ENGLISH TEACHERS' PERCEPTIONS OF INTERACTIVE FLAT PANELS FOR DEEP LEARNING: A TAM PERSPECTIVE

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Abstract

The increasing integration of digital technologies in education has raised important questions about how such tools are perceived and utilized by teachers to support meaningful learning. Among these technologies, Interactive Flat Panels (IFPs) are increasingly adopted in classrooms; however, their contribution to deep learning depends largely on teachers' acceptance and pedagogical use. This study investigates English teachers' perceptions of using Interactive Flat Panel technology to support deep learning in English Language Teaching (ELT) classrooms in South Konawe Regency, Indonesia, drawing on the Technology Acceptance Model as the theoretical framework. A quantitative descriptive survey design was employed, involving 63 English teachers. Data were collected through a 30-item Likert-scale questionnaire measuring perceived usefulness, perceived ease of use, deep learning support, challenges, and classroom implementation. Descriptive statistical analysis using mean and standard deviation was conducted. The findings indicate generally positive teacher perceptions, particularly regarding instructional effectiveness, multimedia integration, and student engagement. While the technology is perceived to support aspects of deep learning, especially motivation and participation, its contribution to higher-order thinking remains limited. Challenges related to training and infrastructure are also present. These results suggest that the effectiveness of Interactive Flat Panel technology depends on teachers' pedagogical competence and contextual support.

Keywords – Interactive Flat Panel, deep learning, ELT, teacher perception, technology integration

Introduction

Globally, the quick development of digital technology has drastically changed teaching methods, resulting in a move toward more participatory and learner-centered strategies. In contemporary education, technology is no longer viewed as a supplementary tool but has become an essential element in shaping effective teaching and learning processes. It enables teachers to deliver content through multiple modes, support collaborative learning, and provide students with access to authentic and diverse resources. As education systems continue to adapt to the demands of the digital era, integrating technology into classroom practice has become increasingly important (Fullan, 2013). Recent studies further highlight that digital technologies contribute to the development of innovative learning environments and play a key role in enhancing student engagement (Bond et al., 2020; Kimmons et al., 2021).

Despite its promise, the availability of digital tools is not the only factor that determines how successful technology integration is; teachers' perceptions and application of these resources in their teaching methods also play a significant role. The degree to which technology is used effectively in the classroom is greatly influenced by teachers' attitudes and opinions about it. (Scherer et al., 2021; Tondeur et al., 2021). Even when technology is accessible, its impact may remain limited if it is not supported by appropriate pedagogical approaches.

At the same time, there has been increasing attention to the concept of deep learning in education. Deep learning refers to a learning process in which students actively engage with content, develop conceptual understanding, and apply knowledge in meaningful ways (Biggs & Tang, 2011). Deep learning encourages critical thinking, introspection, and knowledge creation as opposed to surface learning, which places more emphasis on memory. In the context of language learning, deep learning involves meaningful communication, contextual interpretation, and the ability to use language creatively. Recent research indicates that digital technologies can support deep learning when they are used to foster interaction, collaboration, and student-centered learning environments (Kong, 2021; Zainuddin et al., 2020).

Technology has the potential to facilitate deep learning by creating engaging and interactive learning environments. When integrated effectively, digital tools can support collaborative learning, provide authentic experiences, and increase student participation. Hattie (2012) argues that technology can enhance learning outcomes when it is aligned with appropriate pedagogical strategies. Similarly, Mayer (2009) explains that multimedia learning improves comprehension by combining visual and auditory elements. More recent studies also confirm that multimedia-based tools can significantly improve student engagement and learning effectiveness (Alharbi & Drew, 2021; Wang & Zhang, 2022).

One emerging technology in modern classrooms is the Interactive Flat Panel (IFP), which combines the functions of a computer, projector, and interactive whiteboard into a single touchscreen device. This technology allows teachers to present multimedia content, annotate materials, and facilitate interactive learning activities. In English Language Teaching (ELT), such features are particularly valuable, as language learning requires authentic input, opportunities for interaction, and meaningful engagement. The use of Interactive Flat Panels can therefore create more dynamic and interactive learning experiences that support language development.

However, the successful implementation of Interactive Flat Panel

technology depends largely on teachers' acceptance and readiness to use it. Teachers play a crucial role in determining how technology is integrated into classroom practice, and their beliefs, attitudes, and experiences influence its adoption (Ertmer, 1999). Recent studies also confirm that teachers' perceptions remain a key factor in technology integration (Teo et al., 2022). Teachers who perceive technology as useful and easy to use are more likely to adopt it, whereas those who lack confidence or support may be reluctant to integrate it into their teaching.

To examine teachers' acceptance of technology, this study adopts the Technology Acceptance Model. This model has been widely used in educational technology research because it provides a clear framework for understanding why individuals accept or reject technological innovations. The model emphasizes two primary indicators, namely perceived usefulness and perceived ease of use, which directly influence users' attitudes and intentions toward technology adoption (Davis, 1989). Perceived usefulness refers to the degree to which individuals believe that a particular technology can improve their performance or productivity. In educational settings, this construct is reflected in teachers' beliefs that technology can enhance instructional effectiveness, improve student understanding, increase classroom engagement, and support more efficient learning processes. Teachers who perceive digital tools as beneficial for achieving instructional goals are generally more willing to integrate them into their classroom practices (Scherer et al., 2021).

Meanwhile, perceived ease of use refers to the extent to which a technology is considered easy to operate and free from excessive effort. This indicator is particularly important in educational contexts because teachers often face time constraints and varying levels of technological competence. When technology is perceived as complicated or difficult to manage, teachers may become reluctant to adopt it despite recognizing its potential benefits. Conversely, technologies that are considered user-friendly tend to encourage more consistent classroom implementation (Teo et al., 2022). In the context of Interactive Flat Panel technology, perceived ease of use can be reflected in teachers' confidence in operating the device, navigating its interactive features, and integrating multimedia resources into instruction.

These two indicators are closely interconnected. A technology that is perceived as highly useful may still be rejected if it is considered difficult to use, while a user-friendly technology may not be adopted if teachers do not see meaningful instructional benefits. Therefore, TAM suggests that successful technology integration depends on balancing functionality and usability. In this study, perceived usefulness and perceived ease of use are used as the primary analytical lenses to examine how English teachers perceive Interactive Flat Panel technology and how these perceptions influence its implementation in ELT classrooms. Recent studies confirm that TAM remains a relevant framework for understanding technology acceptance in educational contexts (Scherer et al., 2021; Teo et al., 2022).

In the Indonesian context, digital technology integration has been increasingly promoted to improve educational quality and prepare students for the digital era. Schools in regions such as South Konawe Regency have begun adopting Interactive Flat Panels to support modern teaching practices. However, the effectiveness of these initiatives depends on how teachers perceive and use the technology in their classrooms. While previous studies indicate generally positive attitudes toward technology integration, challenges related to training, infrastructure, and pedagogical use remain

significant (Setyaningsih et al., 2020; Suwarni & Natsir, 2023).

Although previous studies have explored technology integration in education, many of them primarily focus on general digital tools such as online learning platforms, mobile applications, or learning management systems. Comparatively fewer studies have specifically examined Interactive Flat Panel technology, particularly in English Language Teaching classrooms where interaction, communication, and authentic language exposure are essential components of learning. Existing studies also tend to emphasize student engagement and motivation without sufficiently examining how teachers' perceptions influence the effectiveness of technology integration. As argued by Scherer et al. (2021), teachers' acceptance of technology plays a critical role in determining whether digital tools are used meaningfully or merely function as presentation devices.

In addition, previous research in the Indonesian context has largely focused on online learning during and after the COVID-19 pandemic, while limited attention has been given to interactive classroom technologies that support face-to-face instruction. This indicates a gap in understanding how technologies such as Interactive Flat Panels are perceived and implemented in local classroom settings. Such understanding is important because educational technology adoption is influenced not only by technological availability but also by contextual factors, teacher readiness, and pedagogical beliefs (Tondeur et al., 2021).

The Technology Acceptance Model provides a relevant framework for addressing this issue because it explains how perceived usefulness and perceived ease of use shape users' acceptance of technology. In educational contexts, teachers who perceive technology as beneficial and manageable are more likely to integrate it into classroom practice. Therefore, examining teachers' perceptions through TAM can provide deeper insights into the opportunities and limitations of Interactive Flat Panel technology in supporting deep learning in ELT classrooms.

The integration of interactive technologies is particularly relevant in English Language Teaching because language learning requires active communication, authentic exposure, and continuous interaction. Unlike subjects that focus primarily on factual knowledge, language learning involves listening, speaking, reading, and writing processes that benefit from multimodal and interactive instruction. Technologies such as Interactive Flat Panels provide opportunities for teachers to combine visual, auditory, and collaborative learning experiences within a single classroom environment. Through multimedia resources, interactive tasks, and immediate feedback, students may become more engaged in meaningful language use rather than passive content reception.

Recent studies have shown that interactive digital technologies can create more student-centered learning environments in language classrooms by promoting participation, collaboration, and communication (Wang & Zhang, 2022; Zainuddin et al., 2020). However, the educational value of such technologies depends largely on how teachers utilize them pedagogically. In many cases, digital tools are used mainly to support presentation and classroom management rather than to facilitate deeper language interaction and critical engagement (Tondeur et al., 2021). As a result, understanding teachers' perceptions becomes essential because teachers determine whether technology functions merely as a visual aid or as a tool for transformative learning. Therefore, investigating teachers' perceptions of Interactive Flat Panel technology in ELT classrooms is important not only for understanding technology acceptance but also for exploring how digital tools can

support deeper and more meaningful language learning experiences.

Given these conditions, there is still limited research examining the use of Interactive Flat Panel technology specifically in ELT classrooms, particularly in local Indonesian contexts. Most existing studies focus on general digital tools rather than interactive classroom technologies. Therefore, this study aims to investigate English teachers' perceptions of Interactive Flat Panel technology based on perceived usefulness and perceived ease of use, as well as its role in supporting deep learning in ELT classrooms.

Therefore, this study aims to investigate English teachers' perceptions of using Interactive Flat Panel technology to support deep learning in ELT classrooms in South Konawe Regency. Specifically, the study addresses the following research questions: (1) What are teachers' perceptions of Interactive Flat Panel technology in terms of perceived usefulness? (2) What are teachers' perceptions of Interactive Flat Panel technology in terms of perceived ease of use? (3) What benefits do teachers perceive in relation to deep learning? and (4) What challenges do teachers encounter in using the technology? By addressing these questions, the study seeks to contribute to the understanding of technology integration in ELT and provide practical implications for improving teaching and learning in technology-enhanced classrooms.

Methodology

This study employed a quantitative descriptive survey design to investigate English teachers' perceptions of using Interactive Flat Panel (IFP) technology to support deep learning in English Language Teaching (ELT) classrooms. A quantitative approach was selected because the study aimed to collect numerical data and describe patterns of teachers' perceptions in a systematic and measurable way. As noted by Creswell (2014), quantitative research is appropriate for examining trends and summarizing responses across a group of participants using statistical analysis. In this study, the descriptive design was used to provide an overview of teachers' perceptions without manipulating variables, allowing for a clear representation of how Interactive Flat Panel technology is perceived in real classroom contexts.

The subjects of the research consisted of 63 English teachers from junior and senior high schools in South Konawe Regency, Indonesia. The participants were selected using purposive sampling by selecting the participants who are appropriate with the criteria of the research objectives. In this case, the selected teachers had experience using Interactive Flat Panel technology in their teaching practices. This sampling method was considered appropriate because it ensured that all participants had direct exposure to the technology being studied. The participants represented a range of teaching experiences and levels of familiarity with digital tools, providing diverse perspectives on the use of Interactive Flat Panels in ELT classrooms.

Data were collected using a structured questionnaire designed to measure teachers' perceptions of Interactive Flat Panel technology and its role in supporting deep learning. The questionnaire consisted of 30 Likert-scale items that were organized into four main areas: teachers' perceptions of the usefulness and ease of use of the technology, perceived benefits for deep learning, challenges in implementation, and classroom practices. Each item was measured using a five-point Likert scale ranging from strongly disagree to strongly agree. The questionnaire was developed based on the Technology Acceptance Model, focusing on the constructs of perceived usefulness and perceived ease of use. These constructs were reflected in items related to instructional effectiveness,

multimedia integration, and teachers' confidence in using the technology. In addition, the instrument incorporated dimensions of deep learning, including meaningful, mindful, and joyful learning.

The data collection procedure was conducted through an online survey using Google Forms. Firstly, the researchers obtained permission from relevant school authorities and teacher coordinators; in this case the head of the English teacher association in Konawe Selatan. Participants were informed about the purpose of the study and were assured that their responses would remain confidential and used solely for academic purposes. Participation in the study was voluntary, and teachers were asked to respond honestly based on their experiences using Interactive Flat Panel technology in their classrooms. The online distribution of the questionnaire allowed participants to complete the survey at their convenience, which contributed to obtaining a complete set of responses from all participants.

The collected data were analyzed using descriptive statistical techniques, specifically mean and standard deviation. The mean score was calculated to determine the average level of agreement for each questionnaire item, while the standard deviation was used to examine the variability of responses among participants. These statistical measures are commonly used in survey research to summarize and interpret data (Cohen, Manion, & Morrison, 2018). The results were interpreted based on the Likert scale categories, where higher mean scores indicated stronger agreement with the statements. The analysis was then organized according to the main themes of the study, including teachers' perceptions, perceived benefits for deep learning, challenges, and implementation practices. The findings were subsequently discussed in relation to the research questions and the theoretical frameworks used in the study.

Finding and Discussion

This section presents and discusses the findings of the study by organizing the results according to the key constructs of the Technology Acceptance Model. Specifically, the discussion is structured around teachers' perception of IFP in terms of perceived usefulness, perceived ease of use, challenges, and their relationship with deep learning outcomes, including meaningful, mindful, and joyful learning. This theoretically grounded approach allows for a more comprehensive interpretation of teachers' perceptions of Interactive Flat Panel (IFP) technology in English Language Teaching (ELT) classrooms.

1. Perceived usefulness

Perceived usefulness refers to the extent to which teachers believe that using Interactive Flat Panel technology enhances their teaching performance. The descriptive statistics for this construct are presented in Table 1.

Table 1. Perceived of Usefulness of IFP

Statement	Mean
Helps deliver English lessons more effectively	4.30
Improves quality of classroom instruction	4.18
Helps students understand English materials	4.18
Makes presentations clearer and interactive	4.23
Increases students' attention	4.22
Allows integration of multimedia materials	**4.37**

The findings indicate that teachers hold highly positive perceptions of the usefulness of Interactive Flat Panel technology, as reflected in consistently

high mean scores. The highest score (M = 4.37) highlights the importance of multimedia integration, suggesting that teachers perceive the technology primarily as a tool for enhancing instructional delivery. This finding aligns with Mayer (2009**)** and is further supported by more recent studies, which emphasize that multimedia-supported instruction enhances comprehension and engagement in language learning contexts (Alharbi & Drew, 2021; Wang & Zhang, 2022).

From a TAM perspective, perceived usefulness is a critical determinant of technology acceptance. The strong agreement among teachers indicates that they believe the technology improves both teaching effectiveness and student learning outcomes. Recent research also supports this finding, showing that teachers are more likely to adopt digital tools when they perceive clear instructional benefits (Scherer et al., 2021). In this study, the ability to enhance clarity, engagement, and content delivery reinforces the role of perceived usefulness as a driving factor in technology integration.

However, a critical examination of the findings suggests that the perceived usefulness of Interactive Flat Panel technology is largely associated with improving presentation and engagement rather than transforming pedagogical practices. Teachers appear to value the technology for making lessons more interactive and visually appealing, but there is limited evidence that it is consistently used to promote higher-order thinking. This finding is consistent with recent studies (Tondeur et al., 2021), which argue that technology is often used at a surface level unless supported by pedagogical training.

2. Perceived ease of use

Perceived ease of use refers to the extent to which teachers find the technology easy to use. The results are presented below.

Table 2. Perceived of ease of use of IFP

Statement	Mean
Easy to operate during teaching	4.08
Teachers feel confident using it	4.18

The findings show that teachers generally perceive Interactive Flat Panel technology as easy to use, with mean scores above 4.00. This indicates that the technology does not present significant usability challenges. According to Davis (1989), perceived ease of use influences users' willingness to adopt technology, as tools that are easy to operate are more likely to be accepted.

This finding is supported by recent research, which shows that ease of use remains a crucial factor in technology adoption among teachers, particularly in digital learning environments (Cheng & Yuen, 2020; Teo et al., 2022). Teachers who feel confident using technology are more likely to integrate it into their teaching practices. In this study, the relatively high confidence level suggests that teachers are comfortable using Interactive Flat Panels, which supports their continued use in classrooms.

Nevertheless, ease of use should not be interpreted as an indicator of effective pedagogical use. While teachers may find the technology easy to operate, they may still use it in limited ways. This aligns with findings from Tondeur et al. (2021), who argue that technical competence does not necessarily translate into pedagogical competence. Therefore, although perceived ease of use supports technology adoption, it does not guarantee meaningful integration.

3. Technology use and deep learning outcomes

This part of the analysis examines how Interactive Flat Panel technology relates to deep learning outcomes, including meaningful, mindful, and joyful learning.

Table 3. Deep learning Dimensions

Dimension	Mean
Meaningful Learning	4.16
Mindful Learning	4.08
Joyful Learning	**4.31**

The findings indicate that Interactive Flat Panel technology contributes most strongly to joyful learning, followed by meaningful learning, while mindful learning shows slightly lower results. The high score for joyful learning (M = 4.31) suggests that the technology significantly enhances student motivation and engagement. This is consistent with Hattie (2012) and supported by recent studies (Bond et al., 2020), which highlight the role of digital technologies in increasing student engagement.

Meaningful learning is also supported, as teachers report that the technology helps students understand concepts and participate actively. This aligns with Biggs and Tang (2011), who emphasize that deep learning involves active engagement and knowledge construction. However, mindful learning, particularly critical thinking, shows relatively lower results, indicating that the technology is less effective in promoting higher-order cognitive skills.

This finding is important because it highlights a common limitation in technology integration. Recent research (Kong, 2021) suggests that while digital tools can enhance engagement, they do not automatically foster critical thinking unless combined with appropriate pedagogical strategies. Therefore, the effectiveness of Interactive Flat Panel technology in supporting deep learning depends on how it is used in classroom practice.

Furthermore, more details benefits of each deep learning component can be seen as follow:

Table 4. Perceived Benefits of Meaningful Learning

Statement	Mean	SD
Connects new knowledge with prior knowledge	4.13	0.84
Supports deeper understanding of concepts	4.12	0.86
Encourages meaningful learning activities	4.20	0.82
Encourages active participation	4.18	0.80

Table 4 shows that teachers perceive Interactive Flat Panel technology as supporting meaningful learning, with mean scores ranging from 4.12 to 4.20. The highest score (M = 4.20) indicates that the technology encourages meaningful learning activities, suggesting that it facilitates active engagement with content. This aligns with the concept of deep learning proposed by Biggs and Tang (2011), where learning occurs through active construction of knowledge. However, while the results indicate positive perceptions, meaningful learning depends not only on the technology itself but also on how teachers design and implement learning activities.

The similar result also for the mindful learning component of deep learning is demonstrated in the following table:

Table 5. Perceived Benefits of Mindful Learning

Statement	Mean	SD
Encourages critical thinking	3.93	0.91
Improves attention and focus	4.15	0.79
Supports analysis and discussion	4.08	0.84
Supports collaborative learning	4.17	0.83

As shown in Table 5, teachers generally agree that Interactive Flat Panel technology supports mindful learning, particularly in terms of attention and collaboration. However, the relatively lower mean score for critical thinking (M = 3.93) indicates that the technology is not strongly associated with higher-order cognitive processes. This finding suggests that while the technology enhances engagement, it may not be fully utilized to support analytical thinking. According to Perkins (2010), mindful learning requires active reflection and cognitive effort, which depend more on pedagogical design than on technology alone.

Finally, it is also in line with the last component which is joyful learning as can be seen in the table 6 below.

Table 6. Perceived Benefits of Joyful Learning

Statement	Mean	SD
Makes learning more enjoyable	**4.38**	0.71
Increases student motivation	4.32	0.75
Increases student enthusiasm	4.23	0.80

Table 6 indicates that joyful learning is the most strongly supported dimension, with the highest mean score recorded for enjoyment (M = 4.38). These findings suggest that Interactive Flat Panel technology significantly enhances students' emotional engagement. This aligns with Hattie (2012), who emphasizes that engagement and motivation are key factors in effective learning. However, while joyful learning is important, it should be balanced with cognitive challenges to ensure deep learning outcomes.

The above findings highlight an important limitation of technology integration. While Interactive Flat Panel technology can create engaging learning environments, it does not automatically lead to deep learning. According to Biggs and Tang (2011), deep learning requires active cognitive engagement, which depends on instructional design rather than technology alone.

An important finding of this study is the contrast between high levels of engagement and relatively lower support for higher-order thinking. While teachers strongly agreed that Interactive Flat Panel technology increases student motivation and participation, the findings related to mindful learning and critical thinking were comparatively lower. This suggests that the technology is more effective in enhancing emotional and behavioral engagement than in promoting cognitive depth.

This finding reflects a broader issue in educational technology integration. Previous studies have similarly reported that digital technologies are often successful in attracting students' attention but less effective in facilitating analytical thinking unless accompanied by appropriate instructional design (Kong, 2021; Bond et al., 2020). In many classrooms, technology integration tends to focus on visual presentation and content delivery rather than on inquiry-based or reflective learning activities.

Consequently, students may become more enthusiastic during lessons without necessarily engaging in deeper conceptual understanding.

In the context of ELT, this issue is particularly important because language learning involves not only participation but also interpretation, reflection, and critical communication. Interactive technologies may support these processes when teachers design activities that encourage students to analyze texts, solve problems collaboratively, and express ideas critically. However, if the technology is used primarily to display information or multimedia content, its contribution to deep learning may remain limited.

These findings indicate that technology acceptance alone is insufficient for achieving transformative learning outcomes. Although teachers in this study generally perceived the technology as useful and easy to use, pedagogical practices still determine whether meaningful and mindful learning can occur. Therefore, future professional development initiatives should focus not only on technical competence but also on instructional strategies that promote deeper cognitive engagement.

4. Challenges

Challenges refer to the availability of support and infrastructure necessary for using technology effectively. The findings related to this construct are presented in Table 7.

Table 7. Challenges

Statement	Mean
Need more training	**3.88**
Internet connectivity problems	3.95
Limited lesson time	3.50
Technical difficulties	3.00

The findings indicate that the main challenges are related to training and infrastructure. The need for additional training suggests that teachers may not fully understand how to use the technology effectively. This finding is consistent with recent studies (Instefjord & Munthe, 2020), which emphasize the importance of professional development in technology integration.

Internet connectivity issues also represent a significant barrier, highlighting the role of infrastructure in supporting digital learning. This aligns with previous research (Kimmons et al., 2021), which shows that technological limitations can hinder effective implementation, even when teachers have positive attitudes toward technology.

These findings suggest that while teachers are willing to adopt Interactive Flat Panel technology, external factors may limit its effectiveness. Therefore, improving training and infrastructure is essential for maximizing the benefits of technology integration.

Overall, the findings demonstrate that teachers have positive perceptions of Interactive Flat Panel technology, particularly in terms of perceived usefulness and ease of use. However, the impact of the technology on deep learning is uneven. While it effectively enhances engagement and motivation, its contribution to higher-order thinking remains limited.

This suggests that technology integration should move beyond technical adoption toward pedagogical transformation. Teachers need support not only in using the technology but also in designing learning activities that promote critical thinking and meaningful engagement. As recent studies suggest (Tondeur et al., 2021), effective technology integration requires a combination of technological, pedagogical, and content knowledge.

The findings of this study suggest that positive perceptions of technology do

not automatically guarantee transformative learning practices. Although teachers perceive Interactive Flat Panel technology as useful and easy to use, its implementation appears to remain largely focused on improving presentation and classroom engagement. This indicates a gap between technology acceptance and pedagogical transformation. In other words, teachers may successfully adopt digital tools without fully utilizing them to promote higher-order thinking and reflective learning.

Moreover, this finding highlights an important issue in educational technology integration. As noted by Tondeur et al. (2021), effective technology integration requires not only technical competence but also pedagogical readiness. Similarly, Kong (2021) argues that digital technologies can support critical thinking only when combined with instructional approaches that encourage analysis, reflection, and problem-solving. Therefore, the effectiveness of Interactive Flat Panel technology depends not merely on the technology itself but on how teachers design and facilitate learning activities.

From a practical perspective, these findings imply that professional development programs should move beyond technical training and focus more on pedagogical strategies for deep learning. Teachers need support in designing interactive activities that encourage critical thinking, collaboration, and meaningful engagement rather than relying primarily on multimedia presentation. Such an approach may help maximize the educational potential of Interactive Flat Panel technology in ELT classrooms.

Finally, the findings of this study have several pedagogical implications for English language education. First, schools should provide continuous professional development programs that help teachers integrate Interactive Flat Panel technology in more pedagogically meaningful ways. Training should move beyond technical operation and focus on designing interactive activities that support critical thinking, collaboration, and communication. Second, teachers should be encouraged to utilize the interactive features of the technology to facilitate student-centered learning rather than relying primarily on presentation-based instruction. Finally, educational stakeholders should ensure adequate infrastructure and technical support to maximize the effectiveness of technology integration in classrooms. By combining technological readiness with pedagogical innovation, Interactive Flat Panel technology may contribute more effectively to deep learning in ELT contexts.

Conclusions

This study investigated English teachers' perceptions of using Interactive Flat Panel (IFP) technology to support deep learning in English Language Teaching (ELT) classrooms, guided by the Technology Acceptance Model. The findings reveal that teachers generally have positive perceptions of the technology, particularly in terms of perceived usefulness and perceived ease of use. Teachers recognize that Interactive Flat Panels enhance instructional delivery, support multimedia integration, and increase student engagement.

In terms of learning outcomes, the technology is effective in promoting student motivation and participation, contributing to joyful and meaningful learning. However, its role in fostering higher-order thinking remains limited, indicating that technology alone is insufficient to support deep learning. The findings also highlight challenges related to training and infrastructure, which may hinder effective implementation.

Overall, the study suggests that while Interactive Flat Panel technology has strong potential to enhance ELT classrooms, its effectiveness depends on

teachers' pedagogical practices and professional readiness. Future research is recommended to explore instructional strategies that better integrate technology with deep learning outcomes.

Despite its contributions, this study has several limitations that should be acknowledged. First, the study employed a quantitative descriptive design, which limits the ability to explore teachers' experiences and perceptions in greater depth. The findings primarily reflect general trends based on questionnaire responses and may not fully capture the complexities of classroom practices. Second, the study was conducted within a specific local context involving English teachers in South Konawe Regency, which may limit the generalizability of the findings to other educational settings. In addition, the study focused mainly on the constructs of perceived usefulness and perceived ease of use within the Technology Acceptance Model, while other factors such as institutional policy, teaching experience, and technological competence were not examined in detail. Future studies are therefore recommended to employ mixed-method or qualitative approaches and involve broader educational contexts to provide a more comprehensive understanding of technology integration and deep learning in ELT classrooms.

References

Alharbi, S., & Drew, S. (2021). Using multimedia to support language learning: A systematic review. *Computer Assisted Language Learning, 34*(5–6), 1–22. https://doi.org/10.1080/09588221.2020.1839505

Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Open University Press.

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology. *Educational Technology Research and Development, 68*, 1–24. https://doi.org/10.1007/s11423-019-09687-0

Cheng, M., & Yuen, A. H. K. (2020). Student and teacher acceptance of technology: A systematic review. *Educational Technology & Society, 23*(4), 1–15.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47–61. https://doi.org/10.1007/BF02299597

Fullan, M. (2013). *Stratosphere: Integrating technology, pedagogy, and change knowledge*. Pearson.

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. Routledge.

Instefjord, E. J., & Munthe, E. (2020). Preparing teachers for digital competence: A systematic review. *Teaching and Teacher Education, 87*, 102925. https://doi.org/10.1016/j.tate.2019.102925

Kimmons, R., Rosenberg, J. M., & Allman, B. (2021). Trends in educational technology: What teachers should know. *Computers & Education, 173*, 104307.

https://doi.org/10.1016/j.compedu.2021.104307

Kong, S. C. (2021). Technology and critical thinking: A review of the literature. *Computers & Education, 174*, 104293. https://doi.org/10.1016/j.compedu.2021.104293

Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511811678

Scherer, R., Siddiq, F., & Tondeur, J. (2021). The technology acceptance model revisited: A meta-analysis of studies in education. *Computers & Education, 157*, 103967. https://doi.org/10.1016/j.compedu.2020.103967

Setyaningsih, E., Wahyuni, D. S., & Rochsantiningsih, D. (2020). Indonesian EFL teachers' perceptions and practices of technology integration. *International Journal of Instruction, 13*(3), 233–248.

Suwarni, A., & Natsir, N. (2023). Technology integration in English language teaching: Teachers' perceptions and classroom practices. *International Journal of Educational Research, 11*(2), 45–58.

Teo, T., Zhou, M., & Noyes, J. (2022). Teachers and technology acceptance: A systematic review. *Educational Technology Research and Development, 70*, 1–20. https://doi.org/10.1007/s11423-021-10039-7

Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2021). A comprehensive framework for understanding technology integration in education: A systematic review. *Educational Research Review, 33*, 100393. https://doi.org/10.1016/j.edurev.2021.100393

Wang, Y., & Zhang, L. J. (2022). Multimedia use in language learning: Effects on engagement and achievement. *System, 105*, 102712. https://doi.org/10.1016/j.system.2022.102712

Zainuddin, Z., et al. (2020). Technology-enhanced learning and student engagement: A systematic review. *Education and Information Technologies, 25*, 1–18. https://doi.org/10.1007/s10639-019-10029-0