

Primary education teachers' adoption of Web 2.0 tools in educational practices and the impact of the pandemic COVID-19

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Abstract

In recent years, the question of the use of Web 2.0 applications and tools by teachers in their teaching practice has come to the fore as Web 2.0 applications can offer several advantages when used by teachers, as they are tools for interaction, collaboration, and communication. This study aims to investigate the acceptance of Web 2.0 applications and tools by in-service primary School teachers in the framework of a qualitative research design. Thirteen (13) participants including primary education teachers, school directors, coordinators of educational work and B-level trainers in the field of ICTs in education interviewed. Semi-conducted interview used as research tool consisted of questions based on the Technology Acceptance Model 2 (TAM 2) and external factors as well as of questions related to the use of Web 2.0 tools during the COVID-19 pandemic. For the purposes of the study the acceptance of Web 2.0 applications and tools was investigated in terms of perceived usefulness, perceived ease of use, perceived enjoyment, self-efficacy, subjective norm, facilitating conditions and intention to use. From the thematic analysis of the data collected and analyzed, emerged that the degree of perceived usefulness, perceived ease of use, perceived enjoyment, and intention to use of teachers for the utilization of Web 2.0 applications and tools in their teaching are satisfactory. Self-efficacy of the teachers in using Web 2.0 tools, subjective norm, facilitating conditions and the pandemic period influence the levels and ways of acceptance.

Keywords: Adoption of Web 2.0 applications, primary education, teachers, TAM, pandemic impact

Introduction

Education as a sector directly connected to society was one of the first sectors to be affected by the rapid deployment of Information and Communication Technologies (ICT). In the field of Education, there has been a tendency for education systems worldwide to integrate the use of digital tools within their framework and to encourage teachers to use digital tools in their teaching. These actions have been taken with a concern for the acquisition of digital skills by students to meet the needs of a dynamically evolving and developing society. Nowadays, teachers are being asked to educate a generation of students who could be described as "digital natives" (Scherer et al., 2019).

In Greece, the effort to encourage teachers to use ICT tools in their educational practice it was supported by the B-level training in ICT project, which later evolved into B1 level training in ICT project and in B2 level training in ICT project (<https://e-pimorfosi.cti.gr/>), during which most teachers of Primary and Secondary Education all over Greece were trained. The project "In-service Training of Teachers in the utilization and application of Digital Technologies in the teaching practice" (B-Level ICT Teacher Training), implemented by the Computer Technology Institute and Press (CTI) – "Diophantus". The development and implementation of the B-Level ICT teacher training concerns two levels of knowledge and skills: a. "Introductory training for the utilization of ICT in school" (B1-Level ICT teacher training, 36 teaching hours) and b. "Advanced training for the utilization and application of ICT in the teaching practice" (B2-Level ICT teacher training, 42 teaching hours and additional 18 hours for preparing "in-class practice"). B1-Level and B2-Level ICT teacher training addresses primary

and secondary school teachers of all specialties and disciplines and training programs are being implemented all around Greece in Teacher Training Support Centers. Web 2.0 applications and tools and their exploitation in education is one of the key subjects in the content of the training.

Nowadays worldwide Web 2.0 applications and tools are used in various ways in the educational process supporting teachers and students in teaching and learning as they enable interaction and collaboration between users to create content and publish their thoughts and ideas. The Web 2.0 tools culture encourages students to reuse and mix resources and even create new knowledge taking an active role in their learning (Bykova et al., 2021).

Over the last decades, a variety of theoretical approaches have been developed to understand the factors of the use and adoption of different technologies to support the learning and teaching process. Research worldwide has identified TAM as the most widely used powerful and valid model for explaining user behaviour towards the acceptance and adoption of educational technology (Abdullah et al., 2023; Granić, 2023).

The purpose of this study is to investigate the acceptance of Web 2.0 applications and tools by in-service Primary Education teachers in terms of perceived usefulness, perceived ease of use, perceived enjoyment, and intention to use Web 2.0 applications and tools in their educational practice. The influence of teachers' self-efficacy, subjective norm and facilitating conditions on these concepts as well as the impact of the COVID-19 pandemic are also discussed.

Literature Review

Web 2.0 applications and Tools

The term "Web 2.0" (Web 2.0) was first introduced by O'Reilly (2005) to describe a set of operating and design features, applications and tools that used the internet offering a variety of services to users. This generation of applications and tools enabled users to interact and collaborate with each other to create content and publish their thoughts. Internet users are no longer just consumers of information and resources but also can contribute to content creation themselves (Caliskan et al., 2019). The main characteristics of Web 2.0 applications and tools are interactivity, ability to cooperate, ability to create content, share content, direct posting of thoughts, content conversion, information exchange, collective user intelligence. Web 2.0 tools in learning activities could promote the learner to the center of the learning process, open the schools' doors to society and help students learn how to cooperate and create digital content.

For an effective integration of Web 2.0 tools in educational practice be achieved challenges concerning teachers' attitude, parents' attitude, amount of time and effort required, limitations imposed by the curriculum, overestimation of students' skills and lack of training opportunities arose as strong barriers (Orehovački, Bubaš, & Kovačić, 2012; Ozcinar, 2020). Web 2.0 applications and tools with their emphasis on collaboration, distribution of content and social networking, can facilitate educational activities of individuals and groups worldwide. Many specialized Web 2.0 applications have been developed to support traditional e-learning procedures, but some Web 2.0 applications even though were not created for education, their features can be used in education practice (Palaigeorgiou & Grammatikopoulou, 2016; Tzotzou, 2018; Şimşek & Ateş, 2022).

Technology Acceptance Model 2

Technology Acceptance Model (TAM) was developed by Fred Davis in 1986 and is based on the idea that our attitudes towards technology are shaped by two main factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which we believe that using a technology we will improve our performance or achieve our goals, and perceived ease of use refers to the extent to which we believe that using a technology will be easy and simple. According to the

TAM, the two factors are the main determinants of our intention to use a technology, which in turn predicts our actual usage behavior as if we think a technology is useful and easy to use, we are more likely to adopt and use it. Venkatesh & Davis (2000) proposed an extension of TAM named TAM 2 taking external and social influences into consideration.

TAM model and extensions have been used for studying the acceptance of the use of a variety of technologies, in different cultural contexts, over different time periods, and is considered as a highly useful, valid and reliable model for investigating and interpreting teachers' acceptance of technology (Abdullah & Ward, 2016; Granić, & Marangunić, 2019; Scherer et al., 2019; Şimşek & Ateş, 2022).

The extensive use of TAM and its exploitation in numerous studies has resulted in the deployment of several external variables that could affect perceived usefulness and perceived ease of use, which are the two main factors of TAM and are keys to users' intention to use, as well as to the actual use (Davis et al., 1989). Extending the TAM model and enriching it with additional factors that act as external variables helps to identify factors that influence perceived usefulness, perceived ease of use, and contribute to the investigation and interpretation of users' acceptance and use of specific technologies (García & García, 2013; Granić, & Marangunić, 2019; Scherer et al., 2019; Andarwulan, Akbar & Damayanti, 2021; Şimşek & Ateş, 2022).

Technology Acceptance Models and Web 2.0 tools

With the development of Web 2.0 applications and tools and the efforts to adopt them in education, several studies have discussed the acceptance of such tools by teachers and students.

Tatli, Akbulut & Altinisik (2019) tried to investigate the effects of using Web 2.0 tools in teaching on teacher candidates' attitudes towards using technology and instructional materials in the classroom, based on TAM. The attitudes of the teacher candidates towards the use of technology and the use of instructional materials were increased after their training in a course. All the participants to the study pointed out that the use of technology in the classroom nowadays is a necessity.

Alexandrakis, Chorianopoulos & Tselios (2020) designed a TAM extension to investigate elements that influence Greek older adults' intentions to use online storytelling applications. The results of the study showed that TAM validated as a robust model, future time perspective had a positive influence on perceived ease of use, age and loneliness had no significant effect on intention to use the tools.

Turan, Küçük & Karabey (2022) investigated pre-service teachers' intentions to use gamification tools and the factors affecting their usage. The study used TAM as the research framework. The results showed that perceived self-efficacy and attitude factors had significant effects on pre-service teachers' intentions to use gamification tools. Perceived enjoyment and usefulness factors significantly affected pre-service teachers' attitudes to use the tools. Perceived self-efficacy and attitude factors had significant effects on perceived enjoyment.

Şimşek & Ateş (2022) extended the original TAM by considering the impact of tool literacy, metacognitive self-regulation, subjective norm, facilitating conditions, and institutional support to understand preservice teachers' intentions to use Web 2.0 technology in their courses. The findings of their study indicated that metacognitive self-regulation and subjective norm had an important impact on perceived ease of use and perceived usefulness, the institutional support and enabling conditions were not strongly associated with them. Perceived ease of use and perceived usefulness impact on attitude and intention to use.

Factors of the TAM model and external factors for Web 2.0 acceptance

The factors of the TAM model and external factors on which the research tools of the present study are based are presented in Table1.

Table 1. Factors of the TAM model and external factors

Factor	Description
Perceived usefulness (PU)	The term defines the extent to which an individual believes that utilizing a particular technology would enhance his/her job performance (Davis, 1986; Davis et al.). According to Davis et al. (1989) the factor is related to: a) <i>the effectiveness that the particular technology adds to the users' work</i> ; b) <i>the productivity at work as perceived by the users</i> ; and c) <i>the overall importance of the particular technology in the performance of the users' work</i> .
Perceived ease of use (PEU)	The term is used to describe the extent to which an individual believes that the use of a particular technology requires the minimum mental and physical effort for him/her (Davis, 1986; Davis et al., 1989).
Perceived enjoyment (PE)	Defined as the degree to which the use of a particular technology offers pleasure to the user, without considering any impact on his or her work (Davis et al., 1989).
Web 2.0 self-efficacy (SE)	Defines one's confidence in his/her abilities, regardless of the skills he/she may have (Bandura, 1994). Compeau & Higgins (1991) evolved the term and were the first to refer to "computer self-efficacy".
Subjective norm (SN)	Introduced as a factor by Venkatesh & Davis (2000) in a modified version of the TAM model, TAM 2. In this subjective norm defines the people who are important to the user and have an influence on his/her behaviour, such as family, peers, co-workers, etc (Sánchez-Prieto et al., 2016; Sánchez-Prieto et al., 2019).
Facilitating conditions (FC)	Venkatesh & Bala (2008) defined the term as the user's beliefs about the availability of resources and infrastructure to facilitate the utilization of a system.
Intention to use (IU)	It refers to the extent to which users will utilize a technology and helps to predict and understand users' behavior towards the utilization of a technology (Davis et al., 1989; Teo et al., 2019).

Aim and Research Questions

The aim of the study was to investigate the acceptance of Web 2.0 applications and tools by in-service teachers of Primary Education and the impact of the Covid-19 pandemic period on this acceptance. The research questions discussed are:

- What is the acceptance of Web 2.0 applications and tools in terms of perceived usefulness, perceived ease of use, perceived enjoyment, and intention to use by teachers in primary education schools?
- What are teachers' self-efficacy, subjective norm and facilitation conditions concerning the use of Web 2.0 applications and tools in their classroom?
- What is the impact of the Covid-19 pandemic period on the acceptance of Web 2.0 applications and tools?

Method

Research design and data collection

The research was a qualitative one, with data collection and analysis from semi-conducted interviews with staff of all levels of Primary Education (teachers, school principals, coordinators of educational work, B-level trainers in the field of ICTs in education). The sampling of the research was purposive by selecting specific persons to be involved to provide a multifaceted and in-depth discussion on the research questions.

Selection of the participants was based on their sex, specialty, job position, years of service and the area they work in (urban and non-urban). The participants in the research were thirteen (13) persons/educational staff of Primary Education in Achaia Prefecture, including five (5) Primary Education teachers, three (3) school directors, three (3) coordinators of educational work and two (2) B-level trainers in the field of ICTs in education. After the transcription of the recorded interviews data a thematic analysis was conducted (Panagiotakopoulos & Sarris, 2017).

Research tools

Four (4) interview guides were conducted. Each interview guide was consisted by two parts: A. Demographic data (sex, age specialty, job position, years in school service, level of training in ICTs in education) and B. questions based on the questions of the Technology Acceptance Model 2 (TAM 2) (Venkatesh & Davis, 2000) and an extension of it with the addition of external factors (Teo et al., 2010) as well as questions related to the use of Web 2.0 tools during the pandemic.

- The B part of the interview guide for teachers were consisted of 18 open-ended questions.
- The B part of the interview guide for school principals consisted of 18 open-ended questions.
- The B part of the interview guide for coordinators of educational work consisted of 20 open-ended questions.
- The B part of the interview guide for B-level trainers in the field of ICTs in education consisted of 20 open-ended questions.

Preparing the guides to avoid leading questions open-ended inquiries prioritized. All questions included encouraged thoughtful and detailed answers. The four (4) interview guides can be found in the Appendix.

Validity and Reliability

To ensure the validity and reliability of the semi-structured interview questions and the data collected, a three-member team of experts was set up to test the questions thoroughly in terms of (a) the appropriateness and exhaustiveness of the questions for the purpose of the study and (b) the appropriateness of the wording so that there are no unclear points.

Prior to data collection, pilot individual interviews were conducted with one (1) person per interview category to test the required interview time as well as the appropriateness of the wording for each question. A thematic analysis of the qualitative data was conducted (Panagiotakopoulos & Sarris, 2017). To test the reliability of the content analysis, the code reproducibility test was utilized. The term '*reproducibility*' refers to the extent to which coding by different researchers/coders yields the same results (Krippendorff, 2004).

A pilot content analysis of one interview was conducted collaboratively by three coders to discuss and agree how to define and name the codes. Then, each one of them coded the whole data separately and their coding were compared. To measure reliability of coding, the percentage of agreement (% agreement) between the three coders was used as a reliability indicator. This indicator can be considered satisfactory when its value is > 90% (Krippendorff, 2004). The percentage of agreement among the three coders in the present study was calculated with a value of 0.935 and considered satisfactory.

Participants

The demographic data regarding the participants in the study are presented in Table 2.

Table 2. Description of Participants

ID	Sex	Age	Specialty	Job Position	Years of service	Level of Training in ICTs in Education	Working area
P1	Woman	49	Teacher of Physical education	Teacher in primary education	18	A and B-Level	Urban
P2	Man	51	Teacher of ICT	Teacher in primary education	19	A and B-Level	non-urban
P3	Woman	35	Teacher	Teacher in primary education	14	A and B-Level	Urban
P4	Man	56	Teacher	B-level trainers in the field of ICTs in education	33	A and B-Level Trained trainer in the field of ICTs in education	non-urban
P5	Woman	58	Teacher	Coordinator of educational work	36	A and B-Level	non-urban
P6	Man	60	Teacher	School Director	36	A and B-Level	Urban
P7	Woman	49	Teacher	Teacher in primary education	27	A and B-Level	
P8	Man	54	Teacher	School Director	29	A and B-Level	Urban
P9	Woman	63	Teacher	Coordinator of educational work	39	A and B-Level	Urban
P10	Man	55	Teacher	B-level trainers in the field of ICTs in education	33	A and B-Level Trained trainer in the field of ICTs in education	Urban
P11	Man	61	Teacher	School Director	39	A and B-Level	non-urban
P12	Man	57	Teacher in primary Education	Coordinator of educational work	34	A and B-Level	Urban
P13	Woman	45	Teacher of English	Teacher in primary education	21	A and B-Level	non-urban

Results

Six hundred and twenty-nine (629) codes were identified during the thematic analysis of the data. Two hundred and twenty (220) were identified in the analysis of teacher interviews, one hundred and thirty-seven (137) in the analysis of school principals, one hundred and fifty-eight (158) in the analysis of interviews of coordinators of educational work, and one hundred and fourteen (114) in the analysis of interviews of B-level trainers in ICT in education. Common and different codes identified among the four categories of participants (teachers, school principals, coordinators of educational work, B-level trainers in the field of ICTs in education) that discussed below.

Teachers

The answers of the five (5) teachers participated in the study support high *perceived usefulness*. Two (2) of the teachers listed four (4) reasons supporting usefulness of Web 2.0 tools in education:

- a) to arouse students' interest
- b) to present content to students from different perspectives
- c) to offer students the opportunity to collaborate and co-create material
- d) to develop students' collective memory.

Four (4) teachers support that the use of Web 2.0 applications and tools enhances the effectiveness of their teaching due to the variety of teaching techniques utilizing Web 2.0 tools. According to the answers of two teachers this is due to five (5) reasons as Web 2.0 tools could:

- a) be utilized with students of different cognitive levels
- b) be utilized with students of different ages
- c) act as a motivation for students to learn
- d) provide additional interest and motivation for students to participate
- e) offer the experiential nature needed in teaching.

The answers of the five (5) teachers participated in the study support high *perceived ease of use*. All teachers support that the use of Web 2.0 applications and tools could be flexibly adaptable to the content and needs of their lessons as they could:

- a) meet the specific needs of each student in terms of interests, age, cognitive level
- b) support teachers to meet the needs of different groups of students in the classroom
- c) offer a variety of applications and tools to support different subject matters and lessons.

One teacher formulates three (3) conditions for the utilization and flexible adaptation of Web 2.0 applications and tools to the content and needs of teaching:

- a) the workload for teachers to utilize appropriately Web 2.0 tools and adapt them to the content and needs of their teaching
- b) the sufficient knowledge of teachers of the subject matter
- c) the long-needed time for the teacher to adapt the lesson plan utilizing Web 2.0 tools.

The answers of the five (5) teachers support also high *perceived enjoyment*. Four (4) teachers agree that the process of using Web 2.0 applications and tools in their teaching is enjoyable and could be exciting for them and their students. One teacher is not sure about that for her students when they do not have enough digital skills.

The five (5) teachers express a high level of *intention to use* Web 2.0 applications and tools. Four (4) teachers answered that they already recommend to their colleagues the use of Web 2.0 applications and tools in their teaching. One teacher answered that he would not like to interevent in his colleague's lesson.

As far as the *self-efficacy factor* is concerned, the results showed that two of the teachers agree that they feel comfortable in using Web 2.0 tools in teaching and they also are satisfied with their abilities to choose appropriate Web 2.0 tools for their teaching. The other two teachers are not sure about their abilities to use Web 2.0 tools. One teacher stated that teachers acquired enough knowledge and skills in utilizing Web 2.0 applications and tools during the pandemic and their involvement in the emergency distance teaching procedures. Additionally, he stated that the B1 level training course he attended helped him a lot. Two teachers listed three (3) reasons that were important in their efforts to acquire knowledge and skills in the utilization of Web 2.0 applications and tools in teaching:

- a) personal effort and choice as an individuals
- b) attending of training seminars
- c) help and support they received from a person who had knowledge of the utilization of Web 2.0 applications and tools.

One teacher added that many teachers bring their own equipment to the school for the needs of using Web 2.0 tools in their teaching. One teacher stressed out that his school participates in European projects and gaining knowledge and experience to bring the necessary resources to the school to be used for the acquisition of the necessary material and technical infrastructure for the use of Web 2.0 applications and tools in teaching.

As far as the *subjective norm* factor is concerned, most participants (3 teachers) agree that people important in the workplace (colleagues, school principal, coordinator of educational work, etc.) support the use of Web 2.0 tools in education and consider that people who influence the behavior of staff in the workplace, are positive about the use of Web 2.0 tools in teaching. Three teachers also stated that students like the use of Web 2.0 tools in teaching and that both the school and those responsible for the development and implementation of educational policy support the use of Web 2.0 tools in teaching and learning. Most teachers (3 teachers) state the existence of someone important in their workplace who motivates them to use web 2.0 tools and such people are:

- a) fellow teachers
- b) the teacher of ICT
- c) the coordinator of educational work
- d) the director of the school unit.

On the other hand, two (2) teachers stated that their fellow teachers do not motivate them to use Web 2.0 applications and tools in their teaching and their school principal does not motivate them to this direction as he is mainly occupied with the administrative/managing tasks of the school. One of the teachers explained that school principals and coordinators of educational work, often, although willing to support the use of web applications and tools 2.0 in teaching, however, they are not able to do it sufficiently due to:

- a) discontinuities in the formulation and implementation of educational policy in the Greek educational system
- b) non-existence of appropriate tactics for the formulation and implementation of educational policy
- c) lack of organization of the formulation and implementation of educational policy
- d) lack of substantial movements for the formulation and implementation of educational policy.

Furthermore, one teacher stated that sometimes persons responsible for the formulation and implementation of educational policy are not aware of the difficulties of everyday school life. Two (2) teachers list four (4) ways in which persons responsible for the formulation and implementation of educational policy could support the use of Web 2.0 applications and tools in teaching through:

- a) policies to disseminate the use of Web 2.0 applications and tools in teaching
- b) the organization of training courses on the use of Web 2.0 applications and tools
- c) the promotion and encouragement of the use of Web 2.0 applications and tools in the curriculum
- d) updating curricula.

Concerning the *facilitating conditions* factor, two (2) teachers supported that when they need help to use Web 2.0 tools in their teaching someone offers or can offer technical support, they have the necessary infrastructure (computer, internet, etc. etc.) in school to teach with Web 2.0 tools and training opportunities are provided in their environment. Two teachers are not sure when they need help there is someone who can offer pedagogical support. Two teachers think that when utilizing Web 2.0 tools there is difficulty in classroom management. Three teachers are not sure the Curriculum makes it difficult to utilize Web 2.0 tools in teaching.

All teachers state that they need more training on the use of Web 2.0 applications and tools in teaching and learning and four (4) teachers support that they are not provided with the necessary training opportunities, neither in number nor in content. Two (2) teachers highlighted the need for teachers

to be self-directed in their training. Teachers list four (4) possible institutions that can serve as training providers:

- a) the Ministry of Education and Religious Affairs
- b) collaborations with public or private training organizations
- c) the teachers' school community through in-school trainings under the supervision of the coordinator of educational work
- d) the University and especially the Pedagogical Departments.

Four (4) teachers stated that they need technical support for the use of Web 2.0 applications and tools in their teaching due to:

- a) the lack of technical knowledge of the teachers in primary education schools
- b) the inadequate infrastructure of the school especially in rural districts.

Two (2) teachers asked for pedagogical supports due to:

- a) the fact that ICT teachers usually support other teachers to use Web 2.0 tools but they do not have the necessary pedagogical knowledge and skills
- b) the continuous evolution and dynamics of Web 2.0 applications and tools.

Three (3) teachers support that the participation of the school in European programmes, is a very good opportunity for training in ITCs in education including Web 2.0 tools. Additionally, all teachers report difficulties in using Web 2.0 applications and tools in their teaching due to time constraints caused by the limited number of teaching hours for their lessons. Two (2) teachers note that difficulties they face also due to the demanded workload and time consume needed to plan the lessons using Web 2.0 applications and tools.

The pandemic period was a critical period that helped teachers to benefit from the advantages of the use of Web 2.0 applications and their added value to their educational work. All teachers mentioned the strong usefulness of the tools and the positive impact of their use in the emergency distance teaching and learning. Teachers said that they will continue to use Web 2.0 applications in the future as now they are aware of and familiar with their potential in education.

School principals

Two (2) principals consider that the use of Web 2.0 applications and tools in teaching is useful and can enhance the effectiveness of teaching, expressing high *perceived usefulness*. On the contrary, one (1) principal expressed the thought that the use of Web 2.0 tools in teaching should not be in a daily basis, because of the value and deep need for the in-person communication between teacher and student. According to the principals there are five (5) reasons supporting the usefulness of the utilization of Web 2.0 in teaching:

- a) it offers an alternative way of learning for students
- b) it offers pleasure to students as they learn through the utilization of various resources
- c) it makes teaching content more understandable for students
- d) it enables teachers through different ways to trigger students' interest
- e) it is easy to be utilized.

Concerning the *perceived ease of use*, two school principals consider the use of Web 2.0 applications and tools to be flexibly adaptable to the content and needs of teaching. They add two (2) conditions for the use of Web 2.0 tools to be flexibly adaptable to the content and needs of teaching:

- a) the willingness of teachers to use Web 2.0 applications and tools in teaching
- b) the flexibility they must have to overcome difficulties in their teaching in general.

Two principals listed four (4) reasons why the use of Web 2.0 applications and tools could be difficult to be adapted to the content and needs of teaching:

- a) lack of training in the use of Web 2.0 applications and tools by many teachers
- b) lack of time for preparing teaching with the use of Web 2.0 applications and tools

- c) classroom management issues that could arise
- d) lesson duration usually is not enough.

One principal listed Environmental Studies, Mathematics and Language as the lessons during which the utilization of Web 2.0 applications and tools could be suitable.

All school principals agree that the use of Web 2.0 tools in the classroom is and should be enjoyable for both students and teachers supporting in this way the strong *perceived enjoyment*.

Concerning the *self-efficacy* of teachers, one school principal stated that there are enough teachers in his school who have enough knowledge and skills to use Web 2.0 applications and tools in their teaching and they feel confident to do so. One principal stated that there are just a few teachers in his school who have enough knowledge and skills to use Web 2.0 applications and tools while, one principal noted that teachers in his school do not have enough knowledge and skills to use Web 2.0 applications and tools or they do not feel confident to do so.

As far as the status of *subjective norm*, all school principals agree that people important in the school environment as workplace (*colleagues, school principal, coordinator of educational work, etc.*) support the use of Web 2.0 tools in education. They stated that students enjoy the use of Web 2.0 tools in teaching and that themselves as directors as well as people responsible for the development and implementation of educational policy also support the use of Web 2.0 tools in teaching and learning. They stated that almost in each school there is someone who could motivate and support teachers to use web 2.0 tools. Such people are other teachers in school, the teacher of ICT, the coordinator of educational work. On the other hand, they stated that often persons responsible for the formulation and implementation of educational policy are not aware of the difficulties of everyday school life.

Concerning the *facilitating conditions*, two (2) school principals stated that the Institute of Educational Policy (IEP) and the Ministry of Education and Religious Affairs do not strongly in practice support the use of web 2 applications and tools. The training courses they offer are not always synchronized with the needs of teachers and they adopt very long procedures in decision making. All the principals, pointing out the need for the teachers to be continuously trained. They think that the training offered until now is not enough. All the principals noted that teachers in their school need technical and pedagogical support and stressed the urgent need for both kinds of support to be provided. Teachers usually lack technical knowledge and the situation of the technological infrastructure in schools often is poor and old.

Two (2) principals noted that the usefulness of using Web 2.0 applications and tools in teaching became evident during the pandemic and the emergency remote teaching period. All principals mentioned the strong usefulness of the tools and the positive impact of their use during the period of emergency remote teaching. With the help of the Web 2.0 applications, the principals supported their educational and administrative work. One (1) principal supports that for the teachers to keep use Web 2.0 tools in their teaching after the pandemic period, the infrastructure of the schools should be enhanced, and the teachers should be trained.

All school principals expressed their *intention to use* Web 2.0 applications and tools in both educational and administrative duties. They are going to motivate and promote the use of such tools in their school by teachers and they are going to support teachers. They mentioned four (4) ways of motivation that they could and will offer to their teachers:

- a) training in the use of Web 2.0 applications and tools in the context of teaching and learning
- b) design and implementation of in-school training courses
- c) gain financial resources to improve the technological infrastructure of the school
- d) provide the necessary infrastructure to teachers.

Coordinators of educational work

All the coordinators educational work reported that the use of Web 2.0 applications and tools causes an increase in the effectiveness of teaching and learning procedures showing high perceive usefulness. Two of them noted that the pedagogically appropriate way of use of Web 2.0 tools by teachers is important and affects the usefulness of the tools and the enhancement of teaching effectiveness. One coordinator of educational work reported that it is a challenge to integrate Web 2.0 applications and tools into teachers' educational practice. One other stated that if teachers do not use the tools appropriately it may lead to questionable or insignificant results in teaching and learning. One coordinator stressed out that only under certain conditions Web 2.0 applications and tools can be developed into powerful tools in teaching.

Two coordinators of educational work reported that according to their opinion most teachers do not have enough knowledge and skills to use Web 2.0 applications and tools in their teaching. They think that the *perceived ease of use* of the teachers is not very strong. One coordinator supported the idea that this low perceived ease of use is due to:

- a) a kind of skepticism of teachers started the first years of utilizing Web 2.0 applications and tools in teaching
- b) the difficulty to the creation of a critical mass of teachers who started to utilize Web 2.0 applications and tools in their teaching.

All coordinators of educational work agree that the use of Web 2.0 tools in the classroom is enjoyable for both students and teachers supporting in this way the strong *perceived enjoyment* of all members of school community.

All coordinators of educational work expressed their doubts about the *self-efficacy* of teachers in using Web 2.0 tools in classroom as they think that teachers do not have enough knowledge and skills for that. All the coordinators supported that teachers should be trained in the use of Web 2.0 applications and tools in training courses/seminars that combine the theoretical and practical part of the use of Web 2.0 applications and tools in teaching. One coordinator stressed that teacher training should include the technical aspects of each tool, considering that teacher training is the most important investment that can be made in an educational system. At the same time all the coordinators of educational work reported that limited training opportunities are provided to teachers. One coordinator supported that two (2) actions are necessary:

- a) school should be organized and become learning communities
- b) the utilization of peer observation and support among teachers in schools.

One other, asked for:

- a) technical support for the technological infrastructure in schools
- b) proper organization for the schools to acquire the necessary infrastructure.

One coordinator argued that it is necessary for a school to have a person who is exclusively involved in the technical support of the school infrastructure as there are difficulties faced by teachers when there are technical problems.

As concerning *subjective norm* all the coordinators of educational work pointed out that teachers experience difficulties related to classroom management for two (2) reasons:

- a) the manifestation of noise on the part of students
- b) the difficulty of controlling students while navigating the Internet.

One coordinator added that teachers face difficulties in collaborating with each other.

Concerning the *facilitating conditions* the coordinators of educational work agreed with the school principals especially for the teachers' needs for technical and pedagogical support and stressed out the urgent need for both kinds of support to be provided.

The coordinators of educational work answered that they carried out their tasks, collaborated with

teachers and institutions using Web 2.0 tools during the *pandemic*. All of them highlighted that the self-motivation of teachers during the pandemic and emergency remote teaching period was strong, and they improved their knowledge and skills in using Web 2.0 applications and tools in teaching.

All coordinators expressed their *intention to use* Web 2.0 applications and tools in educational, training, and administrative duties. They are going to motivate and promote the use of Web 2.0 tools by teachers, and they are going to support and educate teachers. They asked for more financial resources to design and implement training courses for teachers. They also asked for training for themselves in innovated approaches and tools in education.

B-level trainers in the field of ICTs in education

All the B-level trainers in the field of ICTs in education expressed high *perceived usefulness* and supported that the use of Web 2.0 applications and tools is useful and can enhance the effectiveness of teaching, but teachers should use the tools daily to achieve good learning results. One trainer argued that although teachers realize the usefulness of using Web 2.0 applications and tools in their teaching, they do not use them.

As far as *perceived ease of use*, trainers supported that the use of Web 2.0 tools could be flexibly adaptable to the content and needs of their lessons and one trainer added that this flexibility due to:

- a) the technical characteristics of Web 2.0 applications and tools
- b) the wide variety of Web 2.0 applications and tools which enables teachers to utilize the appropriate Web 2.0 application and tool based on the characteristics of each class and the learning objectives the teacher wants to achieve.

All trainers agreed that the use of Web 2.0 tools in the classroom offer pleasure for both students and teachers supporting in this way the *perceived enjoyment*. Teachers enjoy the use of Web 2.0 tools during their lessons with their students but also during their training in seminars.

Concerning *self-efficacy*, trainers supported that teachers do not have enough knowledge and skills to use Web 2.0 tools in their teaching. One trainer argued that teachers who have been trained in recent years are positive about using Web 2.0 tools in their teaching as they have been introduced to a variety of such tools compared to older teachers and noted that they cannot use Web 2.0 tools appropriately in their teaching due to lack of support. One trainer added that senior teachers need to acquire enough knowledge and skills to use Web 2.0 applications and tools in teaching. One trainer also noted that some teachers refuse to leave traditional teaching methods.

Concerning the *subjective norm*, all trainers claimed that people who are important in the teachers' workplace motivate them to use Web 2.0 applications and tools are the principal, the fellow teachers, and the ICT teacher. Regarding the role of the principal in motivating teachers, one trainer noted that the actions to buy the appropriate infrastructure by the principal is also a form of motivation for teachers. All the trainers stated that they motivate and suggest to teachers to use Web 2.0 applications and tools in their teaching. The trainers argued that the persons responsible for the formulation and implementation of educational policy support the use of Web 2.0 applications and tools in education and suggested three (3) ways of support:

- a) more teaching hours for the ICT lessons
- b) the persons in charge should act directly by taking appropriate decisions
- c) the authorities can support by providing low-cost access and connection to the internet for teachers and students.

One trainer put emphasis on the continuous training teachers need and on in-school training activities that should be carried out. One trainer mentioned the necessity of creating teams of teachers who will offer pedagogical and technical support in person or at a distance to other teachers.

Concerning *facilitating conditions*, all trainers stated that the Primary Schools in the region lack the necessary material and technical infrastructure, addressing three (3) problems:

- a) the computers in school laboratories are quite old
- b) the computers need software upgrading
- c) there are no projectors and computers available in every classroom.

The trainers stated that the school principal plays the most important role in the availability of the necessary infrastructure. The same view, that there are difficulties due to the lack of the necessary material and technical infrastructure, is shared by all trainers.

All trainers expressed their *intention to use* Web 2.0 applications and tools in educational and training, activities, and duties. They are going to motivate and promote the use of Web 2.0 tools by teachers, and they are going to educate teachers as much as they can. They also asked for more financial resources to design and implement training courses for teachers and training for themselves on innovated approaches and tools in education.

The trainers supported that they used a lot of Web 2.0 tools during the pandemic. All of them highlighted the strong impact of Web 2.0 tools during the pandemic and emergency remote teaching period as teachers improved their knowledge and skills in using Web 2.0 applications and tools in teaching.

Discussion and Conclusion

Web 2.0 applications and tools offer several advantages during their use in education. Many studies have shown their positive contribution to the educational process, since they are tools of interaction, collaboration and communication. In the present study thirteen (13) persons/educational staff of Primary Education in Achaia Prefecture, including five (5) Primary Education teachers, three (3) school directors, three (3) coordinators of educational work and two (2) B-level trainers in the field of ICTs in education were interviewed in order to discuss the acceptance of Web 2.0 applications and tools in terms of perceived usefulness, perceived ease of use, perceived enjoyment, and intention to use by teachers in primary education schools, the teachers' self-efficacy, subjective norm and facilitation conditions concerning the use of Web 2.0 applications and tools in their classroom as well as the impact of the Covid-19 pandemic period on the acceptance of such tools.

The perceived usefulness of Web 2.0 tools for teachers at primary schools is high according to their answers. School principals, coordinators of educational work and teacher trainers in ICT in education agree that teachers realize the usefulness of the tools in teaching and learning. Their perceived usefulness is also high for their educational, training, managerial and administrative activities, and duties. They support that Web 2.0 tools can offer an alternative way of learning for students and pleasure to students as they learn through the utilization of various resources and enables teachers through different ways to trigger students' interest.

Teachers express high levels of perceived ease of use but school principals and coordinators of educational work express doubts for that. They support that the perceived ease of use is related with the willingness of teachers to use Web 2.0 tools in teaching as well as with the flexibility they must have to overcome difficulties in their teaching in general. They add that lack of training in the use of Web 2.0 tools by many teachers, lack of time for preparing teaching with the use of Web 2.0 tool and the limited lesson duration usually reflect on the teachers' perceived ease of use.

All participants agree that the use of Web 2.0 applications and tools in the classroom is and should be enjoyable for both students and teachers supporting in this way the strong perceived enjoyment.

Teachers supported their self-efficacy in using Web 2.0 tools in their lesson, but school principals and coordinators of educational work stated that most teachers have enough knowledge and skills to use Web 2.0 applications and tools in their teaching and they feel confident to do so.

As far as the status of subjective norm is concerned, all participants agree that people important in the school environment as workplace (colleagues, school principal, coordinator of educational work, etc.) support the use of Web 2.0 tools in education. They stated that people responsible for the development and implementation of educational policy support the use of Web 2.0 tools in teaching and learning. They think that almost in each school there is someone who could motivate and support teachers to use web 2.0 tools. Such people are other teachers in school, the teacher of ICT, the coordinator of educational work. On the other hand, they stated that often persons responsible for the formulation and implementation of educational policy are not aware of the difficulties of everyday school life to support teachers effectively and according to the appropriate way.

Concerning the facilitating conditions, teachers supported that when they need help to use Web 2.0 tools in their teaching someone offers or can offer technical support, they have the necessary infrastructure (computer, internet, etc. etc.) in school to teach with Web 2.0 tools and training opportunities are provided in their environment. Teachers are not sure that when they need help there is someone who can offer pedagogical support. Teachers ask for support from the Ministry of Education and Religious Affairs, collaborations with public or private training organizations, the teachers' school community through in-school trainings under the supervision of the coordinator of educational work, the University and especially the Pedagogical Departments. They ask for both technical and pedagogical support for the use of Web 2.0 applications and tools in their teaching.

School principals highlight the role the Institute of Educational Policy (IEP) and the Ministry of Education and Religious Affairs should have for the support the use of web 2 applications and tools in practice. The training courses they offer are not always synchronized with the needs of teachers and they adopt very long procedures in decision making. All participants in the research pointing out the need for the teachers to be continuously trained as the training offered until now is not enough. School principals, coordinators of educational work and teachers' trainers agree with teachers that they need technical and pedagogical support and stress the urgent need for both kinds of support to be provided as teachers usually lack technical knowledge and the situation of the technological infrastructure in schools often is poor and old. The participation of schools in European programs, mentioned as a very good opportunity for training in ITCs in education including Web 2.0 tools.

Teachers expressed their intention to use Web 2.0 applications and tools during their lessons. And most of them recommend to their colleagues the use of Web 2.0 applications and tools in their teaching. School principals, coordinators of educational work and teachers' trainers expressed their doubts that teachers will use such tools in their teaching. School principals, coordinators of educational work and teachers' trainers expressed their intention to use Web 2.0 tools during their duties and they are going to motivate and promote the use of such tools by teachers, and they are going to support teachers. They mentioned that ways of motivation that they could and will offer to their teachers concerning training in the use of Web 2.0 tools in the context of teaching and learning, design and implementation of in-school training courses, gain financial resources to improve the technological infrastructure of the school, provide the necessary infrastructure to teachers.

All participants in the study highlighted the usefulness of using Web 2.0 applications and tools in teaching during the pandemic and the emergency remote teaching period. All mentioned the strong usefulness of the tools and the positive impact of their use during that period on all members of the schools' community at all levels of activities and duties. Additionally, all participants argued that during the pandemic the use of such tools in education was just the begging and teachers need training and support to keep using such applications effectively and without stress, as emerged from many other studies during and after the pandemic period (Koutromanos et al., 2022; Pierri et al.; Zhang, 2021).

Limitations and Future Research Work

The results and the conclusions emerged from the present study cannot be generalized and be representative due to the convenient sampling method utilized, the small number of participants per category interviewed and the limited geographical area participants came from (western Greece prefecture). The interviews took place after a short period of time after the pandemic that might affect the answers.

In a future study, participants chosen randomly and by a representative data collection procedure coming from all over Greece will participate. Teachers of both Primary and Secondary Education in the Greece should offer more complete and accurate data and results. Semi-structured interviews from the parents of the students at the primary school could be taken to investigate their own perspective on the use of Web 2.0 applications and tools in the education of their children. Additionally, observation in the classroom by researchers should support conclusions concerning the actual use of Web 2.0 applications and tools in primary education in Greece.

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Appendix A. Interview Guides

Table A1. Interview guide for Teachers in Primary Education

<ol style="list-style-type: none"> 1. Have you been trained in the utilization of ICTs in education and in particular in the utilization of web 2.0 applications and tools in teaching? 2. Do you think that the use of web 2.0 applications and tools is useful and can enhance the effectiveness of your teaching? 3. Do you consider the use of web 2.0 applications and tools to be flexibly adaptable to the content and needs of your teaching? 4. Do you think that the use of web 2.0 applications and tools in your teaching could be enjoyable for your students? 5. Do you think that the use of web 2.0 applications and tools in your teaching could arouse the curiosity and interest of your students? 6. Do you think that you have enough knowledge and skills to use web 2.0 applications and tools in your teaching? 7. Do you think that you need additional training to use web 2.0 applications and tools in your teaching? Do you think that you are provided with such training opportunities? 8. Do you think that you need support to use web 2.0 applications and tools in your teaching? If so, what kind of support (technical, pedagogical)? 9. Do you think that the people who are important to you in your workplace motivate you to use web 2.0 applications and tools in teaching? 10. Do you think that the people responsible for policy making and implementing policy in education support the use of web 2.0 applications and tools in teaching? If yes, in what way? 11. Do you think that the school unit you serve has the necessary material and technical infrastructure for the use of web 2.0 applications and tools in teaching? 12. What difficulties do you face when using web 2.0 applications and tools in your teaching (classroom management, technical problems, time constraints due to workload and Program Study)? 13. Do you use web 2.0 applications and tools in your teaching and in collaborations with other colleagues? 14. Do you recommend to your colleagues the use of web 2.0 applications and tools in their teaching? 15. Which web 2.0 applications and tools do you use? 16. Which web 2.0 applications and tools do you consider suitable for use in Primary Education? 17. Do you feel that the pandemic period characterized by the emergency distance teaching has affected your engagement with web 2.0 applications and tools? 18. Do you think you will continue to use web 2.0 applications and tools that you used during the pandemic after that?
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Table A2. Interview guide for School Principals in Primary Education

<ol style="list-style-type: none"> 1. Have you been trained in the utilization of ICTs in education and in particular in the utilization of web 2.0 applications and tools in teaching? 2. Do you think that the use of web 2.0 applications and tools is useful and can enhance the effectiveness of teaching? 3. Do you consider the use of web 2.0 applications and tools to be flexibly adaptable to the content and needs of teaching each time? 4. Do you think that the use of web 2.0 applications and tools in teaching could be enjoyable for students? 5. Do you think that the use of web 2.0 applications and tools in teaching could arouse the curiosity and interest of students? 6. Do you think that teachers have enough knowledge and skills to use web 2.0 applications and tools in their teaching? 7. Do you think that teachers need additional training to use web 2.0 applications and tools in your teaching? Do you think that they are provided with such training opportunities? 8. Do you think that teachers need support to use web 2.0 applications and tools in teaching? If yes, what kind of support (technical, pedagogical)? 9. Do you think that the people who are important to teachers in workplace motivate them to use web 2.0 applications and tools in teaching? 10. Do you think that the people responsible for policy making and implementing policy in education support the use of web 2.0 applications and tools in teaching? If yes, in what way? 11. Do you think that the school unit you serve has the necessary material and technical infrastructure for the use of web 2.0 applications and tools in teaching? 12. What difficulties do teachers face when using web 2.0 applications and tools in teaching (classroom management, technical problems, time constraints due to workload and Program Study)? 13. Do you use web 2.0 applications and tools in your collaboration with teachers of the school and other colleagues? 14. Do you recommend to your colleagues the use of web 2.0 applications and tools in their teaching? 15. Which web 2.0 applications and tools do you consider suitable for use in Primary Education? 16. Do you feel that the pandemic period characterized by the emergency distance teaching has affected teachers' engagement with web 2.0 applications and tools? 17. Do you think teachers will continue to use web 2.0 applications and tools that you used during the pandemic after that? 18. Do you think that during the pandemic period the use of web 2.0 applications and tools was important for the implementation of your administrative duties? If yes, will you continue to use them after the pandemic?
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Table A3. Interview guide for Coordinators of educational work in Primary Education

<ol style="list-style-type: none"> 1. Have you been adequately trained in the utilization of ICTs in education and in particular in the utilization of web 2.0 applications and tools in teaching? 2. Have you participated as a trainer in the use of ICT in education and in particular in the use of web 2.0 applications and tools in teaching? 3. Do you think that the use of web 2.0 applications and tools is useful and can enhance the effectiveness of teaching? 4. Do you consider the use of web 2.0 applications and tools to be flexibly adaptable to the content and needs of teaching? 5. Do you think that the use of web 2.0 applications and tools in teaching could be enjoyable for students? 6. Do you think that the use of web 2.0 tools in teaching could arouse the curiosity and interest of students? 7. Do you think that teachers have enough knowledge and skills to use web 2.0 applications and tools in their teaching? 8. Do you think that teachers need additional training to use web 2.0 applications and tools in your teaching? Do you think that they are provided with such training opportunities? 9. Do you think that teachers need support to use web 2.0 applications and tools in teaching? If yes, what kind of support (technical, pedagogical)? 10. Do you think that the people who are important to teachers in workplace motivate them to use web 2.0 tools in teaching? 11. Do you think that the people responsible for policy making and implementing policy in education support the use of web 2.0 applications and tools in teaching? If yes, in what way? 12. Do you think that the school units have the necessary material and technical infrastructure for the use of web 2.0 applications and tools in teaching? 13. What difficulties do teachers face when using web 2.0 applications and tools in teaching (classroom management, technical problems, time constraints due to workload and Program Study)? 14. Do you use web 2.0 applications and tools to fulfill your duties as a coordinator of educational work? 15. Do you recommend to teachers the use of web 2.0 applications and tools in their teaching? 16. Which web 2.0 applications and tools do you use? 17. Which web 2.0 applications and tools do you consider suitable for use in Primary Education? 18. Do you feel that the pandemic period characterized by the emergency distance teaching has affected teachers' engagement with web 2.0 applications and tools? 19. Do you think teachers will continue to use web 2.0 applications and tools that you used during the pandemic after that? 20. Do you think that during the pandemic period the use of web 2.0 applications and tools was important for the implementation of your duties and your cooperation with teachers and schools? If yes, will you continue to use them after the pandemic?
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Table A4. Interview guide for B-level trainers in the field of ICTs in education in Primary Education

1. Have you been trained in the utilization of ICTs in education and in particular in the utilization of web 2.0 tools?
2. Have you been trained in the utilization of ICTs in education and in the utilization of web 2.0 tools in teaching?
3. Do the training activities you offer to teachers include the training of teachers in the use of web 2.0 applications and tools in teaching? If yes, in which tools do you train them?
3. Do you think that the use of web 2.0 applications and tools is useful and can enhance the effectiveness of teaching?
4. Do you consider the use of web 2.0 applications and tools to be flexibly adaptable to the content and needs of teaching?
5. Do you think that the use of web 2.0 applications and tools in teaching could be enjoyable for students?
6. Do you think that the use of web 2.0 tools in teaching could arouse the curiosity and interest of students?
7. Do you think that teachers have enough knowledge and skills to use web 2.0 applications and tools in their teaching?
8. Do you think that teachers need additional training to use web 2.0 applications and tools in your teaching? Do you think that they are provided with such training opportunities?
9. Do you think that teachers need support to use web 2.0 applications and tools in teaching? If yes, what kind of support?
10. Do you think that the people who are important to teachers in workplace motivate them to use web 2.0 and tools?
11. Do you think that the people responsible for policy making and implementing policy in education support the use of web 2.0 applications and tools in teaching? If yes, in what way?
12. Do you think that the school units have the necessary material and technical infrastructure for the use of web 2.0 applications and tools in teaching?
13. What difficulties do teachers face when using web 2.0 applications and tools in teaching (classroom management, technical problems, time constraints due to workload and Program Study)?
14. Do you use web 2.0 applications and tools to fulfill your duties as a coordinator of educational work?
15. Do you recommend to teachers the use of web 2.0 applications and tools in their teaching?
16. Which web 2.0 applications and tools do you use?
17. Which web 2.0 applications and tools do you consider suitable for use in Primary Education?
18. Do you feel that the pandemic period characterized by the emergency distance teaching has affected teachers' engagement with web 2.0 applications and tools?
19. Do you think teachers will continue to use web 2.0 applications and tools that you used during the pandemic after that?
20. Do you think that during the period of the pandemic the use of web 2.0 tools was important for the implementation of your training activities and your cooperation with teachers and schools? If yes, will you continue to use them after the pandemic?

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