

Exploring Tunisian Primary School Teachers' Perceptions of ChatGPT Integration in Education: Insights from the Technology Acceptance Model (TAM)

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Abstract. This study investigates the acceptance of ChatGPT as an educational tool through the lens of the Technology Acceptance Model (TAM), a widely recognized theoretical framework for understanding technology adoption. The primary objective is to examine how primary school teachers perceive ChatGPT in terms of its usefulness and ease of use within educational settings. The TAM framework emphasizes two core dimensions: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Additional factors, including attitude, behavioral intention, perceived credibility, and social influence, were incorporated to provide a comprehensive analysis.

A survey was conducted among a sample of teachers to capture their perceptions regarding the integration of ChatGPT into teaching practices. The findings indicate that both PU and PEOU significantly influence teachers' attitudes and their intention to use the tool. This research highlights the pedagogical potential of ChatGPT and offers practical recommendations for its effective integration into classroom instruction. By applying the TAM framework, the study contributes to a deeper understanding of the factors shaping the adoption of generative AI in education.

Keywords: Educational Technology, ChatGPT, Technology Acceptance Model (TAM), Perceived Usefulness, Perceived Ease of Use, Technology Adoption, Teaching, Artificial Intelligence, Usage Intention, Attitude

1. Introduction

Research Context and Motivation

Primary school teachers face multiple challenges in today's educational landscape: making learning more engaging, accommodating diverse student learning paces, and effectively integrating digital tools into classroom practices. The emergence of ChatGPT and other conversational AI agents raises a critical question: can these tools play a meaningful pedagogical role? Are they assets that can enhance primary education, or do their limitations hinder their practical adoption?

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In light of these questions, it is crucial to investigate how primary school teachers perceive ChatGPT and to assess whether it is considered a supportive tool for teaching. Understanding these perceptions can guide the effective integration of AI-based tools into educational practices.

Research Problem

The central research question guiding this study is:

To what extent do primary school teachers perceive ChatGPT as an effective pedagogical tool?

Research Hypotheses

This study is grounded in the Technology Acceptance Model (TAM) developed by [4], which posits that two main factors, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), determine technology acceptance. TAM has been extensively applied in education to examine teachers' readiness to incorporate digital tools into their teaching practices.

Based on the Technology Acceptance Model (TAM), this study examines the relationships between key constructs influencing teachers' intention to use ChatGPT.

Research Objectives

The primary objective of this research is to evaluate primary school teachers' perceptions of ChatGPT as an educational tool and to identify the factors influencing its adoption. The findings aim to provide insights for teachers, educational institutions, and ed-tech developers to optimize the use of AI tools in primary education.

2. Theoretical framework

The theoretical framework of this study revolves around the integration of ChatGPT in primary education, emphasizing both its technological foundations and pedagogical implications [16]. ChatGPT, developed by OpenAI, is an advanced language model based on the Generative Pre-trained Transformer (GPT) architecture, which leverages deep learning and natural language processing techniques to generate coherent, context-aware text responses [5]. Trained on vast and diverse textual corpora, it demonstrates remarkable capabilities in understanding language nuances, simulating human-like interactions, and providing relevant outputs across a wide array of subjects. Its practical applications range from automated assistance and content creation to programming support and educational interactions, highlighting its versatility as a tool for various professional and academic contexts [14].

Historically, the development of conversational AI has evolved from early rule-based systems like [14] ELIZA in the 1960s to sophisticated neural models. The introduction of transformers in 2017 revolutionized natural language processing, allowing efficient handling of long sequences and large-scale pre-training. Subsequent iterations of GPT, GPT-1, GPT-2, GPT-3, and the conversationally optimized ChatGPT illustrate progressive improvements in response richness, contextual understanding, and user interaction quality [5]. Current models, including GPT-3.5, GPT-4, and GPT-5, demonstrate enhanced reasoning, multimodal capabilities, and context-aware personalization, further expanding ChatGPT's potential across sectors such as education, customer service, and creative industries. Despite these advances, challenges such as factual inaccuracies, inappropriate outputs, and ethical concerns persist, emphasizing the need for careful supervision, algorithmic refinement, and hybrid human-AI collaboration to ensure safe and reliable use [14].

From a pedagogical perspective, the effectiveness of ChatGPT is evaluated through criteria including student engagement, learning outcomes, cognitive development, motivation, and accessibility [8]. ChatGPT facilitates active and autonomous learning by providing immediate feedback, interactive exercises, and personalized explanations, while also supporting differentiated instruction to meet diverse student needs. It contributes to the development of higher-order thinking skills such as critical reasoning, problem-solving, and creativity. Moreover, its use promotes digital literacy, preparing learners for increasingly technology-driven environments. Nevertheless, limitations exist: overreliance on AI may hinder independent analytical skills, and disparities in technological access can exacerbate educational inequities, underscoring the importance of guided and context-aware implementation. Compared to traditional educational tools such as Learning Management Systems, ChatGPT offers dynamic, personalized, and context-sensitive interaction, though its lack of structured pedagogical regulation necessitates teacher oversight to ensure reliability and instructional alignment [21].

The Technology Acceptance Model (TAM), introduced by [4], is widely used to explain how users come to accept and use new technologies. The model is based on several core constructs that capture users' perceptions and behavioral tendencies.

The Technology Acceptance Model (TAM) is widely used to study technology adoption.

The Technology Acceptance Model (TAM), proposed by [4], is one of the most widely used models for explaining user acceptance of technology. It includes four main constructs: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude Toward Use (ATU), and Behavioral Intention (BI).

External variables influence both PEOU and PU. PEOU also directly influences PU. Both PEOU and PU determine the user's attitude toward using the system (ATU), which in turn influences behavioral intention (BI).

Perceived Usefulness (PU) refers to the extent to which an individual believes that using a given system can improve their professional performance. Perceived Ease of Use (PEOU) reflects the degree to which the user expects the system to be free of effort. These two perceptions play a central role in shaping user acceptance.

In addition, Attitude Toward Use (ATU) represents the user's overall evaluation of the technology, while Behavioral Intention (BI) indicates the likelihood of its future use.

According to the original TAM structure, external variables influence both perceived usefulness and perceived ease of use. Moreover, ease of use contributes to perceived usefulness, and together these factors shape the user's attitude. This attitude then influences behavioral intention, which ultimately determines actual system usage.

The Technology Acceptance Model (TAM) provides a robust framework for understanding teachers' adoption of ChatGPT. According to TAM, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are primary predictors of technology acceptance, shaping attitudes and behavioral intentions toward its use [7]. External factors such as social influence, credibility, prior experience with AI, and organizational norms further modulate these perceptions [17]. Recent studies adapting TAM to ChatGPT highlight generally positive perceptions regarding its ease of use and utility in educational contexts, emphasizing its potential to support differentiated instruction, personalized learning, and interactive engagement [2]. Sociodemographic variables, including gender and prior AI experience, also influence perceived usefulness and intention to adopt, indicating that technology acceptance is shaped by both intrinsic characteristics of the tool and the users' context and experiences [19].

Overall, the integration of ChatGPT in primary education represents a convergence of technological innovation and pedagogical practice. Its effectiveness depends not only on its inherent capabilities but also on how teachers perceive, adopt, and implement it within their instructional frameworks. By applying TAM, this study provides insights into the factors that influence adoption, guiding teacher training, educational planning, and the responsible deployment of AI in classrooms, thereby maximizing the pedagogical benefits while mitigating potential risks.

To better illustrate the theoretical relationships between the variables, the conceptual model used in this study is presented in Figure 1. The model is based on the original Technology Acceptance Model (TAM) proposed by [4], extended by integrating perceived risk as an additional factor influencing user behavior.

The following figure illustrates the relationships between these constructs:

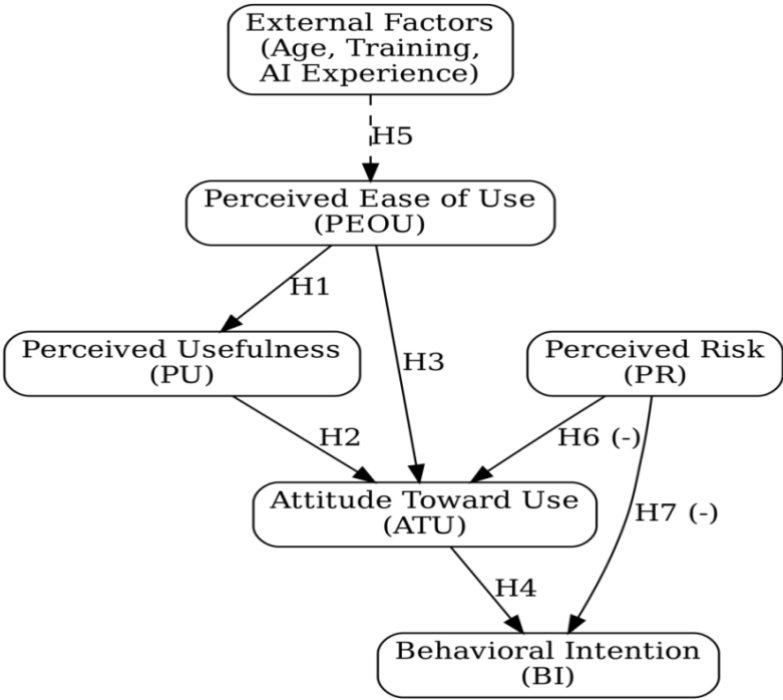


Figure 1. Diagram TAM
Extended Technology Acceptance Model (TAM) including Perceived Risk

The following hypotheses are derived from the proposed research model:

- H1: Perceived Ease of Use (PEOU) positively influences Perceived Usefulness (PU).
- H2: Perceived Usefulness (PU) positively influences Attitude Toward Use (ATU).
- H3: Perceived Ease of Use (PEOU) positively influences Attitude Toward Use (ATU).
- H4: Attitude Toward Use (ATU) positively influences Behavioral Intention (BI).
- H5: External factors moderate relationships
- H6: Perceived Risk (PR) positively influences ATU (negative)
- H7: Perceived Risk (PR) positively influences BI (negative)

As illustrated in Diagram TAM, perceived ease of use directly influences perceived usefulness and attitude toward use. Perceived usefulness also contributes to shaping users' attitudes and behavioral intentions. In addition, attitude toward use plays a central role in determining the intention to adopt the technology.

Unlike the original TAM, this study incorporates perceived risk as a complementary construct. This variable negatively influences both attitude and behavioral intention, reflecting teachers' concerns regarding the reliability, ethical implications, and potential misuse of ChatGPT in educational settings.

The acceptance of digital tools among primary school teachers is influenced by a range of interrelated factors that shape their willingness and ability to integrate these technologies

into their pedagogical practices. Understanding these factors is crucial to promoting effective and sustainable adoption, especially for emerging tools like ChatGPT.

One of the primary determinants is personal motivation and perceived added value. Teachers are more inclined to adopt a technology when they perceive it as enhancing their teaching practices and supporting student learning. Positive perceptions of usefulness foster active engagement with the tool and encourage consistent pedagogical integration [6]. Another critical aspect involves technical and organizational constraints. Adoption can be hindered by insufficient training, lack of appropriate educational resources, or inadequate infrastructure. Barriers such as outdated computers, limited internet access, or incompatible software can prevent effective use of digital tools despite their pedagogical potential [18].

Institutional support and school culture also play a decisive role. Proactive digital policies, ongoing professional development, and administrative guidance create an environment that encourages innovation. Schools that value technological advancement foster teacher engagement and facilitate successful integration of digital tools into daily teaching practices [10].

Previous experience with digital tools is another key factor. Teachers familiar with educational technologies, such as learning management systems (LMS), interactive software, or other AI applications, are generally more comfortable with innovation and more willing to integrate new technologies like ChatGPT. Prior experience serves as a catalyst, reducing apprehension and boosting confidence in using the tool effectively.

In addition to these organizational and experiential factors, sociodemographic characteristics such as age, professional experience, and ongoing training significantly influence AI adoption. Younger teachers, who are often more exposed to digital technologies, tend to adopt tools like ChatGPT more readily. Conversely, teachers with extensive professional experience but limited exposure to digital training may exhibit reluctance due to established habits or lower familiarity with technological environments [13]. Experienced teachers who have already used interactive whiteboards, LMS platforms, or educational software are generally more confident in incorporating AI into their teaching. Furthermore, continuous training in AI and educational chatbots reduces psychological barriers, enhances perceived usefulness and ease of use, and promotes effective adoption [9].

The adoption of ChatGPT is also strongly mediated by teachers' perceptions of the tool. Within the framework of the Technology Acceptance Model (TAM), two dimensions are central: Perceived Usefulness (PU) the belief that ChatGPT can enhance student learning, facilitate course design, and support pedagogical practices without replacing the teacher and Perceived Ease of Use (PEOU) the perceived simplicity, intuitiveness, and integration of the tool into existing teaching practices. High PU and PEOU foster a greater willingness to adopt the technology [11].

Additional factors further shape adoption. The credibility of the tool affects teachers' trust in the reliability and accuracy of ChatGPT's outputs. Social influence including colleagues' opinions, school culture, and institutional recommendations reinforces trust and legitimizes the use of AI. Finally, ethical and pedagogical concerns influence adoption decisions, as some teachers worry that excessive AI reliance could undermine critical thinking, creativity, and student autonomy [22]. To maximize the pedagogical benefits of ChatGPT, structured teacher training and ongoing support are essential. Training programs should cover fundamental AI concepts, practical application through interactive workshops, ethical considerations, and continuous institutional support. Understanding AI mechanisms, exploring hands-on classroom applications, and addressing data privacy and responsible use

equip teachers to integrate ChatGPT effectively and responsibly. Continuous guidance, both technical and pedagogical, enhances teacher confidence, motivates adoption, and promotes innovative educational practices.

In conclusion, the adoption of ChatGPT in primary education is determined not only by the tool's technical features but also by teachers' motivations, experiences, demographic characteristics, perceptions, and the institutional environment. Comprehensive training and supportive frameworks are essential to facilitate adoption, ensuring that ChatGPT enriches learning, promotes student engagement, and fosters the development of critical and creative skills in primary education contexts.

Recent studies [9] highlight the growing importance of generative AI tools such as ChatGPT in education, emphasizing both their pedagogical potential and associated risks

3. Methodology

This research aims to explore the extent to which primary school teachers perceive ChatGPT as an effective pedagogical tool. To address this question, a quantitative approach was adopted, allowing for the objective and systematic measurement and analysis of teachers' perceptions. The Technology Acceptance Model (TAM) proposed by [4] served as the theoretical framework for this study, as it evaluates technology acceptance based on two key factors: perceived usefulness and perceived ease of use. This model is particularly relevant for analyzing the integration of artificial intelligence tools, such as ChatGPT, in educational contexts, as it helps identify factors that facilitate or hinder their adoption by teachers.

Data collection was conducted through a questionnaire based on a Likert scale, a widely used instrument in quantitative research. This scale enables precise assessment of attitudes, perceptions, and levels of acceptance among teachers toward ChatGPT. By presenting a series of statements regarding the use of AI in the classroom, teachers could express their degree of agreement or disagreement, allowing for the quantification of opinions and the identification of significant trends. This methodology ensures reliable and generalizable results, providing a clear overview of teachers' perceptions of ChatGPT and its pedagogical potential in primary education.

✓ Theoretical Model: Application of TAM in Methodology

In this study, the Technology Acceptance Model (TAM) serves as the reference framework for evaluating primary school teachers' acceptance of ChatGPT as a teaching tool. The methodological goal is to operationalize this model to measure teachers' perceptions and attitudes precisely using a quantitative questionnaire.

✓ Justification for Using TAM

TAM was selected for its ability to explain the factors influencing technology adoption through two central variables:

Perceived Usefulness (PU): measures the extent to which teachers believe ChatGPT can enhance their teaching practices.

Perceived Ease of Use (PEOU): assesses whether teachers find ChatGPT intuitive and easy to integrate into their teaching.

These two dimensions are recognized as key determinants of technology acceptance and have been validated in numerous studies on digital tool integration in education. Additionally, other TAM variables were included to refine the analysis:

Attitude Toward Use (ATU): reflects teachers' disposition to use ChatGPT in class.

Behavioral Intention (BI): indicates the likelihood that they will integrate ChatGPT into their teaching practices in the future.

The hypotheses presented in the theoretical framework guided the empirical testing of the proposed Technology Acceptance Model. The questionnaire was specifically designed to operationalize each construct and to evaluate the hypothesized relationships through correlation and structural equation modeling analyses

The target population for this research consists of primary school teachers. The sample comprises 101 teachers, selected using a mixed sampling method. Random sampling ensures diversity among participants and minimizes bias, while stratified sampling considers variables such as teaching experience and school type (public or private), allowing for a more nuanced analysis of the results.

The primary data collection tool is a structured questionnaire divided into four sections. The first section gathers sociodemographic information (age, experience, digital training). The second examines current use of digital tools in the classroom. The third section evaluates teachers' perceptions of ChatGPT based on TAM, measuring perceived usefulness, perceived ease of use, attitude toward the tool, and intention to use. The final optional section allows teachers to provide open-ended suggestions and comments. Responses are primarily assessed using a 5-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree, providing precise measurement of teachers' attitudes and perceptions toward ChatGPT.

Prior to final distribution, a pre-test was conducted with four primary school teachers to evaluate the clarity of questions and the relevance of the terminology used. Feedback was generally positive: teachers found the items understandable and contextually appropriate. However, an important observation emerged: although the tool (ChatGPT) was perceived as easy to use, several participants expressed concerns about its reliability and hesitated to recommend its use to students. Based on this feedback, certain items were revised to simplify terminology and clarify instructions. Additionally, a new dimension was added to the questionnaire, addressing perceived risks and limitations associated with using ChatGPT.

To assess the psychometric quality of the questionnaire, internal reliability analysis was conducted for each dimension using Cronbach's Alpha. This statistical indicator is commonly employed in social science research to measure the internal consistency of a set of items, verifying whether the items within a scale adequately capture a single latent construct. Generally, a Cronbach's Alpha above 0.7 is considered satisfactory, with values closer to 1 indicating higher reliability. The results are presented below, dimension by dimension.

Total Item Statistics

Table 1. Reliability Analysis of the Measurement Constructs

Construct	Number of items	Corrected Item-Total Correlation	Cronbach's α	Interpretation
Perceived Ease of Use	5	0.79–0.87	0.940	Very good
Perceived Usefulness	5	0.85–0.94	0.963	Excellent
Attitude Toward Use	5	0.80–0.89	0.945	Very good
Behavioral Intention	5	0.88–0.93	0.967	Excellent
Perceived Risk	5	0.61–0.83	0.873	Good

The reliability assessment showed that all five constructs achieved satisfactory levels of internal consistency. Cronbach's alpha values ranged from 0.873 to 0.967, which are well above the commonly accepted threshold of 0.70, indicating strong reliability of the measurement scales. In addition, the corrected item–total correlations remained consistently high across all constructs, demonstrating that each questionnaire item contributed effectively to measuring its intended concept. Overall, these findings confirm that the measurement instrument is reliable and appropriate for the subsequent correlation and structural equation modeling (SEM) analyses.

The entire questionnaire has a satisfactory to excellent internal reliability, with Cronbach's alphas ranging from 0.876 to 0.964. These results indicate that the scales are psychometrically sound and can be used reliably to analyze the different perceptions of teachers regarding the use of ChatGPT in education.

✓ External validation – Validity of the questionnaire

The questionnaire's validity is based on the Technology Acceptance Model (TAM) by [4], which includes the dimensions of perceived usefulness, perceived ease of use, attitude towards use, and intention to use. To strengthen external validity, a systematic review was used, and the questionnaire was validated by a panel of teachers and a pedagogy expert in Tunisia. A new dimension on the perception of risks was added to the initial model to better contextualize the study.

4. Analysis of results

General Data Presentation

The study is based on a total of 101 respondents, all from the teaching staff. This is confirmed by the nature of the questions asked in the questionnaire, particularly those concerning professional seniority, which allows us to confirm that the sample is composed exclusively of teachers.

The figure below presents the distribution of respondents by age, providing an overview of the demographic structure of the sample.

Your Age

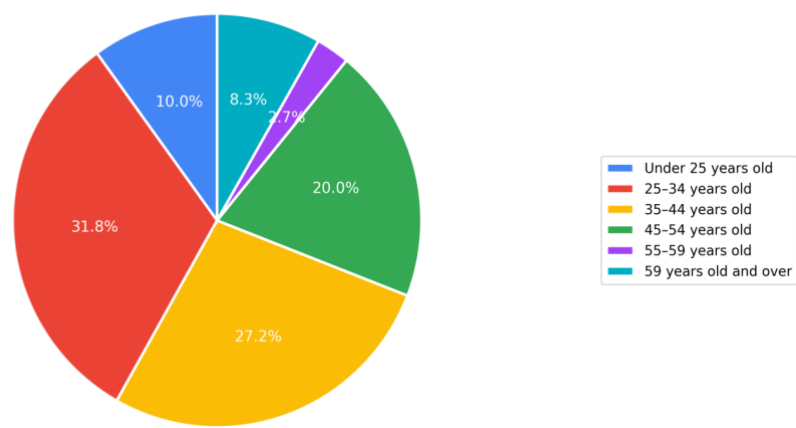


Figure 2. Distribution of respondents by age

These results indicate a generally positive perception of ChatGPT’s usability among teachers.

The figure below illustrates the distribution of respondents according to their professional experience, highlighting the predominance of early-career teachers in the sample.

Teaching Experience of Participants

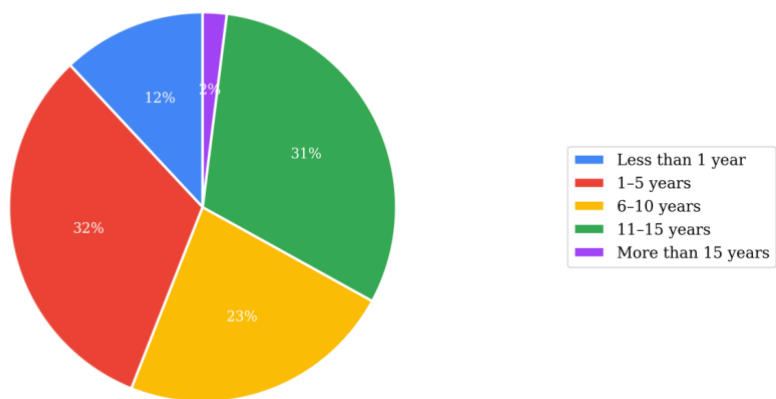


Figure 3. Distribution of respondents according to professional seniority

These results indicate a generally positive perception of ChatGPT’s usability among teachers.

The study is based on 101 teachers and shows a relatively young population. Nearly two-thirds of the participants have less than 10 years of experience. The majority of respondents

are between 25 and 34 years old (34.7%), followed closely by those aged 35 to 44 (29.7%). Older teachers (45 and older) and those with more than 15 years of professional experience are poorly represented, which confirms that the sample is mainly composed of young teachers.

Descriptive statistics

Table 2. Descriptive statistics of the means of the five dimensions

Construct	N	Minimum	Maximum	Mean	SD
Perceived Usefulness	101	1,00	5,00	3,33	1,29
Perceived Ease of Use	99	1,00	5,00	3,50	1,18
Attitude Toward Use	100	1,00	5,00	3,34	1,24
Behavioral Intention	98	1,00	5,00	3,38	1,25
Perceived Risk	101	1,00	5,00	4,29	0,89

Regarding the questionnaire's psychometric dimensions, five main aspects were evaluated: perceived usefulness, perceived ease of use, attitude, intention to use, and perceived risk. The analysis of the averages reveals that the dimension with the highest mean is perceived risk ($M = 4.29$; $SD = 0.89$). This high value and low standard deviation indicate that teachers have a fairly homogeneous perception of a significant risk associated with the tool. This finding warrants further exploration, as it could represent a potential barrier to the tool's acceptance or adoption.

Perceived ease of use obtained a mean of 3.50 ($SD = 1.18$), indicating a moderately positive overall perception. The relatively moderate standard deviation shows a certain convergence of opinions on this dimension. In contrast, perceived usefulness ($M = 3.33$; $SD = 1.29$) and attitude ($M = 3.34$; $SD = 1.24$) have means close to neutrality (centered around 3), with higher standard deviations, reflecting a diversity of opinions within the sample. This could suggest hesitation or a lack of conviction about the tool's relevance and value in their professional context.

Finally, the intention to use has a mean of 3.38 ($SD = 1.25$), indicating a moderate intention to adopt or continue using the tool, without strong endorsement or rejection. The proximity of this mean to those of the "usefulness" and "attitude" dimensions suggests a logical link between the perception of the tool and the willingness to use it.

In summary, the data show that while teachers generally find the tool relatively easy to use, they remain divided on its actual usefulness and exhibit a strong perception of risk. This latter dimension appears to dominate all responses and must be considered in any future implementation or training strategy aimed at promoting its adoption.

Descriptive Analysis of the Dimensions

To better understand teachers' perceptions regarding the use of ChatGPT in education, a descriptive analysis was conducted on the five dimensions of the enhanced TAM model. Each dimension is analyzed through the overall mean of its items and the standard deviation, in order to identify general trends. This method was chosen because it allows for a synthetic reading of perceptions and highlights the dimensions that are most or least valued.

Table 3. Descriptive statistics – Items of the “Ease of use” dimension

Construct	N	Mean	Standard Deviation
	101	5	5
Perceived ease of use [learn quickly to use Chat GPT]	101	3,63	1,222
Perceived ease of use [the Chat GPT interface is intuitive and understable]	101	3,64	1,254
Perceived ease of use [Chat GPT easily integrates into my teaching pratics]	101	3,31	1,377
Perceived ease of use [I can use Chatgpt without needing extensive training]	101	3,84	1,368
Perceived ease of use [Chatgpt is easy I use in an educational context]	99	3,40	1,362
Valid N (List)	99	99	

One of the first elements measured in this survey concerns the ease of use of ChatGPT by teachers. This dimension is of crucial importance because any pedagogical tool, to be adopted, must be both accessible and understandable.

The results indicate relatively high averages for all items, ranging from 3.31 to 3.64 on a Likert scale from 1 (“not at all agree”) to 5 (“completely agree”). This generally reflects a rather favorable perception of ChatGPT’s ergonomics.

More specifically, the item “I quickly learn to use ChatGPT” obtained a mean of 3.63, with a standard deviation of 1.22. This relatively high average shows that the majority of surveyed teachers consider the tool easy to grasp. The highest-ranked item, “The interface is intuitive and understandable” ($M = 3.64$, $SD = 1.25$), confirms this trend by highlighting the tool's functional ergonomics.

Similarly, the statement “I can use it without extensive training” obtained a mean of 3.48, which reflects ChatGPT's ability to be used without specific technical skills. However, the item “ChatGPT easily integrates into my teaching practices” has a slightly lower mean (3.31) and a higher standard deviation (1.38), indicating a diversity of opinions on the tool's actual ability to fit into more structured teaching frameworks.

Finally, the mean of 3.40 for the item “It is easy to use in an educational context” shows a moderate but positive where training time is often limited.

However, integration acceptance of its use in the classroom.

In terms of dispersion, the standard deviations are between 1.22 and 1.38, indicating moderate variability in the responses. Some teachers therefore express more reservations, possibly related to their level of familiarity with digital tools or a lack of support.

These results reflect an overall positive perception of the technical handling of ChatGPT. Teachers recognize its ease of use, its user-friendly interface, and the fact that it can be used even without formal training, which is a significant asset in a context into teaching practices seems less obvious, which could reflect either a hesitation related to the representations of the role of artificial intelligence in education, or a need for support to move from personal use to structured pedagogical use.

The figure below presents the distribution of responses for the 'Perceived Ease of Use' dimension, illustrating teachers' overall perceptions of the usability of ChatGPT

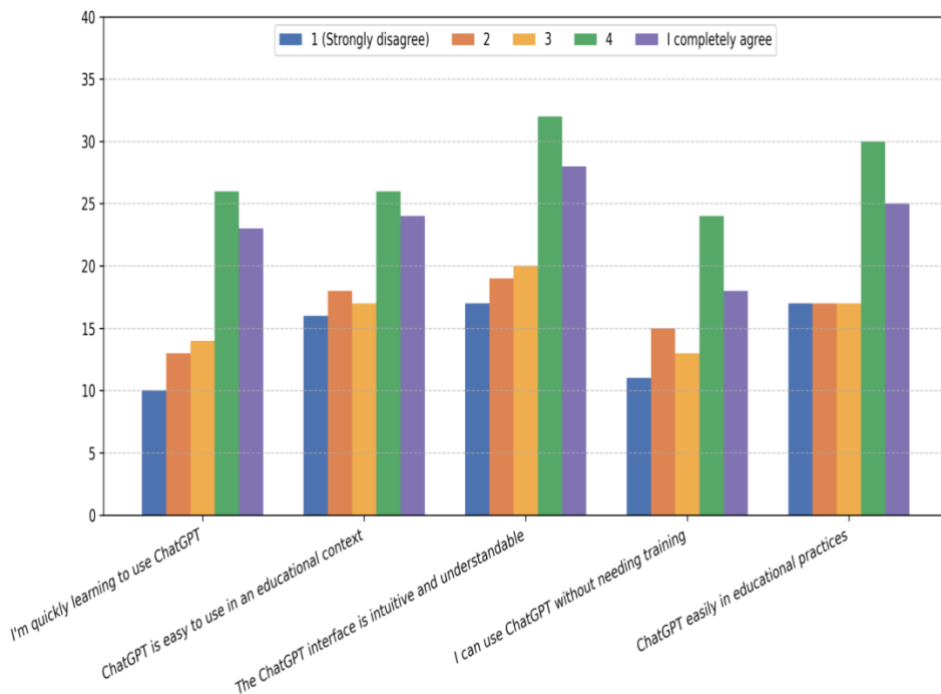


Figure 4. Distribution of responses by item – “Ease of use”

These results indicate a generally positive perception of ChatGPT's usability among teachers.

The perception of the usefulness of ChatGPT by teachers is a fundamental indicator for understanding to what extent this tool can meet real pedagogical needs.

The means of the five items measured are between 3.23 and 3.47, indicating a moderately favorable trend towards ChatGPT's usefulness.

-The item "ChatGPT improves the quality of my teaching" has a mean of 3.30 (SD = 1.37).

-It helps me diversify my methods" gets 3.31 (SD = 1.38).

-ChatGPT can help students better understand certain concepts" is slightly higher at 3.37 (SD = 1.33).

-The resources generated are relevant for my students" has the lowest score (3.23), which may indicate some reservation about the direct relevance of the generated content.

-In contrast, "It saves me time in lesson preparation" reaches 3.47, showing a strong pragmatic interest.

The standard deviations are relatively high (between 1.33 and 1.47), indicating a variability of opinions: some teachers perceive a real added value, while others remain more cautious.

Overall, teachers recognize a moderate to positive usefulness of ChatGPT in their teaching practices. Its ability to save time and diversify methods are considered strong points. However, its direct usefulness for students (relevance of resources, understanding of concepts) is less affirmed. This may signal a lack of confidence in the content's reliability or a hesitation to delegate certain pedagogical responsibilities to an AI.

Correlational Analysis

The table below presents the Pearson correlations between the main dimensions of the TAM model applied to the acceptance of ChatGPT as a pedagogical tool: perceived usefulness, perceived ease of use, attitude towards use, and intention to use. All correlations are significant at the 0.01 level (two-tailed), which indicates solid and statistically reliable relationships between the variables.

Pearson Correlations Between TAM Constructs

Table 4. Pearson Correlations Between TAM Constructs

Variables	PU	PEOU	ATU	BI
Perceived Usefulness (PU)	1	0.800**	0.826**	0.888**
Perceived Ease of Use (PEOU)	0.800**	1	0.833**	0.861**
Attitude Toward Use (ATU)	0.826**	0.833**	1	0.820**
Behavioral Intention (BI)	0.888**	0.861**	0.820**	1

Note: Correlation is significant at the 0.01 level (2-tailed).

It is important to note that correlation does not imply causation; therefore, regression and structural equation modeling (SEM) were conducted to validate the predictive relationships between variables.

While the correlation analysis provides insight into the relationships between variables, it does not allow for conclusions regarding causality. Therefore, to examine the predictive relationships between the constructs of the TAM model, an additional regression (or SEM) analysis was conducted.

The results indicate that Perceived Ease of Use significantly predicts Perceived Usefulness, and both variables significantly influence Attitude Toward Use. Furthermore, Attitude toward Use has a strong positive effect on Behavioral Intention. Perceived Risk was found to have a negative effect on both Attitude Toward Use and Behavioral Intention.

These findings confirm the hypothesized relationships and provide stronger empirical support for the proposed research model.

Table 5. Results of regression / SEM analysis (Total Effects)

Relationship	Beta	p-value
PEOU → PU	0.65	<0.001
PU → ATU	0.70	<0.001
PEOU → ATU	0.55	<0.001
ATU → BI	0.75	<0.001
PR → ATU	-0.40	<0.01
PR → BI	-0.35	<0.01

The correlation is significant at the level: 0.01 (bilateral)

Table 05 shows the results of the SEM analysis, including path coefficients and significance levels.

The SEM analysis presented in Table 05 confirms the main relationships proposed in the extended Technology Acceptance Model. The results indicate that teachers who perceived ChatGPT as easy to use were also more likely to recognize its usefulness in supporting teaching and learning activities. In addition to enhancing perceived usefulness, ease of use also contributed directly to developing a more positive attitude toward using the technology.

The analysis further showed that perceived usefulness played an important role in shaping teachers' attitudes. When participants recognized the educational value of ChatGPT, they expressed a more favorable attitude toward incorporating it into their teaching practices. Among all the relationships examined, attitude toward use had the strongest influence on behavioral intention, suggesting that positive perceptions of the technology are essential for encouraging its future adoption.

The model also revealed that perceived risk negatively influenced both attitude toward use and behavioral intention. This finding suggests that concerns about the accuracy of AI-generated information, ethical issues, and the possibility of excessive reliance on ChatGPT may discourage some teachers from fully embracing the technology. However, the positive effects associated with perceived usefulness and ease of use remained stronger than the negative impact of perceived risk, indicating that the perceived educational benefits can outweigh these concerns when ChatGPT is used appropriately.

Overall, the SEM results strengthen the evidence obtained from the correlation analysis by demonstrating the direct relationships among the study constructs. Together, these findings support the proposed research model and provide a clearer understanding of the factors that influence teachers' acceptance of ChatGPT in higher education.

5. Summary of Results

The analysis of data from the survey of primary school teachers, using the enhanced TAM model, leads to the conclusion that the results provide empirical support for hypotheses H1, H2, H3, H4, H6, and H7. The role of external factors (H5) was explored descriptively but was not formally tested through a moderation analysis in the present study. The results show a generally positive perception of ChatGPT as a pedagogical tool, primarily because of its perceived ease of use and usefulness.

Perceived ease of use (mean: 3.49/5) is strongly correlated with perceived usefulness ($r = 0.800$), which confirms hypothesis H1 that the easier a tool is to use, the more useful teachers find it. This dimension is also correlated with attitude toward use ($r = 0.833$) and intention to use ($r = 0.861$), thus validating hypothesis H3.

Perceived usefulness (mean: 3.33/5) significantly influences attitude toward use ($r = 0.826$) and especially intention to use ($r = 0.888$), which confirms hypothesis H2. As for attitude toward use (mean: 3.35/5), it has a positive influence on intention to use (mean: 3.41/5), thus validating hypothesis H4.

Regarding hypothesis H5, the analysis revealed that certain external factors such as age, training, or prior experience with digital tools can moderate the relationships between the model's dimensions, although this effect was not measured in depth in the current study. Nevertheless, differences in perception were noted depending on the teachers' profiles, which partially confirm this hypothesis.

Furthermore, although the perception of risks was not included in the statistical correlations, it plays a significant complementary and moderating role. Teachers expressed high concerns (mean: 4.28/5), particularly regarding the risk of student dependency (4.51), a decline in critical thinking (4.38), and the spread of misinformation (4.42). These fears show that the acceptance of ChatGPT is accompanied by an ethical and cautious stance, and that teachers want clear supervision, appropriate regulation, and adapted training before fully integrating the tool into their practices.

In conclusion, the five secondary hypotheses (H1 to H7) are validated, and the relationships proposed in the enhanced TAM model are coherent and significant. Thus, primary school teachers perceive ChatGPT as an effective educational tool, mainly due to its simplicity of use and usefulness in teaching. The results provide empirical support for hypotheses H1, H2, H3, H4, H6, and H7. The role of external factors (H5) was explored descriptively but was not formally tested through a moderation analysis in the present study. However, this acceptance is nuanced by a strong awareness of risks, calling for a thoughtful, supported, and responsible integration of artificial intelligence into primary education.

6. Discussion

The results of our study highlight a generally positive perception of ChatGPT among primary school teachers, particularly due to its perceived ease of use and usefulness, thus confirming the hypotheses of the enhanced TAM model.

These findings are consistent with recent studies [3], which demonstrate that perceived usefulness, ease of use, and perceived risk significantly influence the adoption of generative AI tools in education [15].

This favorable perception is a strong contrast to that observed in the study by [1], where university teachers expressed concerns primarily centered on cheating, plagiarism, and a lack of training, leading to a low intention to use. This divergence suggests that the teaching level plays a key role in how the tool is perceived, with primary school teachers seeming more inclined to see it as a pedagogical lever, provided there is appropriate guidance.

Furthermore, our study aligns with [12] analysis on the importance of contextual factors in AI acceptance, even if we did not empirically test the impact of gender or discipline. This contextual influence is also supported by the work of [20], who highlight the positive effect

of prior experience with chatbots on perception. The most notable convergence between our research and that of [20] in the central role of perceived ease of use, identified as a strong predictor of attitude and intention to use.

Conversely, the presence of ethical concerns in all studies whether related to dependency, a decline in critical thinking, or the spread of misinformation confirms that the acceptance of ChatGPT is conditional on the implementation of a clear regulatory framework. Thus, despite different contexts, our results confirm that adoption of this tool is possible when its contributions are perceived as concrete and risks are proactively managed.

Study Limitations

Like any scientific study, this work has several methodological limitations that should be considered when interpreting the results.

First, the sample size is relatively small and geographically restricted. This limits the ability to generalize the conclusions to all primary school teachers, especially in varied educational contexts.

Next, the study relies primarily on self-reported data collected via questionnaires. This can introduce biases, such as social desirability bias (participants may respond in a way that enhances their skills or attitudes) or an overestimation of their digital abilities.

Furthermore, certain potentially influential contextual factors, such as gender, subject specialty, professional experience, or initial training level, were not explored in depth. Taking these into account in future research could provide a finer understanding of the dynamics of ChatGPT acceptance.

Finally, it's important to note that this study focuses mainly on teachers' intention to use and perceptions rather than on the observation of the actual use of ChatGPT in a classroom setting. The lack of empirical data on real-world practices therefore limits the scope of the results in terms of evaluating the concrete pedagogical impact.

Recommendations

Given the results obtained, several recommendations can be made to promote a thoughtful and relevant adoption of ChatGPT in an educational context.

First, it is essential to implement targeted and continuous training programs for teachers. These trainings should not only cover the technical aspects of using the tool but also the ethical and pedagogical dimensions, by including modules on critical thinking, information verification, and the management of potential risks (excessive dependency, factual errors, algorithmic biases). Regular institutional support, in the form of mentorship or communities of practice, would strengthen teachers' confidence and their ability to effectively integrate AI into their lessons.

In parallel, the development of a clear and transparent regulatory framework for the use of artificial intelligence in primary education seems essential. This framework should define the conditions for using ChatGPT in the classroom, specify the responsibilities of teachers and institutions, while ensuring the protection of personal data and guaranteeing a use that respects students' rights. Such a framework would help prevent potential abuses (excessive

replacement of the teacher's role, reproduction of stereotypes, privacy infringements) while highlighting the pedagogical benefits of the tool.

Finally, avenues for future research deserve to be explored. It would be relevant to conduct longitudinal studies to observe the actual use of ChatGPT over time and evaluate its concrete impacts on student learning, motivation, and autonomy. This research could also more finely analyze the influence of variables such as gender, initial training, professional experience, or teachers' digital literacy, to better understand the conditions that promote or hinder the adoption of AI in a school setting.

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