Journal of Information Technology Education: Research

An Official Publication of the Informing Science Institute
InformingScience.org

JITEResearch.org

Volume 21, 2022

THE USE OF COMPUTERS BY GREEK EDUCATORS. DID THE COVID-19 PANDEMIC CHANGE ANYTHING?

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ABSTRACT

Aim/Purpose	The goal of the study was to investigate whether the COVID-19 pandemic and its effects on the educational process also affected the views, attitudes, and intentions of educators regarding the use of computers and their applications both for professional and personal purposes.
Background	A model was developed and tested that included the factors present in the Technology Acceptance Model, together with self-efficacy, and the participant's gender, age group, level of studies, and ICT training. The educators' views were recorded twice: (i) before the lockdowns and (ii) after the lockdowns. The two resulting models were compared, so as to come to conclusions regarding possible changes.
Methodology	The target group was Greek educators (i.e., individuals teaching in primary and secondary education). The study was conducted in two stages: (i) at the beginning of the first general lockdown (March 2020), and (ii) at the beginning of the 2021 school year (September 2021), when schools re-opened and resumed their normal operations. The final sample was 1,099 educators. A questionnaire was used having three sections: (i) four demographic questions, (ii) twenty-five items for recording the educators' views, attitudes, and intentions, and (iii) two questions for recording how many hours per -typical day they use computers for professional and personal purposes.
Contribution	The study contributes to the deeper understanding of educators' views, attitudes, intentions, and actual use of computers and how and to what extent these changed after the period of the multiple lockdowns due to the COVID-19 pandemic.

Accepting Editor Lalitha Jonnavithula | Received: March 7, 2022 | Revised: May 11, 2022 | Accepted: May 18, 2022.
Cite as: Fokides, E., & Kapetangiorgi, D-M. (2022). The use of computers by Greek educators. Did the COVID-19 pandemic change anything? *Journal of Information Technology Education: Research, 21,* 217-244. https://doi.org/10.28945/4975

Findings	The study's major findings were: • The lockdowns did not significantly affect the educators' views, attitudes, and intention to use computers, but resulted in a more extensive use of computers for work than before. • The results oppose the basic assumption of TAM that the behavioral intention to use a technological tool translates into the actual use of this tool. • The perceived usefulness of computers shaped the educators' behavioral intention to use them. • Computer self-efficacy shaped the attitude of educators toward computers. • After the pandemic, the educators' age and gender no longer play a role in shaping their views. • The additional ICT training the educators received did not have an effect on any factor.
Recommendations for Practitioners	Governments have to equip schools with computers and provide the framework that fosters their use. Strategies and support mechanisms that make educators more confident in the use of ICTs and also provide evidence for their usefulness should be implemented. The above will allow the educators' behavioral intention to use ICTs to be translated into actual use. Administrators in higher education should consider the inclusion of more ICT-related courses in their undergraduate and postgraduate programs addressed to educators. Changes have to be made to the context and content of the in-service ICT training programs.
Recommendations for Researchers	The inclusion of self-efficacy is recommended in future studies involving TAM. As deviations from the original TAM were noted, possible swifts in how educators' views and intentions are shaped need to be further investigated.
Impact on Society	The increased use of computers by educators might lead to a more intense use of ICTs in schools, resulting in an education better aligned with the needs of the digitalized society.
Future Research	Comparative studies, targeting educators from other countries, will help to understand how the pandemic affected the educational systems worldwide. Studies are needed for verifying the model's validity and applicability. Researchers can consider the inclusion of other factors that might have a significant effect. Qualitative data may offer an in-depth understanding of educators' beliefs. Finally, longitudinal studies can help to understand whether the pandemic had a lasting effect on educators' intention to use computers.
Keywords	computers, educators, lockdown, pandemic, Technology Acceptance Model

INTRODUCTION

According to Tellí and Altun (2020), education was the second most affected sector of human activity by the COVID-19 pandemic. In fact, based on UNESCO's (2020) data, there was a point in which it had an impact on almost 90% of the learners worldwide. Many countries forcibly closed institutions at all levels of education, trying to stem the spread of the pandemic. The World Health Organization advised educators to switch to online courses. One country after the other switched to distance education, rendering this mode of teaching the predominant one (Tzivinikou et al., 2021). Although governments seemed to lag behind, unable to anticipate the magnitude of the problem and

most educational systems were unprepared, in essence, distance education ensured the continuity of the educational process (Bhaumik & Priyadarshini, 2020). As a result, the pandemic directly led to the global compulsory integration of technology into educational systems (Foti, 2020).

Needless to say, regardless of the pandemic, educational ICTs and applications are becoming increasingly important, as there is a growing demand for educational institutions to use them to teach students the necessary skills and knowledge, they need to be able to meet the demands of the digital era (Lawrence & Tar, 2018). The successful use and integration of technological tools in the teaching practice depends heavily, among other factors, on the attitudes, views, knowledge, and skills of educators (Guillén-Gámez et al., 2020; Semerci & Aydin, 2018). Recent research data suggested that the majority of educators had positive attitudes toward the use of ICTs in education and recognized their positive impact on learning (e.g., Coban & Atasoy, 2019; González-Sanmamed et al., 2017; Guillén-Gámez et al., 2020; Semerci & Aydin, 2018). Research also indicated that educators tended to avoid the use of computers (and ICTs in general) when they did not meet their needs and the needs of their students (Askar & Umay, 2001; Lawrence & Tar, 2018). Other studies found that the more positive educators were toward the use of technology and the more comfortable they felt utilizing it, the more they integrated it into their educational practice (Kersaint, 2003; Palak & Walls, 2009). Yet, most educators use ICTs basically for preparing their lessons and not so much during teaching, while 60% use them just to communicate with parents (European Commission, 2019). During the pandemic, the educators were forced out of their "comfort zone," while many of them, for the first time, had to enter the magical world of "settings" to learn how to use e-learning applications. Many responded positively to the practices and tools used for distance education (Yang, 2020), while others had a negative attitude toward its implementation (Demir et al., 2021), as the various problems they faced were challenging.

As far as Greece is concerned, although considerable efforts were made to upgrade its digital infrastructure, the country lags behind other EU members (European Commission, 2020). Only a third of students attend schools sufficiently equipped with digital devices (Reimers & Schleicher, 2020). On the other hand, a European Social Fund-supported training program runs for a least a decade, providing a large proportion of educators with fundamental digital skills. Regrettably, the content-centered curriculum and the teacher-centered practices, leave little room for educators to meaningfully utilize ICTs during their teaching. Due to the pandemic, there were several local (affecting some cities or regions) and general lockdowns during which all schools remained closed and distance education was the only mode of teaching. The first major lockdown was from early March until the end of May 2020. The second one lasted from mid-November 2020 to early January 2021. The third was from mid-February 2021 until the end of April. Even though schools re-opened after the last lockdown, soon they had to close once again because of the summer break (late June until early September 2021). During the lockdowns, there was an uneven application of distance learning, which resulted in imbalances between educators and between schools (European Commission, 2020). Not only that, but during the first major lockdown, the government did not provide clear guidelines concerning the procedures and which tools educators should use, resulting in relative chaos, as well as in an upsurge of negative reactions among educators, parents, and students. The situation was, somehow, eased during the lockdowns that followed.

Considering the above, the question that logically arises is whether the pandemic resulted in changes in educators' views about computers. Consequently, the goal of our research was to investigate whether the COVID-19 pandemic and its effects on the educational process also affected the views, attitudes, and intentions of educators regarding the use of computers and their applications both for professional and personal purposes. For achieving this goal, we developed and tested a model that encapsulated the relationships between the above factors, as well as of other factors that play an important role. The study's rationale and research method we followed, together with the results we obtained and their interpretation, are presented in the sections to follow. We have to note that through-

out the manuscript we used the terms "before the lockdowns" and "after the lockdowns." The former refers to the situation prior to the multiple lockdowns, while the latter refers to the re-opening of schools in September 2021, and the return to a certain degree of normality and face-to-face teaching.

BACKGROUND

A Brief Presentation of the Reactions of Educators During the Pandemic

The widespread use of technology in teaching during the pandemic was consolidated, as ICTs supported the various teaching methods and facilitated the learning process, utilizing the tools of e-learning (Abbasi et al., 2020). The way in which the educational process was affected during this period and how each country responded to this challenge, caused a surge of research interest worldwide, that resulted in a multitude of studies aiming to determine the pandemic's effect on teaching and learning at all levels of education (e.g., Arora & Srinivasan, 2020; Basilaia & Kvavadze, 2020; Izumi et al., 2021; Nuere & de Miguel, 2021; Pokhrel & Chhetri, 2021). In some cases, distance education was successfully implemented, in others its contribution to the educational process was recognized but reservations were expressed, and in others, it seems to have caused negative consequences, for example, by increasing the digital divide (Maila, 2020).

Generally speaking, educators saw distance learning as a challenge to expand their knowledge of technological tools and viewed them as something dynamic that can meet both their own needs and those of their students (Marpa, 2021), despite issues such as lack of infrastructure/equipment and limited student-teacher interaction (Hebebci et al., 2020). For instance, the educators demonstrated their readiness to use technology (e.g., by developing modules for online teaching), without any adverse effects on their mental and physical health (Ginting et al., 2021). Talidong (2020) noted that, despite the drawbacks in the implementation of distance education, teachers expressed -more or less- positive views, as they felt that it was beneficial for their students. In addition, Niemi and Kousa (2020), noted that teachers quickly learned to use the e-learning platforms, but they also expressed concerns because the teacher-student interaction through them was not of high quality. In line with the above, Auma's and Achieng's study (2020), found that teachers had a positive attitude toward online teaching, despite the many challenges that hampered its effectiveness (e.g., deficiencies in the technological infrastructure, insufficient teachers' training for distance education, and difficulties in preparing the educational material). In another study, it was found that even though teachers received sufficient training regarding online teaching and platforms, some difficulties and challenges remained. This resulted in teachers expressing concerns, although they were positive about the effects of online teaching (Yang, 2020).

The Technology Acceptance Model

Several models have been developed that try to shed light on why and how different groups (including the educators) embrace (or reject) the use of technology. Most, are based on Ajzen's and Fishbein's (1980) Theory of Reasoned Action (TRA). In short, TRA predicts human behavior and actions by using a set of attitudes and intentions and by mapping their relationships. In line with TRA, Davis et al. (1989) proposed the Technology Acceptance Model (TAM). As it is evident in Figure 1, TAM suggests a number of causal relationships between the perceived ease of use of a given technology (EoU), its perceived usefulness (Usefulness), the users' attitude toward it (Attitude), and their behavioral intention to use it (BIU), that eventually leads to the actual use of the given technology. Usefulness is the extent to which a person believes that the use of a tool would improve their performance in work, while EoU is the degree to which individuals believe that the use of a particular system would require (or not) significant effort (Lai, 2017; Velicia-Martin et al., 2021). Attitude refers to the extent to which users wish to use a particular technological tool (Ajzen & Fishbein, 1977).

Finally, BIU determines how much effort a person is willing to put in to perform this behavior (Ajzen & Fishbein, 1980).

Although the TAM has been criticized because of its -sometimes- limited explanatory/predictive power (Chuttur, 2009) and several additions and revisions to the original model have been made (e.g., TAM2, Unified Theory of Acceptance and Use of Technology), it is still acknowledged as a robust model and it is extensively applied in studies regarding a variety of technologies and their use in all levels of education. For example, Fokides (2017a), Sun and Mei (2020), and Teo (2012) examined the intention of pre-service teachers to use computers during their teaching, while Alzahrani (2019) and Teeroovengadum et al. (2017) did the same for secondary school educators. In another study, Teo et al. (2018) focused on the intentions of English teachers. Çakiroglu et al. (2017) and Sánchez-Prieto et al. (2017), used TAM to examine the intention of pre-service educators to use mobile devices. Having TAM as a basis, Fokides (2017b) examined the intention of pre-service teachers to use virtual reality applications.

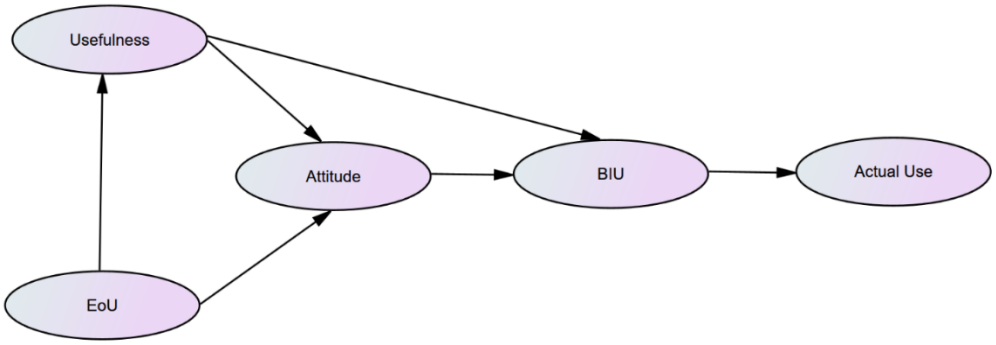

Figure 1: The Technology Acceptance Model

In studies regarding the impact of the pandemic, TAM has also been applied for examining the behavioral intention to use technology and/or distance education applications of both students (e.g., Lazim et al., 2021; Mailizar, Burg, Maulina, 2021; Sukendro et al., 2020) and educators. As far as the latter is concerned, Hong et al. (2021) in their study involving kindergarten teachers, confirmed the applicability of a modified version of TAM. In addition, their results indicated that BIU was between moderate and high and that it was significantly influenced by Usefulness and EoU, while the latter had also an impact on the former. Similar were the results of another study, in which it was found that educators' intention to use Google apps for distance education was influenced by Usefulness and EoU (Utami, 2021). Sangeeta and Tandon (2021) used TAM to develop a theoretical model for determining the adoption of online teaching by teachers. They concluded that performance expectancy and facilitating conditions had a positive impact on both BIU and Attitude; social influence influenced only BIU, while Attitude had an impact on both BIU and actual use. In another study (Mailizar, Almanthari, & Maulina, 2021), it was found that the attitude toward the use of e-learning tools and the experience one has in e-learning, were the two most important constructs in predicting the actual use of e-learning systems. Unlike other studies, EoU and Usefulness were not significant determinants of BIU.

The Attitude was found to have a large impact on college teachers' BIU to teach online, while Usefulness (of online learning platforms) had a greater influence on Attitude than EoU (T. Chen et al., 2021). Bajaj et al. (2021) examined teachers' intention to continue the use of online teaching tools after the pandemic, concluding that EoU positively influenced Attitude. Sharma and Saini (2022) found that facilitating conditions and EoU significantly affected the continuance intention to use digital technologies, which, in turn, affected the actual use. On the other hand, Nikou (2021), who also examined the continuance intention of university teachers to use videoconferencing tools, found that user satisfaction and Usefulness were the stronger predictors of BIU.

Self-Efficacy

A factor often used for understanding the frequency and how successfully individuals use computers is self-efficacy (SE) (e.g., Coban & Atasoy, 2019; Yeşilyurt et al., 2016). According to Bandura et al. (1999), SE is defined as the assessment of one's ability to organize and execute action plans so as to effectively respond to the demands of certain conditions. This concept does not represent the individuals' true abilities, but their faith in them (Bandura, 1977). The term "computer self-efficacy" was introduced by Compeau and Higgins (1995) to define one's perception of his/her abilities regarding computer knowledge and skills. Computer SE is an important predictor of the attitude toward computer-supported education (Yeşilyurt et al., 2016). Moreover, there is a positive correlation between computer SE and teachers' confidence in their abilities to effectively use ICTs (Fanni et al., 2013), as well as with the actual use of ICTs during teaching (Coban & Atasoy, 2019). In contrast, low computer SE forces teachers to avoid the use of technology (Bozdoğan & Özen, 2014). Researchers have routinely incorporated computer SE into TAM. For example, Teo (2014) and Teo et al. (2012), supported that BIU was affected by SE. Likewise, Fokides (2017b), found that SE had a direct effect on pre-service teachers' intention to use 3D virtual environments.

SE was also included in studies examining educators' views about technology that were conducted during the pandemic, either in conjunction with TAM or without it. Ma et al. (2021), focused on the difficulties faced by university teachers in the process of transition to e-learning, concluding that teachers' SE in online applications increased. Kaqinari et al. (2021), also examined the use of technology for distance education by teachers in European universities during the first wave of the COVID-19 pandemic. They focused on the relationships between the use of educational technology, e-learning SE and attitudes toward educational technology. According to their findings, SE and attitude toward educational technology played an important role in the actual use of educational technology. The results of another study (Ninković et al., 2021), revealed that ICT SE and teachers' SE in engaging students, are important factors in understanding teachers' perceptions of online assessment. Baloran and Hernan (2020) concluded that primary school teachers in the Philippines faced a SE crisis and that this crisis affected their commitment to work during the pandemic.

In an analysis of the interactions between administrative support, collective support, computer SE, Technological Pedagogical Content Knowledge (TPACK) SE, and technology anxiety, it was found that the latter is negatively affected by TPACK SE and computer SE (Dong et al., 2020). Building on an enhanced TAM, Cardullo et al. (2021), examined the relationship between the factors of TAM and teachers' SE in distance learning during the COVID-19 pandemic. Based on the results, teachers' levels of SE, along with the lack of support and resources for online teaching, as well as the struggle to motivate students to participate in the process, were the major disadvantages of distance learning during this period. Finally, it is worth noting that computer SE moderated the effects of continuance intention to use digital technologies on their actual use (Sharma & Saini, 2022).

Other Factors That Come Into Play

Educators' attitudes toward ICT have been extensively studied in relation to variables such as gender and age (e.g., Cai et al., 2017; Cussó-Calabuig et al., 2018; Guillén-Gámez et al., 2020; Semerci & Aydin, 2018). Guillén-Gámez et al. (2020) found that male teachers had a more positive attitude toward the use of ICTs than their female colleagues. According to K. T. Chen (2012), female teachers tend to adopt a more negative attitude than males because they are afraid to use computers. In more recent research, Tou et al. (2020) came to the same conclusion for male and female physical education teachers. Vimalkumar et al. (2021) found that a gender-based digital divide regarding computer SE exists. Indeed, in some studies male teachers appear to have higher levels of computer SE (Guillén-Gámez & Mayorga-Fernández, 2020). On the other hand, there is a plethora of research, which argues that there are no significant gender differences regarding teachers' attitudes toward the use of ICT (e.g., Baturay et al., 2017; Cavas et al., 2009; Semerci & Aydin, 2018). In addition, in a study, it was found that female teachers were more confident in teaching online during the pandemic

(Kaqinari et al., 2021). Coming to studies that utilized TAM or similar models, Teo (2011), noted that BIU depends on additional regulatory factors such as gender, age, experience, and voluntary/mandatory use. However, in a study in which a modified version of TAM was used, it was found that demographic characteristics appeared not to significantly affect the perceived usefulness of e-learning (Alzahrani, 2019). Similarly, Papadakis (2018), concluded there was no gender and age differences regarding pre-service teachers' intention to use mobile devices in their teaching. Teo et al. (2015), found that gender had no impact on Usefulness, Attitude, and BIU, while females had lower scores in EoU.

Younger teachers reported more positive attitudes toward the use of technology, as older teachers are likely to be less familiar with digital tools and, as a result, they are more resistant to the use of technology in their teaching (Villalba & Gonzalez-Rivera, 2016). Moreover, younger teachers supported that ICTs in education are necessary, basic, valuable, and easy to use (González-Sanmamed et al., 2017). Eickelmann and Vennemann (2017) trying to discover the (demographic) characteristics of teacher groups based on their attitudes toward ICT, concluded that while "ICT enthusiasts" and "partially ICT enthusiasts" were usually the young teachers (39 years old and under), "skeptics" were the older ones (50 years old and older). Contrary to that, Tou et al. (2020) found that the more experienced physical education teachers (aged forty and above) seemed to have more positive attitudes toward ICT than the less experienced ones, especially in areas related to classroom management and equipment. In other studies, as with gender, no significant differentiation of attitudes toward ICT was found in relation to age and years of experience (Semerci & Aydin, 2018).

Many countries provide teachers with ICT-related training in order to improve their skills and knowledge. This holds true for Greek educators, given that a multi-level, in-service, ICT-training program runs for several years. It was supported that the use of ICTs in teaching significantly depends on the training teachers have received regarding their pedagogical utilization (Comi et al., 2017). On the other hand, Semerci and Aydin (2018) concluded that the number of ICT training programs teachers attended had no impact on their willingness to use ICTs.

Coming to studies conducted during the pandemic, significant differences were found in teachers' attitudes toward distance education depending on their age, professional experience, level of education, and pre-existing knowledge about distance education (Demir et al., 2021). For example, it seems that male and female teachers differed significantly in their attitudes toward the use of technology in their teaching (Marpa, 2021). Bajaj et al. (2021) concluded that male teachers seem to have been more satisfied with online teaching tools and had a greater intention to use online platforms for teaching after the COVID-19 period. In contrast, the study by Demir et al. (2021) concluded that teachers' attitudes toward distance education did not differ significantly in terms of gender. Respectively, Karagül and Şen (2021) found that gender did not affect teachers' attitudes toward distance learning during the pandemic. Regarding age, it was found that educators belonging to the 20-30-years-old group were more positively inclined toward distance learning, while this positive attitude decreased as the age level increased (Demir et al., 2021). Regarding the level of education, teachers' attitudes toward distance education seemed to differ significantly in favor of the ones holding a master's degree (Demir et al., 2021; Korres & Sofos, 2021). In contrast, Karagül and Şen (2021) found no statistically significant difference between teachers holding bachelors or master's degrees.

THE STUDY'S RATIONALE, RESEARCH MODEL, AND HYPOTHESES FORMATION

On the basis of the literature review we presented in the preceding sections, we can infer that it is quite difficult to come to concrete conclusions regarding the impact of the pandemic on educators' intention to use technology, on their attitude toward it, and on the factors that shape the above. First, the results were mixed. Second, researchers routinely added factors that they considered important,

resulting in a multitude of different models that are very hard to compare. Third, many studies focused on specific tools and applications that are commonly used in distance education; yet, the use of the vast majority of these tools will stop after the end of the pandemic. Then again, what will definitely remain is the use of computers and their applications for regular teaching and personal purposes. Consequently, it is more useful to understand educators' overall feelings/attitudes/intentions regarding computers in general, rather than focusing on specific aspects/applications/technologies. Finally, to the best of our knowledge, there are no studies comparing the views of the same sample of educators prior to the pandemic and after the return to normality.

Thus, our study's main goal was to examine the impact of the multiple lockdowns on educators' intention to use computers, their attitude toward them, as well on the actual use of computers for work (actual use for work, AUW), and personal purposes (actual personal use, APU). We considered as the most appropriate approach to develop a model that encapsulates the relationships of the above variables, as well as of factors that can have an impact on them, and then collect data twice using the same participants: (i) during the first days of the first general lockdown (thus, recording their views prior to the pandemic) and (ii) when schools reopened and there was a return to a certain degree of normality (thus, recording their views as they were shaped after the lockdowns). By feeding the two data sets to the model, we hypothesized that the comparison of the two resulting models would allow us to understand whether there were any significant changes.

The initial TAM with just the addition of computer SE (a factor we considered quite important) provided the basis for the development of this model, as presented in Figure 2. Since it was unknown what effects the addition of SE might have to TAM, we decided to examine all possible relationships between the model's factors. Given that, we formulated the following hypotheses:

- H1-5. The computer self-efficacy significantly and positively influences the perceived usefulness of computers (H1), the attitude toward using them (H2), the behavioral intention to use them (H3), the actual use of computers for work (H4), and the actual personal use of computers (H5).
- H6-10. The perceived computers' ease of use significantly and positively influences their perceived usefulness (H6), the attitude toward using them (H7), the behavioral intention to use them (H8), the actual use of computers for work (H9), and the actual personal use of computers (H10).
- H11-14. The perceived usefulness of computers significantly and positively influences the attitude toward using them (H11), the behavioral intention to use them (H12), the actual use of computers for work (H13), and the actual personal use of computers (H14).
- H15-17. The attitude toward using computers significantly and positively influences the behavioral intention to use them (H15), the actual use of computers for work (H16), and the actual personal use of computers (H17).
- H18-19. The behavioral intention to use computers significantly and positively influences the actual use of computers for work (H18) and the actual personal use of computers (H19).

Although they might not drive a study's underline theory, control variables have to be taken into account as they usually have an impact on the results. Several such variables can be identified, but on the basis of what we presented in the preceding sections, we decided to include the participants' gender, age group, level of studies, and ICT training they might have received. As a result, we also tested the following hypotheses:

- H20-23. The perceived usefulness of computers is significantly and positively influenced by one's gender (H20), age group (H21), level of studies (H22), and ICT training (H23).
- H24-27. The attitude toward using computers is significantly and positively influenced by one's gender (H24), age group (H25), level of studies (H26), and ICT training (H27).

- H28-31. The behavioral intention to use computers is significantly and positively influenced by one's gender (H28), age group (H29), level of studies (H30), and ICT training (H31).
- H32-35. The actual use of computers for work is significantly and positively influenced by one's gender (H32), age group (H33), level of studies (H34), and ICT training (H35).
- H36-39. The actual personal use of computers is significantly and positively influenced by one's gender (H36), age group (H37), level of studies (H38), and ICT training (H39).

We treated AUW and APU as the dependent variables, while we considered all the other factors as the independent ones. We treated SE and EoU as exogenous variables, while we treated Usefulness, Attitude, and BIU as endogenous ones.

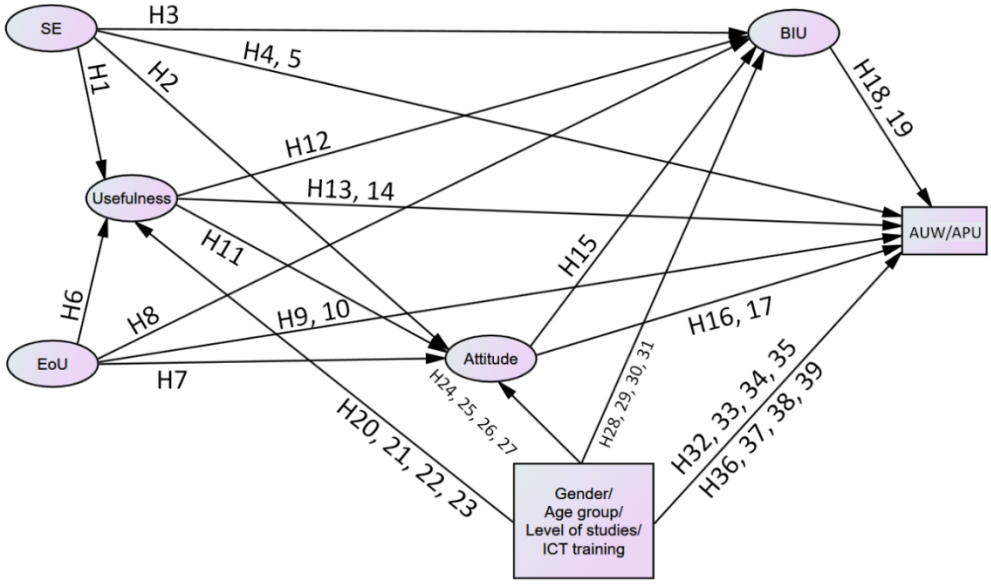

Figure 2: The research model for both before and after the lockdowns

Note. For maintaining the clarity of the presentation and for reducing the number of arrows, the dependent variables (AUW and APU), as well as the control variables (gender, age group, level of studies, and ICT training) were grouped.

METHOD

PARTICIPANTS AND PROCEDURE

The target group was Greek educators (i.e., individuals teaching in primary and secondary education). Participation was on a voluntary basis and there were no prerequisites. The study was conducted in two stages: (i) at the beginning of the first general lockdown (March 2020), and (ii) at the beginning of the 2021 school year (September 2021), when schools re-opened and resumed their normal operations. As we already presented in a preceding section, by doing so, we were able to record the views of educators prior to the lockdowns and after the several minor and major lockdowns, during which they had to switch to distance education and use computers -rather intensively- for preparing their teaching material and for conducting their teaching.

During the first stage, an email was sent to all primary and secondary schools in Greece (more than 7,000 schools in total), asking for educators to participate in the study, by filling out an online questionnaire twice (i.e., during the first and second stages, see section "Instrument"). Consent to participate was deemed to have been given by completing the questionnaire. In addition, the study was approved by the Department's ethical committee. When submitting the questionnaire during the first

stage, a code was automatically generated. The participating educators had to write down this code and use it during the study's second stage, so as to gain access to the questionnaire. We have to note that they were informed that the second stage might be delayed for several months (as it did) and that they will be notified by a second wave of emails addressed to schools. Both times the questionnaire was available for one month. Although it was anonymous and no personal data were collected, the automatically generated code allowed us to ensure that the same individuals participated in both stages. Even though during the first stage there were more than 2,000 participants, the final sample was 1,099 educators, as many of them decided not to fill out the questionnaire during the second stage.

Instrument

As we already mentioned, we used a questionnaire for collecting data (the same for both stages), consisting of three sections. The first included four demographic questions (gender, age group, level of studies, and level of ICT training-if any). The third section consisted of two questions in which participants had to record how many hours per -typical/ordinary- day they use computers for professional and personal purposes. The second section included a total of twenty-five items, presented in a four-point Likert-type scale (ranging from completely disagree to completely agree). We adapted and translated in Greek these items from widely used and validated scales. We draw six items examining self-efficacy from the Computer User Self-Efficacy Scale (Cassidy & Eachus, 2002) and the Computer Self-Efficacy Scale (Murphy et al., 1989). We draw the rest from Selwyn's (1997) Computer Attitude Scale (attitude toward use-five items, perceived usefulness-five items, perceived ease of use-five items, and behavioral intention to use-four items). Before finalizing this section of the questionnaire, a group of four ICT experts reviewed it and they suggested some minor revisions. We present the questionnaire's second section in the Appendix.

Results

Descriptive Statistics and Initial Data Processing

We imported the questionnaires' responses into SPSS 26. We did not detect any missing data or unengaged responses (i.e., participants' responses in which the standard deviation was less than 0.50). Out of the 1,099 participants, 74.3% (n = 817) were females. We expected this outcome, as most educators are indeed females. 51.3% (n = 564) were teachers in primary education, while the rest were employed in secondary schools. Most participants belonged to the 50-59 years old group (41.6%, n = 457), followed by the 40-49 years old group (25.8%, n = 284), and the 30-39 years old group (18.7%, n = 206). Fifty-two participants (4.7%) held a PhD, while 45.0% (n = 506) held a master degree. A hundred and thirty participants (11.8%) had not received any ICT training, while 42.5% (n = 467) had received a Level 1 training (e.g., ECDL and seminars for basic computer usage); Level 2 and Level 3 training (i.e., in-service training programs specialized in how to use computers during teaching) had received 20.1% (n = 221) and 25.9% (n = 285) respectively. In Table 1 we present descriptive statistics for the averages of the study's five factors, before and after the lockdowns.

Table 1: Descriptive statistics for the study's variables

Factor	Before		After	
	M	*SD*	*M*	*SD*
Self-efficacy	3.07	0.71	3.28	0.60
Attitude toward use	3.37	0.72	3.48	0.62
Usefulness	3.08	0.69	3.31	0.62
Ease of use	2.90	0.67	3.13	0.61
Behavioral intention to use	3.02	0.80	3.23	0.73
AUW	2.22	1.22	2.64	1.28
APU	2.02	1.18	2.14	1.25

Although we assembled the questionnaire's second section using items drawn from validated scales, because we adapted and translated them into Greek, we deemed it necessary to assess the validity and reliability of the instrument we used. For that matter, we split the data set into two random halves and we used one half for conducting an exploratory factor analysis (EFA) and the other half for conducting a confirmatory factor analysis (CFA). During the EFA (using Principal Axis Factor Analysis with oblique rotation), no items were dropped because all the items' communalities were above the .50 threshold and there was none with significant loadings in more than one factor (Hair et al., 2010). As we expected, both the scree plot (Costello & Osborne, 2005) and the Kaiser's (1960) criterion (eigenvalue > 1) indicated the existence of ten constructs (SE, Attitude, Usefulness, EoU, and BIU, for before and after the lockdowns). The total variance explained by these factors was 76.90% (before the lockdowns) and 74.68% (after the lockdowns). We assessed the constructs' consistency using Cronbach's *a*. We concluded that it was good, as, in all cases, the value of *a* exceeded the .70 threshold (ranging between .77 and .91) (DeVellis, 2016).

For conducting the CFA, we imported the factorial structure into AMOS 26. For checking the questionnaire's convergent validity, we used the average variance extracted (AVE); for assessing its discriminant validity, we compared the square root of AVE of every factor with the correlations it had with all other factors. As we present in Tables 2 and 3, there were no issues, given that all the critical ratios were well above the .70 threshold and the variance a factor shared with the other factors was less than the variance it shared with its items (Hu & Bentler, 1999). Thus, we concluded that there were no issues regarding the questionnaire's validity or reliability.

Table 2: Convergent and discriminant validity (before the lockdowns)

Factor	CR	AVE	SE	BIU	Attitude	EoU	Usefulness
SE	.94	.73	**.86**				
BIU	.91	.73	.58	**.85**			
Attitude	.94	.76	.77	.56	**.87**		
EoU	.90	.64	.73	.48	.62	**.80**	
Usefulness	.91	.66	.68	.73	.61	.60	**.81**

Notes. AVE: Average Variance Extracted; CR: Critical ratio; diagonal: square root of AVE; off-diagonal: correlations between constructs

Table 3: Convergent and discriminant validity (after the lockdowns)

Factor	CR	AVE	SE	BIU	Attitude	EoU	Usefulness
SE	.93	.69	**.83**				
BIU	.90	.66	.58	**.81**			
Attitude	.92	.71	.74	.58	**.84**		
EoU	.89	.62	.71	.55	.57	**.78**	
Usefulness	.90	.69	.55	.76	.60	.52	**.83**

Structural Equation Modeling

As two sets of Structural Equation Modeling (SEM) were to follow for model testing using AMOS 26 (one for before and one for after the lockdowns, using the whole data set), we checked whether the data were fit for this type of analysis. The sample size was more than adequate (N = 1,099, >150 cases) (Hair et al., 2010). A curve estimation of all the models' relationships revealed that they were linear enough. Cook's distance was normal (< .25 in all cases). The highest value of the Variance Inflation Factor we observed was 2.01, while the recommended maximum is 3. Also, we found that, in all cases, Tolerance exceeded the recommended minimum value of .1 (O'Brien, 2007). Therefore, we concluded that multicollinearity was not an issue. We added a common latent factor and we com-

pared the standardized regression weights before and after the addition of this factor. As the differences were below the .1 threshold, we ruled out the existence of the Common Method Variance (Gaskin, 2013).

Because all the requirements were met, we proceeded with the analyses. We found that several direct effects in both models were not statistically significant. Moreover, several path coefficients were rather small. In order to come up with more robust models, we considered necessary the removal of these problematic paths. For that matter, we examined a total of 2^{39} models by using the Specification Search Facility available in AMOS. We selected as the final models the ones with the smallest Bayesian Information Criterion value (*BIC* = 0.00), as BIC allows the selection of the most parsimonious ones (Claeskins & Hkort, 2008). The fit indices of both models were excellent as shown in Table 4. In Tables 5 and 6, as well as Figures 3 and 4, we present details about the final models, together with the hypotheses that were confirmed.

Table 4: The fit indices for the final models

Measure	Estimate (before)	Estimate (after)	Threshold	Interpretation
CMIN/DF	3.437	3.154	Between 1 and 3	acceptable
CFI	.961	.961	> .950	excellent
SRMR	.058	.050	< .080	excellent
RMSEA	.047	.041	< .060	excellent
PClose	.956	.999	> .050	excellent

Note. Cutoff criteria by Hu and Bentler (1999)

Table 5: The final model before the lockdowns

Hypothesis	Path	Path coefficient (β)	t	p	R^2
H1	SE → Usefulness	.53	13.01	< .001	
H2	SE → Attitude	.59	14.47	< .001	
H4	SE → AUW	.17	4.24	< .001	
H5	SE → APU	.11	3.51	< .001	
H6	EoU → Usefulness	.22	5.56	< .001	
H7	EoU → Attitude	.11	3.03	.002	
H11	Usefulness → Attitude	.15	4.46	< .001	
H12	Usefulness →BIU	.63	18.24	< .001	
H13	Usefulness → AUW	.22	5.50	< .001	
H15	Attitude → BIU	.18	5.84	< .001	
H32	Gender → AUW	-.10	-3.69	< .001	
H36	Gender → APU	-.11	-3.89	< .001	
H21	Age_group → Usefulness	.07	2.79	.005	
H25	Age_group → Attitude	-.06	-3.02	.003	
H37	Age_group → APU	-.09	-3.50	< .001	
H34	Level_of_studies→ AUW	.12	4.25	< .001	
H38	Level_of_studies→ APU	.11	3.66	< .001	
	Usefulness				.50
	Attitude				.60
	BIU				.57
	AUW				.16
	APU				.04

Table 6: The final model after the lockdowns

Hypothe-sis	Path	Path coeffi-cient (β)	t	p	R^2
H1	SE → Usefulness	.37	8.71	< .001	
H2	SE → Attitude	.61	18.30	< .001	
H6	EoU → Usefulness	.30	6.97	< .001	
H11	Usefulness → Attitude	.22	7.46	< .001	
H12	Usefulness →BIU	.62	18.20	< .001	
H13	Usefulness → AUW	.22	4.68	< .001	
H14	Usefulness → APU	.11	3.58	< .001	
H15	Attitude → BIU	.24	7.84	< .001	
H18	BIU → AUW	.13	2.87	.004	
H25	Age_group → Attitude	-.10	-4.47	< .001	
H27	ICT training → Attitude	.06	2.73	.006	
H34	Level_of_studies→ AUW	.12	4.33	< .001	
H38	Level_of_studies→ APU	.14	4.70	< .001	
	Usefulness				.38
	Attitude				.59
	BIU				.60
	AUW				.13
	APU				.03

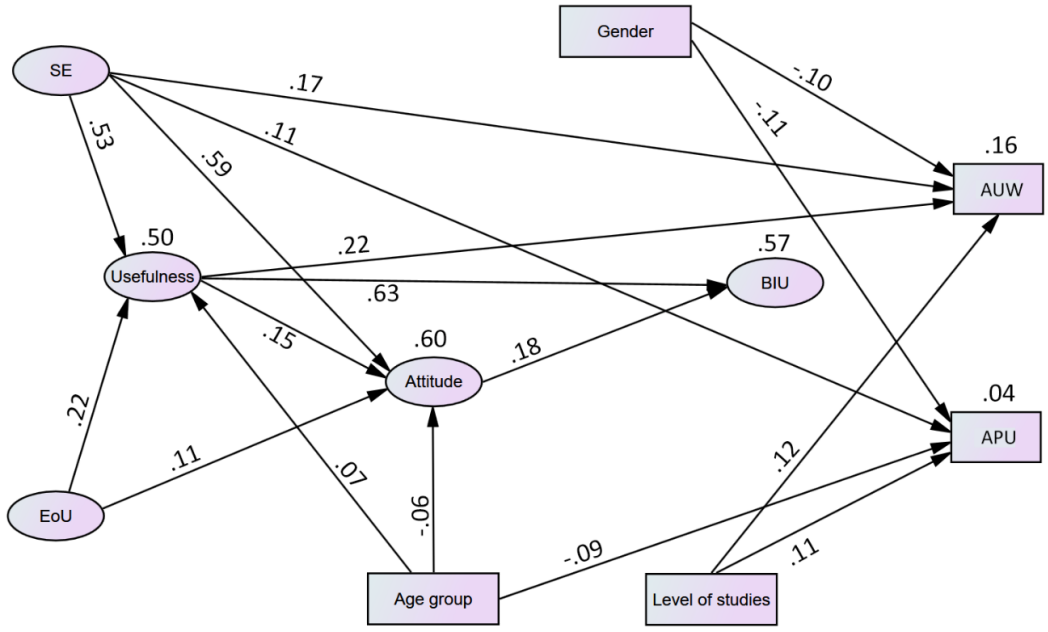

Figure 3: The final model before the lockdowns

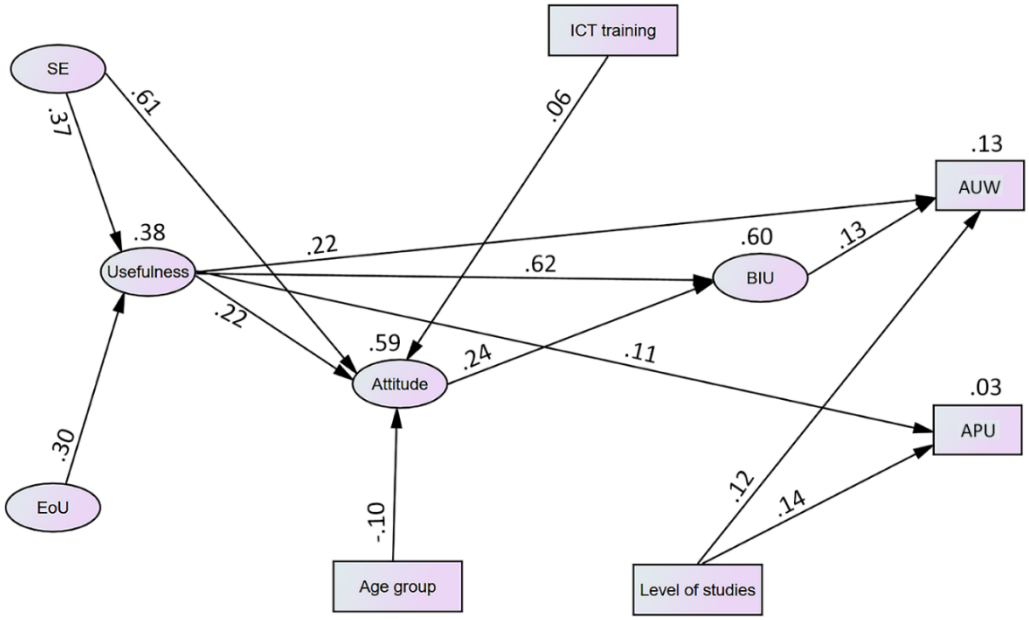

Figure 4: The final model after the lockdowns

DISCUSSION

Though we can extensively discuss the results concerning each model, we think that what is of interest is the differences between the two models. For that matter, in this section, we will focus exactly on this.

WHAT WAS THE IMPACT OF THE PANDEMIC ON EDUCATORS' ATTITUDES, VIEWS, INTENTIONS, AND USE OF COMPUTERS?

Table 1 provides useful information regarding the changes in educators' views and whether these were noteworthy. Before the lockdowns, with the exception of EoU, all the other variables were above the value of 3 (max = 4), meaning that educators considered themselves quite self-efficient (in terms of their skills and knowledge about computers) and had a rather positive attitude toward them. Their intention to use them was also fairly good. EoU was slightly below the value of 3 (M = 2.90, SD = 0.67), indicating that they considered computers easy to use, but, compared to the other variables, this trend was not so strong. As for how frequently educators used computers, the average was around two hours per typical day, for both work and personal purposes. After the lockdowns, there was an increase in the means of all the variables. Yet, this increase, with the exception of AUW, was not impressive at all (SE = +6.84%, Attitude = +3.26%, Usefulness = +7.47%, EoU = +7.93%, BIU = +6.95%, AUW = +18.92%, and APU = +5.94%). Therefore, a quick answer to the question we sought to answer is that the pandemic did not cause significant changes.

Although others noted the educators' positive views during or after the pandemic (Auma & Achieng, 2020; Marpa, 2021; Talidong, 2020), we found that their views and attitudes were already positive before the lockdowns and they became slightly more positive afterward. This finding is consistent with the findings of another study conducted in Greece (Giasiranis & Sofos, 2021), in which the authors concluded that at the beginning of the pandemic teachers had a positive/very positive attitude toward distance education; after the re-opening of schools, the positive emotions doubled, but there was still a large percentage of teachers who continued to experience negative emotions. Despite educators' stress caused by the challenges they faced (Kaqinari et al., 2021), such as lack of infrastructure, limited student-teacher interaction, and insufficient training (Auma & Achieng, 2020; Hebebci et

al., 2020; Niemi & Kousa, 2020), it seems that these problems were not enough to reverse the positive views of educators. Then again, the extensive use of computers during this period was not enough to convince educators who were skeptical (probably having a negative or neutral attitude toward computers) for their value and usefulness. Thus, there was also not an impressive positive change in educators' views, analogous to what was noted in another study (Korres & Sofos, 2021).

The only significant increase was in AUW. This finding is rather encouraging. By its very nature, it means that regardless of their views, we can expect educators to use computers for their work more intensively from this point onwards. Unfortunately, given the lack of relevant data, we cannot be certain whether this increase refers to computer use during teaching, for preparing educational material, for administrative purposes, or a combination of the above.

Differences Between the Two Models and Interpretation of the Results

Two characteristics determine a model's explanatory power: (i) high squared multiple correlations (R^2 > .50) and (ii) significant structural paths (β >= .20, ideally above .30, although smaller but still statistically significant ones play an important role) (Chin, 1998). By observing the two models, we can conclude that, up to a point, they have a rather good explanatory power. However, in both models, we failed to adequately explain AUW and APU; in fact, their squared multiple correlations were alarmingly small, to the point that APU was literary left unexplained. Then again, we have to remind readers that SEM is a linear model framework. In essence, this means that there was either no strong linear relationship between the dependent and the independent variables or that there was no linear relationship at all. To give an example, in both models BIU had no impact on APU. Therefore, educators with both strong and weak behavioral intentions to use computers, use them for the same amount of time for personal purposes. Similarly, again in both models, participants' level of studies (bachelor's degree, master's degree, and Ph.D. holders) had a weak impact on AUW. Thus, although a linear trend exists, meaning that Ph.D. holders tend to use computers for work more hours per day than the ones holding a bachelor's degree, there is still a large number of bachelor holders that use computers for work for quite a lot of hours.

Given that we could not explain a significant percentage of APU's variance, we think that it is pointless to discuss which factors had an impact on it. As far as AUW is concerned, SE (β = .17), Usefulness (β = .22), gender (β = -.10), and level of studies (β = .12), appeared to have an impact in the model before the lockdowns. In the model after the lockdowns, the situation changed dramatically, as only Usefulness (β = .22) remained, and BIU (β = .13) was added to the equation. The link connecting Usefulness and actual use is not present in the original TAM, (Davis et al., 1989), although there are studies supporting this connection (Teeroovengadum et al., 2017). The link between BIU and actual use is one of the core assumptions of TAM, but as it is evident in our results, it is not a noteworthy one. Actually, this finding gives further support to an argument we presented at the beginning of our discussion; the actual use of computers for work, after the lockdowns, stands by itself without being -significantly- impacted by one's personal views, attitudes, and intentions.

Contrary to APU and AUW, BIU was more than adequately explained in both models (R^2 = .57 for before the lockdowns and R^2 = .60 for after). In line with TAM, previous research (e.g., Macharia & Pelser, 2014; Teo et al., 2012; Wong et al., 2013), and studies conducted during the pandemic (T. Chen et al., 2021; Nikou, 2021), its determinants, in both cases, were Usefulness and Attitude. Actually, the effect of Attitude slightly increased after the lockdowns (β = .18 to β = .24) and there was a rather trivial decrease in the impact of Usefulness, which, in both cases was outstanding (β = .63 to β = .62). Basically, this finding suggests that the educators' intention to use computers relies heavily on how useful they consider them. As Usefulness had an impact on other factors as well (Attitude, β = .15-.22 and AUW, β = .22), its role as a significant construct emerged from our study.

The variance in Attitude was also satisfactorily explained (R2 = .59-.60). In this case, the addition of SE had an impressive impact on this factor (β = .59-.61). Although computer self-efficacy is not included in the original TAM, our results suggest that the educators' computer self-efficacy literarily shapes their attitude toward computers. This finding gives further support to studies that also noted the impact of SE on Attitude, though to a lesser degree (e.g., Coban & Atasoy, 2019; Fokides, 2017b; Yeşilyurt et al., 2016). Furthermore, as in TAM, in the model before the lockdowns Usefulness and EoU had an impact on Attitude, but the paths were well-below the recommended value of .20 (β = .15 and β = .11 respectively). In addition, in the model after the lockdowns, the path connecting EoU and Attitude was absent, while the path connecting Usefulness and Attitude, although present, it was not exceptional (β = .22). In light of the above, we come to the conclusion that the addition of SE caused deviations from the original TAM.

As for Usefulness, we can note that: (i) while we acceptably explained the variance in this factor in the model before the lockdowns (R^2 = .50), the results were not that good in the model after the lockdowns (R^2 = .38), and (ii) as with Attitude, SE had a pivotal impact, although the path coefficient dropped from .53 in the model before the lockdowns to .37 in the model after. Although SE is not part of TAM, the path connecting SE and Usefulness was noted by others (Chang et al., 2017). On the other hand, consistent with TAM and relevant studies (e.g., Hong et al., 2021; Khlaisang et al., 2021; Teo et al., 2008), EoU had a rather noticeable impact on Usefulness (β = .22-.30).

All things considered and despite some deviations from the original model, we can confirm that TAM is a robust model, able to sufficiently explain the behavioral intention of educators to use computers, as others suggested (e.g., Çakiroglu et al., 2017; Fokides, 2017a; Sánchez-Prieto et al., 2017; Teeroovengadum et al., 2017; Teo, 2012). Yet, the above does not apply to actual use, for reasons we presented at the beginning of this section. Moreover, on the basis of our results, computer self-efficacy decisively influenced two key constructs of TAM (Usefulness and Attitude). Thus, as was done in past research (Cardullo et al., 2021; Fokides, 2017b; Sharma & Saini, 2022), its inclusion was justified.

The Impact of the Control Variables

By examining the role and impact of the control variables, we can conclude that the two models differ quite a lot. Although we will discuss their role in detail in the coming paragraphs, what we can note is that their impact was trivial in all cases, to the point that some (or their paths to some factors) could have been omitted (although the Bayesian Information Criterion suggested otherwise), without any notable impact on the models.

Before the lockdowns, gender did not affect any of the model's constructs except AUW (β = -.10) and APU (β = -.11), meaning that, prior to the pandemic, females used computers slightly less than males for work and for personal purposes. After the lockdowns, it stopped being a contributing factor. Although several studies concluded that gender affects educators' views, such as their attitude toward ICTs (e.g., K. T. Chen, 2012; Guillén-Gámez et al., 2020; Marpa, 2021), computer self-efficacy (e.g., Guillén-Gámez & Mayorga-Fernández, 2020; Vimalkumar et al., 2021), and intention to use online platforms (Bajaj et al., 2021), the findings of our study contradict all the above. In fact, we can confirm the findings of other studies in which gender did not have an impact on the results (Papadakis, 2018; Teo et al., 2015). We view this outcome as a promising one, given that the extensive use of computers during the lockdowns eased the already minimal gender differences.

More or less, we can support the same for age differences. Before the lockdowns, age had a rather weak impact on Usefulness (β = -.07), Attitude (β = -.06), and APU (β = -.09). After the lockdowns it (weakly) affected only Attitude (β = -.10), meaning that the older the participants were, the less positive attitude toward the computers they had. This finding is in line with the findings of other studies (Demir et al., 2021; Villalba & Gonzalez-Rivera, 2016), but given the magnitude of the effect, we are optimistic that age differences will also cease to exist.

ICT training came into effect as a contributing factor in the model after the lockdowns. Alas, it (marginally) impacted only Attitude (β = .06). Others also noted that ICT training programs do not have an impact on teachers' willingness to use ICTs (Semerci & Aydin, 2018), or no impact at all (Karagül & Şen, 2021). We consider this finding alarming, to say the least. That is because a multi-level, in-service, ICT-training program runs for at least a decade in Greece and it is advertised as a game-changing intervention, able to enlighten educators on how to effectively use ICTs during teaching (European Commission, 2019). On the basis of our results, it seems that it has miserably failed to achieve its goals.

Finally, the educators' level of education plays a role in how much computers are used for work or personal purposes; the ones holding a master's degree or a PhD, use computers more often than the bachelor's degree holders. On the other hand, the values of the structural paths connecting this factor to AUW and APU were almost identical in the models before and after the lockdowns, but well below the threshold of .20, meaning that the impact of this factor was not strong. There are studies that found an impact of the level of studies on teachers' attitudes toward distance education (Demir et al., 2021; Korres & Sofos, 2021), but we are not aware of studies that found an impact on actual use. Nevertheless, as most post-graduate programs in Greece addressed to educators, include in their curriculum courses related to the use of ICTs in education, it seems that they have some impact, at least a more significant one than the in-service ICT training programs.

Implications for Research and Practice

The findings of our research, as we discussed them in the preceding section, have implications for both researchers and education policymakers. For example, while we confirmed the validity of TAM, the addition of computer SE also seemed to be a good choice, given that it had a rather impressive impact on Attitude and Usefulness. Thus, we recommend its inclusion in future studies involving TAM. We noted quantitative but also qualitative changes in the original TAM. These changes can be attributed to specific characteristics of our sample, but, as technology takes deeper roots in peoples' minds, they can also signify changes to TAM per se. Indeed, past research has demonstrated that beliefs and attitudes are not static at all (Teo, 2012). Also, one has to take into account that technological developments are constant. As a result, individuals who now perceive technology as easy to use, may develop avoidance behaviors at a later time, and vice-versa. Consequently, all the above require continuous investigation.

As the educational reality changed after the pandemic, the educators will likely be asked to intensify the use of ICTs in their teaching. To our view, here lies a significant problem. The factors we included in our model did not adequately explain AUW, but, at the same time, the same factors explained, rather satisfactorily, BIU. Because of this, something else blocks educators' good intentions. As others noted, lack of infrastructure/equipment and insufficient training (Auma & Achieng, 2020; Hebebci et al., 2020; Niemi & Kousa, 2020) hinder the use of ICTs in education. Thus, we can hypothesize that these were the cause of the insufficient explanation of AUW. In fact, in terms of digital infrastructure, Greece lags behind other European countries (European Commission, 2020), as only a third of students attend schools sufficiently equipped (Reimers & Schleicher, 2020). Thus, governments have to first equip schools with computers and other digital devices and provide the framework that fosters their use. If these prerequisites are satisfied, hopefully, the educators' intentions will be translated into actual use of ICTs.

On the basis of our findings, self-efficacy and perceived usefulness exercised a significant direct influence on several factors. Therefore, strategies and support mechanisms that make educators more confident in the use of ICTs and also provide evidence for their usefulness should be devised and implemented. For example, constant technical support can boost the educators' self-efficacy. The perceived usefulness of computers can be influenced when educators are provided with clear evidence and practical experiences on how computers can help them to be more effective in their teaching and more productive.

One's level of studies seems to have a long-lasting effect on the actual use of computers for work. We theorized that this finding is directly related to the fact that most postgraduate programs in Greece have courses related to the educational uses of ICTs. Thus, administrators and educators in higher education need to respond accordingly, by considering the inclusion of even more relevant courses to their postgraduate programs addressed to educators, and by constantly updating the content of the existing courses, so as to keep pace with the technological developments. The above finding also highlights the need to do exactly the same to the undergraduate curriculum of university departments related to education. That is because students studying to become educators will eventually become ones. If they are already familiar with educational ICTs and well-equipped with the necessary knowledge and skills (because of the courses they attended), we can speculate that the differences we noted between the different levels of education will be eased.

We also noted that the in-service ICT training programs failed to have an impact whatsoever. This finding, besides being disappointing, sends an urgent signal to education policymakers that changes have to be made to the context and content of these programs (similar to the ones we suggested for higher education), if they are to be of any value to educators.

Limitations and Future Work

Our work has certain limitations that we have to acknowledge. The sample size could have been larger. In fact, during the second stage, the participating educators were less than half of the ones who participated in the first stage. A probable explanation is that we initiated the second stage several months after the first one and educators probably lost interest. Then again, no one could predict the course of the pandemic and the same applies to the number of general lockdowns. As our purpose was to gather data following extensive use of computers, a great distance between the two stages was inevitable. When using questionnaires for data collection, the trustworthiness of participants' responses is always a concern. Moreover, although we translated validated scales and thoroughly checked the questionnaire's items, there is always the chance that some questions might have been misinterpreted, leading to erroneous responses. Our study was limited to Greek educators. In this respect, our results reflect the situation in Greece and we cannot be certain whether they are applicable to educators coming from other countries. As we discussed in a previous section, AUW and APU were left unexplained, whereas other factors were more than adequately explained. We could have added more constructs to our model (e.g., social influence, effort expectancy, performance expectancy, and facilitating conditions), in an attempt to achieve better results. Then again, the addition of more factors would have exponentially increased its complexity.

The above limitations can serve as guidelines for future studies. Larger sample sizes are always desired. Similar studies, targeting educators across the globe, can offer valuable insights into how the pandemic affected different educational systems and educators. Studies are also needed for verifying the model's validity and applicability. Still, some factors can be added to the model we proposed, while others (whose role proved to be insignificant) can be omitted. This can lead to a more robust model able to better explain what drives educators' computer usage. Qualitative data may offer an in-depth understanding of educators' beliefs. Finally, longitudinal studies can help researchers to understand whether the pandemic had a lasting effect on educators' intention to use computers during their teaching.

Conclusion

Through the development and testing of a model, our research contributes to the deeper understanding of educators' views regarding the use of computers and how these changed after the period of the multiple lockdowns. To summarize, the key findings of our study were:

- The period of the multiple lockdowns did not significantly affect the educators' views, attitudes, and intention to use computers, but they stated that, in the period following the lockdowns, they are using computers for work more than before. This means that we came to a point in which we can expect increased usage of computers in education regardless of one's views (with the exception of how useful computers are considered). As the educators spend more time in using computers, this might lead to a more intense use of ICTs in schools, resulting in an education that is better aligned with the needs of our digitalized society.
- An unexpected finding, that opposes one of the basic assumptions of TAM, was that BIU did not affect actual use. This structural path is absent in the model before the lockdowns (for both AUW and APU), while it exists in the model after the lockdowns (only for AUW), though it is feeble.
- How useful computers are considered, almost singlehandedly shaped the educators' behavioral intention to use them.
- Computer self-efficacy had a strikingly strong positive effect on the attitude of educators toward computers.
- The age and gender differences were eased after the lockdowns and no longer play a role in shaping the educators' views, attitudes, intentions, or actual use of computers.
- The additional ICT training the educators received was not enough to produce any palpable impact, raising concerns about its effectiveness.

We hope that the above findings can function as a starting point for reflection for both researchers and education policymakers.

REFERENCES

Abbasi, S., Ayoob, T., Malik, A., & Memon, S. I. (2020). Perceptions of students regarding e-learning during COVID-19 at a private medical college. *Pakistan Journal of Medical Sciences*, *36*(COVID19-S4), S57-S61. https://doi.org/10.12669/pjms.36.COVID19-S4.2766

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, *84*(5), 888-918. https://doi.org/10.1037/0033-2909.84.5.888

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Prentice-Hall.

Alzahrani, M. A. (2019). Factors that influence secondary school teachers' acceptance of e-learning technologies in teaching in the kingdom of Saudi Arabia. *Journal of Research in Curriculum Instruction and Educational Technology*, *5*(2), 175-196. https://doi.org/10.21608/jrciet.2019.33605

Arora, A. K., & Srinivasan, R. (2020). Impact of pandemic COVID-19 on the teaching-learning process: A study of higher education teachers. *Prabandhan: Indian Journal of Management*, *13*(4), 43-56. https://doi.org/10.17010/pijom/2020/v13i4/151825

Askar, P., & Umay, A. (2001, March). Preservice elementary mathematics teachers' computer self-efficacy, attitudes towards computers, and their perceptions of computer-enriched learning environments. In J. Price, D. Willis, N. Davis, & J. Willis (Eds.), *Proceedings of the Society for Information Technology & Teacher Education International Conference* (pp. 2262-2263). Norfolk, VA: Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/17156/

Auma, O. M., & Achieng, O. J. (2020). Perception of teachers on effectiveness of online learning in the wake of COVID-19 pandemic. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, *25*(6), 19-28. https://www.iosrjournals.org/iosr-jhss/papers/Vol.%2025%20Issue6/Series-11/C2506111928.pdf

Basilaia, G., & Kvavadze, D. (2020). Transition to online education in schools during a SARS-CoV-2 Coronavirus (COVID-19) pandemic in Georgia. *Pedagogical Research*, *5*(4), Article No: em0060. https://doi.org/10.29333/pr/7937

Bhaumik, R., & Priyadarshini, A. (2020). E-readiness of senior secondary school learners to online learning transition amid COVID-19 lockdown. *Asian Journal of Distance Education*, *15*(1), 244-256. http://asianjde.com/ojs/index.php/AsianJDE/article/download/456/309

Bajaj, P., Khan, A., Tabash, M. I., & Anagreh, S. (2021). Teachers' intention to continue the use of online teaching tools post COVID-19. *Cogent Education*, *8*(1), Article: 2002130. https://doi.org/10.1080/2331186X.2021.2002130

Baloran, E. T., & Hernan, J. T. (2020). Crisis self-efficacy and work commitment of education workers among public schools during COVID-19 pandemic. *Preprints*. https://doi.org/10.20944/preprints202007.0599.v1

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191-215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A., Freeman, W. H., & Lightsey, R. (1999). Self-efficacy: The exercise of control. *Journal of Cognitive Psychotherapy*, *13*(2), 158–166. https://doi.org/10.1891/0889-8391.13.2.158

Baturay, M. H., Gökçearslan, Ş., & Ke, F. (2017). The relationship among pre-service teachers' computer competence, attitude towards computer-assisted education, and intention of technology acceptance. *International Journal of Technology Enhanced Learning*, *9*(1), 1-13. https://doi.org/10.1504/IJTEL.2017.084084

Bozdoğan, D., & Özen, R. (2014). Use of ICT technologies and factors affecting pre-service ELT teachers' perceived ICT self-efficacy. *Turkish Online Journal of Educational Technology*, *13*(2), 186-196. https://files.eric.ed.gov/fulltext/EJ1022943.pdf

Cai, Z., Fan, X., & Du, J. (2017). Gender and attitudes toward technology use: A meta-analysis. *Computers & Education*, *105*, 1-13. https://doi.org/10.1016/j.compedu.2016.11.003

Çakiroglu, Ü., Gökoglu, S., & Öztürk, M. (2017). Pre-service computer teachers' tendencies towards the use of mobile technologies: A Technology Acceptance Model perspective. *European Journal of Open, Distance and E-Learning*, *20*(1), 176-191. https://doi.org/10.1515/eurodl-2017-0011

Cardullo, V., Wang, C. H., Burton, M., & Dong, J. (2021). K-12 teachers' remote teaching self-efficacy during the pandemic. *Journal of Research in Innovative Teaching & Learning*, *14*(1), 32-45. https://doi.org/10.1108/JRIT-10-2020-0055

Cassidy, S., & Eachus, P. (2002). Developing the computer user self-efficacy (CUSE) scale: Investigating the relationship between computer self-efficacy, gender and experience with computers. *Journal of Educational Computing Research*, *26*(2), 133-153. https://doi.org/10.2190/JGJR-0KVL-HRF7-GCNV

Cavas, B., Cavas, P., Karaoglan, B., & Kisla, T. (2009). A study on science teachers' attitudes toward information and communication technologies in education. *The Turkish Online Journal of Educational Technology*, *8*(2), 20-32. https://files.eric.ed.gov/fulltext/ED505935.pdf

Chang, C. T., Hajiyev, J., & Su, C. R. (2017). Examining the students' behavioral intention to use e-learning in Azerbaijan? The General Extended Technology Acceptance Model for E-learning approach. *Computers & Education*, *111*, 128-143. https://doi.org/10.1016/j.compedu.2017.04.010

Chen, K. T. (2012). Elementary EFL teachers' computer phobia and computer self-efficacy in Taiwan. *Turkish Online Journal of Educational Technology-TOJET*, *11*(2), 100-107. https://files.eric.ed.gov/fulltext/EJ989017.pdf

Chen, T., Li, G., Feng, Q., Liu, J., Wang, P., & Luo, H. (2021, August). What drives college teachers' behavioral intention to teach online? A structural equation modelling approach. *Proceedings of the 2021 International Symposium on Educational Technology (ISET)* (pp. 106-111). Tokai, Nagoya, Japan: IEEE. https://doi.org/10.1109/ISET52350.2021.00031

Chin, W. W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly*, *22*(1), vii-xvi. https://www.jstor.org/stable/249674

Chuttur, M. Y. (2009). Overview of the technology acceptance model: Origins, developments and future directions. *Working Papers on Information Systems*, *9*(37). http://adam.co/lab/pdf/test/pdfs/TAMReview.pdf

Claeskins, G., & Hkort, N. (2008). *Model selection and model averaging*. Cambridge University Press. https://doi.org/10.1017/CBO9780511790485

Coban, O., & Atasoy, R. (2019). An examination of relationship between teachers' self-efficacy perception on ICT and their attitude towards ICT usage in the classroom. *Cypriot Journal of Educational Sciences*, *14*(1), 136-145. https://doi.org/10.18844/cjes.v14i1.3636

Comi, S. L., Argentin, G., Gui, M., Origo, F., & Pagani, L. (2017). Is it the way they use it? Teachers, ICT, and student achievement. *Economics of Education Review*, *56*, 24-39. https://doi.org/10.1016/j.econedurev.2016.11.007

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *19*(2), 189-211. https://doi.org/https://doi.org/10.2307/249688

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, *10*, Article 7. https://doi.org/10.7275/jyj1-4868

Cussó-Calabuig, R., Farran, X. C., & Bosch-Capblanch, X. (2018). Effects of intensive use of computers in secondary school on gender differences in attitudes towards ICT: A systematic review. *Education and Information Technologies*, *23*(5), 2111-2139. https://doi.org/10.1007/S10639-018-9706-6

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982-1003. https://doi.org/10.1287/mnsc.35.8.982

Demir, B., Yilmaz, G. K., & Celik, H. S. (2021). Teachers' attitudes and opinions on mathematics lessons conducted with distance education due to COVID-19 pandemic. *Turkish Online Journal of Distance Education*, *22*(4), 147-163. https://doi.org/10.17718/tojde.1002812

DeVellis, R. F. (2016). *Scale development: Theory and applications* (vol. 26). Sage Publications.

Dong, Y., Xu, C., Chai, C. S., & Zhai, X. (2020). Exploring the structural relationship among teachers' technostress, technological pedagogical content knowledge (TPACK), computer self-efficacy and school support. *The Asia-Pacific Education Researcher*, *29*(2), 147-157. https://doi.org/10.1007/S40299-019-00461-5

Eickelmann, B., & Vennemann, M. (2017). Teachers' attitudes and beliefs regarding ICT in teaching and learning in European countries. *European Educational Research Journal*, *16*(6), 733-761. https://doi.org/10.1177/1474904117725899

European Commission. (2019). *2nd survey of schools: ICT in education: Objective 1: Benchmark progress in ICT in schools, final report*. Publications Office. https://doi.org/10.2759/23401

European Commission. (2020). *Education and training monitor 2020 – Greece*. https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/countries/greece.html

Fanni, F., Rega, I., & Cantoni, L. (2013). Using self-efficacy to measure primary school teachers' perception of ICT: Results from two studies. *International Journal of Education and Development using Information and Communication Technology*, *9*(1), 100-111. https://www.learntechlib.org/p/111898/article_111898.pdf

Fokides, E. (2017a). Greek pre-service teachers' intentions to use computers as in-service teachers. *Contemporary Educational Technology, 8*(1), 56-75. https://dergipark.org.tr/en/download/article-file/307684

Fokides, E. (2017b). Pre-service teachers intention to use MUVEs as practitioners – A structural equation modeling approach. *Journal of Information Technology Education: Research*, *16*, 47-68. https://doi.org/10.28945/3645

Foti, P. (2020). Research in distance learning in Greek kindergarten schools during the pandemic of COVID-19: Possibilities, dilemmas, limitations. E*uropean Journal of Open Education and E-learning Studies*, *5*(1), 19-40. https://doi.org/10.5281/zenodo.3839063

Gaskin, J. (2013). *SEM series part 5a: Confirmatory factor analysis* [video]. https://www.youtube.com/watch?v=MCYmyzRZnIY

Giasiranis, S., & Sofos, A. (2021). Η αποτίμηση από την πλευρά των εκπαιδευτικών της αξιοποίησης της εξ αποστάσεως εκπαίδευσης εν μέσω πανδημίας: Στάσεις, προβλήματα και προοπτικές [Teachers' assessment of the use of distance education in the midst of the pandemic: Attitudes, problems, and prospects]. *Proceedings of the 1st International Online Conference: The Abrupt Transition of our Educational Reality to Digital Environments, Attitudes-Perceptions-Scenarios-Perspectives-Proposals* (pp. 136-144). University of the Aegean. https://doi.org/10.12681/online-edu.3221

Ginting, D., Woods, R., & Nuswantara, K. (2021). Teachers voice: Their experiences in emergency remote teaching amid COVID-19 pandemic. *MEXTESOL Journal*, *45*(4), 1-14. https://files.eric.ed.gov/fulltext/EJ1320896.pdf

González-Sanmamed, M., Sangrà, A., & Muñoz-Carril, P. C. (2017). We can, we know how. But do we want to? Teaching attitudes towards ICT based on the level of technology integration in schools. *Technology, Pedagogy and Education*, *26*(5), 633-647. https://doi.org/10.1080/1475939X.2017.1313775

Guillén-Gámez, F. D., Colomo-Magaña, E., Sánchez-Rivas, E., & del Río, R. P. (2020, December). Attitude towards ICT: A statistical analysis of gender differences in Spanish higher education teachers. *Proceedings of the 3rd International Conference on Advanced Research in Education, Teaching and Learning* (pp. 1-12). Oxford, United Kingdom: Diamond Scientific Publishing. https://doi.org/10.33422/3rd.aretl.2020.12.110

Guillén-Gámez, F. D., & Mayorga-Fernández, M. J. (2020). Identification of variables that predict teachers' attitudes toward ICT in higher education for teaching and research: A study with regression. *Sustainability (Switzerland)*, *12*(4), Article 1312. https://doi.org/10.3390/su12041312

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: International version* (7th ed.). Pearson.

Hebebci, M. T., Bertiz, Y., & Alan, S. (2020). Investigation of views of students and teachers on distance education practices during the coronavirus (COVID-19) pandemic. *International Journal of Technology in Education and Science*, *4*(4), 267-282. https://doi.org/10.46328/ijtes.v4i4.113

Hong, X., Zhang, M., & Liu, Q. (2021). Preschool teachers' technology acceptance during the COVID-19: An adapted Technology Acceptance Model. *Frontiers in Psychology*, *12*, 2113. https://doi.org/10.3389/FPSYG.2021.691492

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Izumi, T., Sukhwani, V., Surjan, A., & Shaw, R. (2021). Managing and responding to pandemics in higher educational institutions: Initial learning from COVID-19. *International Journal of Disaster Resilience in the Built Environment*, *12*(1), 51-66. https://doi.org/10.1108/IJDRBE-06-2020-0054

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, *20*(1), 141-151. https://doi.org/10.1177/001316446002000116

Kaqinari, T., Makarova, E., Audran, J., Döring, A. K., Göbel, K., & Kern, D. (2021). The switch to online teaching during the first COVID-19 lockdown: A comparative study at four European universities. *Journal of University Teaching and Learning Practice*, *18*(5), 10. https://doi.org/10.53761/1.18.5.10

Karagül, S., & Şen, E. (2021). Turkish teachers' attitudes towards distance learning during the Covid-19 pandemic. *International Education Studies*, *14*(10), 53-64. https://doi.org/10.5539/ies.v14n10p53

Kersaint, G. (2003). Technology beliefs and practices of mathematics education faculty. *Journal of Technology and Teacher Education*, *11*(4), 549-577. Society for Information Technology & Teacher Education. https://www.learntechlib.org/primary/p/2222/

Khlaisang, J., Songkram, N., Huang, F., & Teo, T. (2021). Teachers' perception of the use of mobile technologies with smart applications to enhance students' thinking skills: A study among primary school teachers in Thailand. *Interactive Learning Environments*, Online First. https://doi.org/10.1080/10494820.2021.1993933

Korres, D., & Sofos, A. (2021). Στάσεις και αντιλήψεις εκπαιδευτικών ΕΠΑ.Λ. για την εξ αποστάσεως διδασκαλία όπως εφαρμόστηκε με την προσέγγιση "Μαθαίνουμε στο σπίτι" [Attitudes and perceptions of technical education teachers for distance teaching as applied in the approach "We learn at home." *Proceedings of the 1st International Online Conference: The Abrupt Transition of our Educational Reality to Digital Environments, Attitudes-Perceptions-Scenarios-Perspectives-Proposals* (pp. 122-135). University of the Aegean. https://doi.org/10.12681/online-edu.3220

Lai, P. C. (2017). The literature review of technology adoption models and theories for the novelty technology. *Journal of Information Systems and Technology Management*, *14*(1), 21-38. http://www.jistem.tecsi.org/index.php/jistem/article/view/10.4301%25S1807-17752017000100002/643

Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. *Educational Media International*, *55*(1), 79-105. https://doi.org/10.1080/09523987.2018.1439712

Lazim, C. S. L. M., Ismail, N. D. B., & Tazilah, M. D. A. K. (2021). Application of technology acceptance model (TAM) towards online learning during COVID-19 pandemic: Accounting students' perspective. *International Journal of Business, Economics and Law*, *24*(1), 13-20. https://www.ijbel.com/wp-content/uploads/2021/02/IJBEL24_507.pdf

Ma, K., Chutiyami, M., Zhang, Y., & Nicoll, S. (2021). Online teaching self-efficacy during COVID-19: Changes, its associated factors and moderators. *Education and Information Technologies*, *26*(6), 6675-6697. https://doi.org/10.1007/s10639-021-10486-3

Macharia, J. K. N., & Pelser, T. G. (2014). Key factors that influence the diffusion and infusion of information and communication technologies in Kenyan higher education. *Studies in Higher Education*, *39*(4), 695-709. https://doi.org/10.1080/03075079.2012.729033

Maila D. H., R. (2020). Technological barriers and challenges in the use of ICT during the COVID-19 emergency remote learning. *Universal Journal of Educational Research, 8*(11B), 6124-6133. https://doi.org/10.13189/ujer.2020.082248

Mailizar, M., Almanthari, A., & Maulina, S. (2021). Examining teachers' behavioral intention to use e-learning in teaching of Mathematics: An extended TAM model. *Contemporary Educational Technology*, *13*(2), Article No: ep298. https://doi.org/10.30935/CEDTECH/9709

Mailizar, M., Burg, D., & Maulina, S. (2021). Examining university students' behavioural intention to use e-learning during the COVID-19 pandemic: An extended TAM model. *Education and Information Technologies*, *26*(6), 7057-7077. https://doi.org/10.1007/s10639-021-10557-5

Marpa, E. P. (2021). Technology in the teaching of mathematics: An analysis of teachers' attitudes during the COVID-19 pandemic. *International Journal on Studies in Education*, *3*(2), 92-102. https://doi.org/10.46328/ijonse.36

Murphy, C. A., Coover, D., & Owen, S. V. (1989). Development and validation of the computer self-efficacy scale. *Educational and Psychological Measurement*, *49*(4), 893-899. https://doi.org/10.1177/001316448904900412

Niemi, H. M., & Kousa, P. (2020). A case study of students' and teachers' perceptions in a Finnish high school during the COVID pandemic. *International Journal of Technology in Education and Science*, *4*(4), 352-369. https://doi.org/10.46328/IJTES.V4I4.167

Nikou, S. A. (2021). Web-based videoconferencing for teaching online: Continuance intention to use in the post-COVID-19 period. *Interaction Design and Architecture*, *47*(Winter), 123-143. https://doi.org/10.55612/s-5002-047-006

Ninković, S., Ninković, S. O., Lazarević, T., & Adamov, J. (2021). Serbian teachers' perceptions of online assessment during COVID-19 school closure: The role of teachers' self-efficacy. *Educational Studies*, Online First. https://doi.org/10.1080/03055698.2021.1960151

Nuere, S., & de Miguel, L. (2021). The digital/technological connection with COVID-19: An unprecedented challenge in university teaching. *Technology, Knowledge and Learning*, *26*(4), 931-943. https://doi.org/10.1007/S10758-020-09454-6

O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*(5), 673-690. https://doi.org/10.1007/s11135-006-9018-6

Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, *41*(4), 417-441. https://doi.org/10.1080/15391523.2009.10782537

Papadakis, S. (2018). Evaluating pre-service teachers' acceptance of mobile devices with regards to their age and gender: A case study in Greece. *International Journal of Mobile Learning and Organization, 12*(4), 336-352. https://doi.org/10.1504/IJMLO.2018.095130

Pokhrel, S., & Chhetri, R. (2021). A literature Review on impact of COVID-19 pandemic on teaching and learning. *Higher Education for the Future*, *8*(1), 133-141. https://doi.org/10.1177/2347631120983481

Reimers, F. M., & Schleicher, A. (2020). *A framework to guide an education response to the COVID-19 pandemic of 2020*. Organization for Economic Co-operation and Development. https://read.oecd-ilibrary.org/view/?ref=126_126988-t63lxosohs&title=A-framework-to-guide-an-education-response-to-the-Covid-19-Pandemic-of-2020

Sánchez-Prieto, J. C., Olmos-Migueláñez, S., & García-Peñalvo, F. J. (2017). MLearning and pre-service teachers: An assessment of the behavioral intention using an expanded TAM model. *Computers in Human Behavior*, *72*, 644-654. https://doi.org/10.1016/j.chb.2016.09.061

Sangeeta, & Tandon, U. (2021). Factors influencing adoption of online teaching by school teachers: A study during COVID-19 pandemic. *Journal of Public Affairs*, *21*(4), e2503. https://doi.org/10.1002/pa.2503

Selwyn, N. (1997). Students' attitudes toward computers: Validation of a computer attitude scale for 16-19 education. *Computers & Education*, *28*(1), 35-41. https://doi.org/10.1016/S0360-1315(96)00035-8

Semerci, A., & Aydin, M. K. (2018). Examining high school teachers' attitudes towards ICT use in education. *International Journal of Progressive Education*, *14*(2), 93-105. https://doi.org/10.29329/ijpe.2018.139.7

Sharma, S., & Saini, J. R. (2022). On the role of teachers' acceptance, continuance intention and self-efficacy in the use of digital technologies in teaching practices. *Journal of Further and Higher Education*, Online First. https://doi.org/10.1080/0309877X.2021.1998395

Sukendro, S., Habibi, A., Khaeruddin, K., Indrayana, B., Syahruddin, S., Makadada, F. A., & Hakim, H. (2020). Using an extended Technology Acceptance Model to understand students' use of e-learning during COVID-19: Indonesian sport science education context. *Heliyon*, *6*(11), e05410. https://doi.org/10.1016/j.heliyon.2020.e05410

Sun, P. P., & Mei, B. (2020). Modeling preservice Chinese-as-a-second/foreign-language teachers' adoption of educational technology: A technology acceptance perspective. *Computer Assisted Language Learning*, Online First. https://doi.org/10.1080/09588221.2020.1750430

Talidong, K. J. B. (2020). Implementation of emergency remote teaching (ERT) among Philippine teachers in Xi'an, China. *Asian Journal of Distance Education*, *15*(1), 196-201. https://files.eric.ed.gov/fulltext/EJ1290051.pdf

Teeroovengadum, V., Heeraman, N., & Jugurnath, B. (2017). Examining the antecedents of ICT adoption in education using an extended technology acceptance model (TAM). *International Journal of Education and Development using Information and Communication Technology*, *13*(3), 4-23. https://www.learntechlib.org/p/182155/article_182155.pdf

Tellí, S. G., & Altun, D. (2020). The coronavirus and the unstoppable rising of online education. *Journal of University Studies*, *3*(1), 25-34. https://doi.org/10.32329/uad.711110

Teo, T. (2011) Technology acceptance research in education. In T. Teo (Ed.), *Technology acceptance in education* (pp. 1-5). Sense Publishers. https://doi.org/10.1007/978-94-6091-487-4_1

Teo, T. (2012). Examining the intention to use technology among pre-service teachers: An integration of the Technology Acceptance Model and Theory of Planned Behavior. *Interactive Learning Environments*, *20*(1), 3-18. https://doi.org/10.1080/10494821003714632

Teo, T. (2014). Unpacking teachers' acceptance of technology: Tests of measurement invariance and latent mean differences. *Computers & Education*, *75*, 127-135. https://doi.org/10.1016/j.compedu.2014.01.014

Teo, T., Fan, X., & Du, J. (2015). Technology acceptance among pre-service teachers: Does gender matter? *Australasian Journal of Educational Technology*, *31*(3), 235–251. https://doi.org/10.14742/ajet.1672

Teo, T., Huang, F., & Hoi, C. K. W. (2018). Explicating the influences that explain intention to use technology among English teachers in China. *Interactive Learning Environments*, *26*(4), 460-475. https://doi.org/10.1080/10494820.2017.1341940

Teo, T., Lee, C. B., & Chai, C. S. (2008). Understanding pre-service teachers' computer attitudes: Applying and extending the technology acceptance model. *Journal of Computer Assisted Learning*, *24*(2), 128-143. https://doi.org/10.1111/j.1365-2729.2007.00247.x

Teo, T., Ursavaş, Ö. F., & Bahçekapili, E. (2012). An assessment of pre-service teachers' technology acceptance in Turkey: A structural equation modeling approach. *The Asia-Pacific Education Researcher*, *21*(1), 191-202. https://researchrepository.murdoch.edu.au/id/eprint/48415/1/Turkey.pdf

Tou, N. X., Kee, Y. H., Koh, K. T., Camiré, M., & Chow, J. Y. (2020). Singapore teachers' attitudes towards the use of information and communication technologies in physical education. *European Physical Education Review*, *26*(2), 481-494. https://doi.org/10.1177/1356336X19869734

Tzivinikou, S., Charitaki, G., & Kagkara, D. (2021). Distance education attitudes (DEAS) during COVID-19 crisis: Factor structure, reliability and construct validity of the brief DEA scale in Greek-speaking SEND teachers. *Technology, Knowledge and Learning*, *26*(3), 461-479. https://doi.org/10.1007/S10758-020-09483-1

UNESCO. (2020, March 24). *COVID-19 educational disruption and response*. https://en.unesco.org/news/covid-19-educational-disruption-and-response

Utami, T. L. W. (2021). Technology adoption on online learning during COVID-19 pandemic: Implementation of technology acceptance model (TAM). *Diponegoro International Journal of Business*, *4*(1), 8-19. https://doi.org/10.14710/DIJB.4.1.2021.8-19

Velicia-Martin, F., Cabrera-Sanchez, J. P., Gil-Cordero, E., & Palos-Sanchez, P. R. (2021). Researching COVID-19 tracing app acceptance: Incorporating theory from the technological acceptance model. *PeerJ Computer Science*, *7*, e316. https://doi.org/10.7717/PEERJ-CS.316

Villalba, A. I. P., & González-Rivera, M. D. (2016). Integration of ICT in physical education for the improvement of the educational intervention: Perception and proposals. In O. F. von Feigenblatt, & D. C. Domínguez (Eds.), *Trends and Innovation in Higher Education* (pp. 307-322). Journal of Alternative Perspectives in the Social Sciences Press (JAPSS Press).

Vimalkumar, M., Singh, J. B., & Gouda, S. K. (2021). Contextualizing the relationship between gender and computer self-efficacy: An empirical study from India. *Information & Management*, *58*(4), 103464. https://doi.org/10.1016/j.im.2021.103464

Wong, K. T., Teo, T., & Russo, S. (2013). Interactive whiteboard acceptance: Applicability of the UTAUT model to student teachers. *The Asia-Pacific Education Researcher*, *22*(1), 1-10. https://doi.org/10.1007/S40299-012-0001-9

Yang, X. (2020). Teachers' perceptions of large-scale online teaching as an epidemic prevention and control strategy in China. *ECNU Review of Education*, *3*(4), 739-744. https://doi.org/10.1177/2096531120922244

Yeşilyurt, E., Ulaş, A. H., & Akan, D. (2016). Teacher self-efficacy, academic self-efficacy, and computer self-efficacy as predictors of attitude toward applying computer-supported education. *Computers in Human Behavior*, *64*, 591-601. https://doi.org/10.1016/j.chb.2016.07.038

APPENDIX

The items in the questionnaire's second section. The items were presented in random order.

Factor	Item
Self-efficacy	I am competent in using computers.
	I am competent in using a variety of hardware and software.
	I find myself quite capable of dealing with minor hardware and software problems.
	I can understand terms related to hardware and software.
	My skills allow me to work quite comfortably with computers.
	I am quite certain of my computer skills.
Attitude toward use	The use of the computer does not scare me.
	I hesitate to use computers because I am afraid of making mistakes.*
	The use of computers makes me feel uncomfortable/nervous.*
	I am afraid of using computers because I might render them non-functional.*
	I do not feel hesitant when using computers.
Perceived usefulness	Computers help me improve my work.
	The extra effort required for using computers is justified because they are useful.
	Why use computers? With conventional means, I can get the same results.*
	Computers are useful because they render my work interesting and complete.
	Computers are useful tools because they allow me to become more productive.
Perceived ease of use	It is not difficult to learn how to use computers.
	It is easy to become a skilled computer user.
	It is quite easy to carry out the tasks you want by using computers.
	It is not easy to learn how to use computers. I always need help from someone more experienced.*
	The use of computers is easy.
Behavioral intention to use	If I could, I would avoid using computers.*
	I will definitely use computers either for my work or for pleasure.
	I use computers out of obligation not because I really want it.*
	It is my intention to use computers quite often.

Note. * = item for which its scoring was reversed

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