

The effect of using emergency remote teaching on Greek Mathematic classes in secondary education from mathematicians' perspective

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Citation: Kyriazis, C., Protopapas, E., & Stogias, S. (2023). The effect of using emergency remote teaching on Greek Mathematic classes in secondary education from mathematicians' perspective. *Contemporary Mathematics and Science Education*, 4(1), ep23012. <https://doi.org/10.30935/conmaths/13029>

ABSTRACT

From March 2020 until June 2021 secondary education in Greece experienced the consequences of the COVID-19 pandemic. The first measure taken was the general closure of face-to-face teaching at all levels of education and the provision of distance learning through the so-called emergency remote teaching. Mathematicians dealt with unprecedented and difficult situations. In the present paper we record the views of 218 mathematicians of secondary education working in Greek public schools about the obstacles they faced in their teaching during the pandemic in a quantitative survey. According to the survey connectivity problems (affecting teachers and students), lack of teaching material suitable for distance learning, unsatisfactory support of the state, poor previous training in distance learning were major issues. This is the first survey monitoring the problems that Greek mathematicians faced during this period, how they dealt with them and one of a few worldwide regarding mathematicians.

Keywords: Greek secondary education, public schools, distance learning, survey, emergency remote teaching

Received: 22 Dec. 2022 ♦ Accepted: 28 Feb. 2023

INTRODUCTION

Distance education is the education, which uses several means of communication (mail, e-mail, radio, television, Internet and the applications that govern it) and is characterized by minimal contact between the trainee and the trainer (Anderson & Dron, 2011; Cleveland-Innes & Garrison, 2010). In distance education electronic learning (e-learning), online learning, online education and more generally ways that mainly have a common reference point the internet and the computer are used (Cleveland-Innes & Garrison, 2010). The effectiveness of distance learning depends on careful design and planning, using a systematic model (Branch & Dousay, 2015). Therefore distance learning demands careful and detailed organization of each course, which includes the teaching content and the support of the interactions that occur during the teaching process. This approach involves not only the transmission of information, but also social and cognitive process (Bernard et al., 2009).

Distance education is divided in two main categories (Keegan, 2016): synchronous and asynchronous education. In synchronous education teaching and learning take place at the same time in which the teacher delivers the lesson and the student can be anywhere (either interferes in the lesson or not). In the asynchronous education the student learns in a different time.

Distance learning is significantly different from courses that are offered online in response to an emergency situation (i.e., crisis or disaster). The pandemic of COVID-19 forced the countries worldwide to use a different approach of the learning process. In crises the educational planning requires creative problem solving. The way in which remote teaching was implemented worldwide during the period of COVID-19, was done with the so-called emergency remote teaching (ERT). According to Hodges et al. (2020) in emergency situations, the primary purpose is not to create a robust education system, but to provide educational support quickly and reliably. The special circumstances lead to a different treatment compared to distance learning, because it is a temporary change of delivering teaching due to unpredicted situations such as public health issues, wildfires, hurricanes etc.

During the COVID-19 pandemic ERT was applied worldwide in order to protect teachers, students and in general the society from the rapid spread of the virus. In many countries, many supportive actions were implemented, which mirrored the country's economic capabilities and the perspective of the local Ministry of Education. ERT had a huge impact on the social inequalities, because poor people or people living in undeveloped areas had significant difficulties keeping up with distance learning education.

Japan (MEXT, 2020) invested about 828 million Euros, following some basic principles: children must continue to learn, the acquisition

of knowledge must be continued, the correct restart of schools must be done as soon as possible etc. In India (Protiva & Shivani, 2020) due to poor economics they could not spend a large amount of money and the basic measures taken were the development of applications with electronic content, the digitization of all textbooks and the use of TV channels, WhatsApp and SMS in order to deliver the knowledge. In Ireland (Mohan et al., 2020) teachers and students upgraded rapidly their digital skills and many schools provided digital equipment to the students. Teaching was held with live web videos and virtual platforms, while special instructions have been published to support students facing technical difficulties. In Iraq the implementation of an adequate online education was challenging due to the limited capacity to provide students with internet and required electronic tools, especially in federal Iraq (Shamseldin, 2020). In Lebanon about 60% of the students attended classes using their cell phones (El Feghaly et al., 2021). In Iran the most used method was social media (Tajik & Vahedi, 2021). In Jordan the use of a blended learning strategy improved learners' ability to understand educational subjects (Alsarayreh, 2020). Teachers in Saudi Arabia had strong access to support from school leaders, peer networks and training courses during the closure (Mann et al., 2020).

In Greece in order to deal with the first wave of the pandemic (March 2020), the Ministry of Education and Religion Affairs suspended face-to-face teaching of all its educational modules for two months and additionally made the Webex platform available to teachers in order to create digital classrooms and continue the learning process, applying ERT. In this phase, it was stated that the initial goal was not to cover the content of their teaching, but to continue the students' contact with the learning process and as a result students' attendance was not recorded.

The new school year (2020-2021) started normally, but the wide spread of the virus forced the Ministry to stop face-to-face teaching from November 2020 until April 2021. The courses were held through the Webex platform with a more binding framework in order to cover the prescribed teaching content for each class, but also with the mandatory attendance of students. The results of this framework were that students' attendance was recorded, tests were taken and evaluation existed.

The work of the Greek teachers was supported with the pre-existing infrastructure of distance education, which was expressed by:

- the Panhellenic school network (PSN), which is the national network and the Internet service provider of the Ministry of Education and Religion Affairs operating since 1998, providing e-learning environment, communication and collaboration capabilities with personalized access,
- open e-class, which is a free educational management software, which launched at 2003, and
- the Internet structures such as interactive textbooks, digital educational material (named Phototree), Study4exams (containing digital courses and material mainly for 3rd class high school students) and digital educational scenarios (Aesop platform).

Many researchers dealt with the effect of the COVID-19 pandemic in schools. Giovannella et al. (2020) conducted a survey in Italy, employing 336 teachers showing that their high professionalism was the key factor of the normal continuity of education. The study of Niemi and Kousa (2020) in a Finnish school highlighted the lack of effective

contact between teachers and students, expressing serious concerns about students' progress. In Slovakia (Ballova & Verešova, 2020) teachers' preparation of the lesson lasted longer. Jelińska and Paradowski (2021), on a sample of 1,500 teachers from 118 countries, expressed their concern that the education community is at the beginning of many changes. Finally, Kyriazis et al. (2021) agreed with all the aforementioned results in a survey employing 411 teachers of the secondary public education in Greece, adding the fact that each teacher spent a significant amount of money in order to provide the best education for the students.

In this manuscript in order to investigate the problems that Greek mathematicians of secondary public education faced during ERT we present the results of a quantitative survey. This is the first survey in Greece recording only the perspective of mathematicians and one of few worldwide. Mathematics are especially important for students' education and one of the basic courses in the secondary education, so mathematicians' opinions are important in order to apply ERT or in general distance learning.

LITERATURE REVIEW

The COVID-19 pandemic was an unprecedented challenge to societies around the world, and mathematics teachers had to become learners once more in order to find appropriate ways to support their students through unexplored teaching methods. Also, in many cases, they had to adapt to digital teaching for the first time.

Chirinda et al. (2021) conducted a research with a sample of 60 junior high school mathematics teachers, in South Africa. According to their results, as soon as the government decided to adopt ERT, teachers had begun to try various video communication tools such as Zoom, YouTube, Facebook Live and digital learning platforms such as Google Classroom, Blackboard Collaborate, WhatsApp. From their responses on the questionnaire, teachers had never used these tools, but they also had to quickly think about how they could implement them into their teaching. Teachers also indicated that they had to learn to be innovative in order to enforce learning among students during the digital sessions. They soon realized that most students did not have sufficient data and appropriate connectivity to participate in the teaching process (i.e., downloading the digital material that teachers used during teaching and connecting to digital platforms). For that reason, in some schools, teachers proposed sharing learning material through flash disks once lockdown rules were eased, but most parents and learners did not have the necessary devices such as desktops or laptops to work. Regarding mathematics teachers' problems, some of them indicated that they felt exhausted from being continuously online, and that they also hadn't easy access to internet. In order to handle ERT, many teachers indicated that they joined international mathematics discussion groups on social media that focused on implementing digital platforms in the mathematics classroom.

According to Barlovits et al. (2021) mathematics teachers in Germany and Spain, also came up with major problems during ERT. After analyzing data from the answers of 248 teachers (171 German and 77 Spanish teachers), they concluded that some of the major problems were the difficulty to support students from socially difficult backgrounds, several technical problems (lack of digital equipment or media competence) and problems regarding students' assessment and participation. Students felt that they were on holidays because they

spent all their time away from school and their performance wasn't graded. Other problems had to do with communication during online lesson, lack of feedback to teachers, limited students' motivation and also poor, or even loss of control on some students. Also, teachers required more time for preparation, feedback and students' support. Spanish teachers specifically reported that they were overloaded with the organization of the new teaching situation, mostly due to a lack of didactic guidance and preparation.

Similar were the results of Adon et al. (2021) in which 684 mathematics teachers from France, Germany, Israel, and Italy participated. Specifically, the main obstacles were students' assessment, the support of students facing difficulties and the application of typical mathematical processes digitally.

Hodges et al. (2020) conducted a survey in May 2020 with 49 heads of mathematics in secondary schools and followed-up in-depth interviews conducted in June of the same year with a sub-sample (17 participants). According to the report, students' participation was unequal, as disadvantaged students participated less. Regarding schools, those with established online learning practices and infrastructure were more readily able to move to ERT than others that didn't.

STATING THE RESEARCH PROBLEM

As in many countries, mathematics teachers had to adopt in ERT, in order to keep the teaching progress running. In Greece's educational system, and specifically in secondary education, distance learning was never implemented to such a degree, so there was limited research regarding mathematics teachers' problems and obstacles about distance learning. Moreover, no similar research has been made regarding Greece's mathematics teachers' problems and obstacles during ERT. The current paper aims at covering this research gap through the results of a quantitative research.

MATERIALS AND METHODS

A total of 218 mathematicians working at public schools of the secondary education participated in this quantitative research. This specific research method was also used because it is more appropriate for a large sample and assists in finding relations among variables. As there was no access to data regarding the population of the research, none of the systematic sampling methods could be implemented and therefore a convenience sample was used. Despite the fact that this particular method does not provide the possibility of generalizing the conclusions, because no probabilistic sampling method was used (Creswell & Guetterman, 2019), it provides useful conclusions in case the population has approximately the same characteristics as the sample (Blair et al., 2013).

In Greece, as in many countries worldwide, mathematics teachers are not necessary mathematicians, but they only teach to the first classes of the secondary education and therefore they are a tiny minority. In our survey participated mathematicians who teach mathematics in public schools of the secondary education.

The research questions were, as follows:

1. How familiar were Greek mathematicians with distance learning methods?

2. Which are mathematicians beliefs' regarding state's support to them?
3. Which are mathematicians beliefs' regarding the efficiency of distance learning?
4. Which are the obstacles that mathematicians faced during ERT?
5. Which will be the effect of ERT in the future?
6. How mathematicians implemented ERT?
7. Are there any statistically significant differences related to teachers' demographics?

In order to answer our research questions, we structured a questionnaire that included closed ended items and open items grouping the questionnaire items into five sections. The first section was devoted to general demographic information, while the other four sections referred to ERT. As there was no previous research on the specific topic in Greece, the questionnaire was constructed by the research team using questions suitable for Greece's secondary education context.

A Google Form questionnaire was receiving answers from 17/4/2021 till 6/5/2021. The link of the questionnaire was posted to a widely used social media platform. All participants were informed for the purpose of the study and there was a clear statement by the research team that all data will be handled with confidentiality and only for the purposes of the specific study. Appropriate coding of answers was made in order to use SPSS v.26 for its analysis. Both descriptive and inductive methods were used for the presentation of the results and the conclusions regarding the population of the research, by using t-test and one-way ANOVA procedures.

THE SURVEY

Regarding participants demographics, 61.47% of them were men and 38.53% were women. The majority of the participants were 51 years of age or older. Specifically, four persons (1.83%) stated that they are up to 30 years old, 24 people (11.01%) from 31 to 40 years old, 65 people (29.82%) from 41 to 50 years old, and finally 125 persons (57.34%) reported being 51 years of age or older.

The majority of the participants have extensive teaching experience in a public school. Specifically, 27.52% of the teachers (60 persons) have more than 20 years of teaching experience and 28.44% (62 persons) from 16 to 20 years. Most of the teachers teach in a general lyceum (58.7%), followed by those who teach in a gymnasium (34.9%), and in a vocational lyceum (6.4%).

In order to examine whether the school's area in which teachers work affected their answers we asked them to respond to a relative question. In 54.1% of the cases, the school unit is located in Athens or Thessaloniki, while 20.2% in a prefecture capital except Athens or Thessaloniki and 25.7% in other regions of the country.

Next, the participants were asked to state whether they had any contact with distance education before March 2020, either as teachers or as students using distance learning. 61% answered negatively and 39% answered positively. Then, those who answered positively (85 persons), were asked to indicate how they had come into contact with distance education (being able to choose more than one option). 26.32% of them studied at an open university, 31.57% attended a relevant

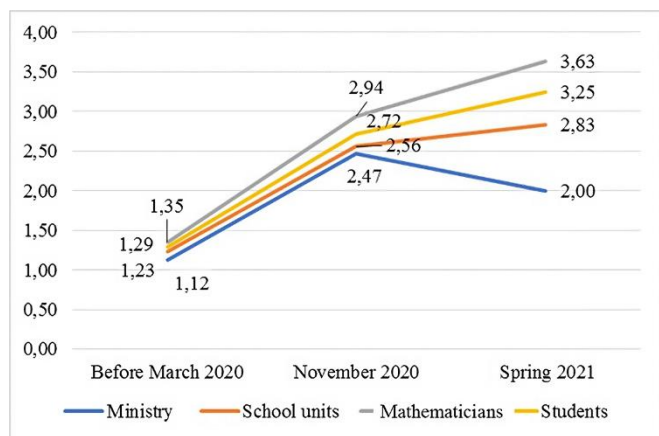


Figure 1. Evaluating the preparation for ERT (Source: Authors)

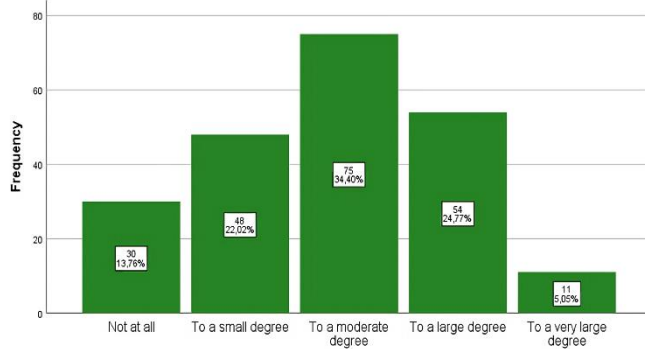


Figure 3. Students' preparation time in ERT era/face-to-face teaching (Source: Authors)

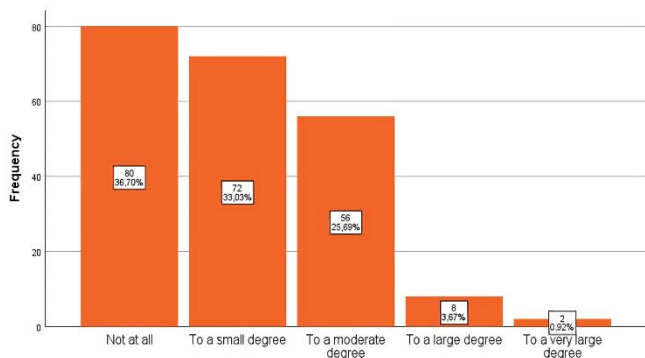


Figure 2. Fulfilment of students' educational needs in ERT (Source: Authors)

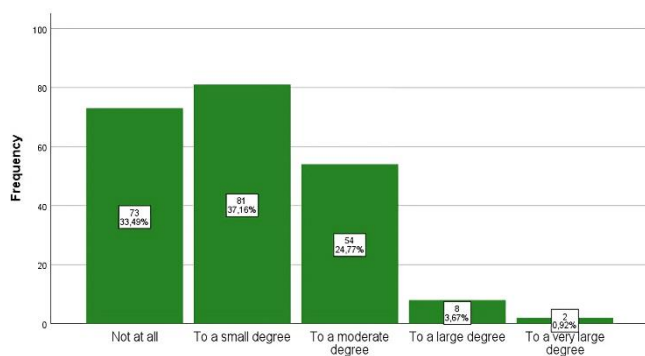


Figure 4. Teachers' developed skill applying ERT (Source: Authors)

seminar or conference, while 15.04% hold a master's degree in the field. Regarding the level of use of the digital classroom of the PSN for their teaching, before the outbreak of the pandemic, 58.30% answered not at all, while 7.8% answered that they used it to a great degree.

In the next group of questions the participants were asked to evaluate how prepared the Ministry, the teachers, the school units, and the students were in order to apply ERT. Specifically, the above were evaluated for the period before the outbreak of the pandemic, after the first and before the second suspension period of the school units operation and finally for the spring of 2021. The evaluation was made on a scale of 1 ("not at all") to 5 ("very much").

From Figure 1 it can be seen that for the period before March 2020, the Ministry, the school units, the teachers and the students were evaluated very low, in all cases below two, while it is characteristic that the evaluation of the Ministry fluctuated slightly above "not at all" (1.13). By November 2020, and given everyone's previous experience,

the picture is clearly improved, but no one was able to fluctuate above 3 ("moderate"), although mathematicians came quite close to it (2.94). It is worth noting that while mathematicians and students in spring 2021 are evaluated above "medium", the school units and the Ministry do not manage to reach this level.

The next propositions concerned the effect of ERT, both for students and teachers. From Table 1, it can be seen that in all the propositions concerning the possible benefits for students, the mean value is below three ("moderate").

Specifically, from Figure 2, it is obvious that ERT does not meet students' educational needs, while from Figure 3, teachers conclude that students spend about the same time for their study comparing to face-to-face teaching.

Teachers do not believe that ERT provide useful skills (Figure 4), but it assists their professional development (Figure 5).

Table 1. The effect of ERT

ERT ...	Mean value (MV)	Standard deviation (SD)
... enhances the student's ability to learn how to learn.	2.94	1.084
... equips students with skills they will need in the future.	2.05	0.935
... is able to fully meet the educational needs of students.	1.90	0.923
... is able to fully meet the needs of students for contact with the educational team.	2.39	1.084
... requires students to spend the same amount of time preparing for face-to-face learning.	2.81	1.145
... assists in the professional development of teachers.	3.42	1.021
... equips teachers with useful skills.	1.98	0.951
... is able to fully meet the needs of teachers for contact with their students.	1.94	1.185

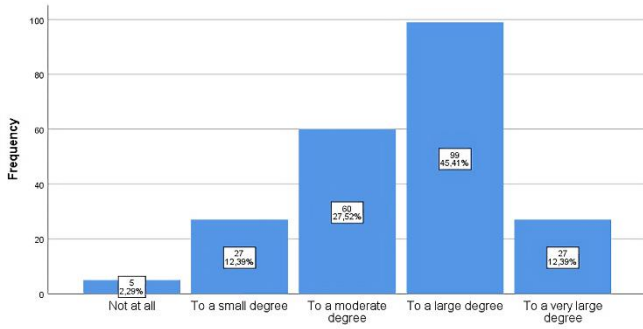


Figure 5. Teachers' professional development (Source: Authors)

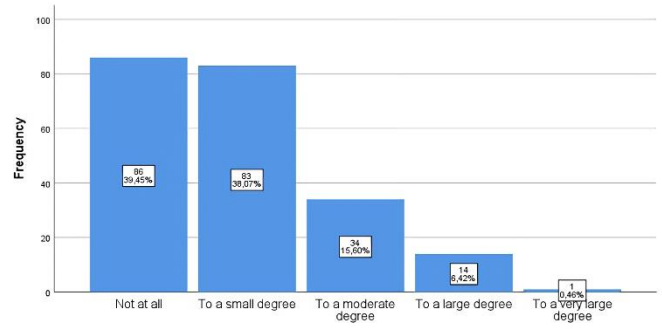


Figure 8. Effectiveness of ERT in next school year (Source: Authors)

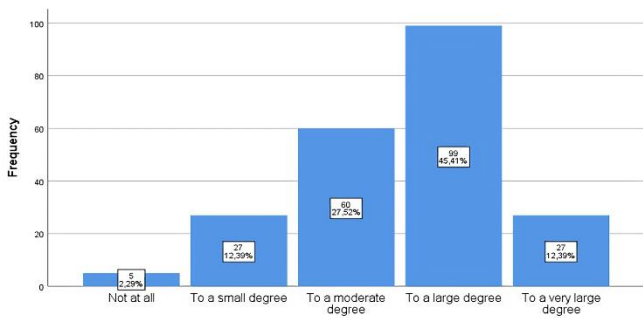


Figure 6. Teachers satisfaction regarding students' participation (Source: Authors)

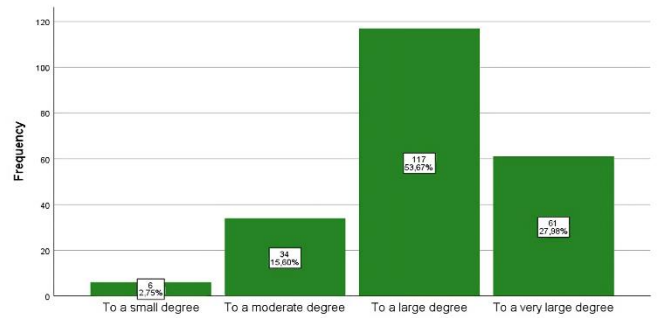


Figure 9. Future use of digital aid material (Source: Authors)

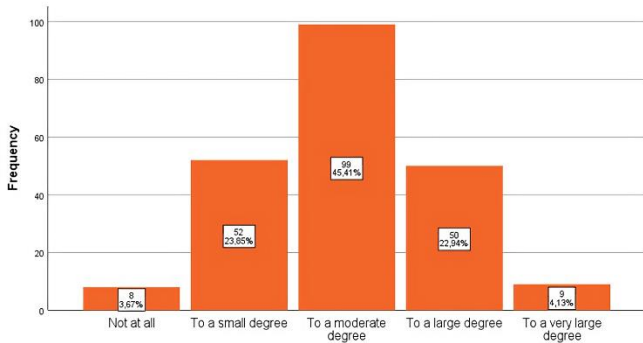


Figure 7. Learning effectiveness of ERT (Source: Authors)

The teachers were also asked about the results of ERT. From **Table 2** it can be seen that distance education has brought a change regarding the frequency of using digital teaching aids to their lesson, while teachers' satisfaction regarding students' participation during the lesson was a little above "moderate".

Table 2. The consequences of ERT

Statement	Mean value (MV)	Standard deviation (SD)
Satisfaction with student participation during ERT.	3.40	1.020
Student absences increased during ERT.	2.60	0.927
Easy return of the educational process to the normal state.	2.96	1.193
Students have acquired the knowledge they should with ERT.	3.01	0.934
Readiness to participate in final exams at first class of lyceum using created database with exercises.	2.48	0.815
This year's situation will affect the next school year.	1.87	0.996
ERT has diversified the frequency of using digital supervisory teaching aids to their teaching.	4.05	0.765

The acquisition of knowledge is at moderate level, while student absences do not seem to have increased. Finally, the opinions are divided as to whether it will be easy to return to the normal situation, while mathematicians believe that the students of the first class of lyceum will not be ready to participate in the promotional exams using the data base with exercises that the Ministry created something, which was finally decided by the Ministry a few days before the present investigation was completed (22/5/2021).

Teachers were satisfied with students' participation (**Figure 6**) and normal distribution appears regarding the learning effectiveness of ERT (**Figure 7**).

Moreover, it is their strong belief that next school year will not be affected (**Figure 8**) and the overall experience will lead to frequent use of digital aid material (**Figure 9**).

From **Table 2**, it seems that the opinions are divided as to whether it will be easy to return to the normal situation and the detailed data are presented in **Figure 10**.

From **Table 3**, it can be seen that the biggest problem, during ERT, was the correction of exercises, since about 63% stated that this was a significant problem (**Figure 11**).

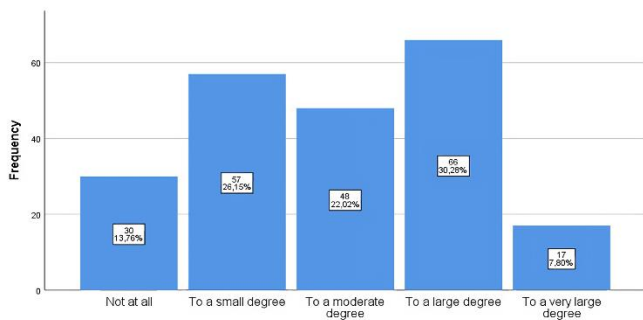


Figure 10. Smooth reset of the teaching process to the normal state (Source: Authors)

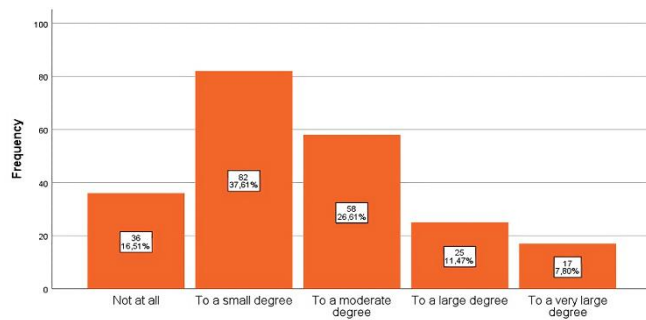


Figure 13. Problems regarding connection to the Internet (Source: Authors)

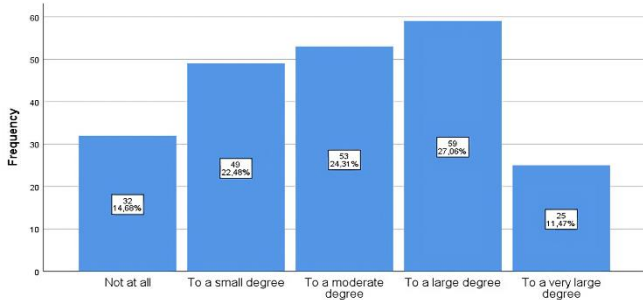


Figure 11. Difficulties regarding correction of homework (Source: Authors)

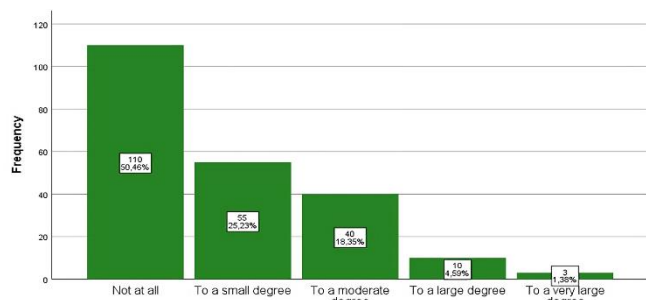


Figure 14. Problems regarding the use of computer (Source: Authors)

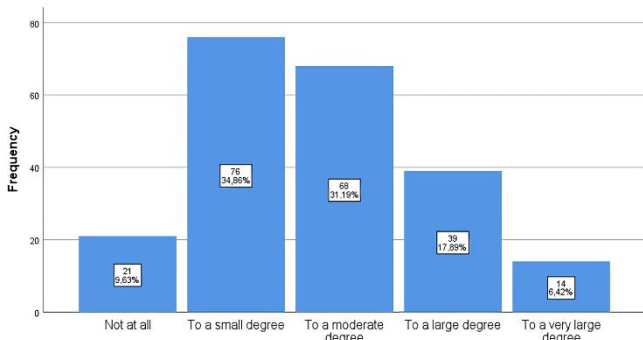


Figure 12. Problems regarding connection to platform (Source: Authors)

Connection problems to the platform (Figure 12) or the internet (Figure 13) were also intense. The least of all problems was the use of the computer (Figure 14).

According to mathematicians' responds for the amount they had to spend in total to cope with the needs of ERT it seems that 30.11% spent 201-300 euros, 30.73% spent 101-200 euros, 17.43% spent 301-400

euros and 13.3% up to 100 euros. It is worth noticing that 6.42% spent more than 400 euros. Specifically, 38.5% of teachers upgraded their PC, 49.5% upgraded their internet connection, 71.1% purchased a digital pen and 42.3% purchased a camera and/ or microphone.

Regarding the source of the teaching material, 81.20% of the mathematicians created it themselves, while an important source was the internet (75.70%) and for 72.5% the digital version of the textbook. Also, 46.80% used material from Phototree and only 35.30% found it from colleagues.

According to mathematicians' answers the use of their personal computer (Figure 15), their tablets (Figure 16) and their pen tablets (Figure 17) were the basic tools for their lessons.

Subsequently, mathematicians were asked to indicate to what extent they were satisfied with the support of different factors during the distance education period. Table 4 shows that they were more satisfied from colleagues and the management of the school unit and less from other agencies.

The teachers were also asked whether they intend to use distance learning in addition to classroom teaching, with 43.58% answering not at all or to a small extent, while 32.57% answered to a moderate extent. Finally, only 23.85% answered that they intend to use it to a large or very large extent (Figure 18).

Table 3. The problems of mathematicians during ERT

Problem	Mean value (MV)	Standard deviation (SD)
Connection on the platform and on the Internet	2.77	1.058
Use of PC	1.81	0.982
The Internet connection	2.56	1.131
Correction of exercises	2.98	1.244
Finding the right equipment	2.27	1.256
Finding the right digital teaching aids	2.35	1.123
Finding the right educational material	2.3	1.102

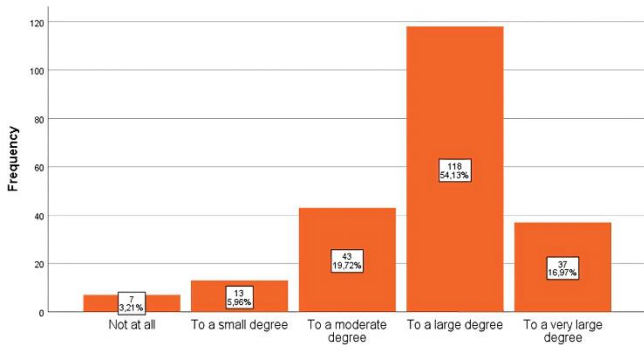


Figure 15. Use of personal computer (Source: Authors)

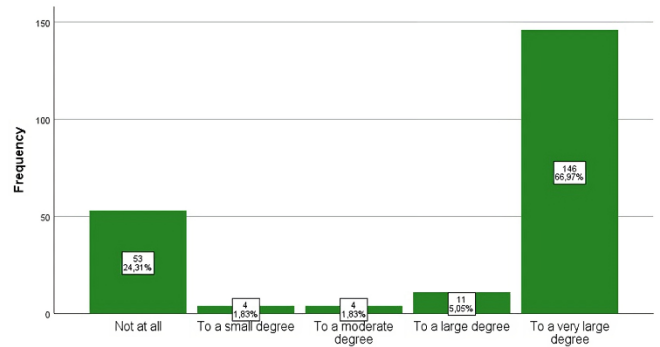


Figure 17. Use of a pen tablet (Source: Authors)

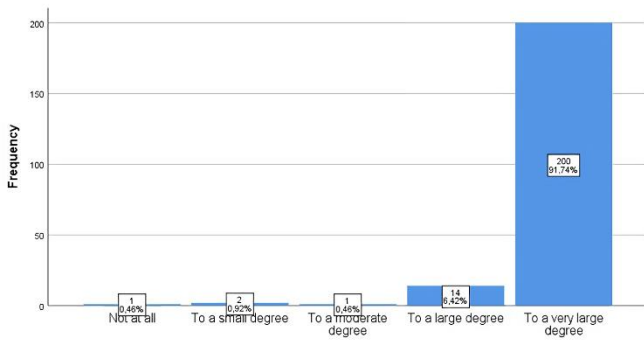


Figure 16. Use of a tablet (Source: Authors)

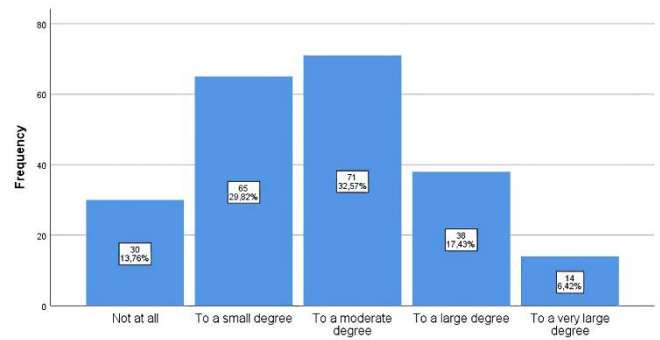


Figure 18. Figure on top of a column (Source: Authors)

In the last question mathematicians were asked to evaluate their experience from their participation in ERT. From Figure 19, it can be seen that satisfaction had mean value 6.65 and standard deviation 2.002.

Finally, mathematicians had the ability to write down in text their opinion of the overall experience. Most of them expressed the belief that distance learning is not suitable for teaching mathematics, at least for the time being. The main reason was children’s inability to solve exercises online and to present their solutions to the class, since they hadn’t a way to write mathematics in their computer, tablet or mobile phone. They also pointed out the lack of training on distance learning teaching, asking intensively to be trained.

Finally, the t-test and one-way ANOVA did not show statistically significant differences, in relation to teacher demographics.

DISCUSSION

The COVID-19 pandemic caused major problems worldwide. In education the total closure or face-to-face teaching was mainly adopted applying ERT. This situation draw the attention of many researchers. In the study of Giovannella et al. (2020) teachers’ professionalism was

pointed out, as well as teachers’ satisfaction with the Italian Ministry of Education. Basilaia and Kavadze (2020) and Huang et al. (2020) concluded that the Internet coverage, internet speed and connection problems were serious issues. Niemi and Kousa (2020) discovered the lack of effective contact between teachers and their students, verified that teachers adapted quickly to the new situation and overall distance teaching was implemented successfully.

The teaching of mathematics during ERT is also a concern of researchers all over the world. In the research of Chirinda et al. (2021) in South Africa, it was found that the transition from live to online education was not smooth, for reasons related to the inability of students and teachers to have access to the required equipment and the internet. In a research conducted in Spain (Rodríguez-Muñiz et al., 2021) it was found that given the use of a large number of digital resources, mathematics teachers declared themselves digitally competent, due to their previous training. Barlovits et al. (2021) recorded problems in the technical equipment, feedback, personal contact, assessment, lack of discipline and lack of didactical teaching. However, the sudden transition to distance education has led to a slowdown in the teaching rate and a reduction in the content of their teaching.

Table 4. Satisfaction from the support of different factors

Factors	Mean value (MV)	Standard deviation (SD)
Ministry	1.94	0.982
Directorate of secondary education	1.97	1.056
Educational project coordinator	2.35	1.284
School unit	3.40	1.253
Colleagues	3.58	1.283

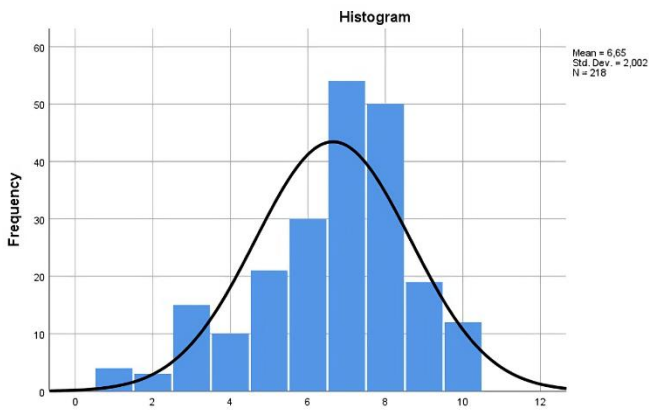


Figure 19. The evaluation of the overall experience (Source: Authors)

In the study of Martin et al. (2022) teachers reported that an important issue was the use of general technologies, which were not suitable for mathematics. Moreover, since students were used to seeing teachers' body language and facial expressions, ERT created a serious drawback (Chirinda et al., 2022). In the same study students stated that it was challenging not to work in groups and therefore they could not learn mathematics productively at home. About 40% of the participants on the survey of Ahmad et al. (2021) never asked students to correct incorrect assignments during online learning. Baran and Baran (2021) in their research highlighted the lack of knowledge and skill about online learning. Teachers in the study of Amedul and Hollebrands (2022) pointed out the difficulties of receiving feedback from students due to limited student interaction. In the survey of Tas et al. (2021) teachers believe that the instructional materials on the platform were not sufficient for the students to be successful, but their experiences in ERT increased their efficiency in education.

Mailizar et al. (2020) studied students' barriers finding that the level barrier had the highest impact on e-learning. Many mathematicians believe that distance learning is less efficient than face-to-face teaching. This assessment is called media comparison and according to Surry and Ensminger (2001) this is not true due to three reasons:

1. Any medium is a way to deliver information, so there is not better or worse medium.
2. People learn in different ways, so we need to fully understand the media to design effective studies.
3. There are many variables in each media comparison study.

The effects of teaching mathematics in ERT in higher education has also been studied. Rhea et al. (2022) concluded that ERT required great effort from the teachers, while Fhloinn and Fitzmaurice (2022) suggested that old and new skills should be utilized in order to move forward. The results of Sulistyani et al. (2021) showed that all lecturers conducted ERT by utilizing both synchronous and asynchronous teaching and implemented an improvement in the learning procedure.

Overall, the implementation of ERT and its effectiveness must be redefined, since it is possible that teachers will be asked to use it again (Samson, 2020).

CONCLUSIONS

The present research involves only Greek mathematicians serving in Greek public schools of the secondary education in a notable sample

(218 teachers). To our knowledge it is the first survey of this kind in Greece. The study showed that Greek mathematicians faced serious difficulties in their teaching during the pandemic period. The support from the state was lower than the expected even in the second period of the lockdown. Mathematicians consider the Ministry's assistance during the pandemic to be flawed (maximum score 2.56 out of 5). Initially the educational project coordinators, then the Regional Center for Educational Planning and later the Educational Policy Institute organized training courses for the teachers, but from the survey's responses it appears that mathematicians wanted quicker response, better and efficient training in distance learning education.

According to our data students have not gain the necessary knowledge and this process did not meet students' educational needs. There was not significant difference about the time that students spend to study before and during ERT, which is in complete contrast with the time that mathematicians spent in order to prepare every day's lesson. Moreover, mathematicians don't believe that this kind of teaching provided them with useful skills, but it will assist in their professional development.

The biggest issue they faced is the correction of homework. Internet coverage, internet speed and connection problems in general (for both teachers and students) were also great obstacles. Mathematicians spent a big amount of money in order to offer the best education for their students. Most of them used a tablet for their lessons. Promising is the fact that they intent to use distance learning techniques and after the COVID-19 pandemic.

In the last section mathematicians were asked to write down a context about whatever they believe was not concluded in the previous questions. Two are the main conclusions of this section: the efficiency of distance learning and their training. Greek mathematicians believe that distance learning is less efficient than face-to-face teaching. Mathematicians emphasize in receiving complete training courses after the COVID-19 era, since there wasn't organized education about distance learning before the era of COVID-19.

In mathematics distance learning without detailed preparation and excellent organization has doubtable results. Students must write along with their teacher, need to solve exercises in class and discuss with their co-students. It was certainly an unprecedented and difficult experience, which can become the springboard for interesting new teaching paths. The continuous effort of Greek mathematicians and their immediate activation in the conditions of ERT seems to have positively affected the educational activities. It is certain that more research and study is needed because such difficult social situations may reoccur, and mathematics teachers need to be ready to come up to the circumstances. Along this line we have conducted a survey about the results of ERT in mathematics, the use of distance learning techniques after the lockdowns, the teaching obstacles that are created due to ERT and the obtained data will be presented in a forthcoming publication.

Author contributions: All authors were involved in concept, design, collection of data, interpretation, writing, and critically revising the article. All authors approve final version of the article.

Funding: The authors received no financial support for the research and/or authorship of this article.

Ethics declaration: Authors declared at the beginning of each questionnaire that the questionnaires were anonymous and the findings will be used exclusively for research purposes.

Declaration of interest: Authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

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