



**A DIGItal toolkit for promoting gender EQUALITY  
in science and technology**

**Methodological Guide  
Part II**

**National Reports**



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## 1<sup>st</sup> Research

## Research on current female situation in STEM in education

This research was conducted within the framework of the project titled “A DIGItal toolkit for promoting gender EQUALITY in science and technology” by all Digi4Equality partners. The aim of this research was to identify the views of in-service teachers about gender equality in STEM in partner countries. Data were collected through a structured questionnaire and analyzed accordingly. The results demonstrate that the gender gap in STEM still exists despite the achievements of the recent years.

## Research Methodology

### **Purpose statement**

The purpose of this research is to collect the views of in-service teachers about the current females’ education in STEM.

### **Measurement Tool**

A quantitative research was conducted to collect data from seventy-two (72) in-service teachers (12 per partner). The research tool that was used was a questionnaire which was developed by the coordinator with the contribution of all partners.

The questionnaire consists of one section expanding in three pages (Appendix I).

## **Data Collection**

The research was carried out in three main stages.

In the first stage, each organization ensured the participation of twelve (12) in-service public teachers in its country. Each organization used its own contact database to reach potential respondents who meet the research design requirements. Respondents were approached over phone or email to ensure their consent to participate in the research. Teachers who were willing to provide the appropriate information from their own experience regarding the topic under investigation were selected.

In the second stage, the selected participants received the questionnaire either via digital means or hardcopy. Participants were informed for the purpose of the research by providing them a letter of consent (Appendix II) in which it was clarified that the questions served research purposes. It was also ensured protection of privacy by remaining all participants' details anonymous and confidential. Twelve (12) in-service teachers in each partner country were targeted. A reminder was sent via email or phone to the teachers who received the questionnaire when a reply was not received after five working days. The timeframe proposed to complete the task was from October 19, 2020 to October 30, 2020.

In the third stage, the data were analyzed.

## National Reports

National Reports are listed below:

### Polish National Report – Szkoła Podstawowa nr 2 w Proszowicach

#### **1. Please enlist stereotypes and bias connected with less frequent representation of girls in STEM in your country. Regard the following groups of stakeholders:**

##### **a) stereotypes among policy makers**

None of the respondents pointed out stereotypical approach of the police makers, neither the national educational authorities nor the local ones. All Maths, Science, IT textbooks use both boys and girls as the subjects of lesson topics (tasks, readings, pictures etc.). There are several opportunities for both girls and boys in locally organized activities connected with technical matters, IT contests (coding and robotics), firefighting contests or military contests. Girls do as well as boys and these contests are very popular among both sexes. According to the questionnaire results, policy makers have realized the need for girls to be involved in STEM education so that girls can increase their performance in Maths and Science and ultimately in STEM careers. There do exist sometimes that girls are not cut out for STEM but there are not held by policy makers. Unfortunately, some workplace policy makers form the judgement that female workers may “bring loss” by taking paid maternity leave (20 weeks) and child-bringing leave (3 years) to which women in Poland are entitled. Still, this opinion is less and less popular as it is not the company that pays the woman, but the state fund.

### **b) stereotypes among teachers**

According to the survey results, there are no stereotypes among teachers with reference to encouraging or enabling girls to participate in STEM. First of all, the majority of teachers are female in Poland at every school level and subject with numbers being only even in purely technical subjects like mechanics. The same applies to school principals who are more often female than male, regardless of school level and type. Accordingly, they not only encourage but strongly support girls if only they want to get involved. The times when boys were thought to be better mathematicians or scientists are gone. Nevertheless, the respondents stressed another issue which is girls' unwillingness to get interested in STEM. That results in more boys choosing technical majors in secondary and university levels thus leading to more men working in technical sectors. The open question remains how to make girls participate in STEM more frequently. Math teachers however strongly stress that the problem of low level of performance is a general issue and concerns BOTH boys and girls. They point out that Math needs focusing on what you do, persistence and time whereas today's kids, educated on digital moving and sounding images, have a lot of problems with concentration when it comes to reading and understanding a typical math text task. Children today do not want to spend time on drilling tasks improving their calculating skills. That leads to low performance at Math lessons and in result to aversion to STEM in general.

### **c) stereotypes among students**

Surprisingly, following the questionnaire results, it is students who most often express stereotypical opinions on girls' involvement in STEM. It is believed that a lot here depends on individual character and personal interests. The respondents stress that girls very often do not want to choose technical subjects, even if they are strongly persuaded by teachers. However, those who do, underline the future possibilities of easily accessible and well-paid jobs.

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Girls often utter the opinion that technical subjects are difficult and boring for them. However, they often follow the idea of studying to become doctors, accountants or bank workers. However, they do not see themselves as IT programmers, builders, mechanics or mining workers. They also point out that technical subjects are associated with masculine-looking women and they do not want that for themselves as they do not want to become nerds.

#### **d) stereotypes among parents**

In Poland, which is a family-valued and mostly traditional society, it is obvious that parents have their say in students' future choice. Parents recognize the importance of STEM subjects but they do not see it as a gender inequality problem but rather as the possibility of a well-paid job, thus comfortable and secure life style for their children. Some have stressed that they do not want the "corpo-lifestyle" for their daughters as they believe it may turn them into workaholics and bring unhappiness if they will not be able to start the family. This opinion may be understood as stereotypical, however parents stress that the final decision always belongs to their daughters. Others admit that they put pressure on girls to follow STEM as this offers better opportunities for the future justifying their approach in this way: "It's better for kids to study Finances and Audit than Philosophy. Arts and Humanities can be a hobby but will not feed you".

## **2. What are in your opinion the factors and reasons of lower participation of girls and women in STEM?**

According to the questionnaire results, the factors and reasons of lower participation of girls and women in STEM are:

- Girls’ low self-esteem and belief in their abilities caused by lack of personal courage and ability to face up the challenge
- Girls unwillingness to undertake STEM subject more seriously as they do not fancy “hardcore” subjects
- Girls sometimes feel intimidated by big groups and work better in smaller groups.
- Characterological traits: girls are more emotional and take failures more seriously

### 3. What can help increase girls’ involvement in STEM?

According to the questionnaire results, girls’ involvement in STEM could be increased by the following actions:

- encouraging girls to get involved in STEM education by strengthening their self-belief
- promoting good STEM career prospects among students, teachers and parents
- promoting role models – local and international females who succeeded in STEM
- organising extra classes in small groups
- organising work in interesting way

### 4. Indicate the percentage of girls you teach who gain:

- excellent results in Maths: ..... 9%
- good and average results in Maths: ..... 52%
- poor results in Maths: ..... 38%
  
- excellent results in Science: ..... 23%
- good and average results in Science: ..... 60%

- poor results in Science: ..... 17%

**5. Indicate the percentage of girls you teach who participate:**

- in Maths contest at school level: ..... 7%
- in Science contest at school level: ..... 12%

**6. Indicate the percentage of girls you teach who succeed:**

- in Maths contest at district level: ..... 2% (in total of school girls)
- in Science contest at district level: ..... 4% (in total of school girls)

**7. Indicate the percentage of girls you teach who participate in technical and/or engineering projects and contests: .....23%**

**8. Indicate the percentage of girls you teach who chose class profile with:**

- extended Maths: ..... 20%
- extended Science: ..... 34%

**9. What are the mean results of school leaving Maths exams in your school for:**

- girls: ..... good/average
- boys: ..... good

**10. If you have any further remarks or ideas referring to the problem of low girls' participation in STEM, please present them here:**

Primary school teachers point out that up to the age of 12 girls do better at Maths because they are more diligent and hardworking, also they have more careful handwriting and that lets them study from their notebooks. However, later on its boys who do better as they do not fear challenges and difficult and demanding thinking processes. Hence, it would be advisable to support girls in their entrepreneurial traits.

## Greek National Report – E-SCHOOL EDUCATIONAL GROUP

### **1. Please enlist stereotypes and bias connected with less frequent representation of girls in STEM in your country. Regard the following groups of stakeholders:**

#### **e) stereotypes among policy makers**

According to the questionnaire results, policy makers have realized the need for girls to be involved in STEM education so that girls can increase their performance in Maths and Science and ultimately in STEM careers. But despite recognizing that need and the actions that have been taken so far, gender inequalities remain.

Policy makers themselves carry the stereotypes of the local society where gender inequalities, although alleviated, still exist. In Greek society, gender stereotypes demonstrate that boys do better in subjects related to Maths and Science which are more practical while girls are more likely to do well in theoretical subjects.

#### **f) stereotypes among teachers**

According to the questionnaire results, the field of education is an integral part of society and therefore reflects the prevailing view in Greek society about roles of males and females. While it seems that gender equality in the education sector is considered an important issue, in fact, gender discrimination is reproduced in the workplace settings even when many improvements have been made. For example, female teachers usually undertake classes with younger students, which are considered to be in line with female nature, while men undertake classes with older students, in which the subjects are more demanding. There is also a gender inequality in the scientific fields and consequently in the professions. More specifically, in

practical sciences there is overrepresentation by male teachers while in theoretical ones by female teachers.

All of the above contribute so that students receive the message that practical sciences are more suitable for men while the theoretical ones for women.

### **g) stereotypes among students**

According to the questionnaire results, the school environment reproduces the values and beliefs of society by passing them on to students. Teachers and students convey their beliefs, values, attitudes and behaviors in the classroom, some of which are based on stereotypes about the roles of men and women in our society.

Teachers play an important role in transmitting gender stereotypes to their students, not only through the content they teach but also through their behavior in the classroom, their interaction with students and their beliefs about the role of males and females.

Thus, gender stereotypes are reproduced in the school environment, passing on to students the message that boys are destined for more technocratic professions while girls are destined for lower positions, since their priority will be family life.

### **h) stereotypes among parents**

According to the questionnaire results, the role of the family is crucial in shaping the perceptions of their children. Most parents consider that, for girls, having a family is more of a priority than building a career and therefore parents tend to question and deny the choice of STEM professions from their daughters. As a respondent said “Unfortunately, there are still parents in Greece

who believe that girls should study, but they should also choose professions which facilitate their future role as women, wives and mothers". These parental incentives, which are reinforced by prevailing stereotypes, finally contribute to shape girls' attitudes.

In this way, stereotypical perceptions and behaviors of parents reproduce gender inequalities.

## **2. What are in your opinion the factors and reasons of lower participation of girls and women in STEM?**

According to the questionnaire results, the factors and reasons of lower participation of girls and women in STEM are:

- Stereotypes about the role of women and men in family and society
- Lack of information on STEM career opportunities
- Lack of information on appropriate women role models

## **3. What can help increase girls' involvement in STEM?**

According to the questionnaire results, girls' involvement in STEM could be increased by the following actions:

- Encouraging girls to get involved in STEM education
- Changing the mentality of boys so that they accept girls / women as equal members of society
- Eliminating the stereotypes of the past of teachers and parents towards girls/women skills and abilities
- Informing students, teachers and parents about career opportunities in STEM professions
- Promoting cases of women scientists who have excelled in the field of science to students, teachers and parents.

**4. Indicate the percentage of girls you teach who gain:**

- excellent results in Maths: ..... 20%
- good and average results in Maths: ..... 30%
- poor results in Maths: ..... 50%
  
- excellent results in Science: ..... 25%
- good and average results in Science: ..... 35%
- poor results in Science: ..... 40%

**5. Indicate the percentage of girls you teach who participate:**

- in Maths contest at school level: ..... 2%
- in Science contest at school level: ..... 5%

**6. Indicate the percentage of girls you teach who succeed:**

- in Maths contest at district level: ..... 0,5% (in total of school girls)
- in Science contest at district level: ..... 2% (in total of school girls)

In general, students in Greece are not so willing to participate in contests.

**7. Indicate the percentage of girls you teach who participate in technical and/or engineering projects and contests: ..... 20%**

**8. Indicate the percentage of girls you teach who chose class profile with:**

- extended Maths: ..... 20%

- extended Science: ..... 25%

**9. What are the mean results of school leaving Maths exams in your school for:**

- girls: ..... average
- boys: ..... average

**10. If you have any further remarks or ideas referring to the problem of low girls' participation in STEM, please present them here:**

According to the questionnaire results, there is a lack of textbooks and learning materials in various fields that would promote gender equality among students, teachers and parents.

Moreover, parents and teachers need to change mentalities and views on the abilities of women! As a respondent said "Let us learn from the fact that many girls have gone abroad and succeeded in professions related to mathematics, engineering, technology and science!"

## Greek National Report – Challedu

### **1. Please enlist stereotypes and bias connected with less frequent representation of girls in STEM in your country. Regard the following groups of stakeholders:**

#### **a) stereotypes among policy makers**

According to the questionnaire results, policy makers have not yet realized the need for girls to be involved in STEM education and thus the girls fall apart in their performance in Maths and Science and ultimately in STEM careers. Furthermore, according to the teachers that answered the questionnaire the state believes that the problem of gender stereotypes in STEM education cannot be addressed by secondary school teachers.

#### **b) stereotypes among teachers**

According to the questionnaire results, the teachers consider that the social/life science courses (such as history, literature, language, biology) are more suitable for girls, while STEM courses are more suitable for boys, either because they are more interested, or even worse, they have more appeal/capacity mentally or otherwise. Also, the teachers are influenced by the higher scores of boys in STEM courses compared to those of girls and therefore do not encourage the participation of girls in STEM activities. Thus, gender stereotypes are reproduced in the school environment.

#### **c) stereotypes among students**

According to the questionnaire results, in the classroom, it is often observed that the boys are more enthusiastic about technology and engineering and therefore perform better in STEM-related activities than girls. This results in

girls being discouraged and feeling less capable in this field. In addition, girls show a preference to participate in other fields in which they feel superior to boys.

#### **d) stereotypes among parents**

According to the questionnaire results, most parents consider that STEM is a male rather than a female field. They also believe that in order for a woman to succeed in the field of STEM she should work long hours as a result of which they are away from her future family husband and children. Also, the parents believe for their girls, that having a family is more of a priority than building a career in the STEM field.

## **2. What are in your opinion the factors and reasons of lower participation of girls and women in STEM?**

According to the questionnaire results, the factors and reasons of lower participation of girls and women in STEM are:

- stereotypes about the role of women and men in family and school.
- lack of information on STEM career opportunities
- lack of information on appropriate women role models on STEM field
- lack of political but also educational practices and tools to encourage girls and fight stereotypes.
- lack of STEM women role-models in school textbooks

## **3. What can help increase girls' involvement in STEM?**

According to the questionnaire results, girls' involvement in STEM could be increased by the following actions:

- Informing students, about career opportunities in STEM professions

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- Encouraging girls to get involved in STEM education through successful women role models in STEM.
- Reviewing school textbooks to include female role models at STEM
- Training of teachers and students with specialized educational tools
- implementation of specialized programs in schools

**4. Indicate the percentage of girls you teach who gain:**

- excellent results in Maths: ..... <=10%
- good and average results in Maths: ..... 37%
- poor results in Maths: ..... 41%
  
- excellent results in Science: ..... <=15%
- good and average results in Science: ..... 46%
- poor results in Science: ..... 35%

**5. Indicate the percentage of girls you teach who participate:**

- in Maths contest at school level: ..... 2%
- in Science contest at school level: ..... 5%

**6. Indicate the percentage of girls you teach who succeed:**

- in Maths contest at district level: ..... 0% (in total of school girls)
- in Science contest at district level: ..... 0% (in total of school girls)

**7. Indicate the percentage of girls you teach who participate in technical and/or engineering projects and contests: ..... 0%**

**8. Indicate the percentage of girls you teach who chose class profile with:**

- extended Maths: ..... 0%
- extended Science: ..... 0%

**9. What are the mean results of school leaving Maths exams in your school for:**

- girls: ..... average
- boys: ..... good

**10. If you have any further remarks or ideas referring to the problem of low girls' participation in STEM, please present them here:**

According to the questionnaire results, there is a lack of policy actions, executive actions for encouraging girls to participate in Stem actions. For promoting gender equality among students in Stem education, special education programs and learning tools must be applied in school.

## Italian National Report – EURO-NET

### **1. Please enlist stereotypes and bias connected with less frequent representation of girls in STEM in your country. Regard the following groups of stakeholders:**

#### **a) stereotypes among policy makers**

Following the answers obtained, there are no stereotypes among policy makers even if some gender inequalities continue to exist in facts.

#### **b) stereotypes among teachers**

Following the answers obtained there are no stereotypes among teachers even if some gender inequalities continue to exist in facts.

#### **c) stereotypes among students**

Among students, it is possible to still find stereotypes about the future jobs but especially in poor and not so cultured families, where still exists the conviction that women should stay in family and to not go to work.

#### **d) stereotypes among parents**

In the families as indicated also in the previous answer there is still in poor or not so cultured families the idea that females should follow the role of mothers and even if they have studied they should choose jobs that permit them to stay at least half day at home.

**2. What are in your opinion the factors and reasons of lower participation of girls and women in STEM?**

The reasons listed were:

- Stereotypes on gender equality still existing in the society
- Lack of information
- Less auto esteem in women

**3. What can help increase girls' involvement in STEM?**

It could be useful:

- A change of paradigm in the school and in the society
- Promote the role of the women leaders in STEM in the world
- Establish a percentage of 50% of women in each concourse
- Encouraging girls to get involved in STEM education
- Modernizing the school

**4. Indicate the percentage of girls you teach who gain:**

- excellent results in Maths: ..... 30%
- good and average results in Maths: ..... 40%
- poor results in Maths: ..... 40%
  
- excellent results in Science: ..... 35%
- good and average results in Science: ..... 30%
- poor results in Science: ..... 35%

**5. Indicate the percentage of girls you teach who participate:**

- in Maths contest at school level: ..... 5-10%
- in Science contest at school level: ..... 7-15%

**6. Indicate the percentage of girls you teach who succeed:**

- in Maths contest at district level: ..... 2-5% (in total of school girls)
- in Science contest at district level: ..... 5-8% (in total of school girls)

The participation in contests in any case is not so strong.

**7. Indicate the percentage of girls you teach who participate in technical and/or engineering projects and contests: .....25%**

**8. Indicate the percentage of girls you teach who chose class profile with:**

- extended Maths: ..... 25%
- extended Science: ..... 30%

**9. What are the mean results of school leaving Maths exams in your school for:**

- girls: ..... average
- boys: ..... average

**10. If you have any further remarks or ideas referring to the problem of low girls' participation in STEM, please present them here:**

The most important thing should be:

- to work on poor and not so cultured families to change their opinions
- to realize more fictions on television to promote the gender respect
- to promote the leadership of women in STEM.

## Turkish National Report – AYDIN IL MILLI EGITIM MUDURLUGU

### **1. Please enlist stereotypes and bias connected with less frequent representation of girls in STEM in your country. Regard the following groups of stakeholders:**

#### **a) stereotypes among policy makers**

According to research results, 8 of the 12 participants stated that there is no stereotypes and bias connected with less frequent representation of girls in STEM among policy makers.

4 of 12 participants stated that although policy makers seem to have no bias against less frequent representation of girls in STEM, the educational policies do not support girls' involvement in STEM education

#### **b) stereotypes among teachers**

10 of 12 participants stated that there are no stereotypes among teachers. However, 2 participants stated that teachers generally think that boys are more successful in engineering fields than girls.

#### **c) stereotypes among students**

According to the research results, the stereotypes among students are as follows:

- Students tend to believe that boys are more successful and talented in STEM (6 participants)
- Girls have more than one responsibility. They have to help their mothers or other members. So, they need easier jobs (3 participants)
- No stereotypes (3 participants)

So, most of the participants stated that students think that boys are more successful and talented in STEM education than girls

#### **d) stereotypes among parents**

According to research results, all the participants stated that parents tend to direct their daughters to jobs where they will have more time for their family life and households. Because parents generally think women have more than one role; one as a housewife and second as a working woman.

### **2. What are in your opinion the factors and reasons of lower participation of girls and women in STEM?**

According to research results, the most important factor is the belief for the girls to have at least two roles; one as a housewife and as a working woman. Another factor is societal views and perceptions against women's roles as a mother, housewife, spouse. This societal attitude affects the families and causes lower participation of girls and women in STEM

### **3. What can help increase girls' involvement in STEM?**

According to the research results, girls' involvement in STEM could be increased by:

- Family education so that their mentality may change and they will be in favour of gender equality.
- Teachers' encouraging girls for STEM education.
- Students should raise awareness for the gender equality.

**4. Indicate the percentage of girls you teach who gain:**

- excellent results in Maths: ..... 10%
- good and average results in Maths: ..... 20%
- poor results in Maths: ..... 70%
  
- excellent results in Science: ..... 10%
- good and average results in Science: ..... 30%
- poor results in Science: ..... 60%

**5. Indicate the percentage of girls you teach who participate:**

- in Maths contest at school level: ..... 2%
- in Science contest at school level: ..... 5%

**6. Indicate the percentage of girls you teach who succeed:**

- in Maths contest at district level: ..... 1% (in total of school girls)
- in Science contest at district level: ..... 2% (in total of school girls)

**7. Indicate the percentage of girls you teach who participate in technical and/or engineering projects and contests: .....2%**

**8. Indicate the percentage of girls you teach who chose class profile with:**

- extended Maths: ..... 10%
- extended Science: ..... 15%

**9. What are the mean results of school leaving Maths exams in your school for:**

- girls: ..... average
- boys: ..... average

**10. If you have any further remarks or ideas referring to the problem of low girls' participation in STEM, please present them here:**

There is a need for effective orientation mechanisms by which every student can discover their talents, regardless of whether they are male or female. The orientation should be according to the wishes of the child, not the wishes of the parents.

In addition, students must be taught more about the woman scientists and they need to raise awareness about the role of woman in scientific revolutions

## Latvian National Report – Adazu vidusskola

### **1. Please enlist stereotypes and bias connected with less frequent representation of girls in STEM in your country. Regard the following groups of stakeholders:**

#### **a) stereotypes among policy makers**

The respondents agreed there are not stereotypes among policy makers connected with less frequent representation of girls in STEM in Latvia. Moreover, local and state authorities demand equal opportunities for all genders.

#### **b) stereotypes among teachers**

There are no stereotypes among teachers on this matter. It all depends on a person's individual abilities.

#### **c) stereotypes among students**

There are not stereotypes among students also; both genders have the same rights, opportunities, responsibilities and representation in STEM subjects.

#### **d) stereotypes among parents**

There might be some stereotypes in some families, but in general, families show full support in girls succeeding in STEM education.

**2. What are in your opinion the factors and reasons of lower participation of girls and women in STEM?**

According to the questionnaire results, the factors and reasons of lower participation of girls and women in STEM are:

- A vast variety of other career opportunities
- Lack of information on STEM career opportunities

**3. What can help increase girls' involvement in STEM?**

According to the questionnaire results, girls' involvement in STEM could be increased by the following actions:

- Popularizing STEM education
- Motivate girls to become successive in STEM education
- Informing society about career opportunities in STEM professions
- Promoting cases of women scientists who have excelled in the field of science

**4. Indicate the percentage of girls you teach who gain:**

- excellent results in Maths: ..... 40%
- good and average results in Maths: ..... 40%
- poor results in Maths: ..... 20%
  
- excellent results in Science: ..... 35%
- good and average results in Science: ..... 35%
- poor results in Science: ..... 30%

**5. Indicate the percentage of girls you teach who participate:**

- in Maths contest at school level: ..... 50%

- in Science contest at school level: ..... 35%

**6. Indicate the percentage of girls you teach who succeed:**

- in Maths contest at district level: ..... 8% (in total of school girls)
- in Science contest at district level: ..... 5% (in total of school girls)

**7. Indicate the percentage of girls you teach who participate in technical and/or engineering projects and contests: .....40%**

**8. Indicate the percentage of girls you teach who chose class profile with:**

- extended Maths: ..... 40%
- extended Science: ..... 45%

**9. What are the mean results of school leaving Maths exams in your school for:**

- girls: ..... average
- boys: ..... average

**10. If you have any further remarks or ideas referring to the problem of low girls' participation in STEM, please present them here:**

The most important ideas about participation in STEM are:

- organizing STEM workshops and seminars
- challenging girls to take part in STEM contests
- meeting with successful female STEM specialists

## Conclusion

This report presents the research findings in each partner country. It provides evidences that despite the fact that there has been significant progress toward greater gender equality in the last years, more actions are needed to ensure girls' participation in and learning of science. Moreover, different social and environmental factors in each partner country contribute to the underrepresentation of women in science and engineering. Different factors have been reported such as girls' low self-esteem and belief in their abilities caused by lack of personal courage and ability to face up the challenge, stereotypes about the role of women and men in family and society, lack of information on STEM career opportunities, Lack of information on appropriate women role models, -lack of political but also educational practices and tools to encourage girls and fight stereotypes, lack of STEM women role-models in school textbooks and so on.

However, as Europe is grown in an increasingly digital society, it is critical to create access and opportunity for girls to improve their performance in STEM subjects and join STEM careers in the future. In this view, STEM equity in the classroom can be supported by encouraging girls to get involved in STEM education by strengthening their self-belief, promoting good STEM career prospects among students, teachers and parents, promoting role models – local and international females who succeeded in STEM, reviewing school textbooks to include female role models at STEM, training of teachers and students with specialized educational tools, implementing specialized programs in schools and so on.

## 2<sup>nd</sup> Research

## Research on methods, tools and practices used in STEM

This survey was conducted within the framework of the project titled “A DIGItal toolkit for promoting gender EQUALITY in science and technology” ” by all Digi4Equality partners. The aim was to identify the methods, tools and practices used in the field of STEM education with a focus on gender issues and game-based education in Greece. Data were collected through a structured questionnaire and analyzed accordingly. The report demonstrates the results of the survey in each partner country and also indicates the current situation and the obstacles that teachers face to apply these methods during their lessons.

## Research Methodology

### **Purpose statement**

The purpose of this survey is to identify the methods, tools and practices used in the field of STEM education with a focus on gender issues and game-based education in each partner country.

### **Measurement Tool**

A research was conducted to collect data from thirty-six (36) in-service teachers (6 per partner). The research tool that was used was a questionnaire which was developed by the coordinator with the contribution of all partners.

The questionnaire consists of one section expanding in three pages and includes seven (7) closed-ended questions and four (4) open-ended questions (Appendix III).

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## **Methodology**

Data collected from the participants were evaluated and interpreted to produce a clear picture of the situation that is being tackled.

Each partner ensured the participation of six (6) in-service public teachers. Respondents were approached over phone to ensure their consent to participate in the research. Teachers who were willing to provide the appropriate information from their own experience regarding the topic under investigation were selected. They received the questionnaire via digital means. Participants were ensured the questions served research purposes and the information provided will be kept confidential. Six (6) in-service teachers in Greece were targeted. The data collection process took about one week (from December 14, 2020 to December 18, 2020). Afterwards, the data were analyzed.

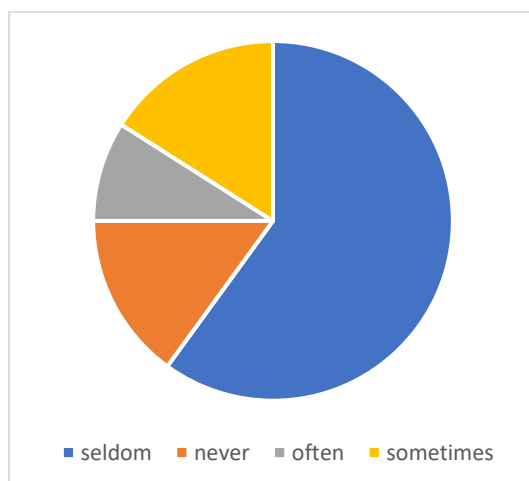
## National Reports

National Reports are listed below:

### Polish National Report – Szkoła Podstawowa nr 2 w Proszowicach

#### 1. Do you use games during online learning?

- a) yes, quite often
- b) yes, sometimes
- c) occasionally
- d) no, never

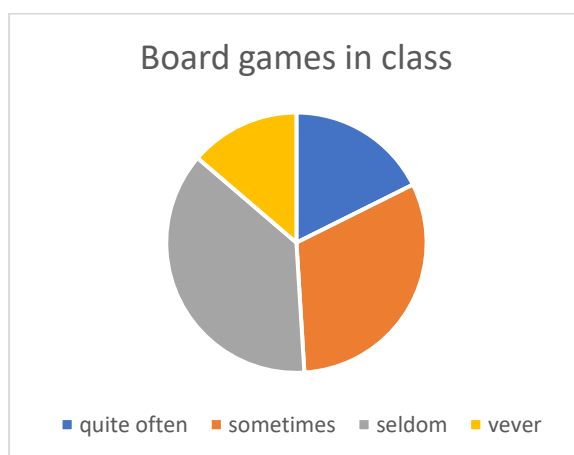


#### 2. Have you designed digital games with your students before? If yes, can you describe?

70 % of the respondents admitted that they had never designed any digital games, however a few teachers mentioned Kahoot games they developed. IT teachers mentioned a webpage prepared by Polish Ministry of Education Online games Coding Portal Gov.pl which is widely used during classes.

**3. Do you employ board gaming during your lessons**

- a) yes, quite often
- b) yes, sometimes
- c) occasionally
- d) no, never



**4. Do you generally believe that STEM and Game Based method would be useful to teach different subjects to students? Justify.**

All the respondents admitted that STEM classes would benefit from game-based teaching ideas however they can also recognise the problems and obstacles connected with this idea. The most eager for using games are It and Technical Science teachers and those teaching younger learners. The most sceptical were Math teachers and those teaching senior classes and / or in secondary schools. The main problem they point out is the constant lack of time and perceiving games as frivolous and strictly entertaining activity in comparison to substantial curriculum for exams which students face at the end of the school.

Many, however, see a lot of potential in using games in education. They justify game-based education as well shaping imagination, teaching strategic approach

and thinking out of the box, developing social skills through teamwork, foreseeing the consequences of one's decisions.

One answer mentioned the card games as a very good way to practice calculation drills.

**5. Which are considered to be the educational benefits gained from the use of STEM and Game Based method in school education?**

The following advantages were mentioned:

Game-Based method:

- ✓ Attractiveness of classes, especially for younger learners
- ✓ Development of strategic and logical thinking
- ✓ Team group cooperation especially in board games
- ✓ Students learn while playing, for example road traffic regulation
- ✓ Development of several intelligence types
- ✓ Students feel more motivated

**6. Which, in your opinion, are the main obstacles in the use of STEM and Game Based method?**

The following problems and obstacles were mentioned during the survey:

- a) Organization and preparation of games during the lesson  
Teacher needs to plan and organize the background, games, instructions, materials etc. That takes time and effort and usually it is impossible to start and finish a game over one lesson (45 minutes)
- b) Cost of games – all kinds of games, both board games and digital ones, cost a lot and they are designed for only a couple of students who can play at one go. Additionally we need equipment – tablets or computers, good and reliable Internet signal, in case of board games the purchased sets.

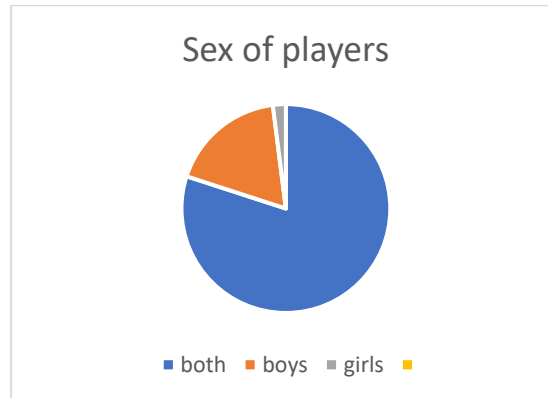
Reference Number: 2020-1-PL01-KA201-081630

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- c) Lack of time to implement the compulsory curriculum topics, let alone playing games. Math teachers especially stress the fact that they are responsible for preparing their students for school leaving final Math exams, which are difficult and comprise a lot of material. They must present material and revise it several times, consequently they have no time for games during the lesson.
- d) Lack of good games which would be both educational and developing
- e) Lack of knowledge among teachers what kinds of games they could use

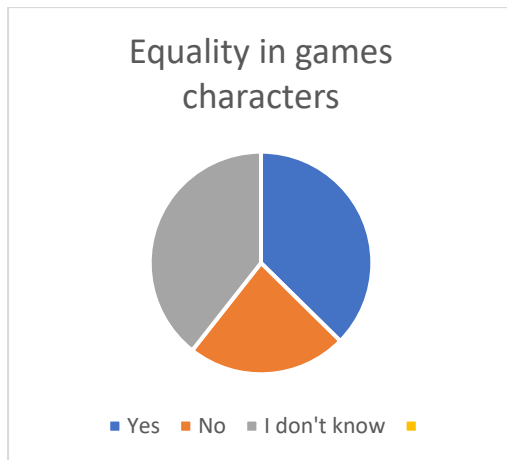
**7. Considering gender issues, who plays games more frequently?**

- a) boys
- b) girls
- c) both
- d) none



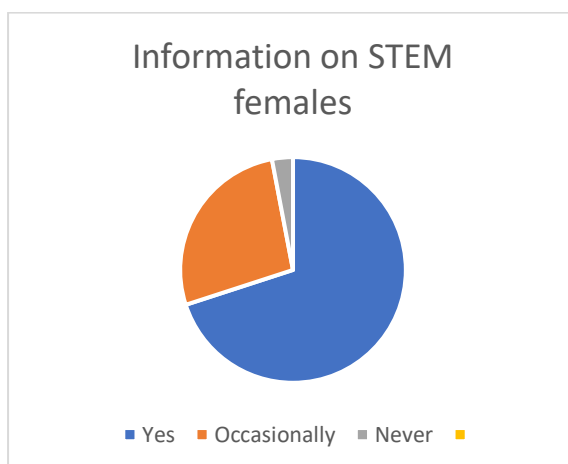
**8. Do you believe there is an equal representation of male and female characters in board games?**

- a) yes
- b) no
- c) I don't know



**9. Do you present female role models in STEM to your students (eg. Marie Skłodowska Curie, etc)?**

- a) **yes, always**
- b) **occasionally**
- c) **no, never**



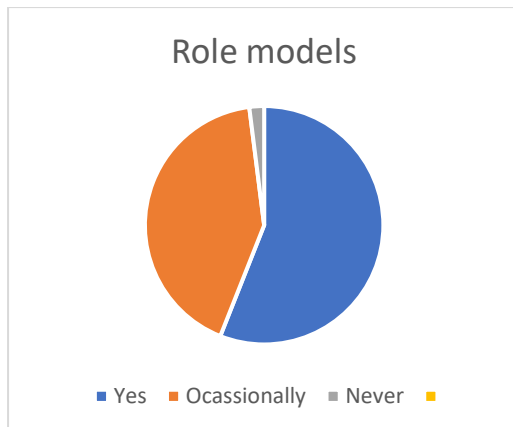
**10. Do you emphasise on life stories and work of important role-model women/men in STEM?:**

- a) **yes, always**
- b) **occasionally**

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**c) no, never**



**2. Do you use digital tools (SCRATCH, CODEORG, GOOGLE BLOCKLY...) in STEM education and Game Based Learning?**

- yes, I'm well familiar with these tools**
- occasionally**
- no, I don't know these options**



## Greek National Report – E-SCHOOL EDUCATIONAL GROUP

### 1. Do you use games during online learning?

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**
- d) **no, never**

According to the questionnaire results:

5 (83,3%) of the 6 respondents in our sample chose the third answer (c). 1 respondent (16,6%) chose the second answer (b).

### 2. Have you designed digital games with your students before? If yes, can you describe?

According to the questionnaire results, no respondent has co-designed games with his/her students. However, they all consider it as a useful process that may be worth trying as it will end up to a game that really meets: a) students' needs in terms of being fun and engaging and b) teachers' needs in terms of teaching specific topics and reaching specific learning goals.

### 3. Do you employ board gaming during your lessons

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**
- d) **no, never**

According to the questionnaire results:

4 (66,6%) of the 6 respondents in our sample chose the third answer (c). 2 respondents (33,3%) chose the second answer (b).

**4. Do you generally believe that STEM and Game Based method would be useful to teach different subjects to students? Justify.**

In the OECD Programme for International Student Assessment (PISA), which is considered a reference point for education systems worldwide, Greece is ranked in Natural Sciences and Mathematics in the group of countries with lower performance than the OECD average (<http://bit.ly/3bpdnEF>).

Respondents reported that these results indicate that further action is needed to improve student performance and increase student achievement in these subjects.

All respondents admitted that STEM and Game Based method would be useful to teach different subjects to students. They all agree that Game-based learning and STEM offer motivating experiences, engaging learning environments and collaborative learning activities.

Moreover, all respondents consider that these two methods have the potential to help their students not just memorize the knowledge but also understand it and be able to use it in a variety of contexts. At this point, respondents mentioned that memorizing knowledge is a major weakness in the Greek Education System. Especially when it comes to exams, it is a typical habit for students to blindly memorize the information word by word without having understood it. Respondents also added that this traditional practice which is focused more on memory no longer serves the needs of students as future adults and employees.

Taking into account all the above, it seems obvious that respondents consider STEM and Game Based method as proper educational tools which enhance learning procedures and satisfies and fulfills students' needs and requirements.

**5. Which are considered to be the educational benefits gained from the use of STEM and Game Based method in school education?**

Respondents indicated multiple benefits for students. More specifically, about:

Game-Based method:

- ✓ learning becomes more motivating and engaging for students
- ✓ promotes a learning environment in which students cultivate their soft skills in an enjoyable way
- ✓ students learn to cooperate and collaborate with their peers
- ✓ students learn to deal with conflicts in a team
- ✓ by playing games students learn to follow rules and place emphasis on thinking strategically
- ✓ students learn to cope with the experience of losing

STEM method:

- ✓ prepares students to live and work in our digitalized world where such skills are highly valued
- ✓ teaches students how to analyze problems and synthesize solutions

- ✓ offers students a deeper understanding in difficult subjects like math and science
- ✓ encourage students to develop their ideas, apply their knowledge and develop solutions for real world problems
- ✓ help students to solve problems, unleash their imagination and creativity and think critically

**6. Which, in your opinion, are the main obstacles in the use of STEM and Game Based method?**

Regarding STEM education, respondents reported the following obstacles:

- **Dependence from sponsors**

In recent years significant efforts have been made by important sponsors in Greece to develop STEM educational programs in Greek schools. These sponsors have offered educational robotics kits to schools, organized educational robotics competitions and supported teams to participate in the World Robot Olympiad (<http://bit.ly/3pDAWP9>). But various questions are being raised about the effectiveness of this endeavor such as whether the involvement of students with STEM education in order to participate in competitions offers them the real benefits of STEM education. Also, despite the fact that the contribution of private sponsors is significant, it does not cover the needs of all schools. The Greek Ministry of Education should deploy a national plan that will guide implementation of STEM education in Greek schools with the aim to give the opportunity to all students to engage in STEM and benefit from it.

- **Lack of teachers who are qualified to teach STEM subjects**

STEM education is a learning approach that combines science, technology, engineering, and mathematics. Therefore, teachers who will implement STEM education should be able to combine knowledge from these subject areas. However, in Greece there are many teachers who teach Natural Sciences, Technology, Informatics and Mathematics, but there are few who can combine these knowledge to introduce STEM learning in their classrooms. All respondents suggested that STEM education should be delivered by teachers with specialized education in STEM disciplines.

Regarding the Game Based method, respondents reported the following obstacles:

- **A repository of Games & Better equipped teachers on how to apply Game based learning**

Respondents reported that having fun while learning is great as pleasure increases engagement. They added that due to that fact, gaming is considered a powerful teaching tool. However, using games for learning is not an easy task, as games have to be successful both as enjoyable games and in supporting learning. Therefore, teachers need to be better equipped on how to apply Game based learning (teacher roles, game selection, and contextual factors for successful adoption of games in schools).

Moreover, respondents added that it would be helpful if there were a repository of games available to teachers to help them make learning fun and engaging to all students.

**7. Considering gender issues, who plays games more frequently?**

- a) boys
- b) girls
- c) both
- d) none

According to the questionnaire results:

6 (100%) of the 6 respondents in our sample chose the third answer (c).

**8. Do you believe there is an equal representation of male and female characters in board games?**

- a) yes
- b) no
- c) I don't know

According to the questionnaire results:

3 (50%) of the 6 respondents in our sample chose the first answer (a). 3 respondents (50%) chose the third answer (c).

**9. Do you present female role models in STEM to your students (eg. Marie Curie, etc)?**

- a) yes, always
- b) occasionally
- c) no, never

According to the questionnaire results:

6 (100%) of the 6 respondents in our sample chose the second answer (b).

**10. Do you emphasise on life stories and work of important role-model women/men in STEM?:**

- a) **yes, always**
- b) **occasionally**
- c) **no, never**

According to the questionnaire results:

6 (100%) of the 6 respondents in our sample chose the second answer (b).

**11. Do you use digital tools (SCRATCH, CODEORG, GOOGLE BLOCKLY...) in STEM education and Game Based Learning?**

- yes, I'm well familiar with these tools**
- occasionally**
- no, I don't know these options**

According to the questionnaire results:

6 (100%) of the 6 respondents in our sample chose the third answer (c).

## Greek National Report – Challedu

### **1. Do you use games during online learning?**

The vast majority of teachers answered in the negative. Only one IT teacher answered that he occasionally uses games during online learning.

### **2. Have you designed digital games with your students before? If yes, can you describe?**

All teachers replied that they have not designed to date digital games with their students. Nevertheless, they mentioned that they would like to do so but they lack the skills.

### **3. Do you employ board gaming during your lessons?**

Only the 5% of the teachers asked have employed board gaming during their lessons, and this only occasionally. The rest have never used board games as educational tool.

### **4. Do you generally believe that STEM and Game Based method would be useful to teach different subjects to students? Justify.**

The majority of teachers believe that STEM and Game Based method is useful to teach physical sciences and especially informatics. The main benefits is that learning in more fun for the students and also the students are mobilized and more participatory and engaged during gaming.

**5. Which are considered to be the educational benefits gained from the use of STEM and Game Based method in school education?**

The majority of respondents claim that **STEM** and **Game Based method** in school education:

- does not discriminate between students (gender, age, nationality, learning background),
- gives immediate feedback and the student checks his / her mistakes and progress at all times,
- is multi-level and close to students' interests,
- is interactive and fun for students and teachers,
- enables students to stimulate their imagination.

**6. Which, in your opinion, are the main obstacles in the use of STEM and Game Based method?**

The majority of questionnaires answered that it is very difficult to apply the STEM and Game Based methods because it is a priority for the teachers to cover the curriculum according to the requirements of the directives from the ministry of education and therefore there is not enough time for educational games. Another obstacle is that the majority of Greek public schools do not have materials available for applying STEM and Game Based methods and they also lack knowledge of such tools. Also STEM is not a unified lesson in Greek schools as curriculum and also school program separates the lessons in scientific fields (math, physics, chemistry, bio, and informatics) with no real interdisciplinary connection among them.

**7. Considering gender issues, who plays games more frequently?**

Majority of questionnaires (75%) answered that boy plays more frequently games. The rest answered both play equally.

**8. Do you believe there is an equal representation of male and female characters in board games?**

Majority of questionnaires (55%) answered that there is not an equal representation of male and female characters in board games. 25% answered that they do not know and the rest that most characters are male.

**9. Do you present female role models in STEM to your students (eg. Marie Curie, etc.)**

Part of the teachers (30%) present occasionally female role models in STEM to their students. The rest never does it.

**10. Do you emphasize on life stories and work of important role-model women/men in STEM?**

A minority of the teachers (15%) emphasize on life stories and work of important role-model women/men in STEM to their students

**11. Do you use digital tools (SCRATCH, CODEORG, GOOGLE BLOCKLY...) in STEM education and Game Based Learning?**

Only the teacher of informatics occasionally used digital tools in STEM education and Game Based Learning. The rest is not aware of these tools.

## Italian National Report – EURO-NET

### 1. Do you use games during online learning?

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**
- d) **no, never**

According to the questionnaire results:

- 3 persons (50%) indicated that they use games sometimes
- 1 person (16,67%) indicated that he never used games
- 2 persons (33,33%) indicated that they use games occasionally

### 2. Have you designed digital games with your students before? If yes, can you describe?

According to the questionnaire results:

- 6 persons (100%) indicated that they did not use digital games

### 3. Do you employ board gaming during your lessons

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**
- d) **no, never**

According to the questionnaire results:

- 1 person (16,67%) indicated that he use boardgame games sometimes
- 5 persons (83,33%) indicated that they never use board games

**4. Do you generally believe that STEM and Game Based method would be useful to teach different subjects to students? Justify.**

These are the 6 answer obtained:

- Game based method is a transversal and direct method to teach something to students. Coming back to the main and natural method everyone used to learn how to know everything in life, like kids, through the game.

Probably but I never did

- Yes. The students are bored by old teaching methodologies and by using a language that is closer to their interest could engage the students in the topics
- Yes because of the engagement of the students
- In my opinion using games is essential because it helps in learning and stimulates the student's attention
- The game-based teaching method is very useful for improving the attention of students

**5. Which are considered to be the educational benefits gained from the use of STEM and Game Based method in school education?**

These are the 6 answer obtained:

- Main benefits are a quick and deep learning, based on experiential learning and learning by doing, enjoying the educational process. Furthermore, this method stimulates interest and creativity.

- They might.
- Active participation of the students in the lessons.
- Interest in the topic increases the engagement of students with an approach they would like.
- STEMs teach students about computational thinking by focusing on real world applications from a problem solving perspective. ... The idea is that reading is still an element that develops a critical sense that contributes to the success of every student.
- The Game Based method is very useful for engaging students in actions that would normally be more noise.

**6. Which, in your opinion, are the main obstacles in the use of STEM and Game Based method?**

These are the 6 answer obtained:

- The main obstacle is to understand that the game is not only a game.  
The difficult
- is the “translation” from the game to the learning subjects
- I don't use them
- Teachers are not skilled to use new approaches and methodologies
- Preparation of the teachers
- It is important to have equipped classrooms
- Equipped classroom is essential

**7. Considering gender issues, who plays games more frequently?**

- a) boys
- b) girls
- c) both

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**d) none**

According to the questionnaire results:

- 1 person (16,67%) indicated both gender
- 5 persons (83,33%) indicated boys

**8. Do you believe there is an equal representation of male and female characters in board games?**

**a) yes**

**b) no**

**c) I don't know**

According to the questionnaire results:

- 3 persons (50%) answered yes
- 3 persons (50%) answered no

**9. Do you present female role models in STEM to your students (eg. Marie Curie, etc)?**

**a) yes, always**

**b) occasionally**

**c) no, never**

According to the questionnaire results:

- 2 persons (33,33%) answered yes, always
- 2 persons (33,33%) answered occasionally
- 2 persons (33,33%) answered no, never

**10. Do you emphasise on life stories and work of important role-model women/men in STEM?:**

- a) yes, always**
- b) occasionally**
- c) no, never**

According to the questionnaire results:

- 3 persons (50%) answered yes, always
- 1 person (16,67%) answered occasionally
- 2 persons (33,33%) answered no, never

**11. Do you use digital tools (SCRATCH, CODEORG, GOOGLE BLOCKLY...) in STEM education and Game Based Learning?**

- a) yes, I'm well familiar with these tools**
- b) occasionally**
- c) no, I don't know these options**

According to the questionnaire results:

- 2 persons (33,33%) answered no, I don't know these options
- 4 persons (66,67%) answered they use these digital tools occasionally

## Turkish National Report – AYDIN IL MILLI EGITIM MUDURLUGU

### 1. Do you use games during online learning?

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**
- d) **no, never**

According to the questionnaire results:

2 (33,3%) of the 6 participants chose the first answer a; 2 participants (33,3%) chose the second answer (b) and 2 participants (33,3%) chose answer c.

### 2. Have you designed digital games with your students before? If yes, can you describe?

According to the questionnaire results, one participant has co-designed games with his/her students. Sample answer is as follows:

*'I've prepared a game of matching information cards and a game to set up an experimental in a virtual lab'*

However the rest of the participants (5) said NO to this question.

### 3. Do you employ board gaming during your lessons

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**

**d) no, never**

According to the questionnaire results:

3 (50%) of the 6 participants chose the answer c, 3 respondents (50%) chose the answer b.

**4. Do you generally believe that STEM and Game Based method would be useful to teach different subjects to students? Justify.**

All the participants firmly believed that STEM and Game Based method would be useful to teach different subjects to students. They all agree that Game-based learning and STEM is one of the best ways to keep students' motivation alive. Moreover, all respondents consider that these two methods help students have fun with the classes. All the participants admitted that these methods provided students with creative thinking.

**5. Which are considered to be the educational benefits gained from the use of STEM and Game Based method in school education?**

Participants stated benefits of STEM for students as:

- STEM help students develop creativity and critical thinking of students.
- It helps students gain self-confidence and they also enhance teamwork and group work studies among students
- It helps students develop problem solving skills.
- It builds resilience for students. Students learn in a safe environment that allows them to fall and try again.

Participants stated benefits of GAME BASED method for students as

- It provides permanent learning.

- It helps students being motivated and curious.
- Students can learn lessons easier than standard methods.
- They make education a pleasant process for students and increase the permanence of knowledge of students.

## **6. Which, in your opinion, are the main obstacles in the use of STEM and Game Based method?**

Participants stated the following obstacles:

- **EDUCATION SYSTEM AND TIME LIMIT:** As in Turkish education system, students have to pass the national exams to continue their education in a qualified school, they spend most of their time by solving multi-choice questions. So participants stated that they had lots of things to teach and help students prepare for these exams (3 participants' statement)
- **LACK OF TEACHER QUALIFICATION:** For some people it will be harder to use Stem. Because they are not used to using it. Teachers do not have the qualifications to use these methods (2 participants)
- **TECHNOLOGICAL DEFICIENCIES:** Students do not have the necessary technological tools. (1 participant)

## **7. Considering gender issues, who plays games more frequently?**

- a) **boys**
- b) **girls**
- c) **both**
- d) **none**

According to the questionnaire results:

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3 (50%) of the 6 participants chose the answer BOTH, 3 (50%) of the participants chose the answer BOYS.

**8. Do you believe there is an equal representation of male and female characters in board games?**

- a) **yes**
- b) **no**
- c) **I don't know**

According to the questionnaire results:

4 (66,7%) of the 6 participants chose the answer NO. 1 participant (16,7%) chose the answer I DON'T KNOW, 1 participant (16,7%) chose the answer YES.

**9. Do you present female role models in STEM to your students (eg. Marie Curie, etc)?**

- a) **yes, always**
- b) **occasionally**
- c) **no, never**

According to the questionnaire results:

5 (83,3%) of the 6 participants chose the answer YES, ALWAYS, 1 (16,7%) chose OCCASIONALLY.

**10. Do you emphasise on life stories and work of important role-model women/men in STEM?:**

- a) yes, always**
- b) occasionally**
- c) no, never**

According to the questionnaire results:

6 (100%) of the 6 participants chose the answer YES, ALWAYS.

**11. Do you use digital tools (SCRATCH, CODEORG, GOOGLE BLOCKLY...) in STEM education and Game Based Learning?**

- a) yes, I'm well familiar with these tools**
- b) occasionally**
- c) no, I don't know these options**

According to the questionnaire results:

3 (50%) of the 6 participants chose OCCASIONALLY, 1 (16,7%) chose the answer C, 2 (33,3%) YES, I'M WELL FAMILIAR WITH THESE TOOLS.

## Latvian National Report – Adazu vidusskola

### 1. Do you use games during online learning?

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**
- d) **no, never**

According to the questionnaire results 5 (83%) of the 6 respondents have chosen the third answer (c). 1 respondent (17%) has chosen the second answer (b).

### 2. Have you designed digital games with your students before? If yes, can you describe?

According to the questionnaire results, all the teachers replied that they have never designed any digital games with their students. However, they mentioned that they have sometimes played digital education games with their students.

### 3. Do you employ board gaming during your lessons

- a) **yes, quite often**
- b) **yes, sometimes**
- c) **occasionally**
- d) **no, never**

According to the questionnaire results, 4 (67%) of the respondents in our sample chose the third answer (c). 2 respondents (33%) chose the second answer (b).

**4. Do you generally believe that STEM and Game Based method would be useful to teach different subjects to students? Justify.**

All the participants are absolutely sure that STEM education and Game-based method can be useful and helpful in teaching different school subjects to students. They all agree that Game-based learning and STEM is one of the best ways to keep students' motivation and desire to learn high. Moreover, all respondents consider that these two educational methods help their students to be active learners and enjoy the classes. All the participants admitted that these methods could provide students with creative thinking and searching for new ideas.

**5. Which are considered to be the educational benefits gained from the use of STEM and Game Based method in school education?**

There are multiple benefits for students:

- Active participation of the students in the lessons;
- Development of creativity and critical thinking of the students;
- Team work, cooperation and collaboration with their classmates;
- Problem solving, conflict resolution;
- It helps students to gain self-confidence;
- Improves multi-tasking;
- Stimulates their imagination and critical thinking;
- It makes educational process more enjoyable for the students.

**6. Which, in your opinion, are the main obstacles in the use of STEM and Game Based method?**

The respondents highlighted the following obstacles:

- The lack of modern equipped classrooms;
- The low quality of the digital educational programmes;
- Very conservative, sometimes even outdated, school subject programmes;
- The lack of teachers qualified to teach STEAM subjects.

**7. Considering gender issues, who plays games more frequently?**

- a) boys
- b) girls
- c) both
- d) none

According to the questionnaire results, 6 (100%) of the 6 respondents have chosen the third answer (c).

**8. Do you believe there is an equal representation of male and female characters in board games?**

- a) yes
- b) no
- c) I don't know

According to the questionnaire results, 3 (50%) of the 6 respondents have chosen the first answer (a) and 3 respondents (50%) have chosen the third answer (c).

**9. Do you present female role models in STEM to your students (eg. Marie Curie, etc)?**

- a) **yes, always**
- b) **occasionally**
- c) **no, never**

According to the questionnaire results, 6 (100%) of the 6 respondents have chosen the second answer (b).

**10. Do you emphasise on life stories and work of important role-model women/men in STEM?:**

- a) **yes, always**
- b) **occasionally**
- c) **no, never**

According to the questionnaire results, 6 (100%) of the 6 respondents have chosen the second answer (b).

**11. Do you use digital tools (SCRATCH, CODEORG, GOOGLE BLOCKLY...) in STEM education and Game Based Learning?**

- a) **yes, I'm well familiar with these tools**

**b) occasionally**

**c) no, I don't know these options**

According to the questionnaire results, 6 (100%) of the 6 respondents have chosen the second answer (b).

## Conclusion

This report presents the research findings in each partner country. It provides evidences that there are educational benefits gained from the use of STEM and Game Based method in school education. As for Game Based Learning, respondents stated that learning becomes more motivating and engaging for students, facilitates students development of strategic and logical thinking, students learn to cooperate and collaborate with their peers, students learn to deal with conflicts in a team, enables students to stimulate their imagination and so on. As for STEM method, respondents stated that prepares students to live and work in our digitalized world where such skills are highly valued, teaches them how to analyze problems and synthesize solutions, offers them a deeper understanding in difficult subjects like math and science, help them develop creativity and critical thinking of students, enhance teamwork and group work studies among them and so on.

However, respondents mentioned a number of obstacles in the use of STEM and Game Based method in school environment. They stated that teacher needs to plan and organize the background, games, instructions, materials etc. that takes time and effort, lack of time to implement the compulsory curriculum topics, let alone playing games, lack of good games which would be both educational and developing, lack of knowledge among teachers what kinds of games they could use and so on. In addition, as for applying the STEM method in schools, they refer as a main obstacle to the lack of teachers who are qualified to teach STEM subjects due to the fact they need to combine knowledge from subject areas such as science, technology, engineering, and mathematics.

## Appendix I

### Females in STEM – science, technology, engineering, maths

#### Participation of girls in STEM

##### TEACHERS

12. Please enlist stereotypes and bias connected with less frequent representation of girls in STEM in your country. Regard the following groups of stakeholders:

e) stereotypes among policy makers

.....  
.....

f) stereotypes among teachers

.....  
.....

g) stereotypes among students

.....  
.....

h) stereotypes among parents

.....  
.....

13. What are in your opinion the factors and reasons of lower participation of girls and women in STEM?

.....  
.....  
.....

14. What can help increase girls' involvement in STEM

.....  
.....  
.....

15. Indicate the percentage of girls you teach who gain:

- excellent results in Maths: .....
- good and average results in Maths: .....
- poor results in Maths: .....
  
- excellent results in Science: .....
- good and average results in Science: .....
- poor results in Science: .....

16. Indicate the percentage of girls you teach who participate:

- in Maths contest at school level: .....
- in Science contest at school level: .....

17. Indicate the percentage of girls you teach who succeed:

- in Maths contest at district level: .....
- in Science contest at district level: .....

18. Indicate the percentage of girls you teach who participate in technical and/or engineering projects and contests: .....

19. Indicate the percentage of girls you teach who chose class profile with:

- extended Maths: .....
- extended Science: .....

20. What are the mean results of school leaving Maths exams in your school for:

- girls: .....
- boys: .....

21. If you have any further remarks or ideas referring to the problem of low girls' participation in STEM, please present them here:

.....

.....

.....

## Appendix II

### Letter of consent

In the framework of the European project titled “A DIGital toolkit for promoting gender EQUALITY in science and technology” in which our organization is participating, we conduct a survey with the aim to collect teachers’ views on the current females’ education in STEM.

This information is provided to help you decide if you would like to participate in this research. We are inviting you to answer a specific questionnaire which is strictly for survey purposes. This will take you approximately 15 minutes to complete it.

You should know that you are free to withdraw at any time without consequences of any kind. Participation in the research is voluntary. Moreover, the questionnaire is anonymous and confidential.

Please let us know if you agree to participate in this research.

Partner contact details:

## Appendix III

### STEM and Game-based education

12. Do you use games during online learning?

- a) yes, quite often
- b) yes, sometimes
- c) occasionally
- d) no, never

13. Have you designed digital games with your students before? If yes, can you describe?

.....

.....

.....

14. Do you employ board gaming during your lessons

- a) yes, quite often
- b) yes, sometimes
- c) occasionally
- d) no, never

15. Do you generally believe that STEM and Game Based method would be useful to teach different subjects to students? Justify.

.....

.....

.....

Reference Number: 2020-1-PL01-KA201-081630

16. Which are considered to be the educational benefits gained from the use of STEM and Game Based method in school education?

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.....  
.....

17. Which, in your opinion, are the main obstacles in the use of STEM and Game Based method?

.....  
.....  
.....

18. Considering gender issues, who plays games more frequently?

- a) boys
- b) girls
- c) both
- d) none

19. Do you believe there is an equal representation of male and female characters in board games?

- a) yes
- b) no
- c) I don't know

20. Do you present female role models in STEM to your students (eg. Marie Curie, etc)?
- a) yes, always
  - b) occasionally
  - c) no, never
21. Do you emphasise on life stories and work of important role-model women/men in STEM?:
- a) yes, always
  - b) occasionally
  - c) no, never
22. Do you use digital tools (SCRATCH, CODEORG, GOOGLE BLOCKLY...) in STEM education and Game Based Learning?
- a) yes, I'm well familiar with these tools
  - b) occasionally
  - c) no, I don't know these options