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An Alternative Educational Tool Through Interactive Software over Facebook in the Era of COVID-19

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Abstract. During the COVID-19 period, education has been required to reform and adapt to a modern, imposed paradigm in which all of its activities must be delivered in a completely digital format. As a result, in light of this pressing need, educational institutions should either repurpose existing facilities, such as learning management systems, or develop new online education options in a timely manner. In view of the above, this paper proposes an alternative educational tool over Facebook by exploiting the technology of social networking. This Facebook-based application was used as the sole platform for supporting asynchronous learning of high school students in the tutoring of mathematics during the COVID-19 lockdown. This modern educational approach through Facebook encompasses interactive software which involves an e-class environment with social characteristics, multimedia-based learning material delivery and learning activities and assessment of different types. The presented Facebook-based interactive educational software has been evaluated by school students with very encouraging results.

Keywords. Coronavirus, COVID-19, education, Facebook, online learning, technology, social networks.

1. Introduction

In the era of COVID-19, education has been forced to reform and adapt to a new, imposed reality where all its activity must be conveyed in a fully digital way. As such, in view of this compelling need, education institutes should either use their already existing equipment, namely platforms, or to offer new possibilities of online education within a reasonable time. Until the time the pandemic appeared, education institutes worldwide have mainly incorporated Learning Management Systems (LMSs) that can support online learning either in the form of solely electronic or blended learning. Blended learning combines the traditional classroom learning with online learning, in which students can, in part, control the time, pace, and place of their learning [1].

Indeed, educators report[2], in a percentage of over 90%, that they use one LMS, while in a percentage of over 85% they believe that through LMSs, education can be further enhanced. From students' perspective, they use only the basic features and functionalities

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[2] https://www.educause.edu/ecar

of the LMSs, and dislike the others that require more engagement [2]. The e-lesson is the core component of the LMSs. Each lesson is an autonomous entity on the platform that incorporates a number of subsystems [3]. Essentially, the course is a modular structure that is organized and managed by the responsible instructor, depending on the material and the e-learning model s/he adopts (from a simple informative educational website to a fully dynamic learning environment).

At the same time, social networking sites have evolved thanks to the second generation of the internet (web 2.0) [4,5] and their users can, on the one hand, publish the content they want and, above all, interact with each other. One representative example is Facebook, which has been also used in the educational settings [6]. According to previous studies [7], Facebook has been used for self-directed learning, with the potential for cooperative teaching. This is to be anticipated, given that Facebook's integrated module for offline and instant messaging can facilitate contact between learners and their educators. Researchers [8-10] emphasize the use of Facebook in education because it offers a pleasant interface for promoting learner-computer communication, teamwork, and the exchange of knowledge and materials. As a result, it is crucial that tutors all over the world concentrate on the integration of such technology into education, as well as the aspects that can help with the adoption of educational platforms that result from them. Furthermore, according to the authors of [11], educational institutes should encourage learners to incorporate Facebook into their learning scenario in order to develop their knowledge and capacities. Indeed, learners are increasingly requesting the use of social media practices in their studies.

Concerning the incorporation of Facebook in instructional settings, research efforts [12-20] have mostly highlighted the interaction of learners and instructors in its social media environment; however, so far, instructors have not used it as the sole tool for supporting education, but they believe that it can offer learners a pleasant and effective learning experience.

In view of the above, this paper presents an alternative educational tool through adaptive software over Facebook in the era of COVID-19. More specifically, the presented application has been used as an alternative of LMSs during the imperatively imposed online education as a result of the pandemic. This paper exploits the technology of social networking and proposes an alternative educational approach through interactive software over Facebook. This application was used as the sole platform for asynchronous learning by high school students in the tutoring of mathematics during the COVID-19 lockdown. This modern educational approach through Facebook encompasses interactive software which involves an e-class environment with social characteristics, multimedia-based learning material delivery and learning activities and assessment of different types.

2. Description of modules

This section provides an overview of the system’s main modules, focusing on its user interface, learning material delivery and e-assessment.

2.1. E-class environment

For the environment of the e-class, the Facebook groups are utilized. Facebook groups provide a closed space for small groups of users who can communicate in the contexts of their educational interests. A group can be created to resemble an e-class for teaching a specific domain. Group members can chat, exchange messages, post text, link to websites, videos, photos and photo galleries, create and collaborate on shared text files, add files of various types as well as create events. Also, they can receive a notification when a member makes posts in the group. Such posts can be the upload of learning material or assessment. In terms of privacy, a group can belong to one of the following categories: i) open, ii) closed and iii) secret. In closed and secret groups, on the one hand the new members are accepted or added by the pre-existing ones and on the other hand the posts are visible only to the group members. The difference between closed groups and secret groups is that closed groups are visible to both members and non-members of the group, while secret groups are visible only to group members. Accessing Facebook's open and closed groups is similar to accessing the open and closed courses of e-learning systems.

The collaborative teaching method can be supported by the Facebook social networking program, through the groups that can be created. Students can communicate with their classmates and their teacher and then discuss the relevant information in class. Teachers can post files, activities, presentations, organize events and remind students of various events. All team members can see the posts but also interact. The interaction can be done in two ways:

- with a comment, where they can express their views in text or post relevant links and related photos and videos and
- by adding a reaction to express their dis/agreement with the post. Also, instead of a “Like”, they can react by choosing one of the following: “Love”, “Haha”, “Wow”, “Sad”, “Angry”.

The role of teachers is mainly coordinating-guiding. In web 2.0 applications, the focus is placed on the student and for this reason it is necessary to adjust and differentiate the role of the teacher.

Figure 1. Environment of the e-class.

2.2. Learning material delivery

The learning material is delivered to learners in the form of text, images, videos and audio and external website links (Figure 2). As such, the learners have the opportunity to study better according to the way of learning they prefer. For instance, if they are visual learners, then they can choose to see an image or watch a video. The domain to be taught included mathematical concepts, such as natural, decimal and positive/negative numbers, percentages, fractions and equations.

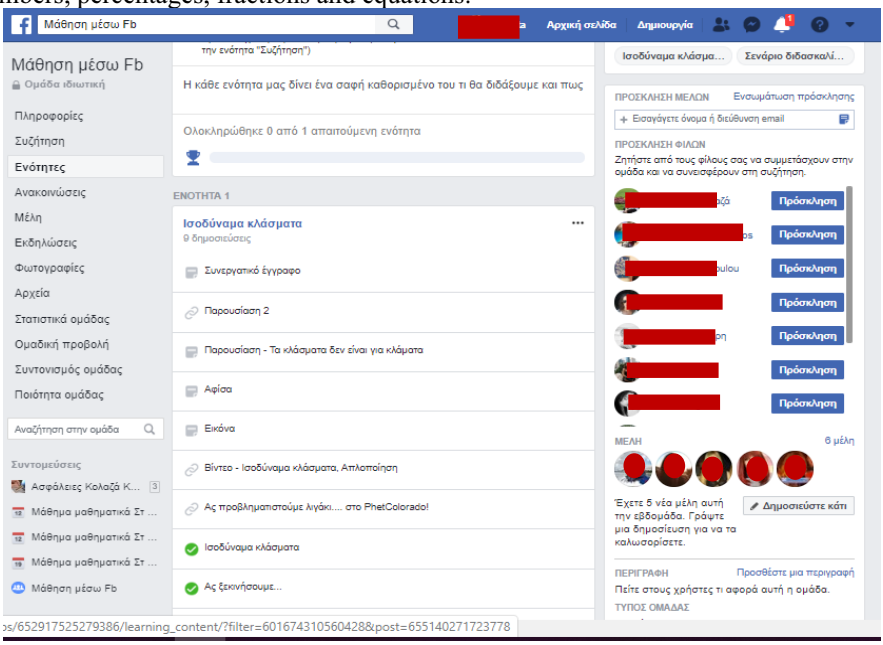

Figure 2. Learning material delivery.

2.3. Learning activities and assessment

Through the platform, the students have the opportunity to assess their knowledge level, which is of utter importance in online learning environments [21,22]. Towards this direction, the Facebook application had multiple quizzes for each one of the chapters being taught as well as revision exercises (Figure 3). The exercises were of several different types, such as multiple choice and file upload. Especially in the multiple-choice questions, the system provided automated feedback to students in order to motivate them towards advancing their knowledge.

The progress of learners is also monitored; with the option of group statistics, the instructor can have an overview about the degree of completion and monitoring of the submitted activities by students. With the option of getting results from the quiz, the instructor has a complete picture of the students' answers, so that the evaluation can be carried out both qualitatively and quantitatively.

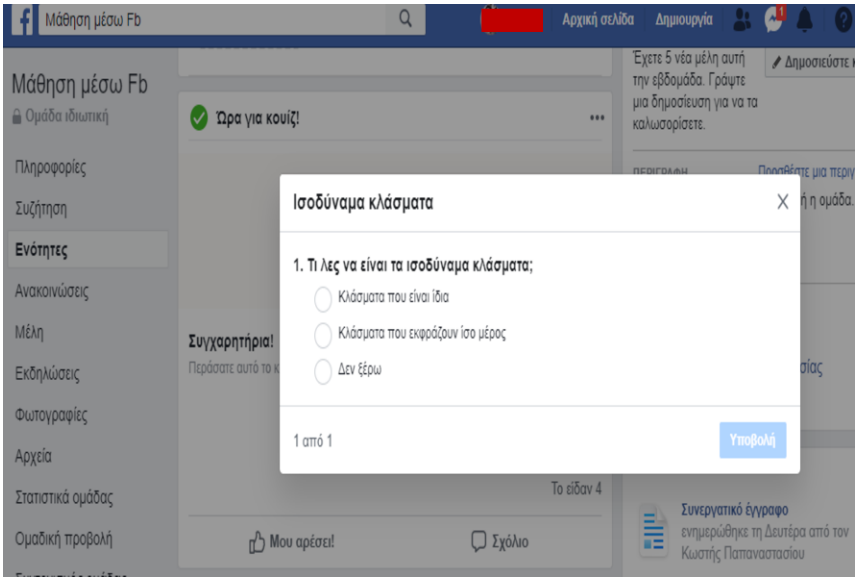

Figure 3. Learning activity.

3. Experimental results and Discussion

This section presents an evaluation of the presented Facebook-based application. The first part of the evaluation involves the perception of learners, while the second part describes the assessment of their knowledge level advancement.

The population of the experiment includes 60 students in the first years of a public high school in the capital city of the country (population A). Also, at the time of the experiment, the students had reached the minimum legal age to have a Facebook

account[3].The experiment took place during the COVID-19 lockdown for a period of 4 months. The students have used the presented Facebook application, as the only tool of asynchronous learning, for the following reasons: a) download the learning material, b) communicate with peers/instructors, c) take quizzes, d) ask and resolve possible questions, e) interact in the e-learning environment. Apart from the asynchronous learning offered by the application, the students also had synchronous meeting with the instructors via corresponding tools. The evaluators described the user interface and functionalities of the application to students. After the period of the four months, the participants were asked to answer the following questions (5-Point Likert Scale: 1-Strongly disagree; 2-Disagree; 3-Neither agree nor disagree; 4-Agree; 5-Strongly agree):

- Question 1: Did the software assist you in advancing your knowledge?
- Question 2: Was your stance toward e-learning technology changed as a result of this experience?

The results are presented in Fig. 4. Analyzing the results, it can be inferred that a) students have reached the learning objectives and met the desired outcomes, namely the knowledge acquisition has been achieved in a high rate, b) the type and number of learning activities were appropriate to the knowledge level of students, c) the system is easy to use and its interface is friendly, d) students are very engaged and motivated throughout their interaction with the system.

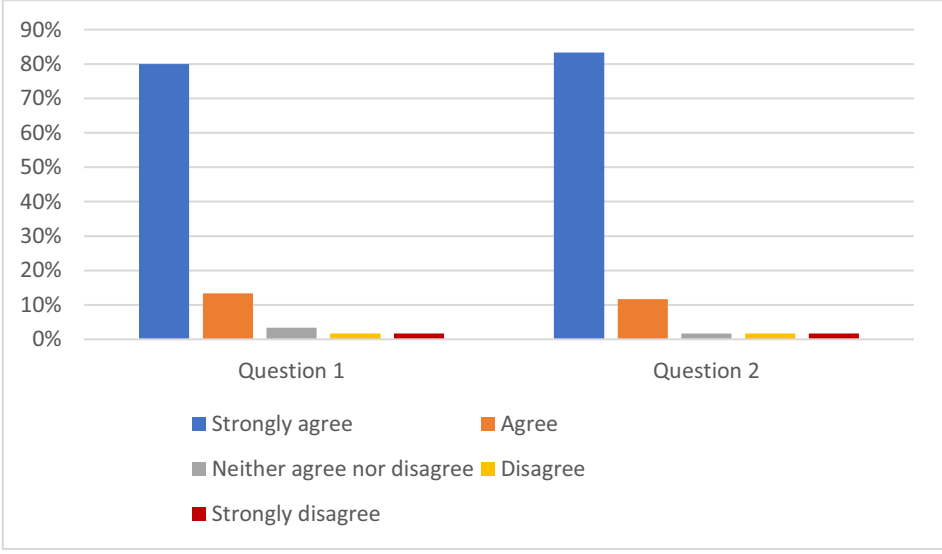

Figure 4. Results.

The second part of the evaluation includes the assessment of the improvement of the students' knowledge level. Using students' t-test, we compared the grades of the 60 students (population A) that used the presented Facebook application with other 60 students (population B) who are also in the first years of the same public high school.

[3] https://www.facebook.com/help/157793540954833

Population B used Edmodo[4], which is an educational platform that refines the concepts of social networking and adapts them for use in a classroom, during the same period of time and for the same reasons, i.e. asynchronous learning. The grades of students were between 0 (lowest) to 20 (highest).

Table 1. Results of t-test.

	Population A	*Population B*
Mean	15,93333333	14,81666667
Variance	7,114124294	7,982768362
Observations	60	60
Hypothesized Mean Difference	0	
df	118	
t Stat	2,226154971	
P(T<=t) one-tail	0,013951352	
t Critical one-tail	1,657869522	
P(T<=t) two-tail	0,027902703	
t Critical two-tail	1,980272249	

The grade averages of the two populations were compared. Table 1 summarizes the findings. According to the findings, the performance of Population A (15.93) outperformed the performance of Population B (14.81). We also note that P(T<=t) two-tail value is less than 0.05. This indicates that the difference in performance between the two means is statistically significant. Based on the t-test results, it can be inferred that the provided scheme, which is a social e-learning application over Facebook, helps the students to enhance their performance on the domain taught.

4. Conclusions

This paper presents a modern way of online education beyond the established LMSs. Students can perceive an alternative way to use Facebook, apart from its social dimension. As presented in this paper, this modern educational approach through Facebook encompasses interactive software which involves an e-class environment with social characteristics, multimedia-based learning material delivery and learning activities and assessment of different types.

Students can interact and communicate with peers, exchange ideas, collaborate and express themselves in a variety of ways. Comments become arguments as students think about the style and way they can comment. This cultivates creativity and the expression of emotions and thoughts. Submitting comments allows students to express their views, whether they agree or disagree, which helps to cultivate the self-awareness of team members. Consequently, smooth socialization is promoted, since student-centered discussions and collaborative learning in groups cultivate responsibility and positive relationships between groups.

[4] https://new.edmodo.com/

Through the use of the presented Facebook-based educational tool, students can be more engaged during the educational process. On top of that, their technological skills can be strengthened and expanded. The presented application has been evaluated using questionnaire and t-test with very promising results, showing the acceptance by its users and knowledge advancement of students. Future steps include the exploration of different social media platforms as educational tools. Also, a more extensive evaluation is in our future plans.

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