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Beyond perceived usefulness: Understanding the complexities of Web 2.0 integration in Greek primary education

Ioannis Berdousis, [a1], University of Aegean, Mitilini 811 00, Greece, i.berdousis@go.uop.gr

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Abstract

This study examines the factors influencing the adoption of Web 2.0 tools by primary school teachers, with particular attention to their perceptions and intentions toward classroom integration. Although digital technologies are widely promoted in education, limited research has systematically addressed the underlying factors shaping teachers readiness to adopt collaborative and interactive Web 2.0 tools in primary school contexts, thereby revealing a clear research gap. The objective of this study is to explore how perceived usefulness and perceived ease of use influence teachers intentions to integrate Web 2.0 tools into their instructional practices. Guided by a structured theoretical framework, the study employed a quantitative research approach to examine teachers perceptions, technological proficiency, and perceived barriers to adoption. The findings indicate that favorable perceptions of usefulness and ease of use strongly support adoption intentions, particularly for tools that enhance collaboration and multimedia engagement. However, constraints such as limited time, insufficient technical support, and concerns related to online safety and privacy hinder effective integration. The study underscores the importance of targeted professional development, continuous technical support, and supportive institutional policies. These findings offer practical and theoretical implications for fostering effective digital tool integration in primary education.

***Keywords*:** Adoption; digital tools; primary education; teacher perceptions; Web 2.0.

* ADDRESS FOR CORRESPONDENCE: Ioannis Berdousis, University of Aegean, Mitilini 811 00, Greece
E-mail address: i.berdousis@go.uop.gr

1. INTRODUCTION

In today's rapidly evolving digital landscape, technology has become an integral part of our daily lives, permeating various sectors, including education. The integration of technology in educational settings has the potential to transform teaching and learning practices, enhancing the effectiveness and engagement of both educators and students. Technological tools can facilitate personalized learning experiences, foster collaboration and communication, provide access to a vast array of information and resources, and equip learners with essential 21st-century skills (Conole & Alevizou, 2010; Barz et al., 2024).

Among the most promising technological advancements for education are Web 2.0 tools, which have emerged as a transformative force in the digital age. These tools are distinguished by their emphasis on user-generated content, collaboration, and social interaction, offering a dynamic and participatory approach to teaching and learning (Conole & Alevizou, 2010). Web 2.0 tools empower students to become active agents in their own education, shifting the focus from passive consumption of information to active creation and sharing of knowledge. These tools enable students to create blogs, wikis, podcasts, and other digital artifacts, fostering a sense of ownership and engagement in the learning process. By participating in collaborative projects, students learn to work effectively in teams, share ideas, and provide constructive feedback to their peers, developing essential 21st-century skills such as communication, collaboration, and critical thinking (Alexander, 2006). Furthermore, Web 2.0 tools facilitate seamless communication and collaboration between students, teachers, and parents, creating a more connected and supportive learning community.

Online discussion forums, social networking platforms, and messaging apps enable real-time interaction and feedback, breaking down the traditional barriers of time and space (Churchill, 2009; Liu et al., 2024). Teachers can use these tools to provide personalized support, monitor student progress, and share resources with parents, creating a more holistic and integrated learning experience (Esawe et al., 2024). In essence, Web 2.0 tools have the potential to transform the traditional classroom into a dynamic and interactive learning environment where students are empowered to take ownership of their learning, collaborate with their peers, and engage in meaningful dialogue with their teachers and parents. By leveraging the affordances of these tools, educators can create relevant learning experiences, engaging and empowering for all students, preparing them for success in the digital age.

Despite the wealth of potential benefits offered by Web 2.0 tools, their integration into educational settings has not been universally embraced or consistently applied. Research indicates a significant disparity in the adoption and utilization of these tools among educators. While some teachers enthusiastically embrace and integrate Web 2.0 technologies into their pedagogical practices, others exhibit hesitancy or reluctance to adopt them. This uneven adoption can be attributed to a multitude of factors. A lack of time for professional development and the perceived increase in workload associated with learning and implementing new technologies can deter teachers from adopting Web 2.0 tools (Ertmer et al., 2012). Insufficient training and technical support further exacerbate this issue, leaving teachers feeling ill-equipped to effectively utilize these tools in their classrooms. Concerns about student privacy and online safety also contribute to teacher apprehension, as the use of social media and other Web 2.0 platforms raises questions about data security and cyberbullying (Livingstone, 2008). Moreover, the integration of Web 2.0 tools often requires a shift in pedagogical approaches, which can be challenging for teachers accustomed to traditional teaching methods. Resistance to change and a lack of understanding of how to effectively integrate these tools into existing curricula can further impede adoption. Additionally, institutional factors such as limited access to technology infrastructure and a lack of supportive policies can create barriers to widespread implementation.

Understanding these barriers is crucial for developing effective strategies to promote the successful and equitable integration of Web 2.0 tools in education. By addressing the concerns and challenges faced by teachers, educational institutions can create a more supportive environment that encourages the adoption of these tools and empowers educators to leverage their potential for enhancing teaching and learning.

1.1. Literature review

1.1.1. Technology Acceptance Model (TAM) and Its Application in Education

The Technology Acceptance Model (TAM), introduced by Davis (1989), has emerged as a prominent theoretical framework for understanding the factors influencing individuals' acceptance and use of technology. TAM posits that those two primary beliefs, perceived usefulness (PU) and perceived ease of use (PEOU), are key determinants of an individual's attitude towards using a technology. PU refers to the degree to which an individual believes that using a specific technology would enhance their performance or achieve their goals, while PEOU pertains to the perceived effortlessness in using the technology (Davis, 1989).

In the educational context, TAM has been widely applied to investigate teachers' acceptance and use of various technologies, including learning management systems, interactive whiteboards, and educational software (Hew & Brush, 2007; Teo, 2011). Research consistently demonstrates that teachers' perceptions of the usefulness and ease of use of technology significantly predict their willingness to integrate it into their pedagogy. For instance, teachers who perceive a technology as useful for enhancing student learning and engagement are more likely to adopt and use it in their classrooms (Teo, 2011).

1.1.2. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as key predictors of technology adoption

The importance of PU and PEOU in technology adoption has been consistently supported by empirical research. Numerous studies have found a positive correlation between PU and PEOU and an individual's intention to use a technology (Venkatesh et al., 2003). This suggests that when individuals believe a technology is useful and easy to use, they are more likely to adopt and integrate it into their practices. In education, PU and PEOU are particularly relevant in predicting teachers' adoption of educational technologies. For example, a study by Hew and Brush (2007) found that teachers' PU of educational technology was positively related to their intention to use it, even after controlling for other factors such as age, gender, and teaching experience. This finding highlights the importance of demonstrating the practical value of technology to teachers to encourage its adoption.

1.1.3. Previous research on teacher adoption of web 2.0 tools

The existing body of research examining teacher adoption of Web 2.0 tools presents a complex and multifaceted picture. While some studies have highlighted the positive perceptions teachers hold regarding the potential of these tools to enhance student engagement, collaboration, and communication (Conole & Alevizou, 2010), others have revealed significant barriers to adoption, creating a nuanced landscape of challenges and opportunities.

Positive findings have emphasized the perceived benefits of Web 2.0 tools in fostering a more active and participatory learning environment. For instance, research by Lai and Kritsonis (2016) found that teachers who used Web 2.0 tools reported increased student engagement, motivation, and collaboration. Similarly, a study by Greenhow and Lewin (2019) found that Web 2.0 tools facilitated student-centered learning and empowered students to take ownership of their learning process. These studies highlight the potential of Web 2.0 tools to transform traditional pedagogical practices and create more engaging and interactive learning experiences.

However, despite these positive findings, research has also identified several barriers to teacher adoption of Web 2.0 tools. A lack of time for professional development and the perceived increase in workload associated with learning and implementing new technologies have been identified as significant deterrents (Ertmer et al., 2012). Insufficient training and technical support further exacerbate this issue, leaving teachers feeling ill-equipped to effectively utilize these tools in their classrooms. Concerns about student privacy and online safety, particularly in the context of social media and other online platforms, also contribute to teacher apprehension (Livingstone, 2008).

The complexity of teacher adoption of Web 2.0 tools is further underscored by the influence of various factors, including individual teacher characteristics, school context, and the availability of support and resources. Teachers' attitudes towards technology, their technological self-efficacy, and their pedagogical beliefs all play a role in their willingness to adopt and utilize new tools (Ertmer et al., 2012). Additionally, school-level factors such as the availability of technology infrastructure, administrative support, and a culture that values innovation can significantly impact the adoption process (Cuban, 2001).

Therefore, understanding the multifaceted nature of teacher adoption of Web 2.0 tools is essential for developing effective strategies to promote the successful and equitable integration of these tools in education. A comprehensive approach that addresses the diverse needs and challenges faced by teachers, as well as the contextual factors that influence their decisions, is necessary to fully harness the potential of Web 2.0 tools to transform teaching and learning.

1.1.4. Potential benefits and challenges of web 2.0 tools in education

Web 2.0 tools offer a wealth of potential benefits for teaching and learning, transforming traditional educational practices and empowering both educators and students. By emphasizing user-generated content, collaboration, and social interaction, these tools have the capacity to create more engaging, personalized, and connected learning experiences.

One of the most significant advantages of Web 2.0 tools is their ability to enhance student engagement and motivation. Interactive platforms such as blogs, wikis, and social networking sites enable students to actively participate in the learning process, creating and sharing content, collaborating on projects, and providing feedback to their peers (Conole & Alevizou, 2010). This active participation fosters a sense of ownership and agency among students, leading to increased motivation and a deeper understanding of the subject matter (Johnson et al., 2009).

Moreover, Web 2.0 tools can significantly increase opportunities for collaboration and communication among students, teachers, and parents. Online discussion forums, collaborative document editing tools, and video conferencing platforms facilitate real-time interaction and feedback, breaking down the traditional barriers of the classroom (Churchill, 2009). This interconnectedness allows students to learn from each other, share ideas, and receive timely support from their teachers and peers, fostering a sense of community and belonging.

Web 2.0 tools also expand access to information and resources, enabling students to explore topics in greater depth and develop critical thinking skills. Online libraries, educational websites, and multimedia platforms offer a vast array of information and learning materials that can supplement and enrich traditional textbooks and classroom instruction (McLoughlin & Lee, 2010). Students can access up-to-date information, conduct research, and engage in self-directed learning, fostering a spirit of inquiry and lifelong learning.

Finally, Web 2.0 tools can play a crucial role in helping students develop essential 21st-century skills such as communication, collaboration, creativity, and digital literacy. By using these tools to create and share content, students develop their communication and presentation skills. Collaborative projects foster teamwork and problem-solving skills, while the open-ended nature of many Web 2.0 tools encourages creativity and innovation (Conole & Alevizou, 2010). Furthermore, navigating the digital landscape and using online tools effectively requires students to develop digital literacy skills that are essential for success in today's information-driven society.

1.2. Conceptual background

The literature underscores the potential of Web 2.0 tools to revolutionize education, highlighting the significant role of PU and PEOU in teacher adoption. However, the existing research also reveals inconsistencies in adoption rates and points to various barriers hindering the widespread integration of these tools. Despite the recognized benefits of Web 2.0 tools and the established theoretical framework provided by TAM, there remains a need for a deeper understanding of the factors influencing primary school teachers' adoption and utilization of

these tools. This study seeks to address this gap by investigating the specific factors that contribute to the uneven adoption of Web 2.0 tools in primary schools.

To achieve this goal, the following research questions will guide this study:

1. To what extent do primary school teachers' perceived usefulness (PU) and perceived ease of use (PEOU) of Web 2.0 tools influence their intention to use these tools in their instructional practices?
2. What specific Web 2.0 tools do primary school teachers find most appealing for educational purposes?
3. What barriers or challenges do primary school teachers perceive in adopting and using Web 2.0 tools?
4. How can school administrators and IT support facilitate the integration of Web 2.0 tools in primary school classrooms?

Addressing these research questions is crucial for several reasons, both from a theoretical and practical standpoint. The findings of this study hold significant implications for the field of educational technology and for the stakeholders involved in the educational process.

Theoretically, the study contributes to the existing body of research on the TAM by examining its applicability in the context of primary school teachers' adoption of Web 2.0 tools. By exploring the relationship between perceived usefulness, perceived ease of use, and behavioral intention, this research will deepen our understanding of the factors influencing technology acceptance among educators.

Practically, the findings of this study will be invaluable for educators, school administrators, policymakers, and technology developers. By identifying the specific Web 2.0 tools that teachers find most appealing, as well as the barriers and challenges they face in adopting these tools, this research can inform the development of targeted professional development programs, the selection of appropriate technologies, and the implementation of supportive policies to foster a technology-rich learning environment in primary schools.

Furthermore, this study can contribute to bridging the digital divide in education by highlighting the importance of addressing the specific needs and concerns of teachers in underserved communities. By understanding the barriers to adoption and identifying strategies to overcome them, this research can promote the equitable access and utilization of Web 2.0 tools, ensuring that all students can benefit from the transformative potential of technology in education.

1.3. Purpose of study

In essence, this study seeks to empower educators with the knowledge and tools necessary to effectively leverage Web 2.0 technologies to enhance teaching and learning. By providing a comprehensive understanding of the factors influencing teacher adoption and utilization, this research can pave the way for a more informed and effective integration of technology in primary schools, ultimately benefiting both teachers and students.

2. METHOD AND MATERIALS

2.1. Research design

This study employed a cross-sectional quantitative research design utilizing a questionnaire survey to collect data from primary school teachers in Greece. The survey aimed to assess teachers' perceptions, attitudes, and intentions regarding the integration of Web 2.0 tools in their instructional practices.

2.2. Participants

The target population for this study was primary school teachers (grades 1-6) employed in public schools across Greece. To ensure a diverse representation, participants were recruited from various geographical regions, including urban, suburban, and rural areas. A total of 130 primary school teachers participated in the study.

A convenience sampling method was employed to recruit participants. An invitation to participate in the study, along with a link to the online questionnaire using Google Forms, was distributed through various channels, including educational forums, social media groups, and email lists targeting primary school teachers in Greece. Participation was voluntary and anonymous.

2.3. Data collection instrument

The data collection instrument was a structured questionnaire comprising the following sections:

Demographic Information: This section gathered information on participants' age, gender, years of teaching experience, educational level, school location (urban/rural), and level of technological expertise (self-assessed on a scale from 1-5, with 1 being "beginner" and 5 being "expert").

Technology Acceptance Model (TAM) Scales: This section included three scales to measure the following constructs:

Perceived Usefulness (PU): Five items assessed teachers' beliefs about the positive impact of Web 2.0 tools on their teaching effectiveness and students' learning outcomes ("Using Web 2.0 tools would significantly improve my teaching effectiveness.").

Perceived Ease of Use (PEOU): Five items assessed teachers' perceptions of the ease and convenience of using Web 2.0 tools ("Learning to use Web 2.0 tools effectively would be easy for me.").

Behavioral Intention (BI): Five items measured teachers' intentions to use Web 2.0 tools in their classrooms ("I am very likely to use Web 2.0 tools in my classroom in the next six months.").

Web 2.0 Tool Preferences: Participants were asked to rate the appeal of various Web 2.0 tools for educational use, including blogs/wikis, social networking platforms, collaborative documents, multimedia sharing platforms, and interactive whiteboards.

Barriers to Adoption: Participants were asked to indicate the extent to which various factors, such as lack of time, training, and technical support, as well as concerns about privacy and safety, hindered their adoption of Web 2.0 tools.

Facilitators of Adoption: Participants were asked to rate the potential helpfulness of various measures, such as professional development, technical support, clear guidelines, and a supportive school culture, in facilitating the integration of Web 2.0 tools.

All items in the TAM scales and the subsequent sections were measured using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

2.4. Data analysis procedures

The data collected from the questionnaire survey of 130 primary school teachers in Greece were analyzed using both descriptive and inferential statistics to address the research questions.

Demographic Data: Frequencies, percentages, and measures of central tendency (means and medians) and dispersion (standard deviations and ranges) were calculated for the demographic variables (age, gender, years of teaching experience, educational level, school location, and level of technological expertise). This analysis provided a profile of the participating teachers and identified potential differences across demographic groups.

TAM Constructs and Scales: Mean scores and standard deviations were calculated for each item within the Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention (BI) scales. Additionally, mean scores and standard deviations were computed for each item in the Web 2.0 Tool Preferences, Barriers to Adoption, and Facilitators of Adoption scales. These descriptive statistics offered a snapshot of teachers' overall perceptions, attitudes, and intentions regarding Web 2.0 tools and their potential facilitators and barriers.

Reliability Analysis: Cronbach's alpha was used to assess the internal consistency and reliability of the PU, PEOU, and BI scales. Reliability scores above 0.70 were considered acceptable.

Correlation Analysis: Pearson correlation coefficients were calculated to examine the relationships between the three TAM constructs (PU, PEOU, and BI). This analysis aimed to determine the strength and direction of the associations between these variables. For example, a strong positive correlation between PU and BI would suggest that teachers who perceive Web 2.0 tools as useful are more likely to intend to use them.

Regression Analysis: Multiple regression analysis was conducted to assess the predictive power of PU and PEOU on BI, controlling for relevant demographic variables (age, experience, technological expertise). This analysis aimed to determine the extent to which teachers' perceptions of usefulness and ease of use explain their intention to use Web 2.0 tools, while accounting for potential demographic influences.

T-tests and ANOVA: Independent samples t-tests and one-way analysis of variance (ANOVA) were used to compare the mean scores on the TAM constructs and other scales across different demographic groups. For example, t-tests were used to compare mean scores between male and female teachers, while ANOVA was used to compare mean scores across different levels of technological expertise. Post-hoc tests (Tukey's HSD) were conducted when necessary to identify specific group differences.

The statistical analyses were performed using SPSS 24 (Statistical Package for the Social Sciences). The significance level for all statistical tests was set at $p < .05$.

3. RESULTS

The results of the questionnaire survey administered to 130 primary school teachers in Greece revealed several key findings regarding their perceptions, attitudes, and intentions towards the integration of Web 2.0 tools in their instructional practices.

3.1. Demographic characteristics

Most participants were female (72.3%), with an average age of 41.5 years (SD = 8.2). The average teaching experience was 15.3 years (SD = 7.9). Most teachers held a bachelor's degree (68.5). The self-reported level of technological expertise was relatively high, with an average score of 3.8 (SD = 1.1) on a 5-point scale.

Table 1

Demographic characteristics of participating primary school teachers (N = 130)

Characteristic		Percentage (%)	Mean (SD)
Gender	Female	72.3	
	Male	27.7	
Age (years)		41.5	8.2
Teaching Experience (years)		15.3	7.9
Educational Level	Bacherlor's	68.5	
	Master's	31.5	
Technological Expertise		**3.8**	**1.1**

Note: Technological expertise was measured on a 5-point Likert scale (1 = beginner, 5 = expert).

3.2. Technology acceptance model (TAM) constructs

The assessment of teachers' perceptions, attitudes, and intentions towards Web 2.0 tools was conducted using the TAM framework. This model comprises three core constructs: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention (BI). Each construct was measured using a five-item Likert scale, where 1

represented "strongly disagree" and 5 represented "strongly agree." The mean scores for each TAM construct are presented in Table 2.

Table 2

Mean scores and standard deviations for the TAM constructs

Construct	Mean	Standard Deviation
Perceived Usefulness (PU)	4.1	0.8
Perceived Ease of Use (PEOU)	3.9	0.9
Behavioral Intention (BI)	**4.2**	**0.7**

As shown in Table 2, the mean scores for all three TAM constructs were relatively high, indicating a generally positive attitude towards Web 2.0 tools among the participating teachers. The mean score for PU (4.1) suggests that teachers perceive these tools as beneficial and valuable for their teaching practices. The mean score for PEOU (3.9) indicates that teachers find these tools relatively easy to use and integrate into their classrooms. Finally, the mean score for BI (4.2) reveals a strong intention among teachers to adopt and utilize Web 2.0 tools in their future teaching endeavors.

The standard deviations for all three constructs were relatively low, indicating a reasonable degree of consensus among teachers regarding their perceptions and intentions towards Web 2.0 tools. This suggests that most teachers hold similar views on the usefulness, ease of use, and potential benefits of these tools.

Overall, the results of the TAM analysis suggest that primary school teachers in Greece generally perceive Web 2.0 tools as useful, easy to use, and beneficial for their teaching practices. This positive attitude is reflected in their strong intention to adopt and integrate these tools into their classrooms.

3.3. Correlation analysis

To investigate the relationships between the three TAM constructs - Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention (BI) - Pearson correlation coefficients were calculated. The results are presented in Table 3.

Table 3

Correlations between TAM constructs

Construct	Perceived Usefulness (PU)	Perceived Ease of Use (PEOU)	Behavioral Intention (BI)
Perceived Usefulness (PU)	1	0.58**	0.72**
Perceived Ease of Use (PEOU)	0.58**	1	0.65**
Behavioral Intention (BI)	**0.72****	**0.65****	**1**

Note: ** $p < .001$

As depicted in Table 3, all three correlations were found to be positive and statistically significant ($p < .001$). This indicates that teachers' perceptions of usefulness and ease of use of Web 2.0 tools are positively associated with their intention to use these tools in their teaching practices.

The strongest correlation was observed between PU and BI ($r = 0.72$), suggesting that teachers who believe Web 2.0 tools are beneficial for their teaching and students' learning are more likely to express a strong intention to use them. The correlation between PEOU and BI ($r = 0.65$) indicates that the perceived ease of use also plays a significant role in predicting behavioral intention. Teachers who find Web 2.0 tools user-friendly and easy to integrate into their existing practices are more likely to intend to use them.

Furthermore, the correlation between PU and PEOU (r = 0.58) suggests that these two constructs are moderately related. This implies that teachers who perceive Web 2.0 tools as useful also tend to find them relatively easy to use. However, this relationship is not as strong as the relationship between each of these constructs and BI, indicating that usefulness and ease of use are distinct but interrelated factors that influence teachers' intention to adopt new technologies.

Overall, the results of the correlation analysis provide strong evidence supporting the applicability of the TAM in understanding teachers' adoption of Web 2.0 tools. The findings suggest that perceived usefulness and perceived ease of use are both critical factors that drive teachers' intention to use these tools in their classrooms. This highlights the importance of designing professional development programs and support mechanisms that address both the perceived benefits and the ease of use of Web 2.0 tools to promote their widespread adoption in educational settings.

3.4. Regression analysis

To further examine the influence of perceived usefulness (PU) and perceived ease of use (PEOU) on behavioral intention (BI), a multiple regression analysis was conducted. This analysis aimed to assess the extent to which these two factors predict teachers' intention to use Web 2.0 tools in their classrooms, while controlling the effects of relevant demographic variables such as age, years of teaching experience, and level of technological expertise.

The regression model was found to be statistically significant ($F(2, 127) = 85.3$, $p < .001$), explaining 57% of the variance in behavioral intention ($R^2 = 0.57$). This indicates that the model, which includes PU and PEOU as predictors, provides a good fit to the data and accounts for a substantial proportion of the variability in teachers' intention to use Web 2.0 tools.

Table 4

Multiple regression analysis predicting behavioral intention (BI)

Predictor	B	SE B	β	t	p
Perceived Usefulness (PU)	0.42	0.06	0.52	07.02	< .001
Perceived Ease of Use (PEOU)	**0.21**	**0.05**	**0.31**	**4.15**	**< .001**

As depicted in Table 4, both PU and PEOU emerged as significant predictors of BI, with positive beta coefficients (β = 0.52 and β = 0.31, respectively). This indicates that higher levels of perceived usefulness and perceived ease of use are associated with a stronger intention to use Web 2.0 tools in the classroom. Notably, PU was found to be a stronger predictor of BI compared to PEOU, suggesting that teachers' beliefs about the benefits and value of these tools for their teaching and students' learning play a more crucial role in influencing their intention to adopt them.

In other words, teachers who perceive Web 2.0 tools as highly useful for enhancing their teaching effectiveness, improving student learning outcomes, and achieving instructional goals are more likely to express a stronger intention to use these tools, even if they do not perceive them as particularly easy to use. This finding underscores the importance of demonstrating the practical value and educational benefits of Web 2.0 tools to teachers to encourage their adoption and integration into the classroom.

Conversely, although PEOU is a significant predictor of BI, its effect is relatively weaker compared to PU. This implies that while ease of use is a desirable characteristic, it is not a sufficient condition for teachers to adopt Web 2.0 tools. Teachers need to perceive these tools as genuinely beneficial to their practice to develop a strong intention to use them.

These findings provide valuable insights for educational policymakers and practitioners seeking to promote the successful integration of Web 2.0 tools in schools. By emphasizing the pedagogical value and potential benefits of

these tools, while also addressing concerns about ease of use and providing adequate training and support, schools can create an environment that encourages teachers to embrace and utilize these technologies to enhance teaching and learning for all students.

3.5. Web 2.0 tool preferences

To gauge teachers' preferences for specific Web 2.0 tools, participants were asked to rate the appeal of various tools on a 5-point Likert scale (1 = not appealing at all, 5 = very appealing). The results are presented in Table 5.

Table 5

Mean ratings and standard deviations for web 2.0 tool preferences

Web 2.0 Tool	Mean	Standard Deviation
Collaborative Documents (Google Docs)	4.5	0.6
Multimedia Sharing Platforms (YouTube, Flickr)	4.3	0.8
Blogs/Wikis	4.1	0.9
Interactive Whiteboards/Smartboards	4.0	1.0
Social Networking Platforms (Edmodo, Twitter)	**3.8**	**1.2**

As shown in Table 5, collaborative documents (Google Docs) emerged as the most appealing tool, with the highest mean rating of 4.5 and the lowest standard deviation of 0.6. This suggests that teachers perceive these tools as highly valuable for facilitating collaborative learning and communication among students. Multimedia sharing platforms were also rated as highly appealing, reflecting the growing importance of incorporating visual and auditory elements into teaching and learning.

Blogs and wikis, while still considered appealing, received slightly lower ratings compared to collaborative documents and multimedia platforms. This might be due to the perceived time and effort required to create and maintain these platforms, as well as concerns about managing student contributions and ensuring appropriate content.

Interactive whiteboards and smartboards, although perceived as beneficial for enhancing classroom interactivity, were rated slightly lower than other tools. This could be attributed to the cost and technical complexity associated with these technologies, as well as the need for specialized training to utilize them effectively.

Social networking platforms received the lowest mean rating among the listed tools, indicating a degree of hesitation among teachers regarding their use in educational settings. This could be due to concerns about privacy, safety, and potential distractions for students.

Overall, the results suggest that primary school teachers in Greece are particularly interested in Web 2.0 tools that facilitate collaboration and communication among students, as well as tools that enable them to incorporate multimedia resources into their teaching. However, there is also a need for further professional development and support to address concerns and challenges related to the use of certain tools, such as social networking platforms.

3.6. Barriers to adoption

The study also aimed to identify the barriers that hinder primary school teachers in Greece from adopting and integrating Web 2.0 tools into their instructional practices. Participants were asked to rate the extent to which various factors posed challenges to their adoption of these tools on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The results are presented in Table 6

Table 6

Mean Ratings and Standard Deviations for Barriers to Adoption

Barrier	Mean	Standard Deviation
Lack of time to learn and integrate new tools	3.8	1.1
Insufficient technical support from the school	3.6	1.2
Concerns about student privacy and online safety	3.4	1.3
Difficulty finding appropriate content for my subject area	3.2	1.0
Resistance from students or parents to using technology	**2.9**	**1.4**

As illustrated in Table 6, the most significant barriers to Web 2.0 tool adoption were a lack of time for professional development and insufficient technical support from schools. These results align with previous research findings (Ertmer et al., 2012), highlighting the persistent challenges teachers face in finding the time and resources to effectively learn and implement new technologies.

Concerns about student privacy and online safety also emerged as a significant barrier, reflecting the growing awareness among educators of the potential risks associated with using online platforms and social media in educational settings. This finding underscores the need for schools to establish clear policies and guidelines for the safe and responsible use of Web 2.0 tools, as well as provide teachers with training on how to address these concerns with students and parents.

The difficulty of finding appropriate content for specific subject areas was also identified as a barrier, particularly for teachers in specialized fields such as science, mathematics, or foreign languages. This finding suggests the need for greater collaboration between educators and technology developers to create high-quality, curriculum-aligned resources that cater to the diverse needs of different subject areas.

While resistance from students or parents was reported as a barrier, it was rated as less significant compared to other factors. This indicates that most teachers do not perceive student or parent resistance as a major obstacle to Web 2.0 tool adoption. However, it is important to acknowledge that this barrier may be more pronounced in certain contexts or with specific tools, and further investigation is warranted to fully understand its impact.

Overall, the results highlight the multifaceted nature of the barriers to Web 2.0 tool adoption among primary school teachers in Greece. Addressing these challenges requires a multi-pronged approach that includes providing adequate time and resources for professional development, ensuring sufficient technical support, addressing privacy and safety concerns, and developing high-quality, curriculum-aligned content for various subject areas.

3.7. Facilitators of adoption

To understand the factors that could promote and facilitate the adoption of Web 2.0 tools in primary schools, teachers were asked to rate the potential helpfulness of various measures on a 5-point Likert scale (1 = not helpful at all, 5 = extremely helpful). The results are presented in Table 7.

Table 7

Mean ratings and standard deviations for facilitators of adoption

Facilitator	Mean	Standard Deviation
Providing professional development on Web 2.0 tools	4.6	0.7
Offering ongoing technical support and troubleshooting	4.4	0.8
Establishing clear guidelines for appropriate tool use	4.3	0.9
Creating a school culture that values technology integration	4.2	1.0
Allocating dedicated time for teachers to explore and experiment with tools	**4.1**	**1.1**

As illustrated in Table 7, the most significant facilitators of Web 2.0 tool adoption identified by teachers were the provision of professional development and ongoing technical support. These findings align with previous research, which has consistently emphasized the importance of teacher training and support in facilitating technology integration in schools (Ertmer et al., 2012; Lawless & Pellegrino, 2007). Teachers who receive adequate training and support are more likely to feel confident and competent in using new technologies, which in turn increases their willingness to adopt and integrate them into their teaching practices.

The establishment of clear guidelines for appropriate tool use was also considered an important facilitator. This suggests that teachers value guidance and structure in the use of Web 2.0 tools, particularly regarding issues such as student privacy, online safety, and appropriate content selection. Clear guidelines can help alleviate concerns and provide teachers with a framework for responsible and effective technology use.

Creating a school culture that values technology integration was also perceived as a significant facilitator. This finding underscores the importance of creating a supportive and encouraging environment where teachers feel comfortable experimenting with new tools and sharing their experiences with colleagues. A positive school culture can promote a sense of community and collaboration among teachers, fostering the exchange of ideas and best practices for technological integration.

Allocating dedicated time for teachers to explore and experiment with Web 2.0 tools was also viewed as a helpful facilitator. This suggests that teachers need time to familiarize themselves with new technologies, explore their potential applications, and develop strategies for integrating them into their teaching practices. Providing dedicated time for experimentation can alleviate the pressure of time constraints and allow teachers to engage in meaningful exploration and learning.

Overall, the results highlight the importance of providing comprehensive support for teachers in the adoption of Web 2.0 tools. By offering professional development, technical support, clear guidelines, and a supportive school culture, schools can create an environment that encourages and empowers teachers to embrace these tools and leverage their potential to enhance teaching and learning.

3.8. Group differences

To examine whether demographic variables influenced teachers' perceptions, attitudes, and intentions regarding Web 2.0 tools, independent samples t-tests and one-way analysis of variance (ANOVA) were conducted. The analyses focused on comparing mean scores on the TAM constructs (PU, PEOU, and BI) and other scales across different demographic groups, specifically gender, years of teaching experience, educational level, school type, and level of technological expertise.

Gender: No significant differences were found between male and female teachers on any of the TAM constructs or other scales. It seems that gender does not play a significant role in influencing teachers' perceptions and attitudes towards Web 2.0 tools.

Years of Teaching Experience: There were no significant differences between teachers with varying years of experience on any of the TAM constructs or other scales. This indicates that experience level does not significantly impact teachers' views on the usefulness, ease of use, or their intention to use Web 2.0 tools.

Educational Level: Teachers with a master's degree reported significantly higher levels of Perceived Usefulness (PU) ($M = 4.25$, $SD = 0.78$) compared to those with a bachelor's degree ($M = 4.02$, $SD = 0.82$), $t(128) = 2.11$, $p = .036$. This suggests that teachers with higher educational levels may be more aware of the potential benefits of Web 2.0 tools for their teaching practices. However, no significant differences were found between the two groups on PEOU or BI.

Level of Technological Expertise: A one-way ANOVA revealed significant differences in all three TAM constructs based on teachers' self-reported level of technological expertise, $F(4, 125) = 12.83$, $p < .001$ for PU, $F(4,$

125) = 10.57, p < .001 for PEOU, and F(4, 125) = 9.22, p < .001 for BI. Post-hoc Tukey HSD tests indicated that teachers with higher levels of expertise reported significantly higher levels of PU, PEOU, and BI compared to those with lower levels of expertise. This finding aligns with previous research (Teo, 2011), suggesting that teachers who are more comfortable and confident with technology are more likely to perceive its benefits and express a stronger intention to use it in their classrooms.

Table 8

Mean scores for TAM constructs by level of technological expertise

Level of Expertise	PU	PEOU	BI
Beginner (1)	3.65	3.40	3.78
Intermediate (2)	3.98	3.75	04.02
Proficient (3)	4.22	4.10	4.35
Advanced (4)	4.48	4.32	4.56
Expert (5)	**4.60**	**4.55**	**4.70**

In conclusion, the analysis of group differences reveals that technological expertise plays a crucial role in shaping teachers' perceptions, attitudes, and intentions regarding Web 2.0 tools. Teachers with higher levels of expertise are more likely to perceive these tools as useful, easy to use, and beneficial for their teaching practices, leading to a stronger intention to use them in their classrooms. This finding underscores the importance of providing teachers with adequate professional development and support to enhance their technological skills and confidence, which can ultimately facilitate the successful integration of Web 2.0 tools in primary education.

4. DISCUSSION

The findings of this study provide valuable insights into the factors influencing the adoption and utilization of Web 2.0 tools among primary school teachers in Greece. The results align with the TAM, confirming the significant role of perceived usefulness (PU) and perceived ease of use (PEOU) in predicting teachers' intention to use these tools.

The results of this study strongly support the fundamental tenets of the TAM in the context of Web 2.0 tool adoption among primary school teachers in Greece. The strong positive correlations observed between Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention (BI) confirm the central premise of TAM: that individuals' beliefs about the usefulness and ease of use of a technology directly influence their intention to use it (Davis, 1989).

The high mean scores for PU, PEOU, and BI indicate that the majority of participating teachers hold positive attitudes towards Web 2.0 tools. They perceive these tools as valuable for enhancing their teaching effectiveness, facilitating student learning, and improving overall classroom outcomes. This positive perception of usefulness, in turn, translates into a strong intention to integrate these tools into their instructional practices.

The finding that PU is a stronger predictor of BI than PEOU aligns with previous research that suggests the perceived value and benefits of a technology are often more influential than its perceived ease of use in driving adoption (Venkatesh et al., 2003). In the context of education, this implies that teachers are more likely to embrace Web 2.0 tools if they believe that these tools can significantly improve their teaching practices and positively impact student learning outcomes. While ease of use remains an important factor, it is the perceived value proposition that ultimately motivates teachers to overcome any challenges or barriers associated with learning and implementing new technologies.

The results of this study also underscore the importance of understanding the specific needs and preferences of teachers when designing and implementing technology integration initiatives. For instance, the high appeal of collaborative documents and multimedia sharing platforms indicates that teachers value tools that facilitate

student interaction, collaboration, and the incorporation of diverse learning materials. By focusing on the pedagogical benefits and providing adequate training and support, schools can effectively leverage the TAM framework to promote the successful adoption and integration of Web 2.0 tools, ultimately benefiting both teachers and students.

The findings of this study are largely consistent with previous research on teacher adoption of Web 2.0 tools, reaffirming established patterns while also providing unique insights into the Greek primary school context. The barriers identified in this study, namely the lack of time for professional development and insufficient technical support, echo the challenges frequently reported in international research (Ertmer et al., 2012). This suggests that these barriers are not unique to Greece but rather represent systemic issues in educational technology integration globally. The lack of time is particularly salient, as teachers often struggle to balance their existing workload with the additional demands of learning and implementing new technologies. The need for adequate technical support also underscores the importance of providing teachers with ongoing assistance to troubleshoot problems and maximize the benefits of Web 2.0 tools.

Similarly, the facilitators identified in this study, including the provision of professional development and ongoing technical support, align with well-established strategies for promoting technology integration (Lawless & Pellegrino, 2007). This reinforces the importance of investing in teacher training and support systems to foster a positive and empowering environment for technological adoption.

However, this study also reveals unique insights into the specific preferences and concerns of primary school teachers in Greece. The high appeal of collaborative documents, such as Google Docs, may reflect a cultural emphasis on collective learning and knowledge sharing in the Greek educational system. Furthermore, the strong preference for multimedia sharing platforms, such as YouTube, suggests a recognition of the value of incorporating diverse and engaging learning materials into the classroom.

Conversely, the relatively low appeal of social networking platforms indicates a degree of caution among Greek teachers regarding the potential risks and distractions associated with these tools. This may stem from concerns about student privacy, cyberbullying, and the potential for social media to detract from academic focus. This finding highlights the need for further research to explore the specific concerns of Greek teachers and develop strategies to mitigate the perceived risks of social networking platforms in educational contexts.

In summary, while this study confirms many of the findings from previous research on teacher adoption of Web 2.0 tools, it also provides valuable insights into the unique context of primary education in Greece. The results emphasize the importance of tailoring professional development and support mechanisms to address the specific needs and preferences of teachers, while also acknowledging and addressing the potential risks and challenges associated with technology integration. By understanding and responding to these contextual factors, educators and policymakers can create a more conducive environment for the successful and sustainable adoption of Web 2.0 tools in Greek primary schools.

The findings of this study shed light on the nuanced landscape of primary school teachers' preferences for specific Web 2.0 tools and the barriers they encounter in adopting these technologies. Collaborative documents, exemplified by Google Docs, emerged as the most favored tool among teachers. This preference can be attributed to the inherent potential of these tools to foster student interaction, engagement, and co-creation of knowledge. By enabling real-time collaboration, synchronous editing, and commenting features, collaborative documents provide a platform for students to work together on projects, exchange ideas, and provide constructive feedback to one another (Voogt et al., 2013). This active and participatory learning environment aligns with contemporary pedagogical approaches that emphasize student-centered learning and the development of 21st-century skills such as communication, collaboration, and critical thinking.

The high appeal of multimedia sharing platforms, including YouTube, reflects the growing recognition among educators of the importance of incorporating diverse and engaging learning materials into their teaching practices.

Videos, images, and audio recordings can enhance student understanding by catering to different learning styles and preferences (Moreno & Mayer, 2007). These multimedia resources can also spark curiosity, stimulate discussion, and make learning more enjoyable and memorable for students.

However, the adoption of Web 2.0 tools is not without its challenges. The most frequently cited barriers in this study were lack of time and insufficient technical support. These findings resonate with previous research, highlighting the persistent difficulties faced by teachers in balancing their already demanding workloads with the additional demands of learning and implementing new technologies (Ertmer et al., 2012). The lack of time for professional development, coupled with limited access to technical support, can create feelings of frustration and inadequacy, hindering teachers' willingness to adopt Web 2.0 tools.

Furthermore, concerns about student privacy and online safety emerged as a significant barrier, particularly in the context of social networking platforms. The potential risks associated with cyberbullying, inappropriate content, and data breaches can create a sense of apprehension among teachers and parents alike (Livingstone, 2008). Addressing these concerns requires a multi-faceted approach that includes educating teachers and students about responsible online behavior, implementing robust privacy policies, and establishing clear guidelines for the appropriate use of Web 2.0 tools in educational settings. The difficulty of finding appropriate content for specific subject areas also emerged as a significant barrier. This suggests a need for greater collaboration between educators and technology developers to create high-quality, curriculum-aligned resources that cater to the diverse needs of different subject areas and grade levels.

Based on the findings of this study and the existing literature, several recommendations are proposed to facilitate the successful adoption and integration of Web 2.0 tools in primary schools. First and foremost, it is crucial to provide comprehensive professional development opportunities for teachers. These should be ongoing and embedded in their daily work, focusing not only on the technical aspects of the tools but also on their pedagogical applications and best practices for incorporating them into the curriculum. By equipping teachers with the knowledge and skills to effectively utilize Web 2.0 tools, schools can empower them to create engaging and interactive learning experiences for their students.

In addition to professional development, it is essential to establish a reliable system of technical support to address teachers' questions and concerns, troubleshoot any technical difficulties they encounter, and help with integrating the tools into their classrooms. This ongoing support can alleviate teachers' anxieties about using new technologies and ensure that they have the resources they need to successfully implement them.

Clear guidelines and policies regarding the appropriate use of Web 2.0 tools in educational settings are also essential. These guidelines should address issues such as student privacy, online safety, and acceptable content, providing teachers with a framework for responsible and ethical technology use. By establishing clear expectations and promoting responsible digital citizenship, schools can create a safe and productive learning environment for all students.

Furthermore, fostering a school culture that values technology integration and encourages collaboration among teachers is crucial for successful adoption. When teachers feel supported and encouraged to experiment with new tools and share their experiences with colleagues, they are more likely to embrace technology as an asset in their teaching practices. Creating opportunities for collaboration, such as workshops, peer mentoring programs, and online communities of practice, can facilitate the exchange of ideas and best practices, ultimately leading to more widespread and effective use of Web 2.0 tools.

Another important recommendation is to allocate dedicated time for teachers to explore and experiment with Web 2.0 tools. This allows them to discover the potential benefits of these tools for their specific subject areas and grade levels, and to develop creative strategies for incorporating them into their lesson plans. By providing teachers with the time and space to experiment, schools can encourage a sense of ownership and autonomy in their use of technology.

Finally, collaboration between educators and technology developers is crucial for creating high-quality, curriculum-aligned resources that cater to the specific needs of different subject areas and grade levels. By working together, educators and developers can ensure that Web 2.0 tools are not only engaging and user-friendly but also relevant and meaningful for students.

By implementing these recommendations, schools can create a more supportive and enabling environment for the adoption and utilization of Web 2.0 tools. This can empower teachers to leverage the full potential of these technologies to enhance teaching and learning, ultimately benefiting students and preparing them for success in the digital age.

5. CONCLUSION

This study provides a clear understanding of the factors influencing Web 2.0 tool adoption among primary school teachers in Greece, revealing a dynamic interplay of perceived benefits, challenges, and contextual nuances. The findings offer valuable insights into the complex landscape of technology integration in primary education and underscore the need for tailored interventions to promote the effective use of these tools.

The results highlight the critical role of perceived usefulness (PU) and perceived ease of use (PEOU) in shaping teachers' attitudes and intentions towards Web 2.0 tools. Teachers who perceive these tools as valuable for enhancing their teaching effectiveness, improving student learning outcomes, and facilitating collaboration are more likely to express a strong intention to integrate them into their classrooms. This finding aligns with the TAM and reinforces the importance of emphasizing the pedagogical benefits of Web 2.0 tools when promoting their adoption among educators.

Moreover, the study reveals a strong preference among Greek primary school teachers for collaborative tools such as Google Docs and multimedia sharing platforms like YouTube. This suggests that teachers value tools that foster student interaction, engagement, and the incorporation of diverse learning materials. These tools empower students to become active participants in their own learning, co-creating knowledge and developing essential 21st-century skills such as communication, collaboration, and digital literacy.

However, the study also identifies several significant barriers to the adoption of Web 2.0 tools. The lack of time for professional development and the perceived increase in workload associated with learning and implementing new technologies remain persistent challenges for teachers. Insufficient technical support also poses a significant barrier to adoption. Teachers require ongoing assistance to troubleshoot technical issues, learn new features, and effectively integrate these tools into their classrooms. Schools need to invest in robust technical support systems, including training workshops, online resources, and readily available help desk services, to ensure that teachers feel supported in their efforts to utilize Web 2.0 tools.

Concerns about student privacy and online safety are another major barrier, particularly in relation to social networking platforms. The potential risks associated with cyberbullying, inappropriate content, and data breaches create sincere concerns among teachers. To address these concerns, schools must establish clear policies and guidelines for the safe and responsible use of Web 2.0 tools, educate students about digital citizenship, and provide teachers with the resources and training to effectively manage online interactions and protect student privacy. Finally, the availability of appropriate content remains a challenge for many teachers, particularly in specialized subject areas. This underscores the need for greater collaboration between educators and technology developers to create high-quality, curriculum-aligned resources that cater to the diverse needs of different subject areas and grade levels.

To promote the widespread and effective use of Web 2.0 tools in Greek primary schools, a multi-faceted approach is necessary. Policymakers and school administrators must prioritize the provision of comprehensive professional development programs that focus on both the technical and pedagogical aspects of these tools. Furthermore, investing in robust technical support systems and creating a school culture that values technology

integration can empower teachers to confidently explore and utilize Web 2.0 tools in their classrooms. Addressing concerns about privacy and safety through clear guidelines and policies is also crucial for fostering a safe and productive learning environment.

By implementing these recommendations, schools can leverage the transformative potential of Web 2.0 tools to enhance teaching and learning, ultimately benefiting students and preparing them for success in the digital age. This study serves as a call to action for educators, administrators, and policymakers to collaborate in creating a more supportive and enabling environment for technology integration in primary education, ensuring that all students could thrive in the 21st-century learning landscape.

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