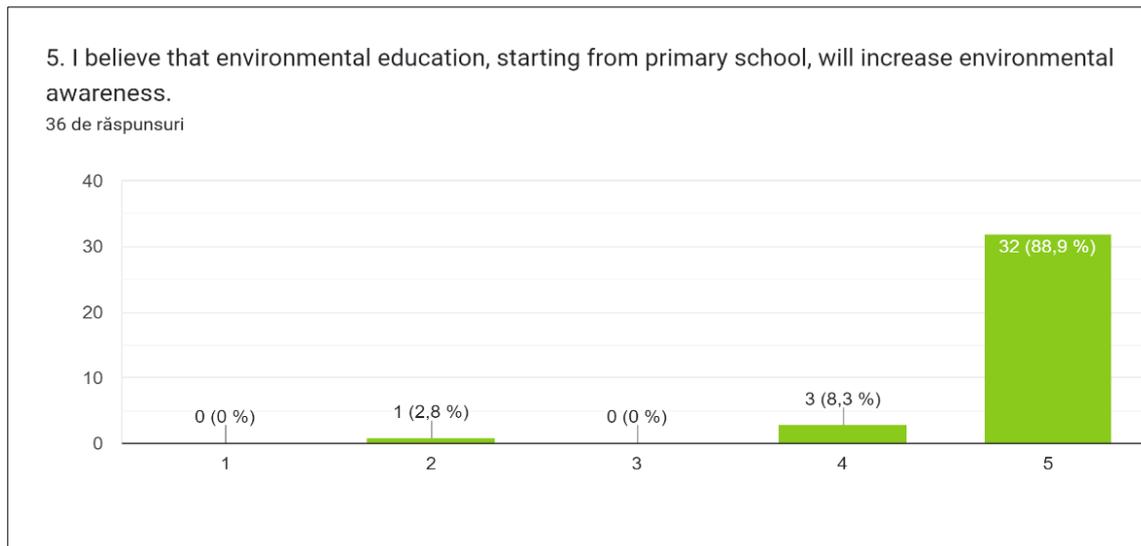
The 3<sup>rd</sup> statement of the survey received answers as: “totally agree” – 58,3%, “mostly agree” – 27,8%, “moderately agree” – 11,1% and “disagree” – 2,8%.

#### Question - 4:



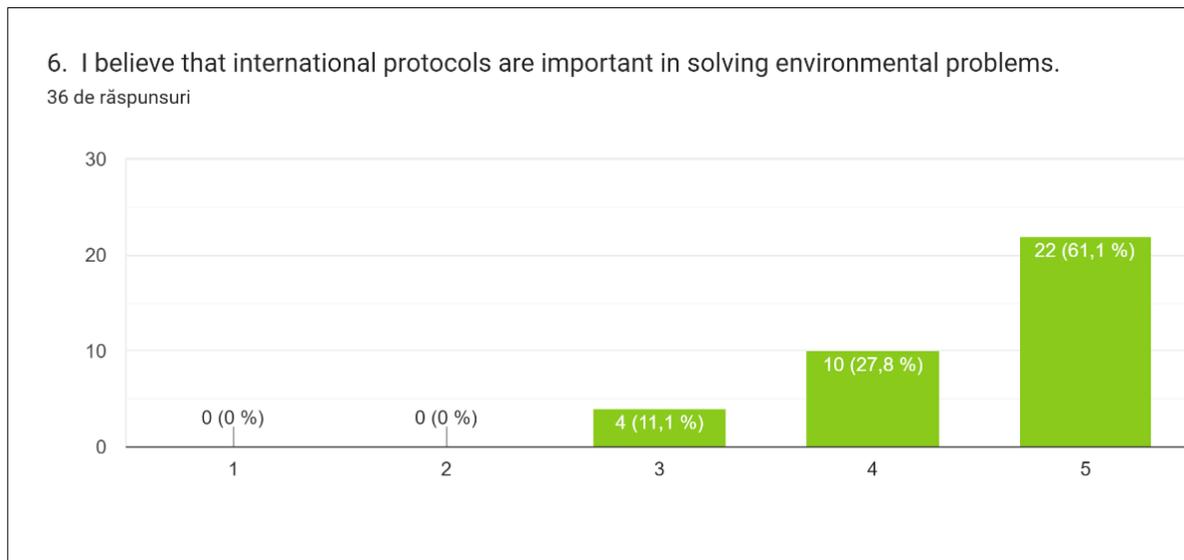
To the fourth statement of the survey, 55.6% of participants answered, "totally agree", 33.3% answered "mostly agree", 2.8% - "moderately disagree" and 8.3% - "disagree".

#### Question - 5:



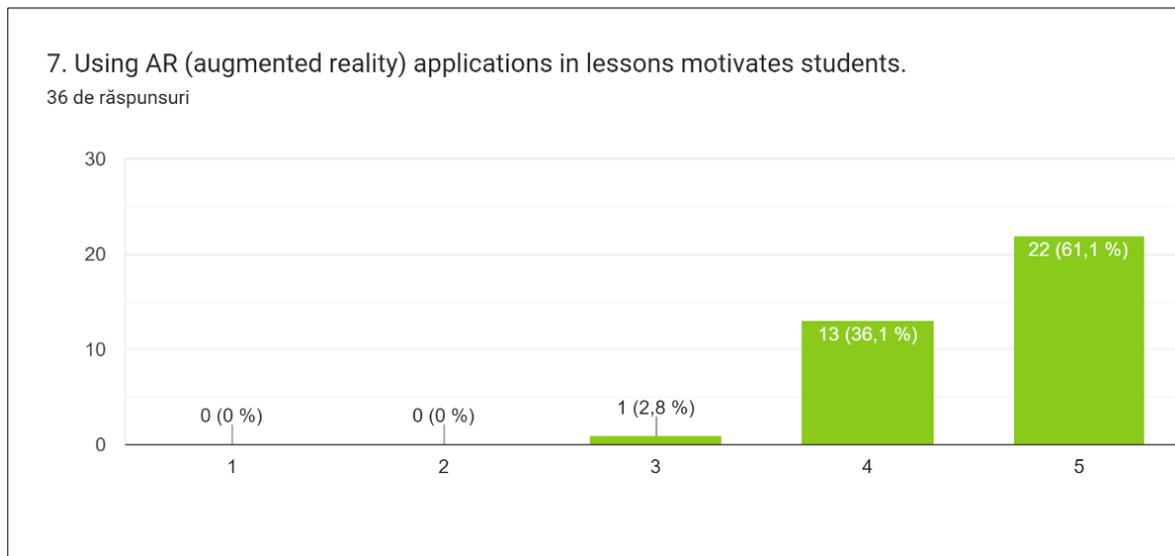
To the fifth statement of the survey, 88,9 % of participants answered, "totally agree", 8.3% - "mostly agree" and 2.8% - "disagree".

### Question - 6:



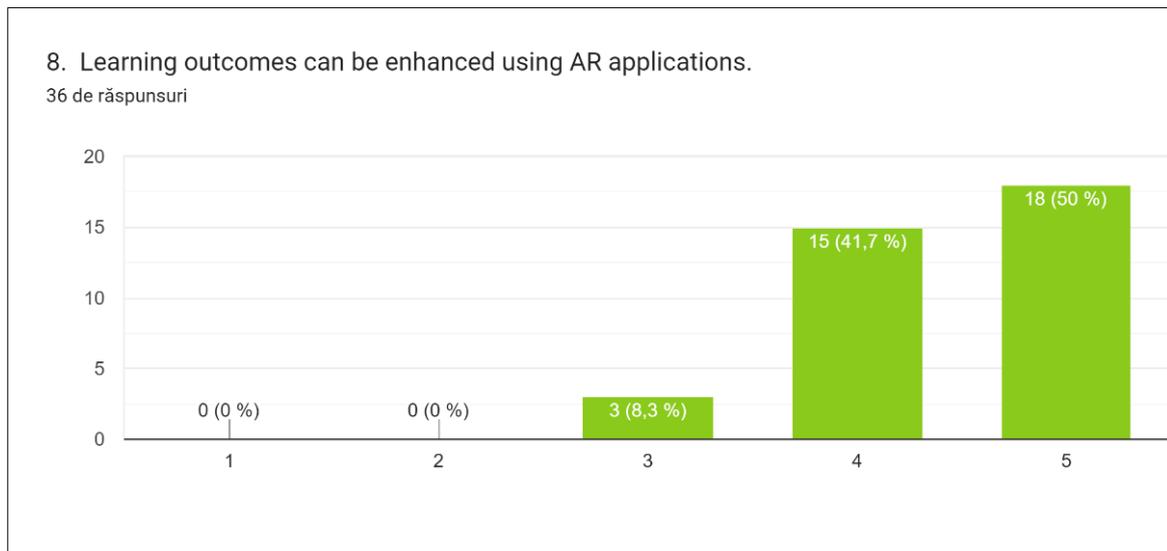
To the sixth statement of the survey, 61,1 % of participants answered "totally agree", 27,8% - "mostly agree" and 11,1 % - "moderately agree".

### Question - 7:



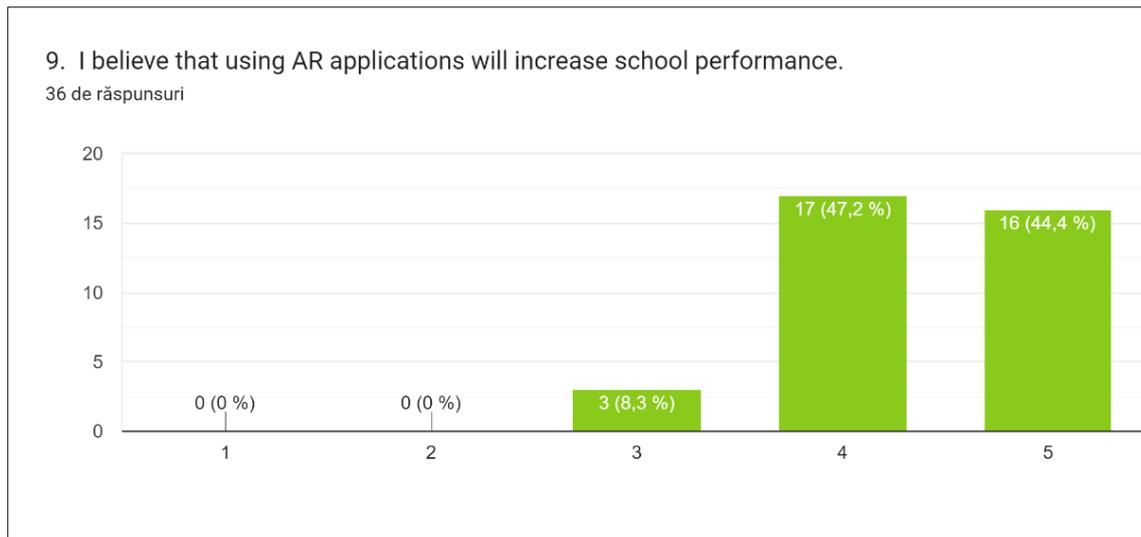
To the seventh statement of the survey, 61,1% of participants answered "totally agree", 36,1% of them answered "mostly agree" and 2,8% - "moderately agree".

### Question - 8:



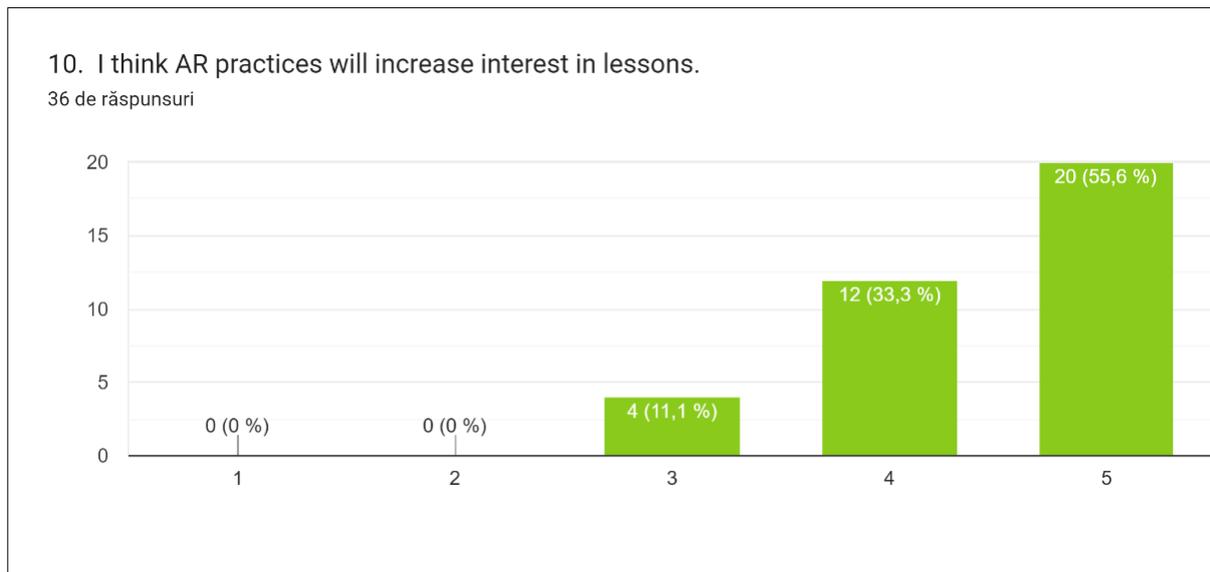
The 8th statement of the survey was responded as “totally agree” by 50% of the participants as “mostly agree” by 41,7 % and “moderately agree” by 8,3 %.

### Question – 9:



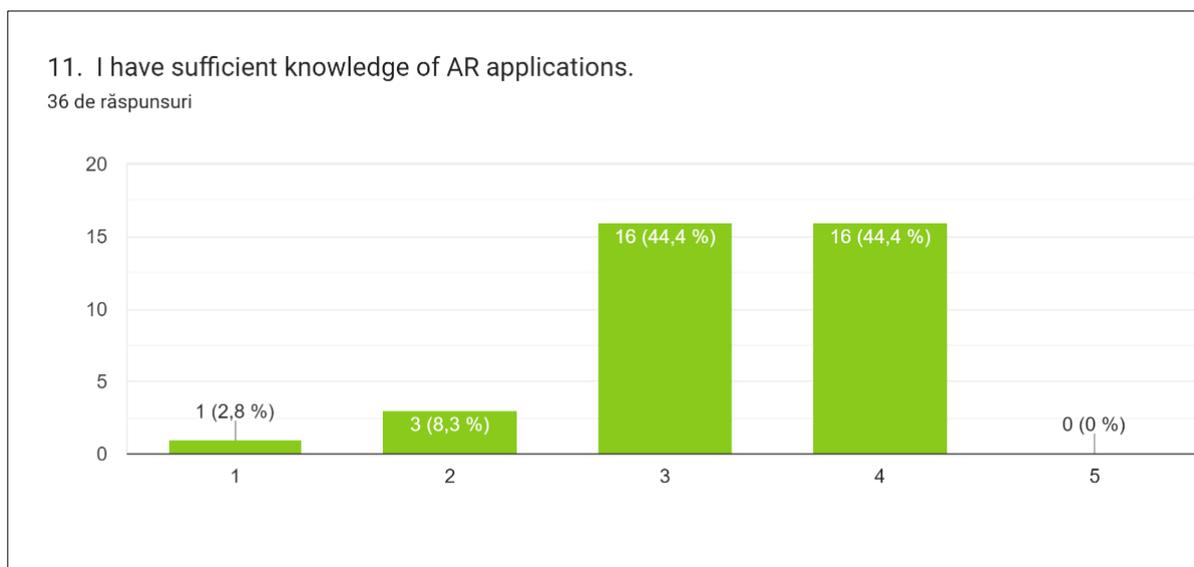
The 9th statement of the survey was responded as “totally agree” by 44,4 % of the participants, as “mostly agree” by 47,2 % and “moderately agree” by 8,3 %.

### Question – 10:



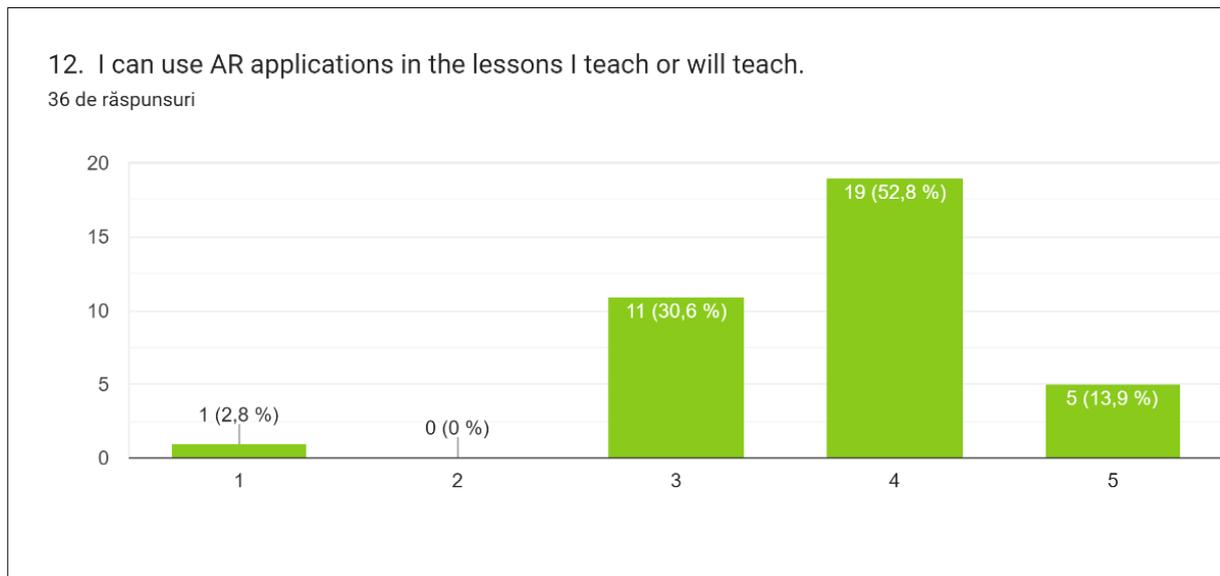
The 10th statement of the survey was responded as “totally agree” by 55,6 % of the participants, as “mostly agree” by 33.3%, as “moderately agree” by 11.1%.

### Question – 11:



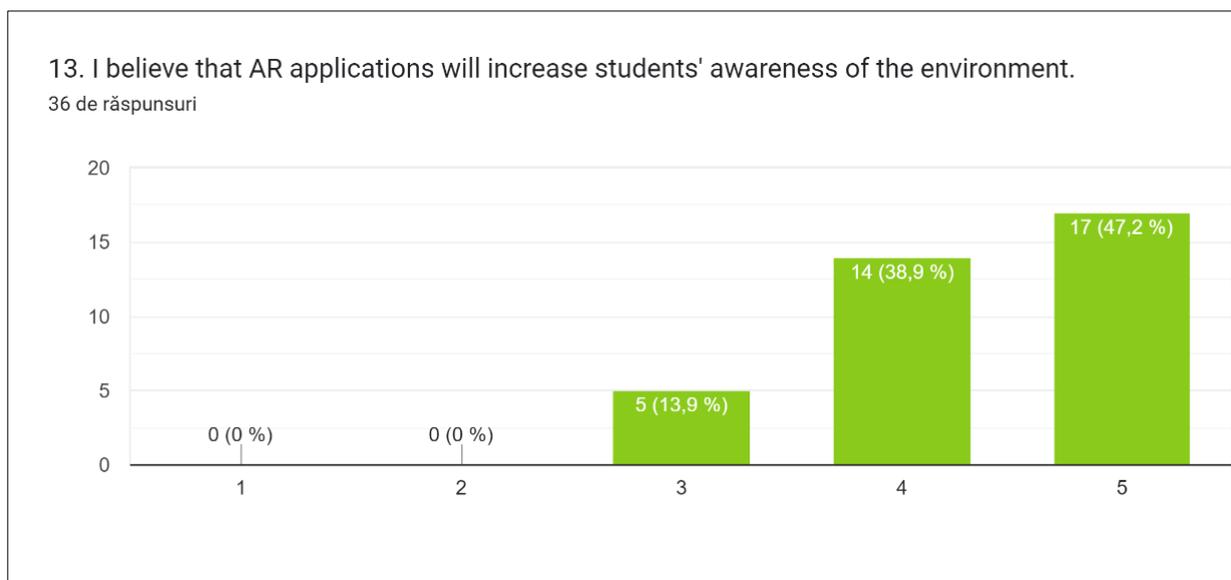
The 11th statement of the survey was responded as “totally agree” by 0 % of the participants and as “mostly agree” by 44,4%, as “moderately agree” by 44,4 %, as “disagree” by 8,3% and as “disagree” by 2,8%.

### Question - 12:



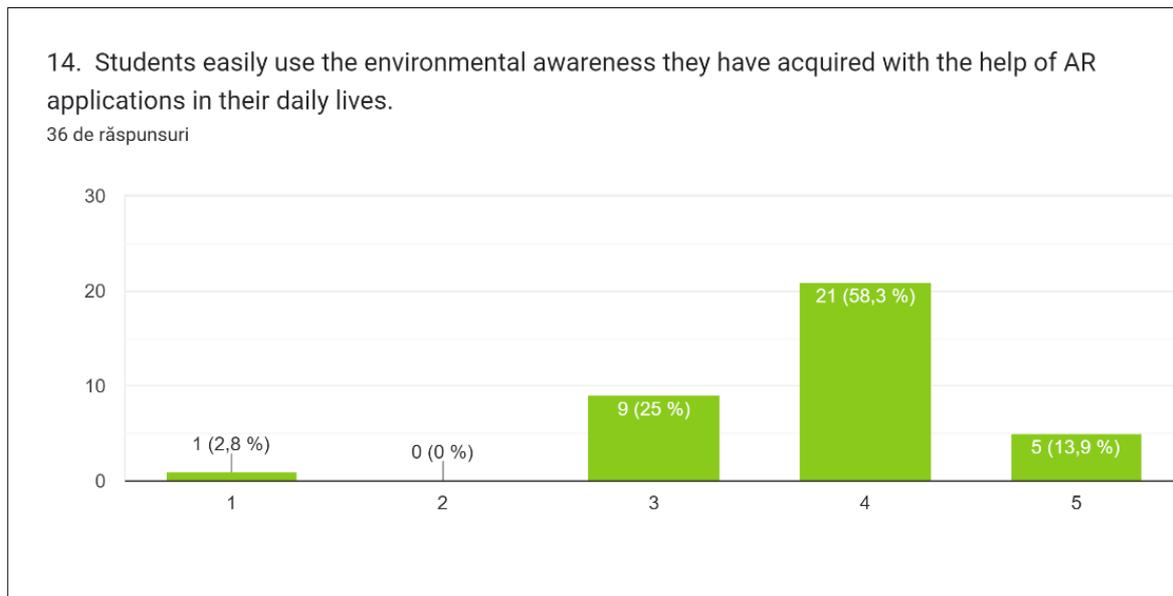
To the 12th statement of the survey, 13,9 % of participants answered “totally agree”, 52,8 % of them answered “mostly agree”, 30,6 % - “moderately agree”, and as 2,8 % “disagree”.

### Question – 13:



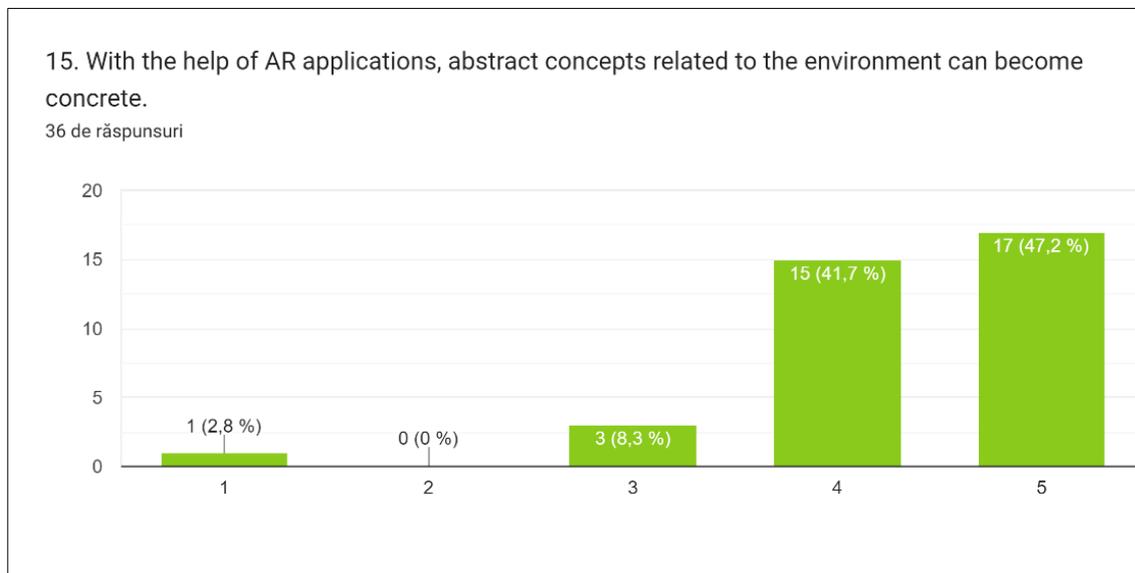
The 13th statement of the survey was responded as “totally agree” by 47,2% of the participants, as “mostly agree” by 38,9 %, and as “moderately agree” by 13,9%.

#### Question – 14:



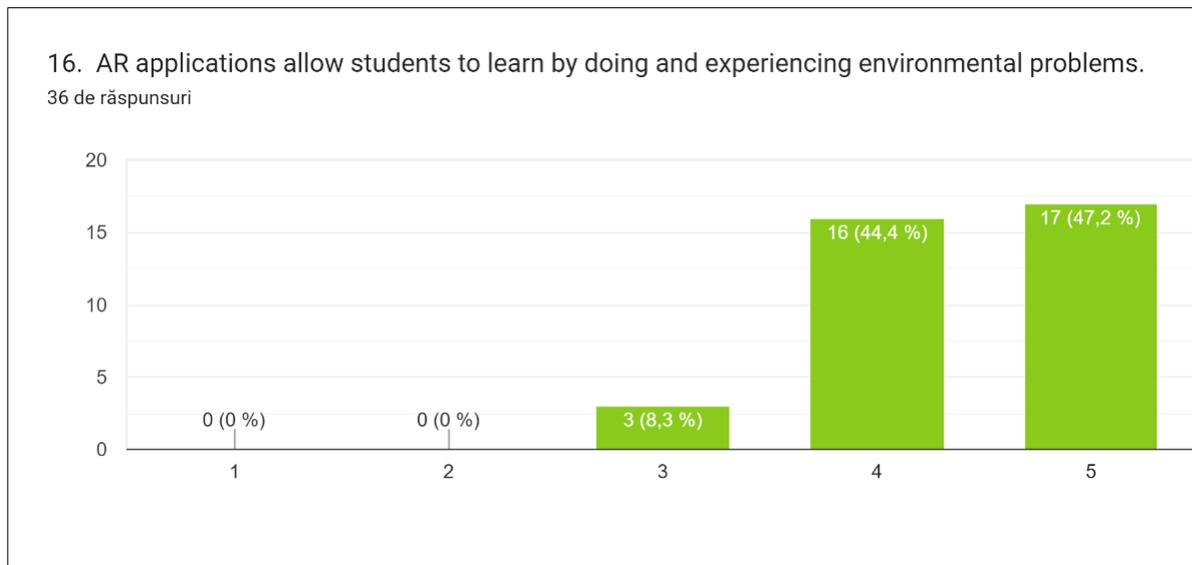
To the 14th statement of the survey, 13,9 % of participants answered “totally agree”, 58,3% of them answered “mostly agree”, 25 % - “moderately agree”, and as 2,8 % - “definitely disagree”.

#### Question – 15:



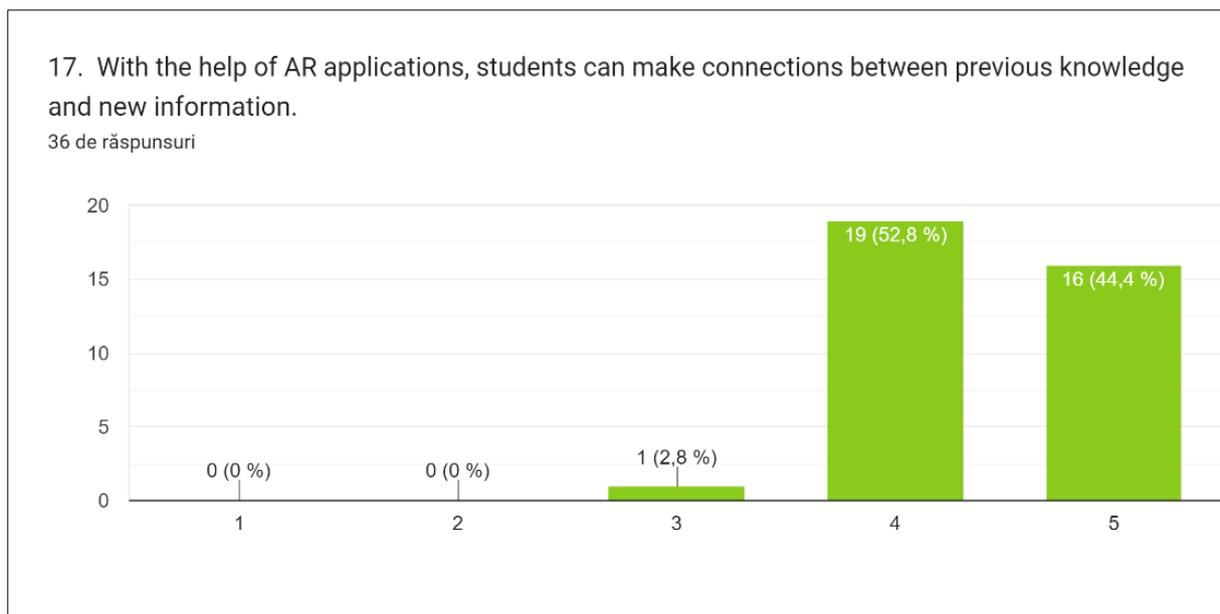
The 15th statement of the survey was responded as “totally agree” by 47,2 % of the participants as “mostly agree” by 41,7 %, as “moderately agree” by 8.3%, and as “totally disagree” by 2,8%.

### Question – 16:



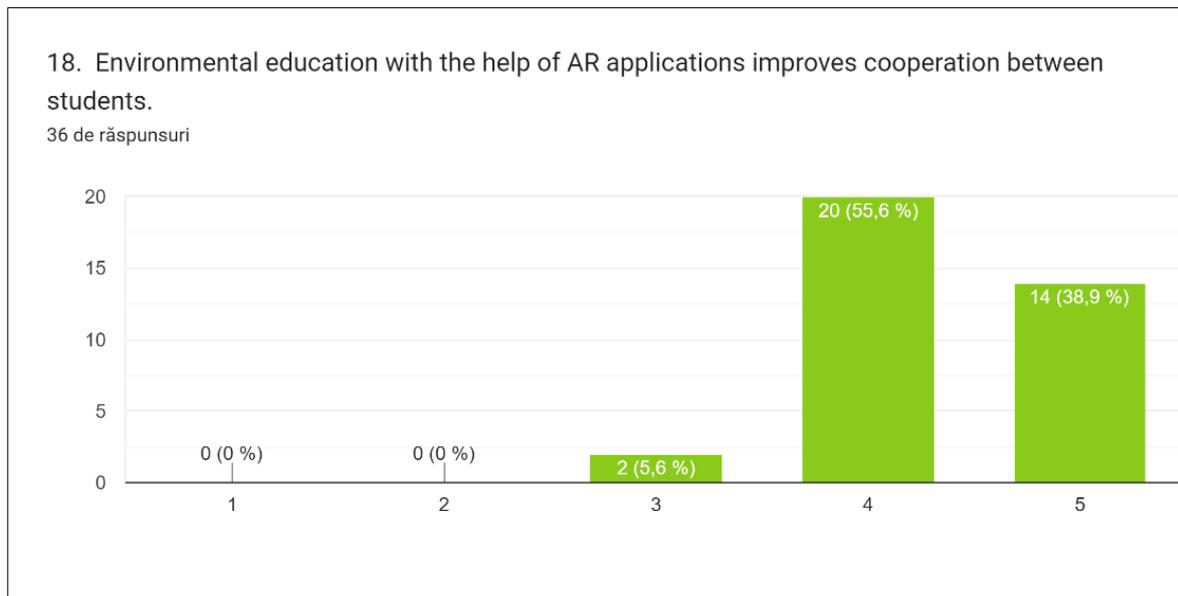
The 16th statement of the survey was responded as “totally agree” by 47,2 % of the participants, as “mostly agree” by 44,4 % , and as “moderately agree” by 8,3 %.

### Question – 17:



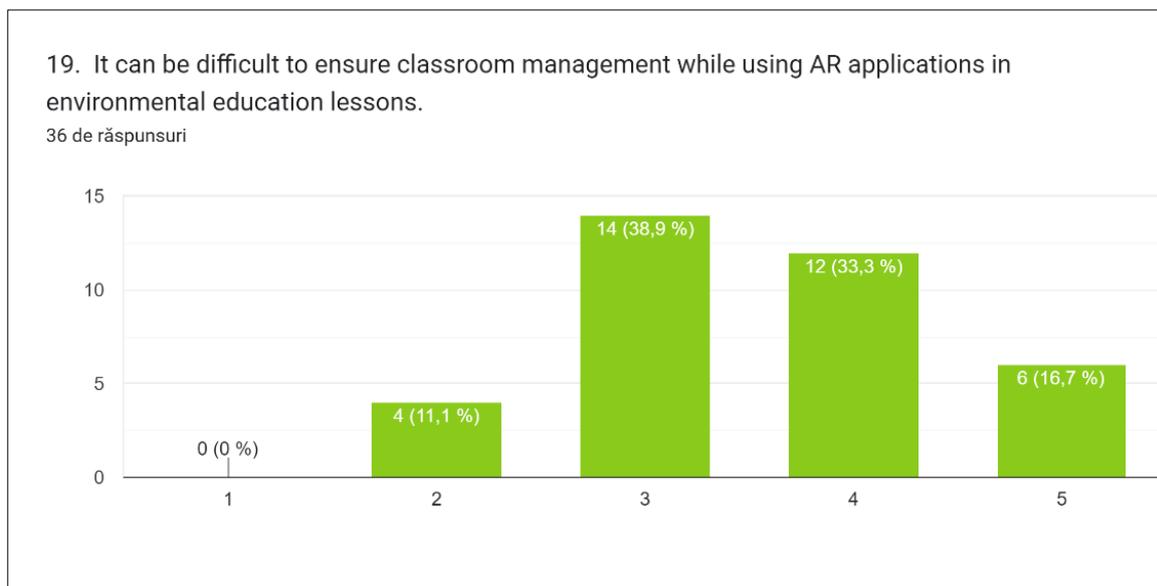
The 17th statement of the survey was responded as “totally agree” by 44.4% of the participants and as “mostly agree” by 52,8 %, and as “moderately agree” by 2,8%.

**Question – 18:**



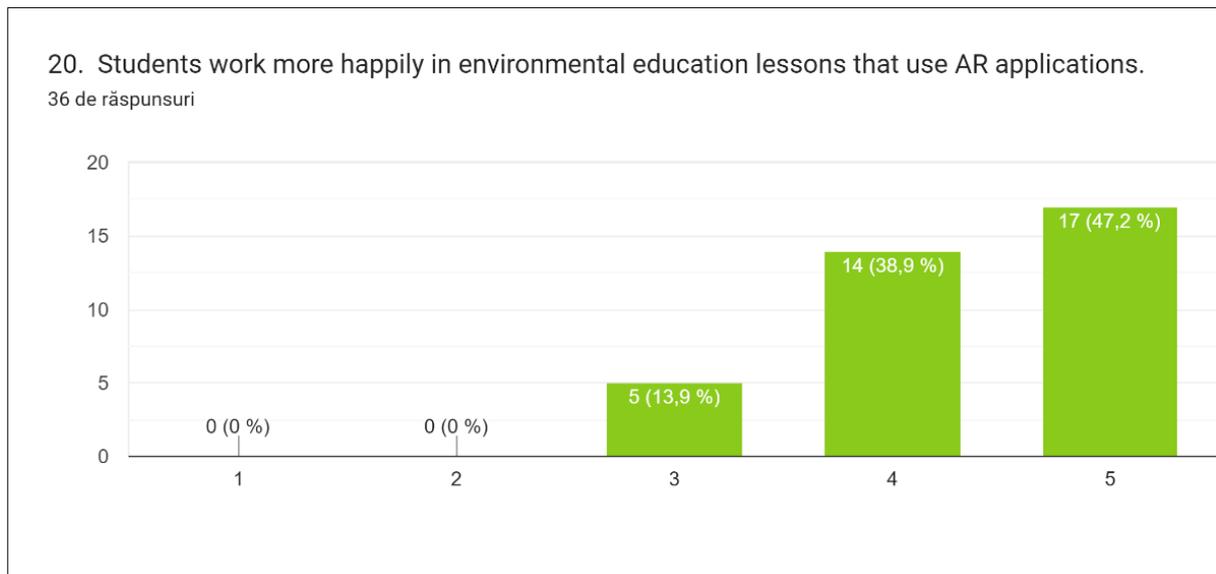
The 18th statement of the survey was responded as “totally agree” by 38.9 % of the participants, as “mostly agree” by 55,6 %, and as “moderately agree” by 5,6 %.

**Question – 19:**



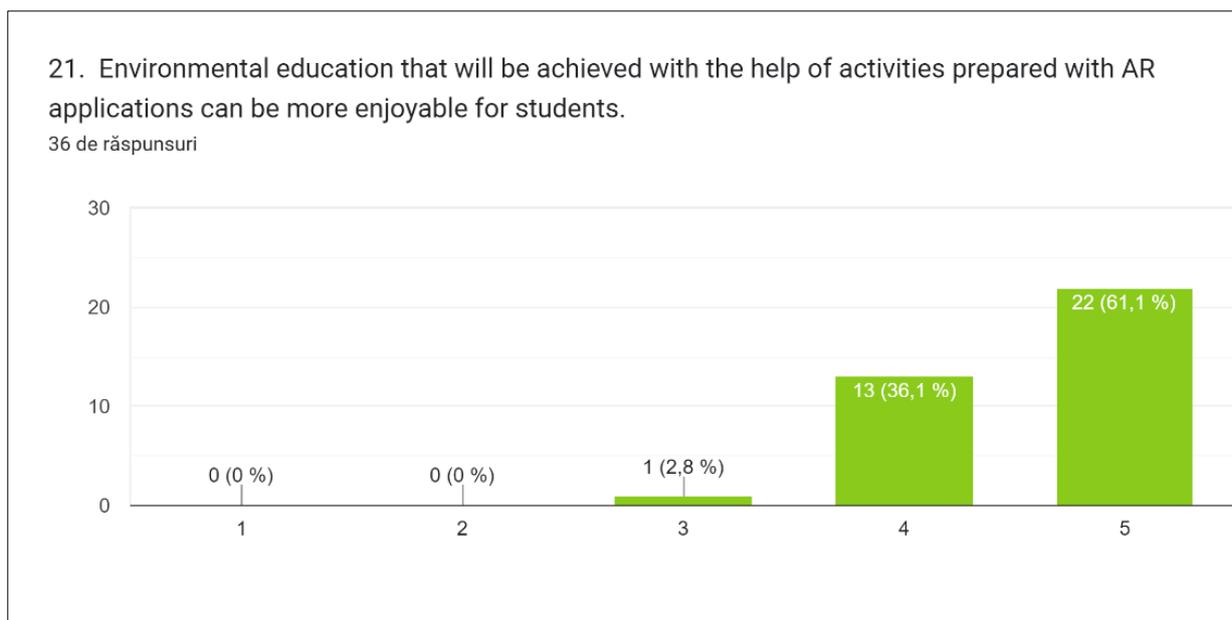
The 19th statement of the survey was responded as “totally agree” by 16,7% of the participants as “mostly agree” by 33,3%, as “moderately agree” by 38,9 %, and as” disagree” by 11,1 %.

### Question – 20:



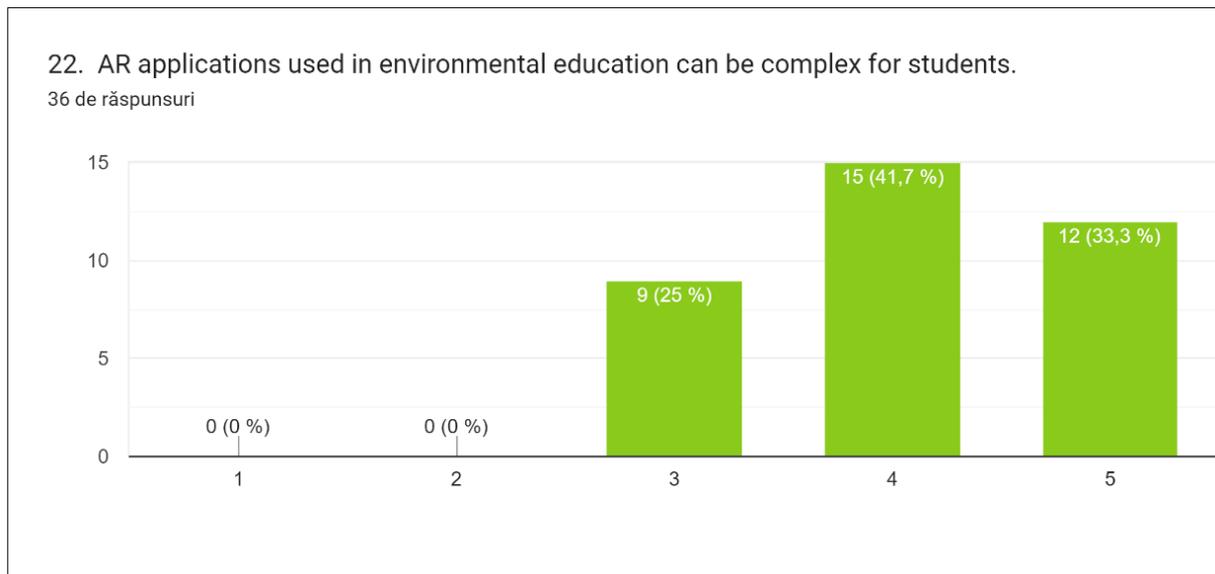
The 20th statement of the survey was responded as “totally agree” by 47,2 % of the participants, as “mostly agree” by 38,9 %, and as “moderately agree” by 13,9%.

### Question - 21:



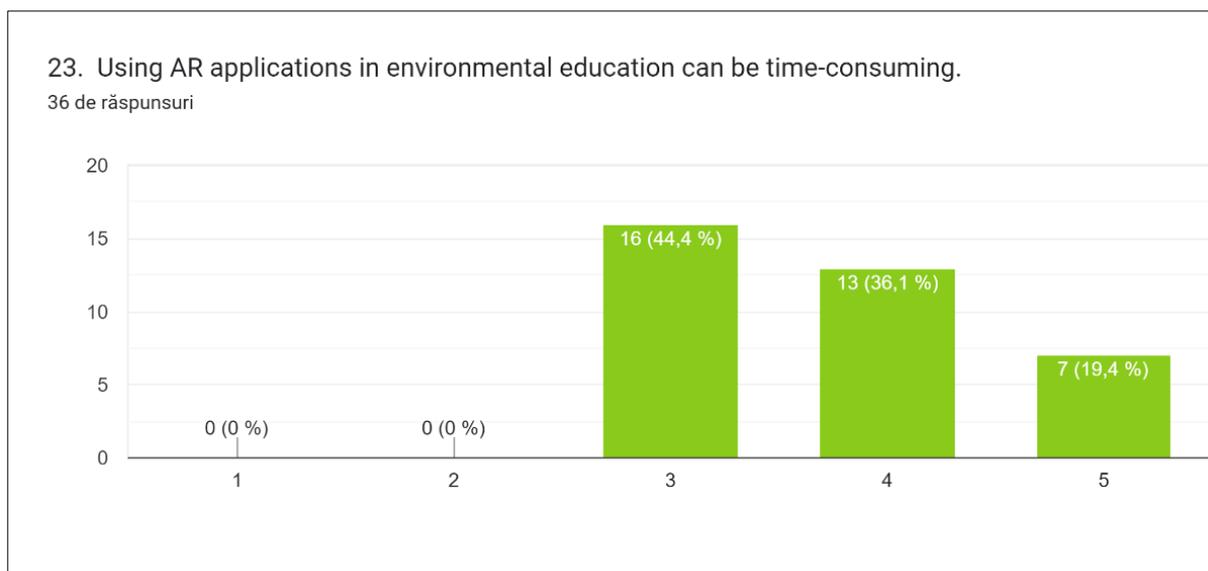
The 21st statement of the survey was responded as “totally agree” by 61,1 % of the participants and as “mostly agree” by 36,1 %, and as “moderately agree” by 2,8 %.

### Question – 22:



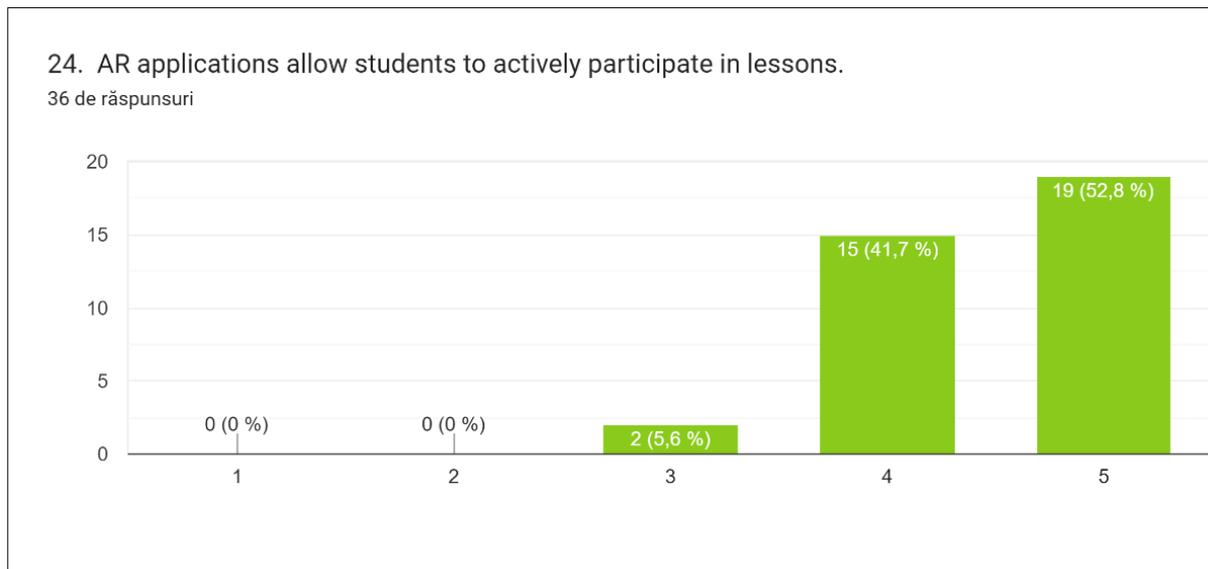
The 22nd statement of the survey was responded as “totally agree” by 33,3 % of the participants, as “mostly agree” by 41,7 %, and as “moderately agree” by 25 %.

### Question – 23:



The 23rd statement of the survey was responded as “totally agree” by 19.4% of the participants as “mostly agree” by 36,1 %, and as “moderately agree” by 44,4 %.

### Question - 24:



The 24th statement of the survey was responded as “totally agree” by 52,8 % of the participants as “mostly agree” by 41,7 %, and as “moderately agree” by 5,6 %.

### 4.3. Conclusion

According to the results of the survey, most participants fulfil their responsibility to protect the environment and have information about environmental awareness. Most respondents also believe that there are problems with environmental protection in our country and believe that if environmental education started in primary school, people's environmental awareness would increase.

Most of the participants in the survey believe that the use of AR applications: a) will increase school performance; b) learning results can be qualified better with the help of AR applications; c) will increase the students' attitude towards the course; d) will increase students' environmental awareness; e) using AR applications abstract concepts related to the environment can be made concrete; f) will give students the opportunity to easily use environmental awareness in everyday life; g) allow students to learn by doing and experiencing environmental problems; h) help students to make connections between prior knowledge and new information; i) improve cooperation among students; j) will make environmental education more enjoyable for students; k) can be complex for students; l) will make students to work more willingly in environmental education; m) enable students to actively participate in the lessons; n) will increase students' motivation for lessons.

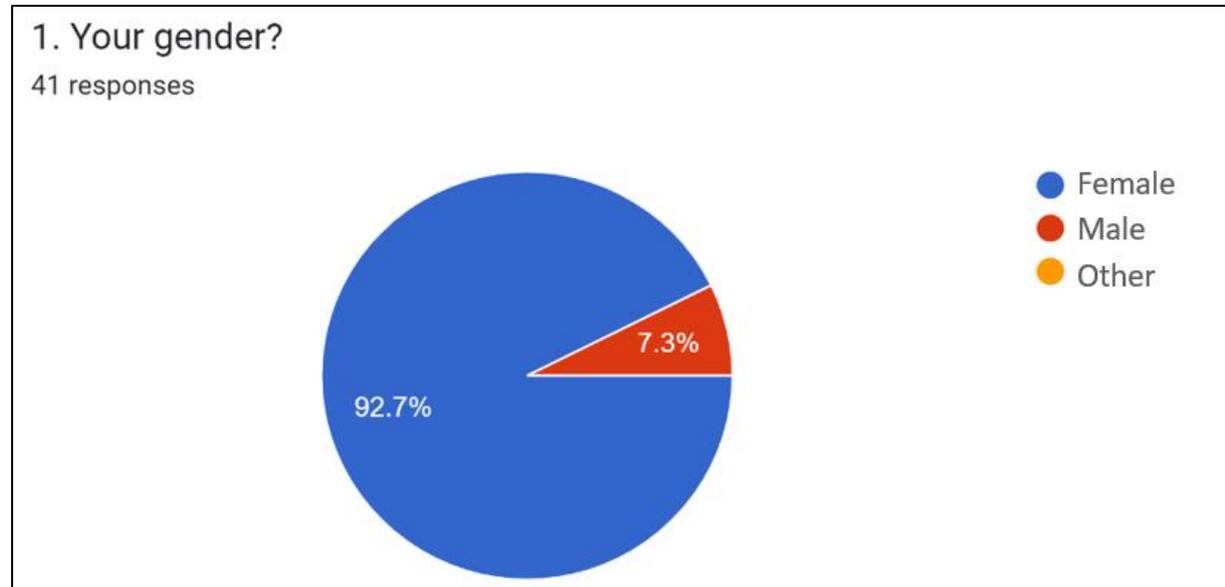
Concerning the participants' knowledge on the use of AR applications, only a very small percentage of them (disagree - 8,3%, "disagree" - 2,8%) do not know about these applications. To this statement: "It can be difficult to provide classroom management in environmental education with AR applications" most of the participants responded: "mostly agree" - 33,3%, and "moderately agree" - 38,9 %. Regarding the use of AR applications in lessons, most respondents stated that they use or will use these applications.

In conclusion, AR applications have the potential to revolutionise the education sector by providing learners with engaging and interactive experiences. However, there are also several challenges and limitations that need to be addressed before it can be fully embraced by the education sector. As such, further research and development is needed to fully realise the potential of AR in education.

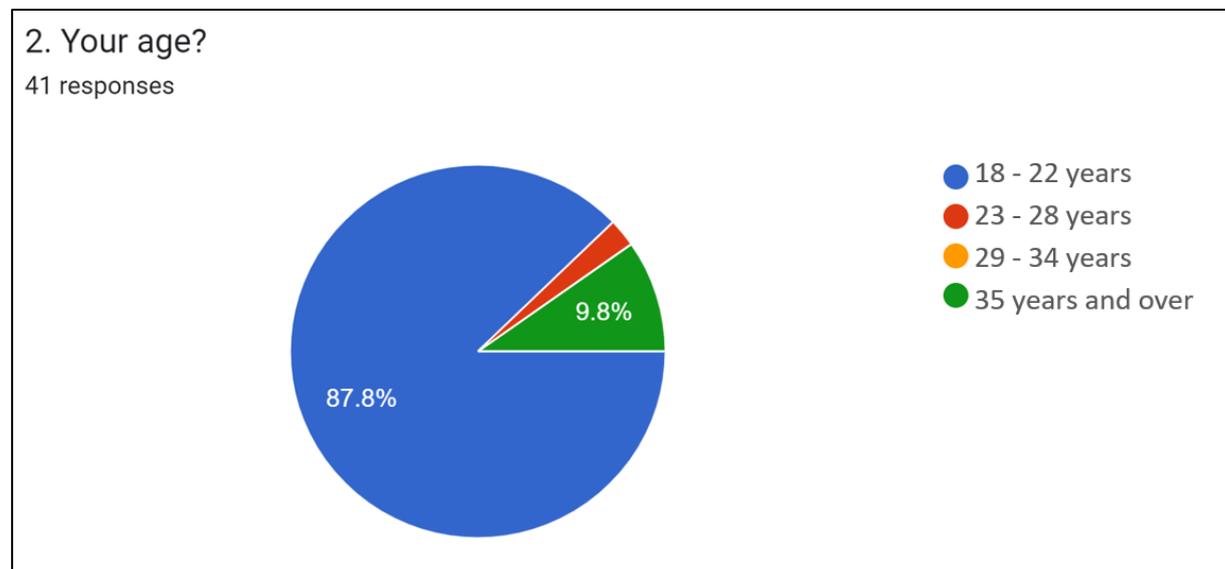
## 5. TURKEY

### 5.1. Number of Participants and Profile

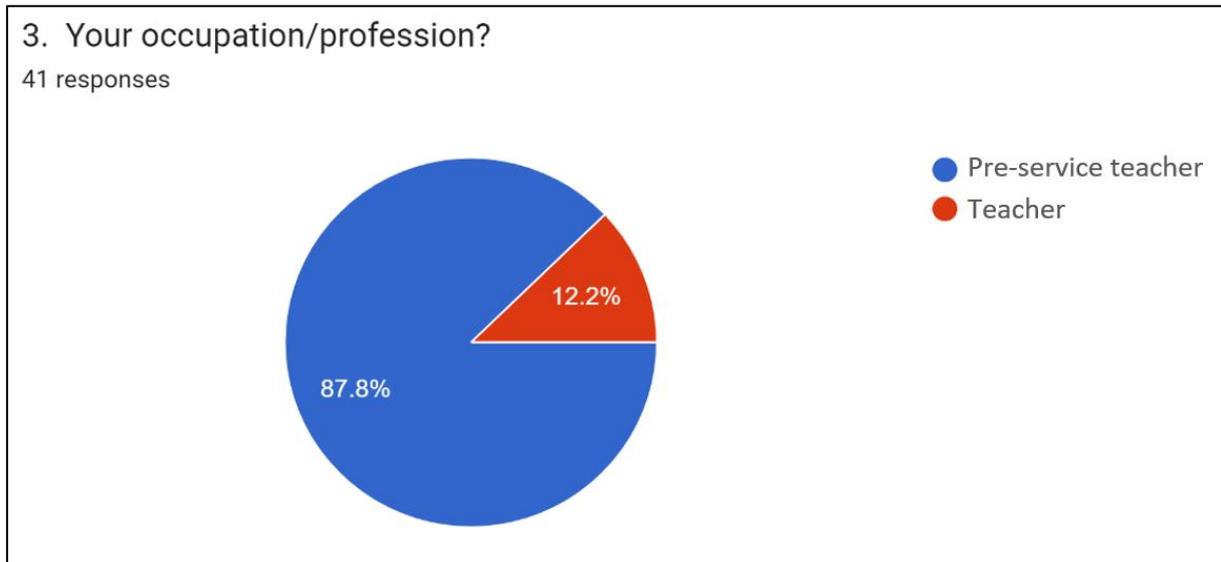
The survey was conducted by Çanakkale Onsekiz Mart University, one of the project partners, with 41 participants. 92.7% of the participants were female (38) and 7.3% were male (3).



87.8% of the participants were between the ages of 18-22 (36), 9.8% were 35 years and over (4) and only 1 person was between the ages of 23-28.



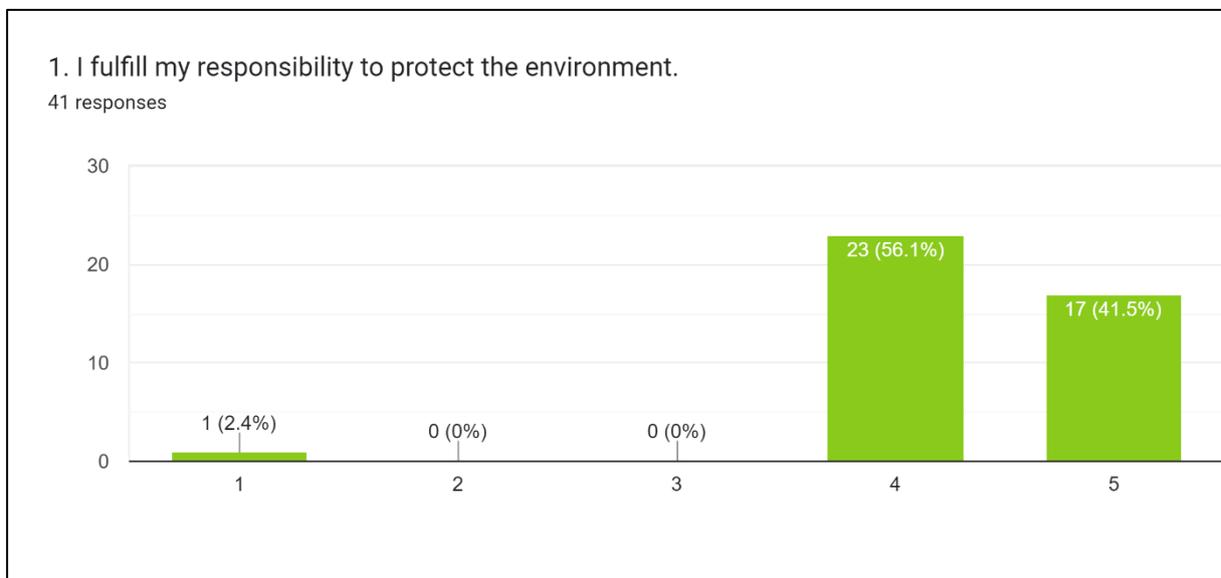
87,8% of the participants were pre-service teachers (36) and 12,2% were teachers (5).



## 5.2. Summary of Results

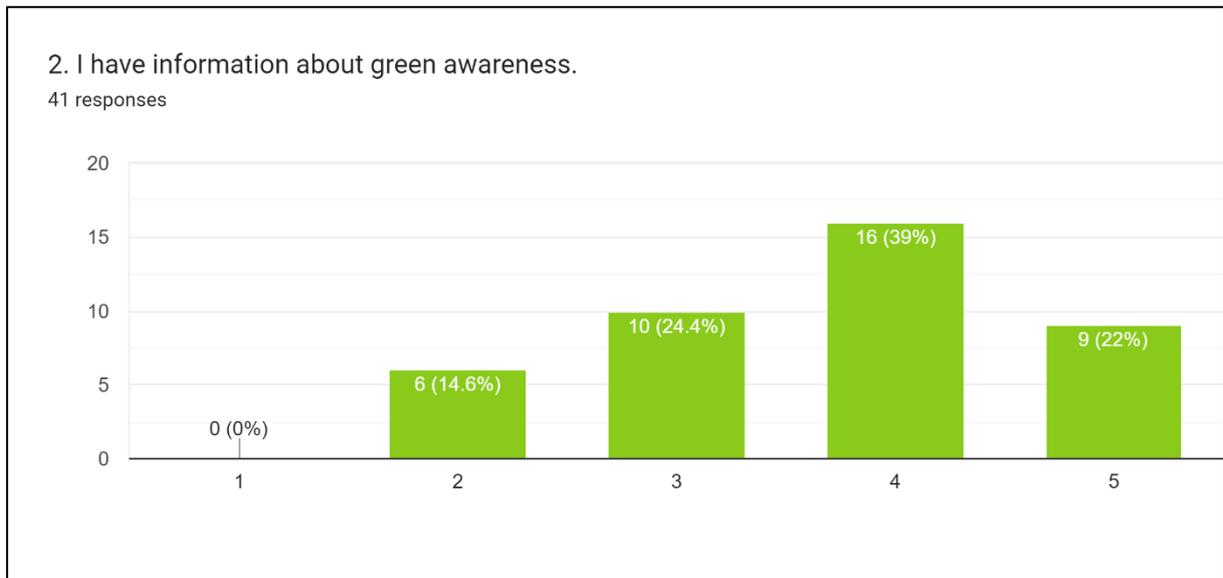
### Question – 1:

In this section, firstly, the participants were asked questions about environmental protection and green awareness.



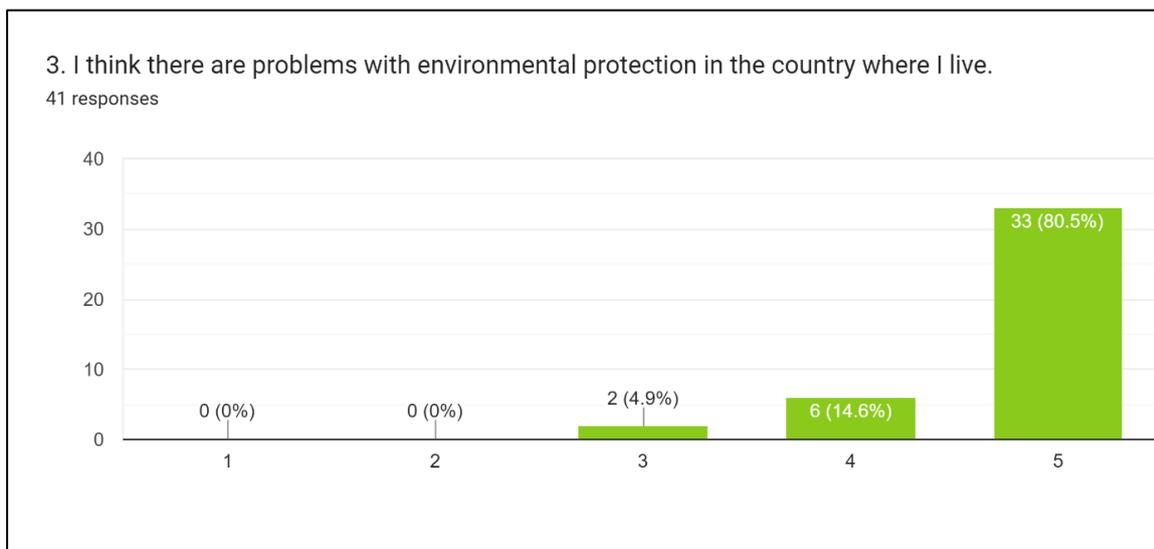
While 41.5% of the participants said “Totally Agree” to the statement “I fulfill my responsibility to protect the environment”, 56.1% said “Mostly Agree”. This shows that 97.6% of all participants think that they fulfill their responsibilities to protect the environment. Only 1 participant stated that he definitely disagreed with this statement.

## Question – 2:



While 22% of the participants said “Totally Agree” to the statement "I have information about green awareness", 39% said “Mostly Agree” in the same way. This result shows that 61% of all participants have information about green awareness. The remaining 39% of the participants stated that they thought negatively or moderately agreed.

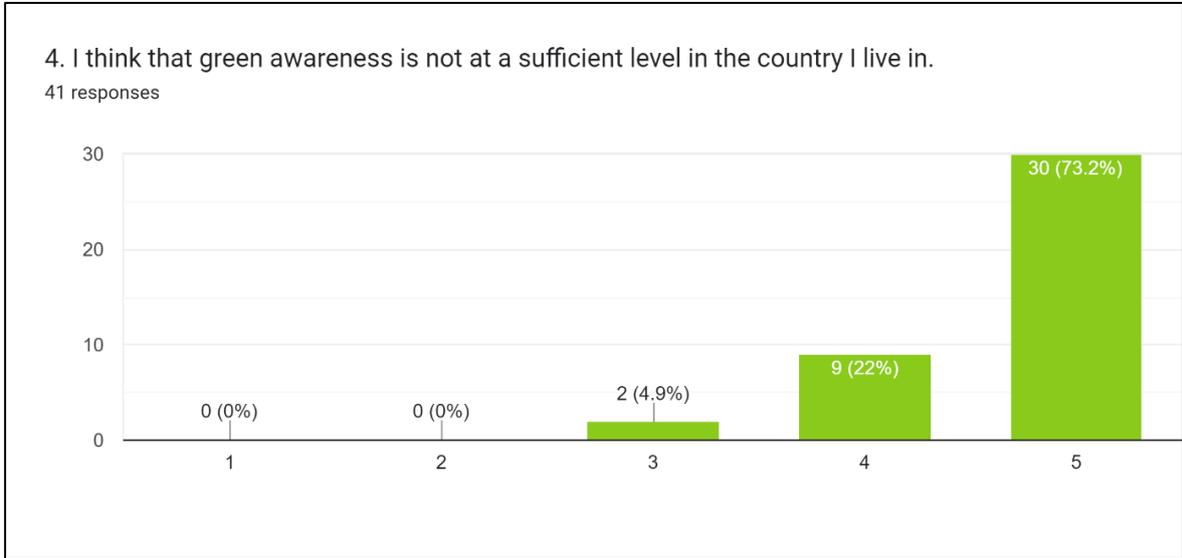
## Question – 3:



The participants were then presented with the statement "I think there are problems with environmental protection in the country where I live." To this statement, 80,5% of the participants responded as “Totally Agree” and 14,6% of them responded as “Mostly Agree”.

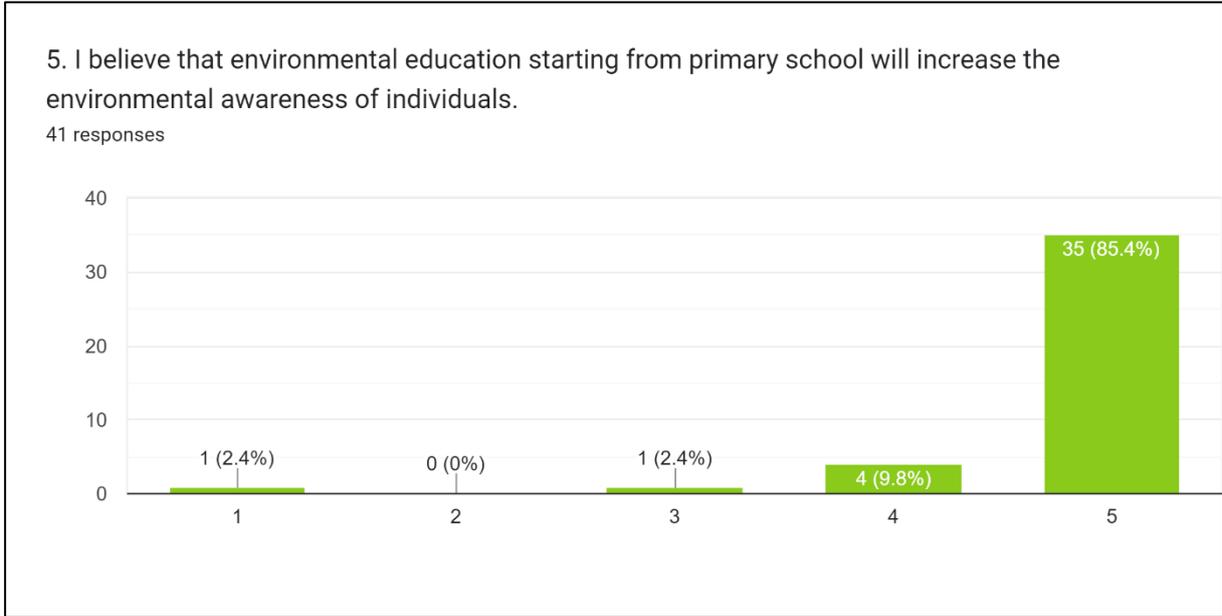
This shows that 95,1% of the participants think that there are problems related to environmental protection in the country where they live.

**Question – 4:**



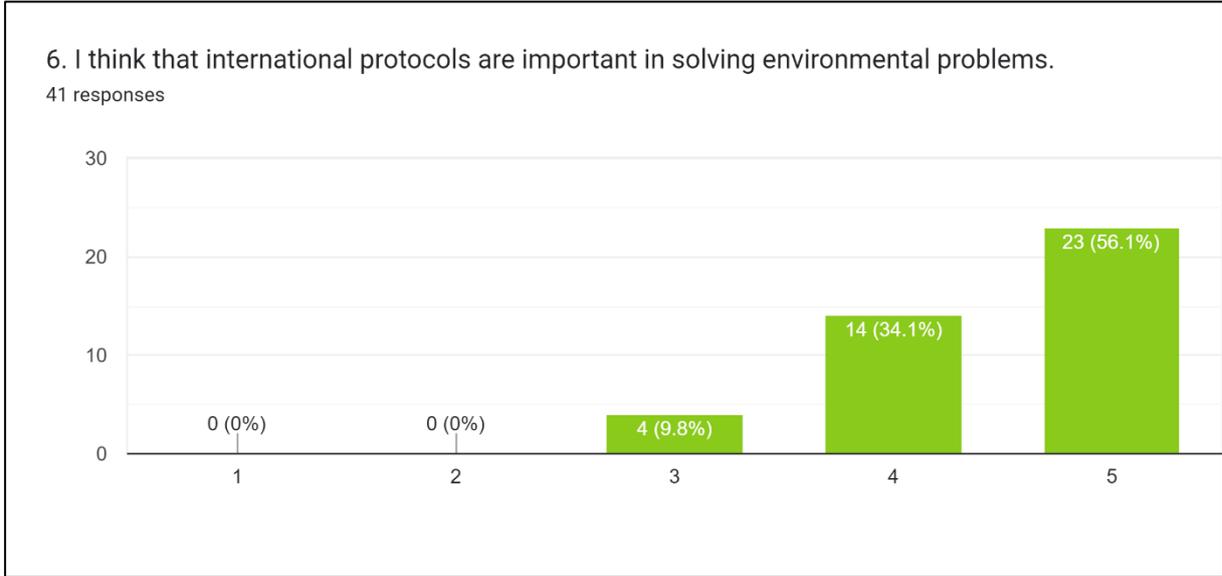
Similarly, 73.2% of the participants said “Totally Agree” to the statement about the lack of green awareness in the country they live in, while 22% said “Mostly Agree”. This result shows that 95.2% of all participants think that green awareness is not at a sufficient level in the country they live in.

**Question – 5:**



To the statement that environmental education given starting from primary school will increase individuals' environmental awareness, 85.4% of the participants said “Totally Agree”, while 9.8% answered “Mostly Agree”. This shows that 95.2% of the participants think that environmental education starting from primary school will increase individuals' environmental awareness. Only 1 participant stated that he strongly disagreed with this statement.

**Question – 6:**



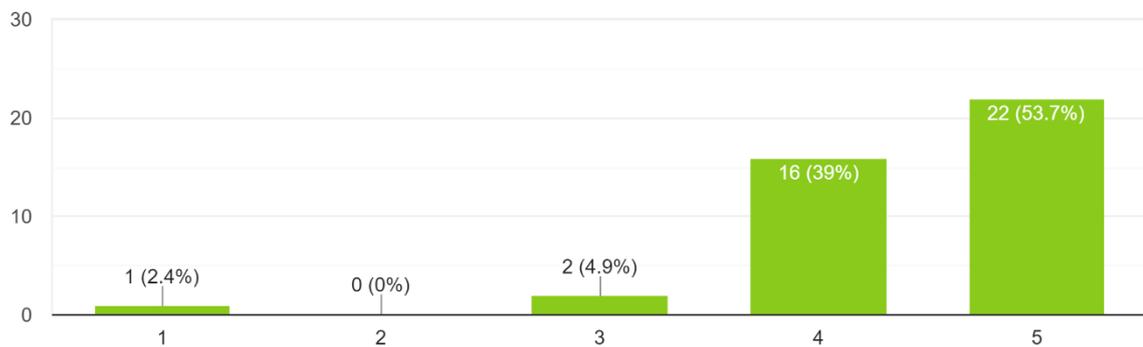
Then, the statement "I think that international protocols are important in solving environmental problems" was presented to the participants. To this statement, 56.1% of the participants responded "Totally Agree" and 34.1% responded "Mostly Agree". This shows that 90.2% of the participants think that international protocols are important in solving environmental problems.

**Question – 7:**

Then, statements about augmented reality (AR) applications were presented to the participants.

### 7. Using AR applications in lessons motivates students.

41 responses

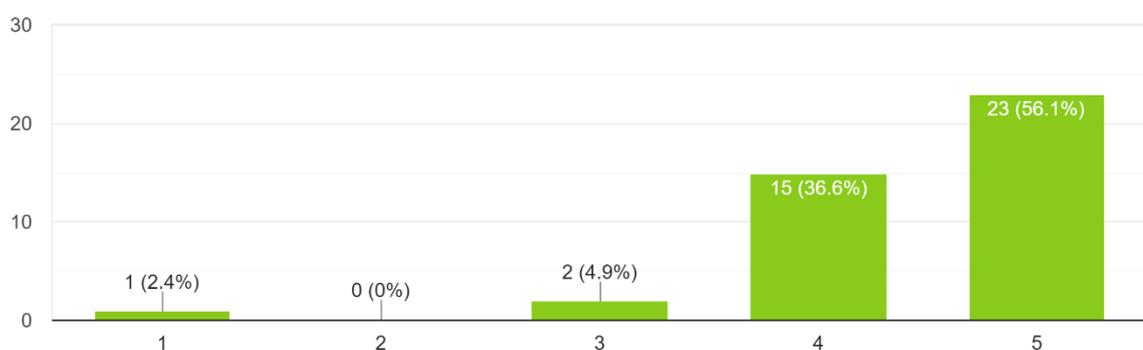


To the statement about the use of AR applications in the lessons motivating the students, 53,7% of the participants answered "Totally Agree" and 39% answered "Mostly Agree". This shows that 92.7% of the participants think that the use of AR applications in lessons will motivate students. Only 1 participant strongly disagreed with this statement.

### Question – 8:

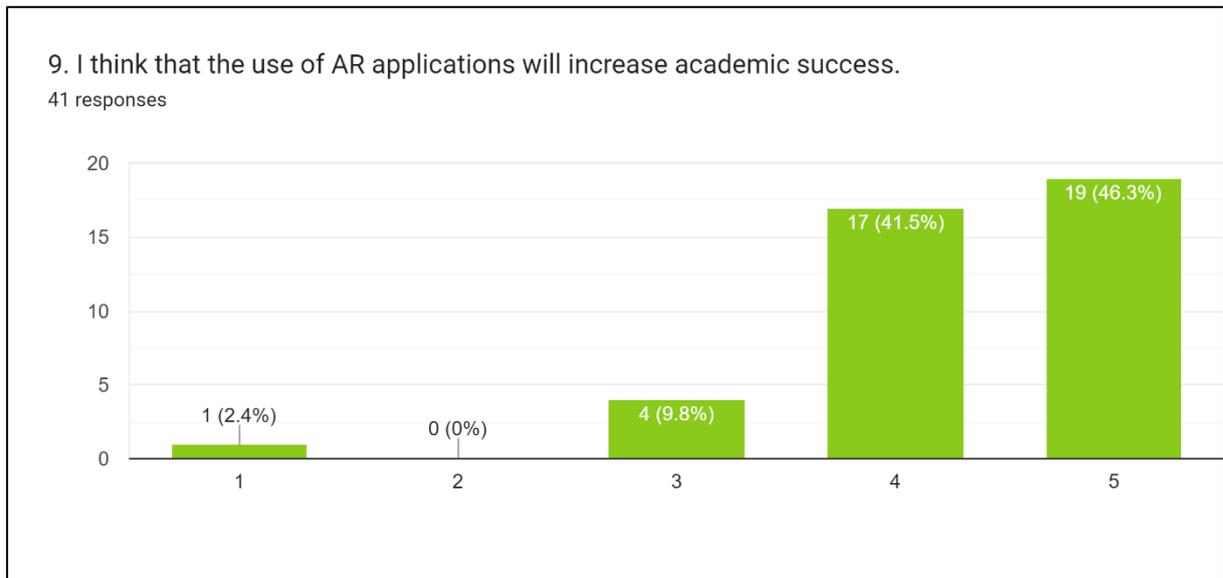
### 8. Learning outcomes can be made more qualified with AR applications.

41 responses



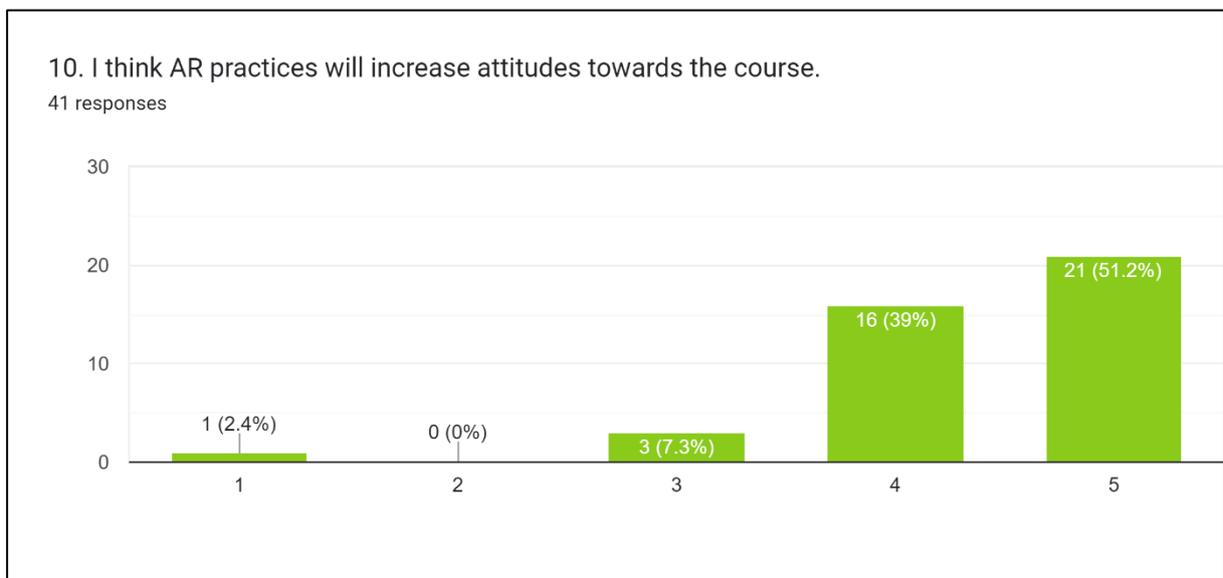
Similarly, 56.1% of the participants "Totally Agree" with the statement that learning outcomes become more qualified with AR applications, while 36.6% of the participants "Mostly Agree". This result shows that 92.7% of all participants think that learning outcomes will become more qualified with AR applications.

### Question – 9:



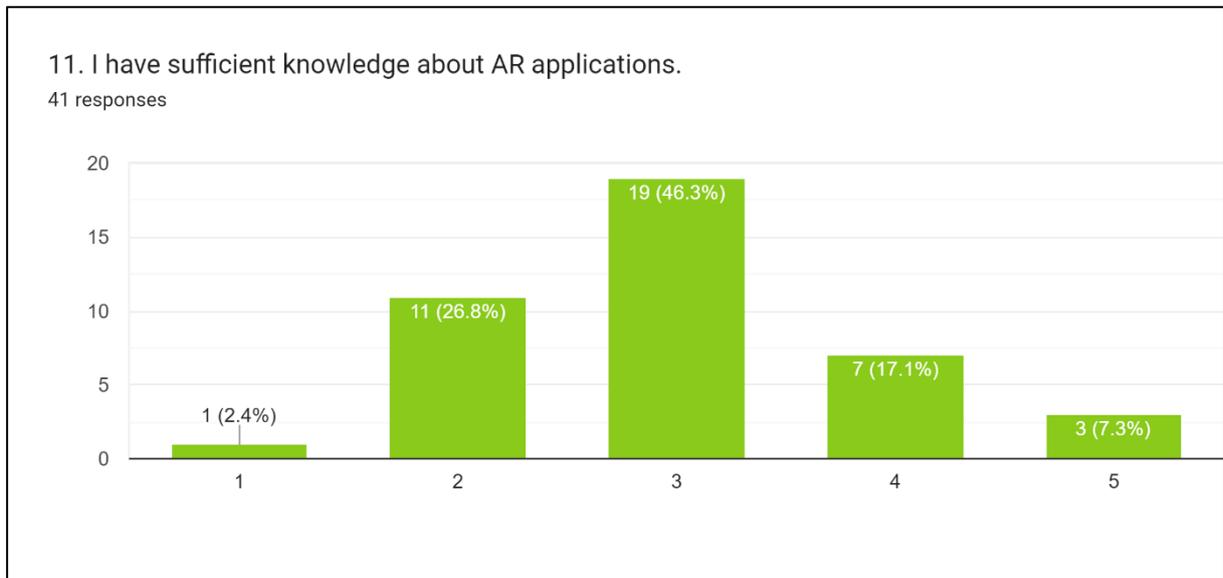
While 46,3% of the participants "Totally Agree" with the statement "I think that the use of AR applications will increase academic success", 41,5% of the participants "Mostly Agree". This result shows that 87.8% of all participants think that the use of AR applications will increase academic success.

### Question – 10:



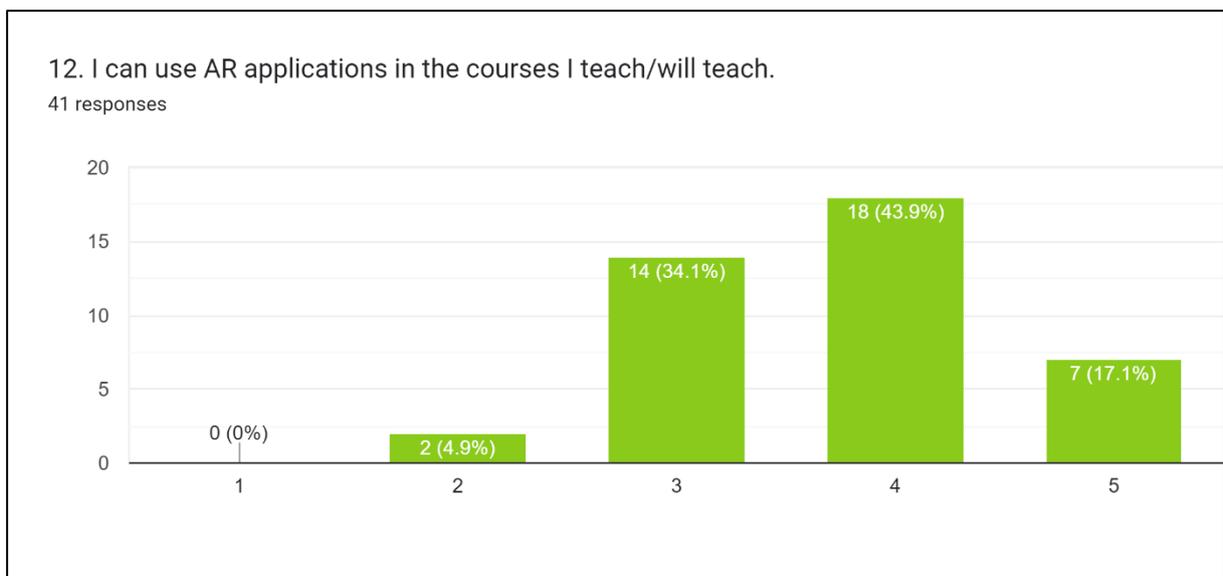
To the statement that AR applications will increase attitudes towards the course, 51,2% of the participants responded "Totally Agree" and 39% responded "Mostly Agree". This shows that 90.2% of the participants think that AR applications will increase attitudes towards the course. Only 1 participant strongly disagreed with this statement.

### Question – 11:



Then, the participants were presented with a statement about having sufficient knowledge about AR applications. Only 7.3% of the participants answered "Totally Agree" to this statement, while 17.1% answered "Mostly Agree". This shows that 24.4% of all participants have sufficient knowledge about AR applications. On the other hand, 75.5% of the participants stated that they moderately agree or disagree with this statement.

### Question – 12:

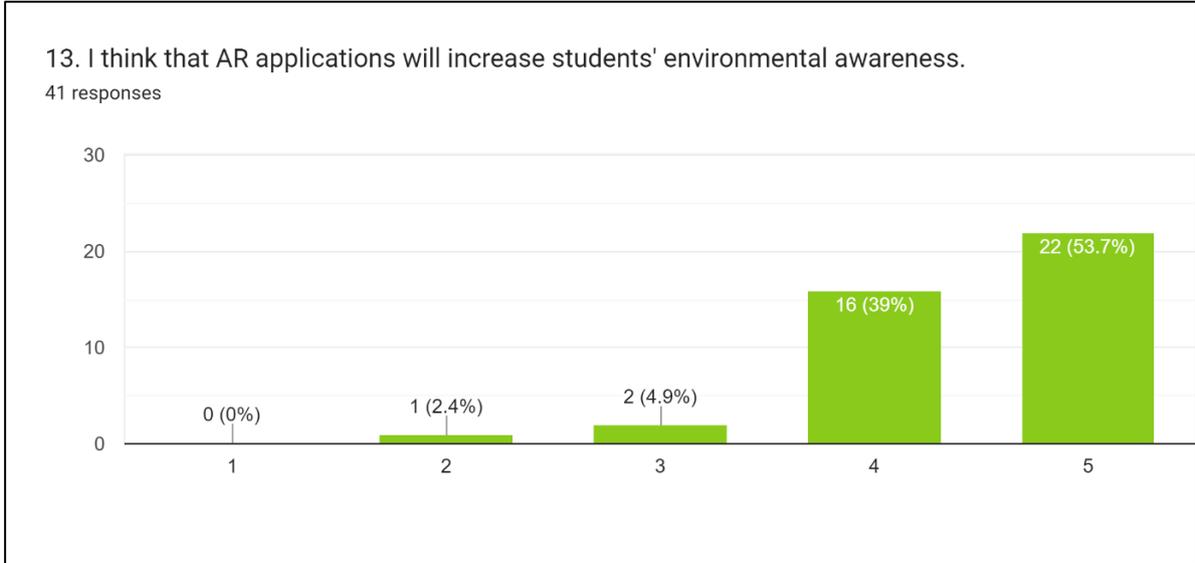


To the statement about their ability to use AR applications in the lessons, 17,1% of the participants answered "Totally Agree" while 43,9% answered "Mostly Agree". This situation

shows that 61% of the participants consider themselves sufficient, while 39% of them think that they are not fully sufficient.

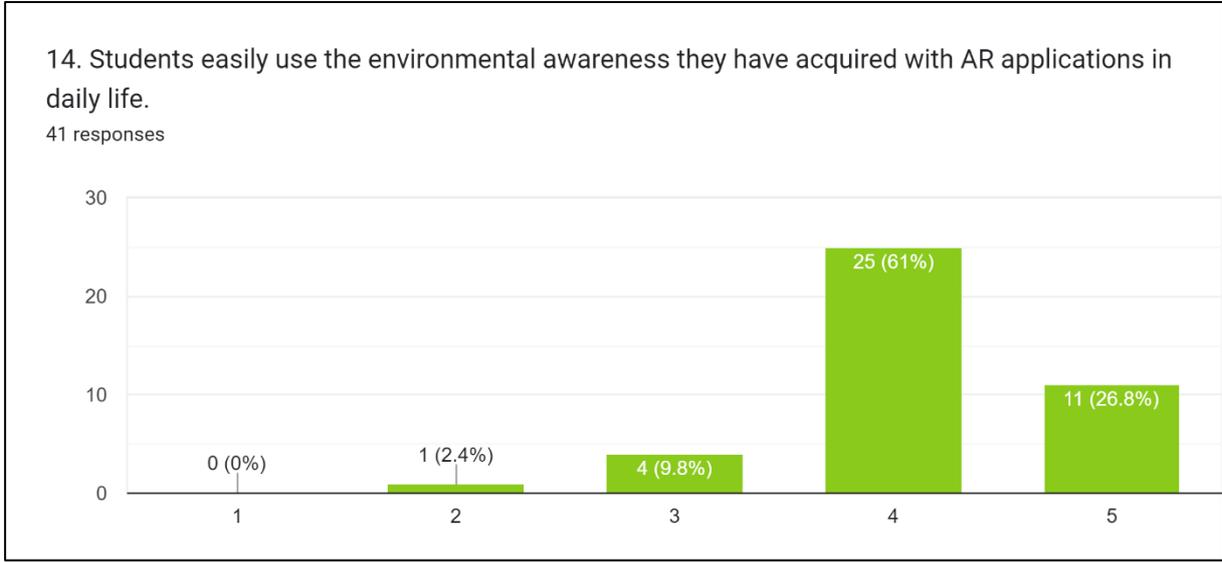
**Question – 13:**

Then, the participants were presented with statements about the relationship between augmented reality (AR) applications and environmental awareness.



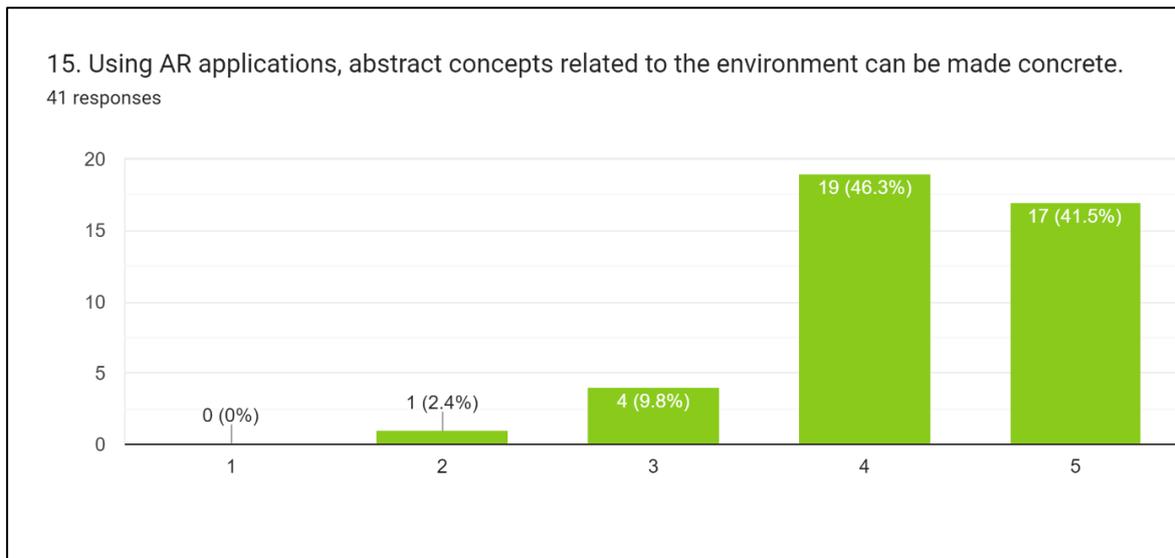
To the statement that AR applications will increase students' environmental awareness, 53.7% of the participants answered "Totally Agree" and 39% answered "Mostly Agree". This shows that 92.7% of the participants think that AR applications will increase students' environmental awareness.

**Question – 14:**



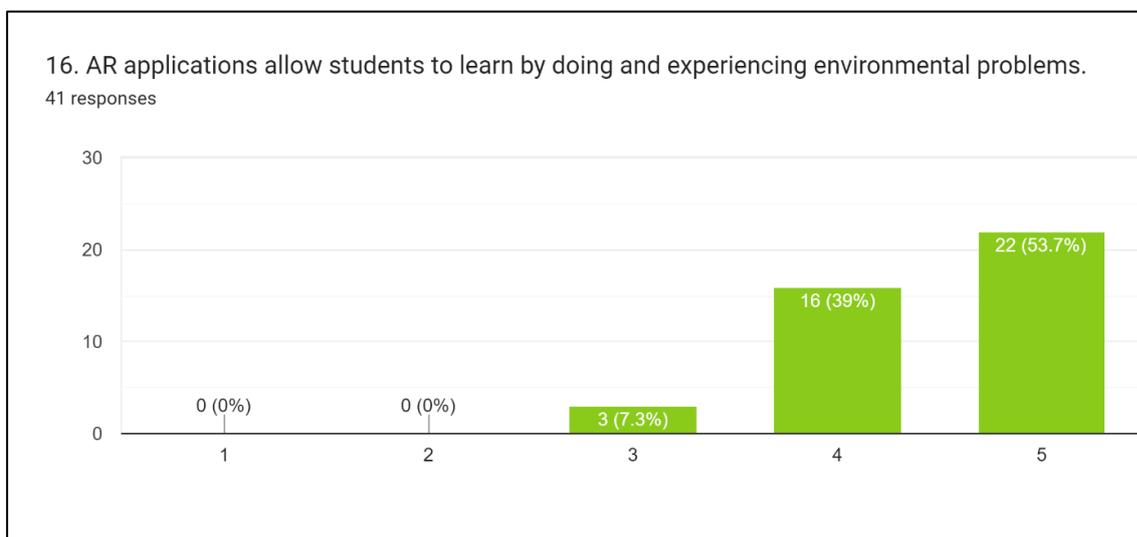
While 26,8% of the participants said “Totally Agree” to the statement "Students easily use the environmental awareness they have acquired with AR applications in daily life", 61% said “Mostly Agree”. This shows that 87.8% of all participants think that students can easily use the environmental awareness they acquire through AR applications in daily life.

**Question – 15:**



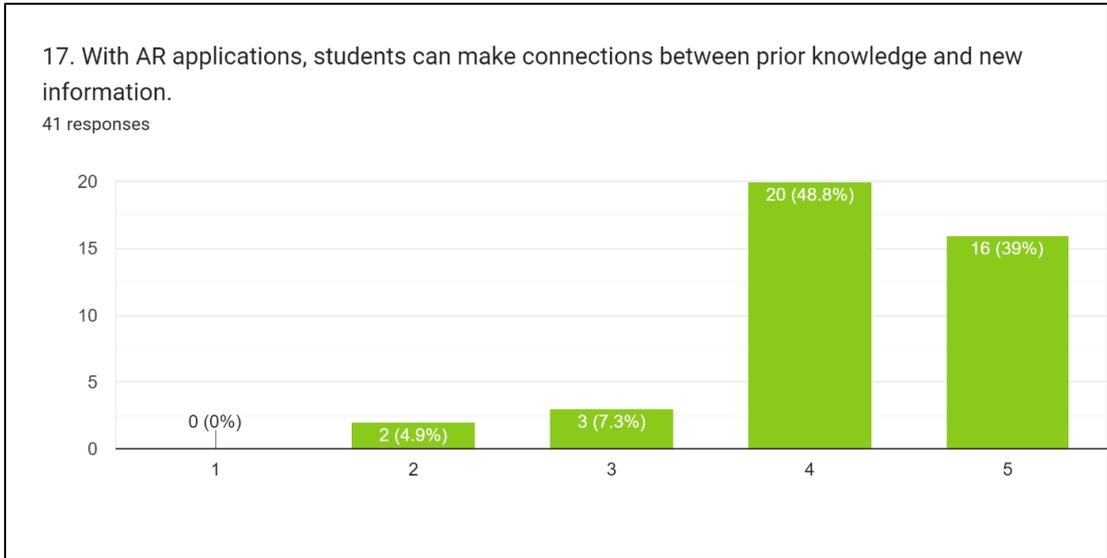
41.5% of the participants responded “Totally Agree” to the statement that abstract concepts related to the environment can be made concrete by using AR applications. 46,3% of the participants answered “Mostly Agree”. As can be understood from these results, 87.8% of all participants think that abstract concepts related to the environment can be made concrete with the use of AR applications.

**Question – 16:**



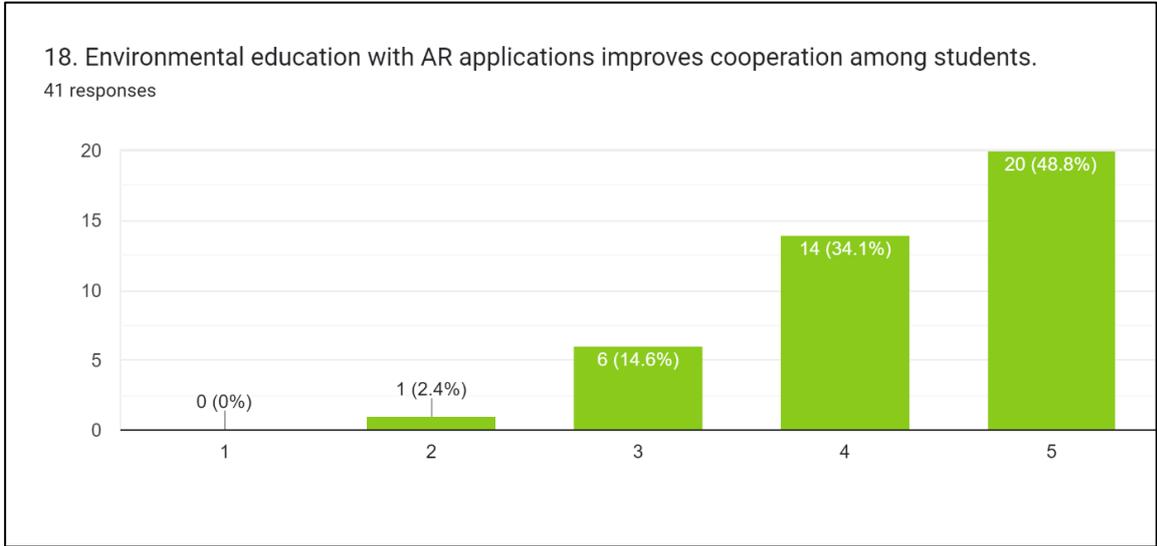
Similarly, 53.7% of the participants "Totally Agree" and 39% "Mostly Agree" with the statement that AR applications enable students to learn environmental problems by doing and experiencing. This result shows that 92.7% of all participants think that AR applications enable students to learn environmental problems by doing and experiencing.

**Question – 17:**



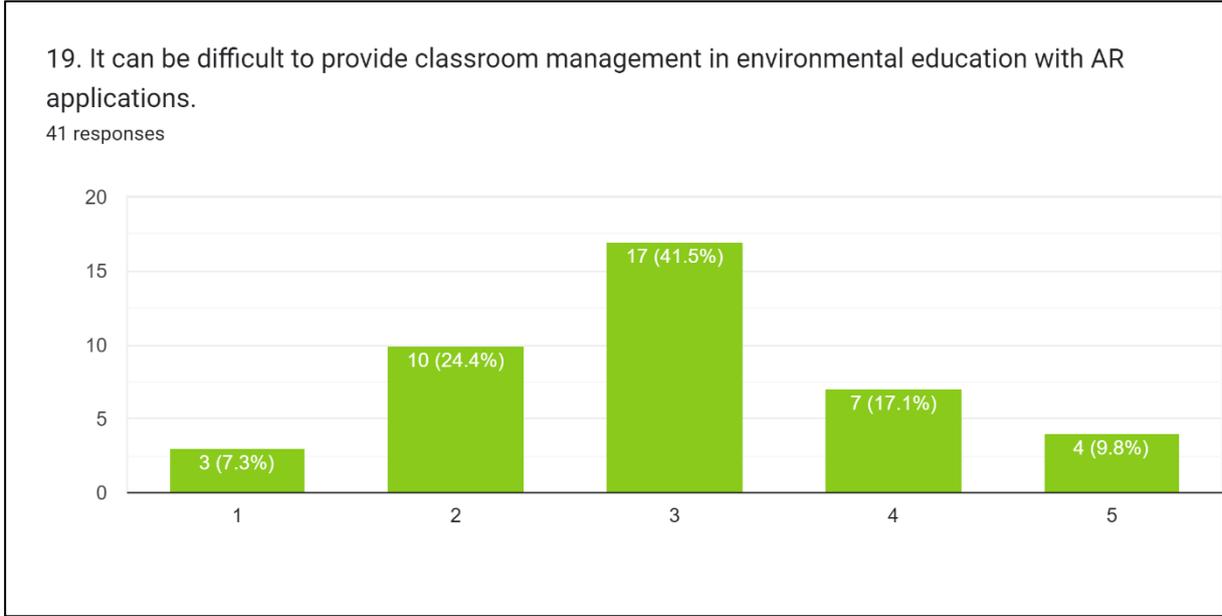
Afterwards, the participants were asked the statement about the students' ability to establish a connection between their prior knowledge and new knowledge with AR applications. To this statement, 39% of the participants answered "Totally Agree" and 48,8% of them answered "Mostly Agree". This situation shows that 87,8% of all participants think that students can establish a connection between prior knowledge and new knowledge with AR applications.

**Question – 18:**



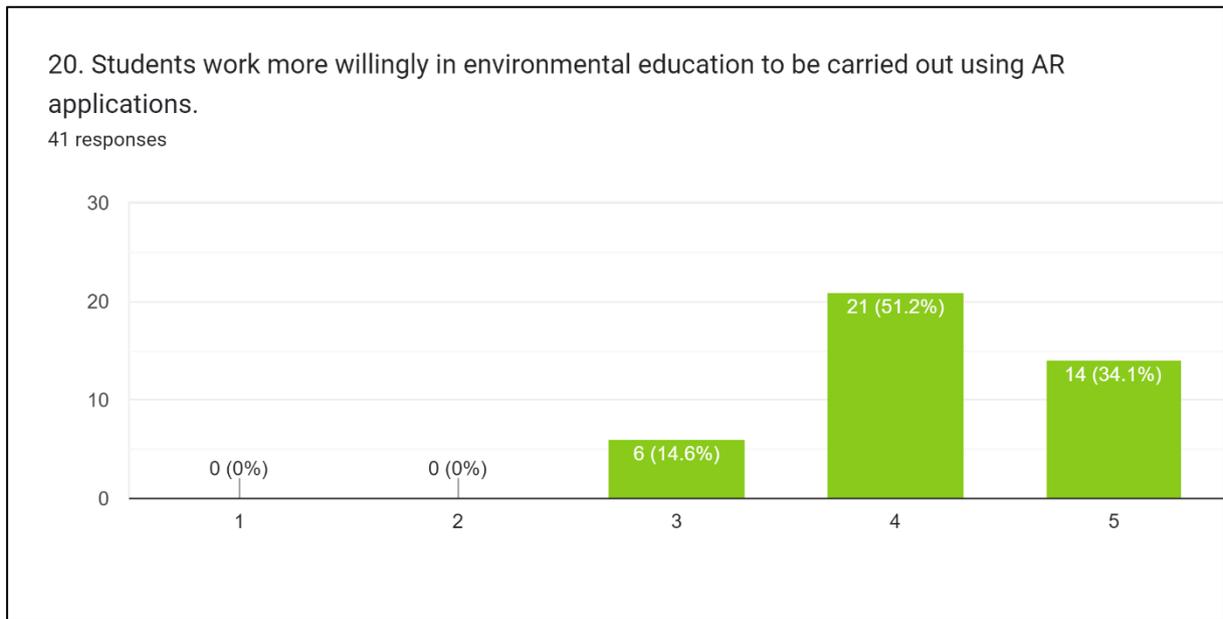
While 48,8% of the participants said “Totally Agree” to the statement "Environmental education with AR applications improves cooperation among students", 34.1% said “Mostly Agree”. This shows that 82.9% of all participants think that environmental education with AR applications will improve cooperation among students. Only 1 participant stated that he disagreed with this statement.

**Question – 19:**



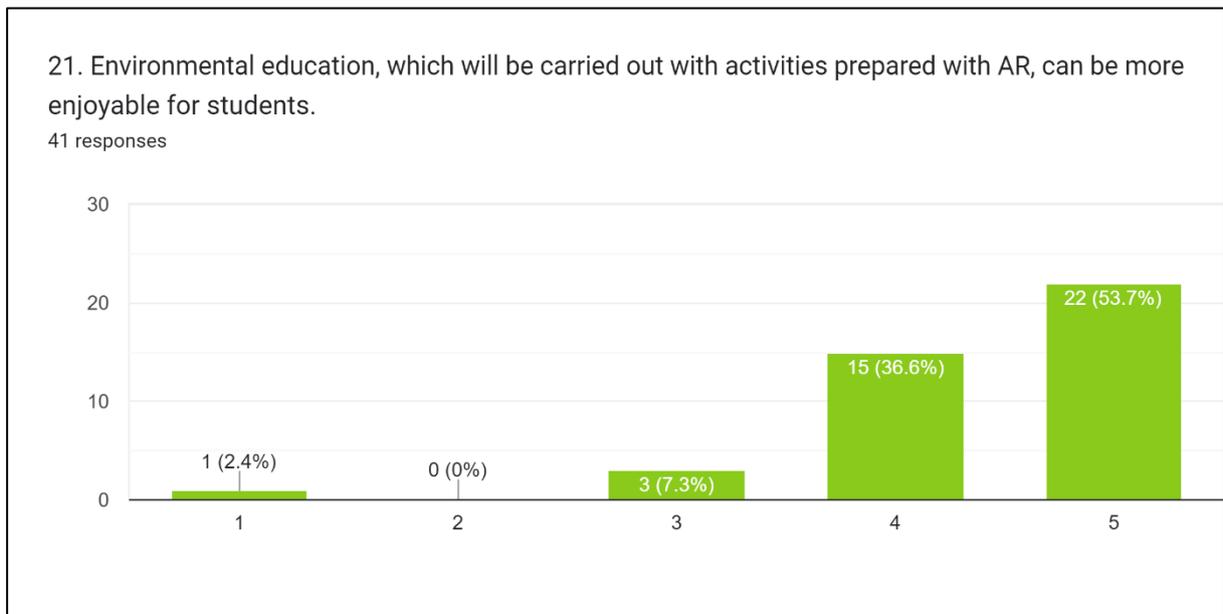
Then, the participants were asked the statement "It can be difficult to provide classroom management in environmental education with AR applications". For this statement, 9.8% of the participants said "Totally Agree" and 17.1% said "Mostly Agree". This shows that only 26,9% of the participants agreed with this statement. On the other hand, 24,4% of the participants said "Disagree", while 7,3% said " Definitely Disagree". This shows that 31,7% of the participants disagree with this statement. The remaining 41,5% of the participants moderately agreed.

**Question – 20:**



While 34,5% of the participants answered "Totally Agree", 51,2% of them answered "Mostly Agree" for the students to work more willingly in environmental education to be carried out by using AR applications. This situation shows that 85,7% of all participants think that students will work more willingly in environmental education using AR applications.

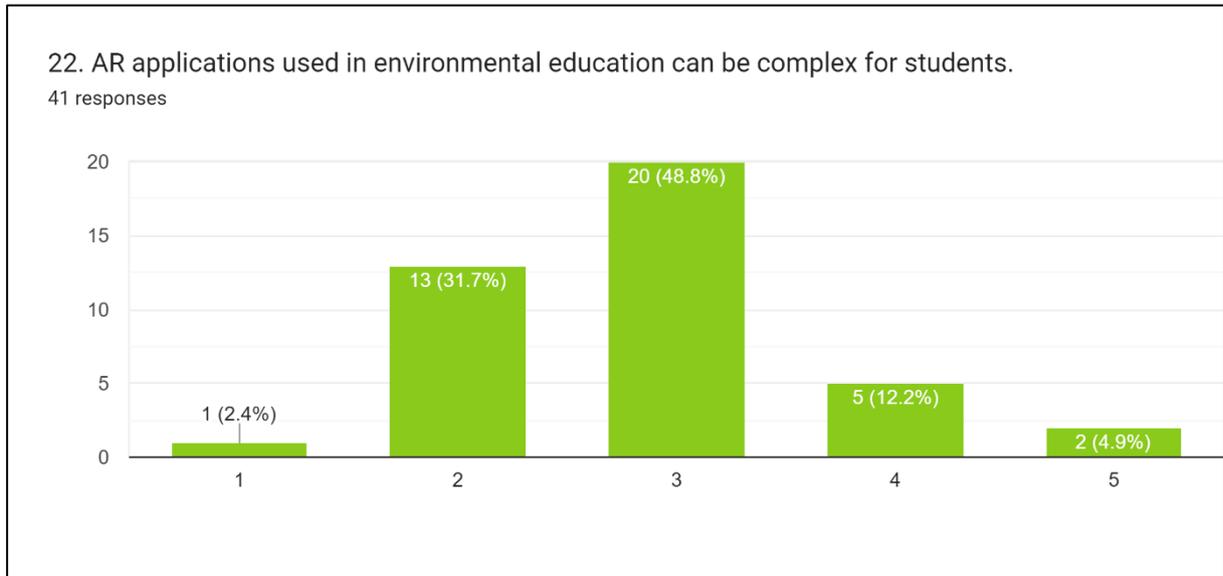
**Question – 21:**



Similarly, 53.7% of the participants answered "Totally Agree" and 36.6% of the participants answered "Mostly Agree" to the statement about environmental education being more

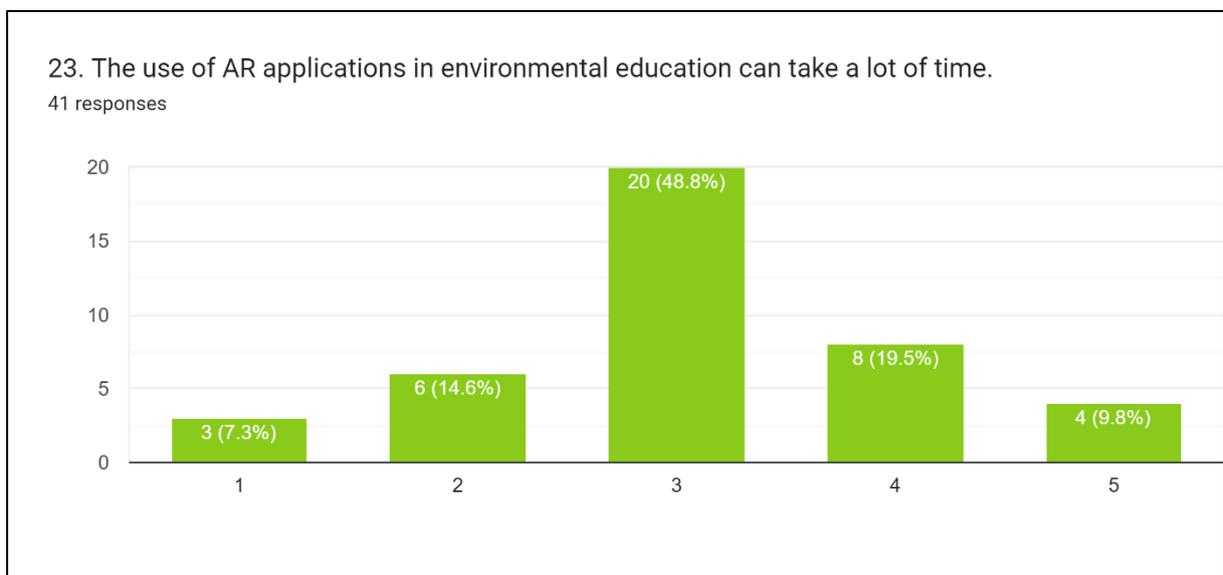
enjoyable for students with activities prepared with AR. This result shows that 90.3% of all participants think that environmental education with activities prepared with AR will be more enjoyable for students. Only 1 participant strongly disagreed with this statement.

**Question – 22:**



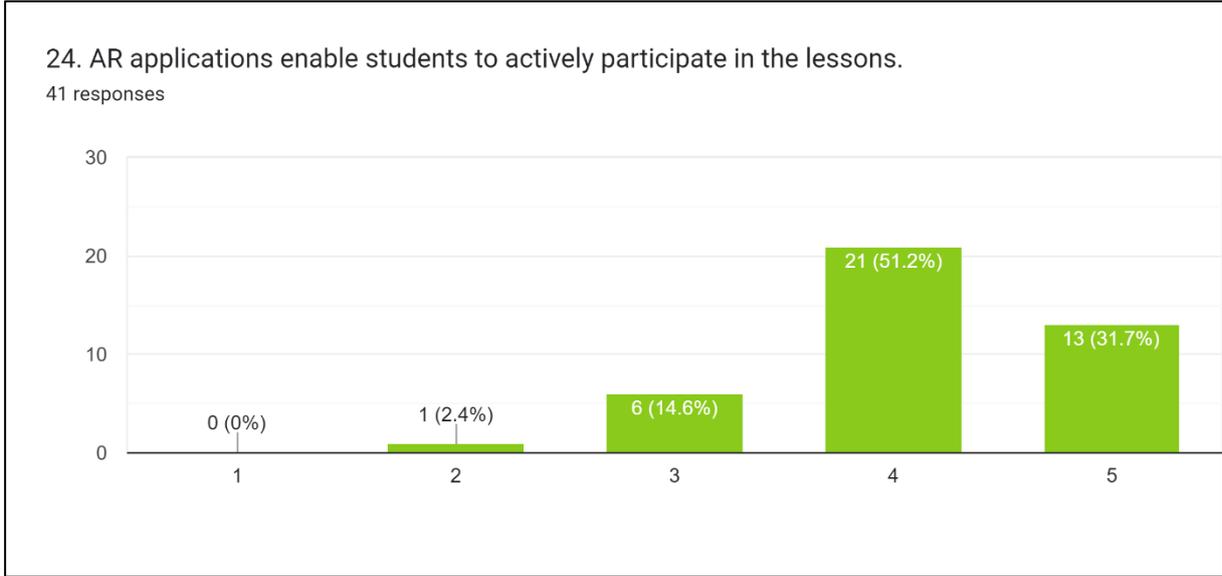
Then, the participants were asked the statement "AR applications used in environmental education can be complex for students". For this statement, 4,9% of the participants said "Totally Agree" and 12,2% said "Mostly Agree". This shows that only 17,1% of the participants agreed with this statement. . On the other hand, 82,9% of the participants stated that they moderately agree or disagree with this statement.

**Question – 23:**



To the statement "The use of AR applications in environmental education can take a lot of time." 9,8% of the participants answered "Totally Agree" and 19,5% answered "Mostly Agree". This shows that only 29,3% of the participants agree with this statement. . On the other hand, 70.7% of the participants indicated that they moderately agreed or disagreed with this statement.

**Question – 24:**



Finally, the participants were asked about the statement that AR applications enable students to actively participate in the lessons. To this statement, 31,7% of the participants answered "Totally Agree" and 51,2% answered "Mostly Agree". This shows that 82.9% of all participants think that AR applications enable students to actively participate in the lessons.

**5.3. Conclusion**

In this survey, pre-service teachers and teachers were primarily asked questions about environmental protection, environmental awareness and green deal. Then, questions about AR applications and their use in environmental education were asked. When the survey results are analysed, it is seen that the participants generally think that they fulfil their responsibility to protect the environment. According to the answers given, although it is seen that the majority of the participants have knowledge about green awareness, it is also seen that there are participants who are not sufficiently informed about this issue. In addition, it is seen that almost all of the participants think that there are problems related to the protection of the environment in the country they live in. Similarly, almost all of the participants think that green

awareness is not at a sufficient level in the country they live in. In the question about the relationship between environmental education and environmental awareness, the participants generally answered that environmental education starting from primary school will increase the environmental awareness of individuals. Only one participant disagreed with this view. Participants generally think that international protocols are important in solving environmental problems. Regarding the use of AR applications in lessons, the participants think that the use of AR applications in lessons motivates students. Only one participant disagreed with this view. In addition, it is seen that the participants generally think that learning outcomes will be made more qualified with AR applications. In support of this result, the participants think that the use of AR applications will increase academic achievement. Similarly, the survey results also show that the participants generally think that AR applications will increase the attitude towards the course. In summary, the participants think that the use of AR applications in the courses will increase student motivation, academic achievement and attitude towards the course and learning outcomes will become more qualified. In the next part of the survey, the participants answered the statements about their ability to use AR applications. Participants generally think that they do not have sufficient knowledge about AR applications. However, when the results are analysed, it is seen that the participants think that they can use AR applications in the courses they will teach. This shows that even if the participants do not have sufficient knowledge about AR applications, they can use AR applications in their lessons if necessary information is provided. Finally, the participants answered the statements about the relationship between environmental education and AR applications. According to the answers given to the survey, in general, the participants think that AR applications will increase environmental awareness and students will be able to use the environmental awareness they have acquired in daily life. In addition, the participants think that with the use of AR applications, abstract concepts related to the environment will become concrete and students will learn environmental problems by doing and experiencing. In support of these results, it shows that the participants think that students will work more willingly and enjoyably with the cooperation of students in environmental education to be carried out with AR applications. In addition, the participants generally think that AR applications will enable students to actively participate in the lessons and students will be able to establish connections between their prior knowledge and new information. On the other hand, negative statements about the use of AR applications in environmental

education were also presented to the participants. The number of participants who agreed with the statement that it would be difficult to provide classroom management in environmental education with AR applications was very low. Similarly, the number of participants who agreed with the statement that the use of AR applications in environmental education takes a lot of time and is complex for students is also very low. When all the results are analysed in general, it can be said that there is a need for trainings to give AR applications to teachers and prospective teachers. It can be concluded that teachers and pre-service teachers think positively about AR applications and their use in environmental education.

## CONCLUSION

This survey report stems from a comprehensive study conducted to measure the perceptions of both educators and pre-service teachers regarding the integration of AR applications in environmental teaching. The findings presented here serve as a compass to guide our understanding of how AR applications and content can potentially reshape environmental education and increase student engagement and achievement.

### Key Findings:

#### Positive Attitudes Towards AR:

- Most participants believe that AR can effectively implement theory and practice in environmental education.
- Respondents feel confident about implementing AR in education and lessons.

#### Green Awareness:

- Most respondents believe there are no problems with environmental protection in their country, but green awareness is not at a sufficient level.
- Participants express the need for more information on nature protection measures.

#### Benefits of AR in Education:

- Participants believe AR can bridge the gap between theory and practice in environmental education.
- AR applications provide opportunities for students to learn by doing and experiencing environmental problems.

- Respondents see potential in AR to increase students' knowledge, skills, and motivation.

#### **Teacher Knowledge and Training:**

- Participants rate their knowledge of AR applications and their use in the learning process relatively low.
- There's a need for training educators in working with AR technology.

#### **Environmental Responsibility:**

- Most participants believe they fulfill their responsibility to protect the environment and have information about environmental awareness.
- There is a consensus that environmental education starting in primary school can increase society's environmental awareness.

#### **AR Application Use:**

- Participants generally believe that using AR applications will increase school performance, improve learning results, and enhance students' attitudes toward courses.
- Some concerns about time consumption and classroom management with AR applications were raised but were not widely shared.

#### **Relationship Between Environmental Education and AR:**

- Participants see a positive connection between AR applications and environmental education, believing it will increase environmental awareness and make abstract concepts concrete.
- Participants generally think that AR applications will enhance students' willingness to work in environmental education and improve their overall learning experience.

#### **Training Needs:**

- Despite the positive views on AR applications, there is a need for training to enhance teachers' and pre-service teachers' knowledge and confidence in using AR in the classroom.

In conclusion, the majority of participants express optimism about the potential of AR applications in advancing environmental education and sustainability. However, they acknowledge the importance of training to effectively integrate AR into the learning process.

