



RESEARCH ARTICLE

Section: Education

## The impact of e-learning mathematics in higher education, Israel

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### Abstract

The main aim of study is to examine the implementation of e-learning in mathematics education programs. Qualitative and non-random data were collected from high school, college and university students in Israel using survey methods. There are two types of evidence, the outcomes of learning mathematics and the student's response using an online questionnaire. The survey was used to determine their answer. It is a qualitative case study, supported by a web-based survey. Data gathered through an online survey with 15 questions. The survey was conducted with various age groups of pupils perusing in different schools, colleges, or Universities in this lockdown period due to the COVID-19 disaster to evaluate the challenges in e-learning who exist in the Israel. Based on the survey of a variety of websites, the profits and difficulties linked with using websites in learning math are outlined.

**Keywords:** e-learning, mathematics, Israel, students, survey

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## Introduction

Mathematics is a core subject taught at both secondary schools and universities. This is one of the basic educational fundamentals which need students to be capable and recognize the various approaches used to structure lives. For example, in late 2019, the world was disrupted by the creation of the coronavirus in Wuhan, China, which has later spread to multiple countries around the world. Spread of the virus is extremely rapid and has spread to nearly every country, including Israel, in just a few months. As a result, certain countries put in place a containment policy to stop the spread of the coronavirus (Chinazzi, 2020; Nicola, 2020). Numerous policies have been implemented in each organization to ensure that learning continues. The learning process measured most applicable for the COVID-19 pandemic is the remote learning technique (Pragholapati, 2020; Crawford et al., 2020). This is undoubtedly not easy to implement, as it needs the preparation of services which care both the mentors, organizations, and students (Abisha Meji et al., 2020).

With respect to home learning, the Minister of Education and Culture stresses that it must be done online or distance learning aims at providing students with meaningful learning experiences without being troubled with the demands of finishing all course accomplishments for grade promotion. The Minister of Education and Culture also commends regions that have learned from home to confirm that educators also teach from home to sustain teacher safety (Sari, 2020).

E-learning is education through the Internet. E-learning is just a kind of distance learning for any distance learning and not in a traditional classroom. The major motives are that it gives students more access to education than traditional teaching approaches, since students can start their studies from anywhere and at any time (El-Seoud et al., 2014). (Salamat et al., 2018) stated that, Online learning can refer to when students and teachers communicate via the online system. Students have been qualified and taught via online systems and teachers can also be in the same building with them.

E-learning has become widespread because of its ability to give learning flexibility which permits unrestricted access and teaching of place and time (Salamat et al., 2018). There were many benefits to online learning, including a high level of motivation, a wider approach to education, students' learning skills, the availability of quality learning opportunities and educational choices, outcomes enhancement, and efficacy in educational management. E-learning also had flexible features, facilitated access to reliable learning resources for students, and fostered independent learning ability for students (Hassan & Mirza, 2020). Furthermore, an online learning environment could develop individual relations, social ability and relationship between members (Onyema et al., 2020). While e-learning was a solution when the school closed, e-learning was no auxiliary for the importance of face-to-face communication between students and educators (Teo et al., 2020).

It is understood that learning technology is a new education technology that can be executed using telecommunications systems for active communication between teachers and students. The term e-learning is very new for the Israelian education sectors and carries a number of novelties in modern data and Communication Technologies in the education area using innovative software, communicative media, broadband, etc (Almanthari et al., 2020; Assareh & Bidokht, 2011). But learning is not for everyone because it is different from traditional classroom learning. Online learning is favourite for students who cannot take regular courses at a school or college for various reasons. Most schools and higher education organizations around the world are now shut down as a result of the COVID-19 disaster. Many countries globally have educated their schools/universities and Their member colleges start to learn classes, but students in urban areas where the Internet speed is only good can benefit. It is difficult for students in remote rural areas to contribute in an online class session due to a various cause. In the absence of infrastructure for e-learning courses, teachers and students face challenges and crises.

Sande (Sande, 2011) explained, how students behave in an online discussion on mathematics. The objective is to characterise the mathematical action of the students' making queries and their response to the support offered. The researcher examined 100 queries and responses on the theme of the boundary of a step-by-step function and 100 queries and responses on the application of by-products. In addition, it was discovered that about partial students were actively asking the query, meaning that the student was presenting their idea. The 2<sup>nd</sup> largest group was students who did not demonstrate any mathematical action in their queries. It was mainly students who were immediately seeking support because they did not recognize the certain problem at all. In addition, it was noted that if assistance was provided by asking queries, the students were later more active and tried to discover their own idea. This increases queries about the connection between student activity and the form of care provided and leads to a quest for aspects that impact student movement.

Mulenga & Marban (Mulenga & Marban, 2020) described digital learning in math. Data were collected from 102 mathematical professors at Copperbelt University. The results demonstrate the positive reaction of e-learning during the COVID-19 closing period. This study revealed their wish to create an official online virtual platform for math students via the university. (Owusu-Fordjour et al., 2020) studied the impact of COVID-19 and the challenges facing Ghanaian students. They talked about the capacity of parents to access technology. They examined the disadvantages of the online educational system.

(Baki, 2006) observed on the use of Web sites to elucidate the function concept and practical problems solved in high schools for 5 weeks. The researcher studied how students changed their attitudes towards the educations and their outcomes. Each contributing school had students separated into investigational and control groups. Preliminary analysis revealed no variances between the 2 groups with respect to their initial information. The survey group operated with websites during their lessons twice per week and the students also used them for their work at house. Whereas the research is still ongoing, the educators listed an augmented inspiration and confidence in the students in terms of education and accomplishing tasks. The post-test information and ability, the investigational group exhibited suggestively better outcomes, in particular in amended understanding of the different illustrations of functions. Educators positively assessed the communicating essentials of the site and reported that the concept of visualization and animatronics played a vital role in educating students.

This study analysed how e-learning mathematics helped various age groups during the COVID-19 pandemic. How have a variety of online learning platforms been used to effectively interact with teachers and students? The study also analysed the views expressed by on-line students.

## Methodology

The qualitative method was used to analyse the impact of online learning of math among the students of Upper Secondary School, College and University of Israel. The findings consist of two secondary schools, two college and one university student in Israel with non-random sampling method. The topic of this study was 200 students in educational mathematics. The data collection techniques used in this study were investigated through on-line surveys and interviews. In total, 15 queries were used in the online survey to determine the impact of e-learning on mathematics by students. The application used in online surveys is Google Forms and Google Meet On-line Interviews.

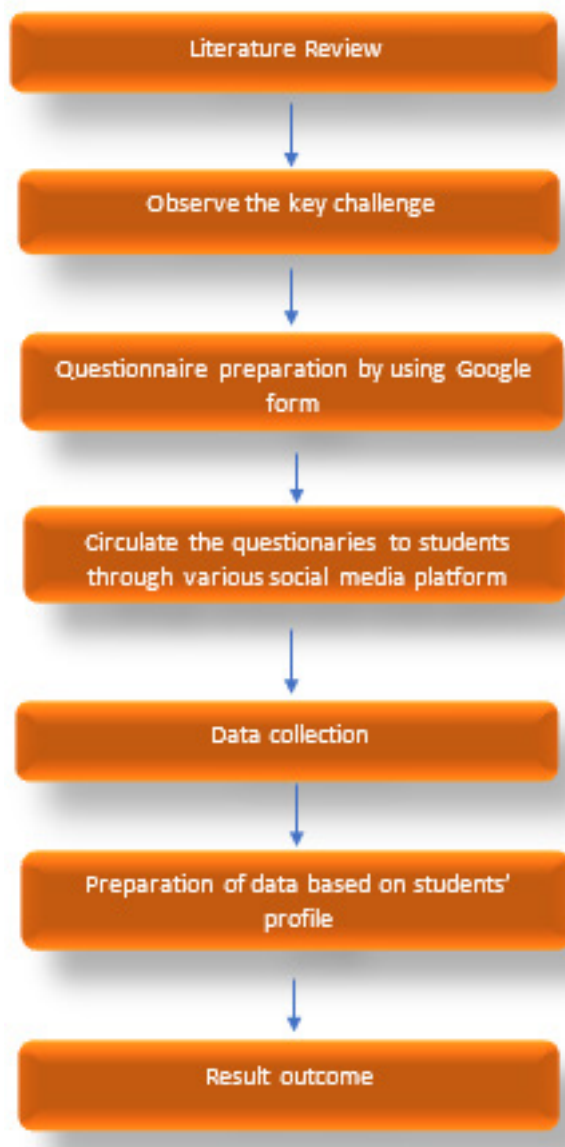


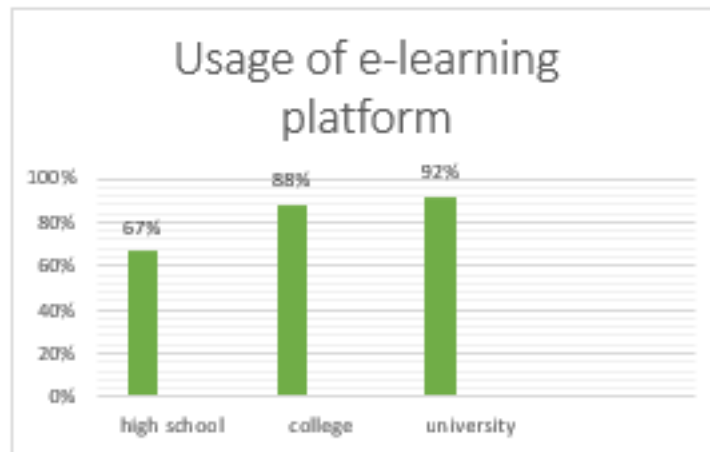
Fig. 1 flow chart of methodology

## Results and Discussion

Challenges/Constraints for Teachers As a result of the COVID-19 pandemic, teachers and students can no longer meet in class. Classroom learning activities have evolved into distance learning. E-learning was the first option to continue learning today as it had different profits and was likely applied during the COVID-19 pandemic. However, behind convenience, teachers need to quickly adapt to a variety of online learning methods. As a result, teachers are expected to have encountered challenges in implementation. There are a number of factors that can present challenges for educators when implementing e-learning. Student, teacher, school, curriculum and parental factors can create challenges for educator (Shahzad et al., 2020; Quadri et al., 2017; Aguti et al., 2014).

The use of the electronic learning platform by students, as shown in Graph 1. 92% of university students used various online learning sites, followed by college and high school students. Actual use of eLearning was determined by self-efficacy, while intentions for continued use of eLearning systems were predicted by social influence (SI), effort expectancy (EE), performance expectations (PE). With the arrival of e-learning technologies, there has been a substantial increase in the use of e-learning systems to improve e-learning in universities by provide a mixture of class teaching, learning, online learning and

distance learning (Lwoga & Komba, 2015).



Graph. 1 The usage of e-learning platform by students

The results of completing an online examination indicate that learning administration sites are the widely used (google classroom) though audio-visual conferencing is the second choice (Zoom) (see Figure 1). Both Email and Webex were used for the minimum number of learners. But learning math through lectures, topics preferred to use zoom, Google Meet and Google classroom. Both YouTube and WhatsApp have also been used numerous times (16%).

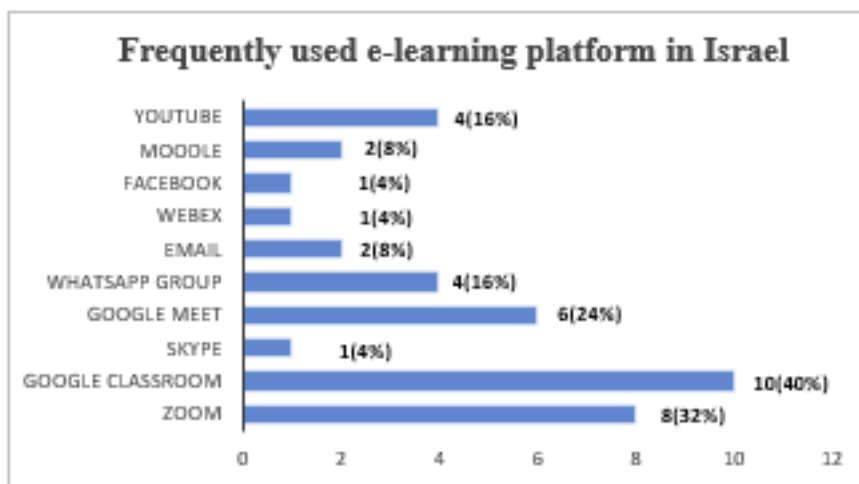


Fig. 2 The platform which is often used in e-learning by students

The frequency of media chosen for eLearning was based on a number of reasons. The most important reason taken into consideration was the practical aspect of the platform. It was user-friendly and easy to access, free, easy and quick to transfer, unlimited by time, and efficient in the organization of material and issues for practice. These benefits have sustained the functions of online educational technology, as re enhance teaching and learning experience, sharing lessons, composing content, valuation, and feedback (Teo et al., 2020). Another thought of using the platform to support e-learning was that students were aware with and already possessed the platform. Finally, the orientation and agreement of the school administration was the reason why the lowest percentage was recorded in the choice of an e-learning platform.

Difficulties faced by students	No. of students participated	Percentage
Unable to connect with my peer group	67	27%
Unable to integrate with the group of other students	55	22%
Can't keep up with the speed of every other student	49	20%
Online software tools selected for math which I do not know	66	26%
I need more training on the software tool prior to learning	97	39%
High quality camera signal failure due to low internet signal	87	35%
No, I haven't faced any of those difficulties that I'm aware of software	53	

**Table. 2 Difficulties faced by students though learning online math**

Some results did not match our estimates. We believed that no straight interaction with educators would be considered the main difficulty and, ultimately, the students' votes put it in tertiary position (Table. 1). For pupils, the main drawback of electronic learning would be a lack of communication with their colleagues. Overall, lack of direct interaction is considered the biggest issue in online learning. The fact that working long hours on the computer may be detrimental is the major drawback. Its demonstrates that pupils are committed to the protection of their strength and the atmosphere. Students admit the Internet and the computer as a means of learning, of getting information, of interacting with one another, but the students distinguish that there must be bounds to the use of information technology.

Aspects	Percentage (%)
There is no time limitation on learning	88
Have enough time on your own	45
Effective because it did not charge a tuition fee at the school	39
Easily visualized	18
A number of online resources to support e-learning	15

**Table. 2 Benefits of eLearning**

Many students have taken advantage of the e-learning platform (Table. 2). The scores were consistent with our expectations. Stay away from home, family, friends, especially for city students, but also avoid traffic jams, traveling were maybe vital when indicating the most important benefit of electrical learning and because of this, most students chose online learning. Then follows the opportunity of discovering all the resources in the same place that is much easier than searching in bookshops or borrowing resources from elders. This is a pleasing wonder that many acknowledged electronic learning as a benefit for public with reduced movement. Then there is easy access to data and the absence of fixed learning terms, which gives students a sense of liberty. The latter benefit can easily turn into a difficulty if an educator fails to manage a student via goals or mandatory reports to the educator (Frid, 2002).

As we can see, the e-learning exercise allowed learners to practise self-employment, combined learning, making them use their additional time, making students to be technological friendly, etc. This combined learning has therefore improved constructive learning. This should be encouraged and we should refrain from generalising the new system by saying that it has not gone beyond the conventional system using only one experiment. Therefore, the necessity of testing several successive treatments and a diversity of courses can be the future.

The pandemic takes us to an uncommon life, particularly on learning math at university. The results of this analysis are certainly not a reference for learning in normal situations. In addition, this investigates attentions on learning math where the application of e-learning offerings new tasks for teachers and students because of problems in elucidating online mathematical concepts (Nakamura et al., 2018; Albelbisi & Yusop, 2018). Next, it shows that teachers prefer to use widely available online learning platforms (Google Classroom), video conferencing (zoom) rather than using e-learning industrialized by college or universities. The result indicates the speakers are not gratified with the aspects and services of e-learning at the university. The researchers suggesting, there is an attending system that can be verified correctly and can be transferred in the procedure of Excel, and the presence of video conferencing aspects. That suggestion makes a lot of sense, because it does make sense when you learn (Ali & Magalhaes, 2008; Donnelly & McSweeney, 2008; Pratiwi, 2020).

### Questionnaire about e-learning

1. What kind of recorded video conferencing is the most efficient way to learn?
2. What is the experience with online earnings from home digitally?
3. Among the digital approaches, which one motivates you to learn?
4. Which of these digital collaborations allows you to work on a specific task that you feel comfortable doing?
5. Which methods will personally engage you in digital learning?
6. What is your preferred method of dispelling doubts about online learning?
7. Do you agree to electronic learning as a new form of learning?
8. If you missed school yourself recently, why did you miss school?
9. If you have recently missed the on-line courses, why did you miss the courses?
10. Are you satisfied with how much time you spend talking to your professor?
11. What is the challenge or ease of using distance learning technology (computer, tablet, video calls, learning applications, etc.)?
12. How hard or easy is it for you to connect to the Internet to access your academic work?
13. On the whole, how interested are you in your courses?
14. If you have recently missed the on-line courses, why did you miss the courses?
15. What's your problem at school right now?

### Teachers and Students Ideas for Effective Online Education Math

Teacher defendants indicated that online teaching differs entirely from traditional class learning and teaching. Training on the efficient use of customized mathematical software for educators is required. This will help many of the learners at the primary and higher levels. In addition to training, rapid and continuous internets, the high-resolution camera is also significant for efficient online teaching to support bi-directional interactivity.

Student suggested that online educators should not be rushed when teaching. Information of custom mathematical programs is essential for students and educators. Communicating whiteboards and effective screen-sharing approaches should be explored more efficiently, with no success in teaching and learning mathematics. All students should be providing with customized training, like usage, various custom-made online math software.

### Difficulties of using online learning

Using e-learning as a proxy for in-person learning during the COVID-19 pandemic was the best choice

to ensure student safety during learning (Mulenga & Marban, 2020). In the previous section, eLearning had several benefits. But this has also created some challenges for teachers and learners. Students struggle to understand materials, student complaints about electricity and Internet costs increase, students do not have the media to learn online, the perception of students that e-learning has not yielded optimal outcomes, and the lack of student motivation in e-learning (Means et al., 2009). With mathematics as a topic of abstract material and high-level thinking, logic made it problematic for students to recognize the material presented by online learning. As a result of this challenge, students were less passionate and felt that the learning they receive is not ideal. High expenditures due to routine Internet access have also caused students to complain about participating in online learning (Quadri et al., 2017). Students' capacity and learning experience during e-learning, financial issues, motivation issues, and peer isolation have become barriers to implementing e-learning.

### Conclusion

According to the answers, the study found very positive views for online education but some difficulties also there. The objective of this study is to demonstrate that e-learning is a method of education that must shortly be used universally. In an academic environment, online learning is intended for students to use it, and because of this it's very significant to get feedback from learners and attitudes towards the possibilities of applying an online learning system and the details of the creation of online learning materials. Furthermore, this study could be used as a foundation for future formal education to implement blended learning or the combination of in-person and e-learning. However, further studies are suggested to examine the challenges of e-learning from the perspective of students and teachers and discover appropriate and effective e-learning models for high school math learning.

### Outcome of the survey

1. Online learning makes it easier for students to learn at their own pace in a comfortable way.
2. Students prefer to learn from video conferences given by their faculty addressing the topic.
3. Online courses are more efficient because they offer PPPs to all students.
4. Students do not have disruptions that make learning more efficient.
5. Students can make their doubts clear during classes.

To enhance the quality of online education, the government must ensure that all students have access to computers and a reliable network. Next, the education sectors create a formal online virtual platform for online learning so that students can freely access all the information they need beforehand. Provision should be made for a dedicated network to prevent network traffic. Guidance should be given to teachers and parents to motivate students to participate in e-learning courses and guide them toward effective learning.

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