Using Interactive Whiteboards (IWB) in the English Classroom as Supporting Technology in the Teaching and Learning Process: Opportunities and Challenges

Tira Nur Fitria
Institut Teknologi Bisnis AAS Indonesia, Indonesia
Corresponding Author: tiranurfitria@gmail.com

Abstract. This research describes the teachers' and students' perception of using Interactive Whiteboards (IWB) and explain the opportunities and challenges of using IWB in English classrooms. This research uses library research. IWBs are large interactive displays used as input devices for computers. They can be used in educational institutions combining traditional presentation benefits with cutting-edge technology. IWB technology consists of a digital board, computer, and projector, which can be linked to a personal computer for easy use. It offers various tools including graphics, word processing, database, and multimedia tools. Using IWB as an educational tool increase new knowledge, provide innovations to students, improve the quality of students' learning, facilitate interaction between teaching teams and students, improve teaching efficiency, and reduce paper usage. IWB has been found to significantly improve students' English skills, vocabulary proficiency, engagement, and attitude. However, implementing IWBs in schools presents challenges including large costs, insufficient technical support, technical issues, lack of adequate e-materials, limited time for lesson preparation, negative attitudes, lack of consensus among decision-makers, inadequate proficiency, and inadequate teacher training. Teachers need to master this technology so they can use it effectively in teaching. It is proposed that teachers receive training on utilizing IWBs more efficiently in various classroom settings. Teaching using proper operation of IWBs is a major factor in the teachers' ability to implement it successfully in the classroom. The trained teachers possessed a comprehension of the most efficient methods for utilizing the IWBs.

INTRODUCTION

The rapid advancement of technology has the potential to significantly alter our day-to-day lives and make people's lives easier in every aspect of human life The presence of technological advancements is continuing to be felt in a variety of domains, including communication, health, and the economy. Incorporating technology into the realm of education provides the foundation for a significant number of educational changes being implemented worldwide (Tosuntaş et al., 2015). Technological advancements are similarly evident in the realm of education (Fitria, 2021). Presently, technological advancement is considerably more advanced than it has been in previous years. In response to contemporary developments, education has accelerated development (Humairoh et al., 2023).

Undoubtedly, educational technology has had a profound impact on the field of education (Alfaki & Khamis, 2018). It has transformed how teachers instruct, and students acquire knowledge. It has transformed both how teachers instruct and students acquire knowledge. Equipment and instruments have been installed in the classroom to improve the environment for instruction and learning. An alternative type of classroom exists in which the boundaries have been eliminated. Although these modifications have not shifted the underlying learning methodologies, they have altered individuals' perspective and task approaches. A new perspective on the learning process has emerged, integrating high technology as an instrument for teaching and learning.

Educational technology encompasses both software and hardware that are implemented within academic environments to augment the quality of instruction and learning. The Interactive Whiteboard (IWB) is a technological innovation that significantly alters classroom activities and the function of teachers. The traditional chalkboard has given way to an electronic, interactive board. A learner can simultaneously perceive and experience his or her accomplishment. Users can write, draw, drag an object, manipulate text, and shape objects with their fingers. IWB is, in fact, both a learning resource and a tool for teaching. By using the Internet, a teacher can introduce the outside world into the classroom. Schmid (2010) Mentions several competencies as they integrated technology into their lessons, such as a) the capacity to create interactive whiteboard-based materials that facilitate opportunities for students to engage with the whiteboard and the learning material; b) the ability to manage interactions around interactive whiteboards in a way that guarantees every student has the chance to participate actively; and c) the capacity to strike the "right balance" when it comes to technology use.

Jang & Tsai (2012) explain that information and communication technology have been highlighted as essential in the field of education. This is because it allows for the enhancement of teaching efficacy, which in turn helps students learn more effectively via the utilization of various technological gadgets. One of the technology tools that has grown more popular among teachers in a variety of nations is the interactive whiteboard, sometimes known as an IWB. Mastering 21st-century skills from an early stage of education is a good start to ensuring a smoother educational journey for a student (Mohamad et al., 2022). The education sector is always equipped with new technology to meet the latest educational needs. One of the technologies is the Interactive Whiteboard (IWB). The impact of technological advancements in education now encompasses pre-kindergarten, elementary, secondary, and tertiary levels. Ensuring that a subject is effectively taught and learned in the classroom (Baharudin et al., 2020).

The basic blackboard, which entered classrooms in 1801, was the first revolutionary teaching aid and profoundly affected the nature of education for the next two centuries (Betcher & Lee, 2009). Farr & Murray (2016), interactive whiteboards (IWBs) have gained significant traction in the domain of computer-assisted language learning (CALL) since the late 1990s. The blackboard has come to be associated with the traditional classroom and continues to be regarded as a stereotypical representation of education. IWBs, or interactive whiteboards, are capable of becoming the second revolutionary teaching instrument. The interactive whiteboard (IWB) possesses the capacity to become synonymous with the emerging digital classrooms of the twenty-first century, just as the blackboard was a fundamental component of classrooms in the nineteenth and twentieth centuries. Notwithstanding its relatively recent inception, the IWB demonstrates the same potential to fundamentally transform—and indeed revolutionize—the essence of education.

Like traditional blackboards, a technology that all teachers could use daily in traditional schools, interactive whiteboards are already demonstrating their capability to be used daily by all

teachers in our emerging digital schools. Due to its potential to seamlessly incorporate into contemporary classrooms, the IWB could potentially act as the impetus for schools to ultimately abandon their paper-based operations in favor of a more streamlined digital paradigm (Betcher & Lee, 2009). The utilization of Interactive Whiteboard (IWB) technology in the field of education since the beginning of the 1990s until the present (Wujec-Kaczmarek, 2021).

Over the last decade, interactive whiteboards have become popular teaching and learning tools (Northcote et al., 2010). Gregorcic et al. (2018) Emphasize that over the last few decades, the interactive whiteboard, often known as an IWB, has emerged as a significant instructional tool in some Western institutions. Compared to a standard computer-projector-canvas arrangement, the interactive whiteboard (IWB) is effectively a giant touch screen that allows the user to engage with digital material in ways that are not before conceivable. On the other hand, the one-of-a-kind capabilities of interactive whiteboards are typically not utilized to improve teaching and learning beyond the elementary school level. De Vita et al. (2014) State that an interactive whiteboard, often known as an IWB, is a relatively new technology that offers a variety of fascinating affordances in the context of a classroom setting. These affordances include the ability to move and simulate motion and various visualizations and multimedia presentations.

Interactive Whiteboards (IWBs) align well with several pedagogical theories, enhancing learning while preparing students for the Fourth Industrial Revolution and 21st-century skills. Constructivism emphasizes that students construct understanding through real-time engagement and problem-solving, which IWBs facilitate by promoting interactive and collaborative activities essential for innovation and adaptability. Social Learning Theory supports this by enabling collaborative projects that foster communication and teamwork, reflecting the social interactions necessary in modern professional environments. Additionally, Multimodal Learning Theory recognizes that IWBs cater to diverse learning styles by presenting information in various formats—text, images, and videos—thus supporting digital literacy and adaptability. Experiential Learning Theory enhances learning through simulations and interactive exercises, fostering critical thinking and problem-solving skills. Finally, Constructive Alignment emphasizes the importance of aligning learning activities with intended outcomes; IWBs enable educators to design lessons that connect theoretical knowledge to real-world applications, ensuring students develop the competencies needed for future success. Integrating these theories with IWBs creates engaging learning environments that promote collaboration, critical thinking, and adaptability, effectively preparing students for the challenges of a dynamic world.

Dvorak (2012) Explains that Interactive whiteboard (IWB) refers to hardware that is linked to our computer and displays our computer's desktop. This hardware allows us to interact with the information displayed on the interactive whiteboard rather than what is displayed on our computer. So. It is possible to launch programs and browse the web. Engage in activities such as writing on the interactive surface, writing over our notes, saving the notes, watching videos, recording sound, and using the camera linked to the interactive whiteboard.

According to Aytaç (2013), an interactive whiteboard (IWB) is a prevalent interactive display system utilized in academic settings. An IWB connects a computer and a teaching surface via a digital projector. Kennewell & Morgan (2003) Explain that interactive whiteboards (IWBs) are sizable touch-sensitive display panels that can be utilized as a computer projector screen, an ordinary whiteboard, or an electronic copy board, or by simply touching the panel's surface to manipulate the computer image instead of employing a mouse or keyboard. Thanks to this technology, the user can write or draw on the surface, print the resulting image, save it to a computer, or distribute it via a network. Additionally, the user can impart a computer screen image onto the surface, enabling them to manipulate the application through direct touch or the

utilization of a specialized pen. It is possible to annotate or draw over the computer image, with the annotations being saved.

According to Coyle et al. (2010), an interactive whiteboard, also known as an IWB, is an as large board that is touch-sensitive and is often installed on a wall. It is connected to both a computer and a digital projector at the same time. It is possible to access any program or files stored on the computer by physically touching the board or using a pen to do so. Through the use of the projector, the computer screen is projected onto the surface of the board. This allows both the teachers and the students to interact with the board's contents by writing or sketching on it, moving items about, or simply touching the board to switch between screens.

Saville et al. (2014) explain more that the data projector's placement can differ significantly, ranging from a proximity to the top of the IWB to several meters away. Additionally, it has the option of being fixed in place or freestanding. The degree to which the data projector and the classroom environment are in alignment influences the frequency at which the IWB must be calibrated or realigned with the data projector. Additionally, the functionality of a virtual whiteboard can be experienced by employing an interactive projector that detects the whereabouts of an infrared pen on a given surface. In addition to projectors, an extensive variety of attachments are accessible for IWBs. Interactive response systems, printers, slates or tablets, wireless graphic pads, or other mobile technologies, and slates or tablets are among these.

Türel & Johnson (2012) state that Interactive Whiteboards (IWBs) are widely recognized as a groundbreaking instructional technology that has revolutionized learning across multiple grade levels. While several studies have recently investigated the effects of IWBs in the classroom, this one examines the perception and actual usage and behaviors associated with promising IWB features in practical settings. About the recent implementation of interactive whiteboards in secondary schools, this study is crucial for determining the effects of interactive whiteboards on lessons, identifying the teachers' perspectives as system users, and enhancing the efficacy of initiatives associated with the implementation of interactive whiteboards (Kutluca et al., 2019). The researcher is interested in describing the implementation of interactive whiteboards (IWB), the benefits and challenges, and the teacher and students' perception of interactive whiteboards (IWB).

METHOD
This research applies a library research. A library study is one type of research that introduces us as researchers to managing libraries (Saputra et al., 2023). Library studies can be defined as a step in obtaining information from previous research (Siregar & Fahmi, 2023). The method of collecting data uses documents. Researchers often apply documentation methods to complete data in qualitative research to make it more credible (Iskandar et al., 2023). This documentation method is one form of the easiest data collection because the researcher only observes inanimate objects and makes mistakes easily to revise because the data source is fixed and does not change (Abdussamad, 2021). This research collects data from previous studies, such as national and international article journals, related to the topic of interactive whiteboards. Data analysis simplifies data in depth, making it easy to read and interpret the form of this research. After collecting data, the data is analyzed to get conclusions, the form of technique in data analysis is content analysis. A researcher used data analysis techniques in the form of content analysis because this type of research is research literature, where the data sources are books and documents as well as literature in other forms.

RESULT AND DISCUSSION

1.   The Notion of Interactive Whiteboard in Classroom

Maher et al. (2012) explain that IWBs are sizable surfaces resembling whiteboards that function as "input" devices to computers. When utilized in conjunction with a data projector to project the image from the computer monitor onto the board's surface, they operate as a "touch-sensitive screen." IWBs retain numerous characteristics of conventional whiteboards and chalkboards, such as the capability to visually exhibit student work or drawings in a classroom setting.

Mosina (2019) Explains that IWB is a large interactive display in the form of a whiteboard. An interactive whiteboard (IWB) may be displayed by an independent computer featuring a sizable touch screen and a device connected to the notebook, projector, and touch panel. IWBs are utilized in board meetings, educational institutions, and training sessions. An electronic IWB is a substantial touch screen that allows for the demonstration of various user interface functions through the use of a stylus or finger. Electronic IWBs enable the fusion of all the benefits of traditional presentation with the potential of cutting-edge technology.

An interactive whiteboard consists of a computer and a touch-sensitive display board that is interconnected (Biebighäuser & Zibelius, 2012). It is possible to operate every application on the computer by manipulating the IWB using either a finger or an electronic stylus. The majority of boards include specialized software that facilitates the use of electronic flipcharts and a variety of tools that enable a multitude of tasks, including but not limited to highlighting and coloring, dragging and dropping objects or text, handwriting recognition, object hiding and revealing, web browsing, and the creation of interactive exercises. Blank pages comprise flipcharts, which may be utilized impromptu to annotate or exhibit classroom content or generate instructional materials. In addition to providing an infinite quantity of writing space, they can be rotated in both directions. Including the annotations, every flipchart is capable of being stored and reused electronically.

Software is typically included with WBs and installed on the computer that is connected to the board (Maher et al., 2012). Tailored specifically for teachers, this software operates similarly to presentation software but also incorporates robust multimedia galleries, handwriting recognition, drawing capabilities, audio recording and playback, hyperlinking, and file embedding capabilities. Illustrative instances of built-in resources comprise timers, grid paper, Flash-based interactive dice rolls, and audio files that can indicate accurate or inaccurate responses (e.g., handclapping or applause). Specific examples of such software include SMART Notes, ActivInspire, and Easiteach, all of which are manufactured and distributed by the main IWB brands. Because each brand has its own set of variant names, we shall henceforth denote this software as "flipchart software." The unique features of the interactive whiteboard enable the viewing of photo and video files, the execution of educational software, the modification of documents using a variety of software applications, and more (Pardanjac et al., 2018).

2.   Advantages of Interactive Whiteboard

Numerous findings have been made regarding the advantages of learning via an interactive whiteboard (IWB) pedagogy, which has accelerated the acquisition and implementation of IWBs in schools (Xu & Moloney, 2011). Numerous studies have investigated the advantages of Interactive Whiteboard technology from the viewpoint of teachers and students. According to Belinda et al. (2023), Three components make up IWB technology: a projector, a computer, and a digital board. A board and a projector are connected to a personal computer. As a result, interactive boards are not like conventional boards in that they also accept computer input in

addition to handwriting. Software has been developed to make IWBs easier to use. The board is projected onto the computer screen via a computer link. With the use of this IWB, students may access resources, including word processing, graphic design, database management, and multimedia applications. Additionally, IWBs appear to be essential technical tools for instructors due to the growth and extensive usage of the internet. As a result, IWB enables educators to digest knowledge to make greater use of cutting-edge technology.

An interactive whiteboard learning model is suitable as an innovative learning medium (Belinda et al., 2023). The effectiveness of interactive whiteboards in facilitating teaching and learning will continue to be the subject of discussion as their prevalence rises in primary classrooms (Maher et al., 2012). Technology development is continuously advancing and continues to play an increasingly important role in education. The implementation of interactive whiteboards in classrooms is currently being made possible as a result of this advancement. The teaching and learning process in classrooms can be supported by the appropriate utilization of interactive whiteboards (Herawati et al., 2023).

Zevenbergen & Lerman (2008) Interactive whiteboards (IWB) are an innovation that has a considerable presence in contemporary classrooms. IWB is rapidly becoming a popular and effective teaching tool in classrooms (Nolan, 2009).

The interactive whiteboard has undergone remarkable advancements due to a multitude of innovations that have transformed it into an educational technology product that facilitates interactive learning in the classroom(Purwanto, 2013). According to Wujec-Kaczmarek (2021), the issues related to the benefits of interactive whiteboards (IWBs) in education, namely adaptability and versatility, interactivity, and a multitude of affordances, have the potential to revolutionize pedagogy. The following sections provide an examination of the benefits that IWB technology offers, which students particularly value. These encompass the ability of IWBs to foster a student-centered learning environment, increase motivation, facilitate material sharing, and provide additional benefits.

The interactive whiteboard is a vital instrument in the classroom because it alters the teaching process(Bahadur & Oogarah, 2013). Al-Kahlan & Khasawneh (2023) IWB provided substantial advantages for the classroom concerning the teacher, the subject matter, the instructional approach, and the students. In regards to the benefits of implementing the IWB in the classroom, no statistically significant distinctions were observed between male and female users. The IWB is an ideal resource to support whole-class teaching (Lewin et al., 2008). This means that one of the benefits of interactive whiteboards is the potential to include a variety of resources in the teaching process. To give a great deal of weight to the in-depth analysis to determine whether or not teachers of English as a foreign language employ a variety of pedagogical ways to include IWB in their teaching practice, further research on the usage of IWB in L2 is necessary. Furthermore, future studies should make an effort to investigate how the perspectives of experienced and beginner teachers differ concerning their capacity to comply with new technology and the integrative abilities related to the use of interactive whiteboards.

The interactive whiteboard (IWB) function has identified many strategies teachers employ to facilitate their students' learning (Harlow et al., 2010). The influence of educational technology in the teaching and learning process is growing in significance. Integration success should be the ultimate objective of any educational technology. By utilizing the interactive whiteboard (IWB), teachers may improve the efficacy of their teachings (Gashan & Alshumaimeri, 2015).

Wood & Ashfield (2008) Examines how the interactive whiteboard can be utilized to support and improve pedagogical practice in the areas of literacy and numeracy during the teaching process Utilizing ICT, particularly IWB, in the classroom can enhance the knowledge and

abilities of students. IWB characteristics foster an enjoyable learning environment, particularly when teachers are instructing literacy skills (Baharudin et al., 2020). Mohamad et al. (2022) Explain that using interactive whiteboards supports students' mastery of 21st-century skills, namely stimulating mastery of communication skills, fostering a spirit of collaboration, stimulating critical thinking, and stimulating creativity. This means the interactive whiteboard afforded rich opportunities for students to collaborate and share their thinking (Taylor et al., 2010). Furthermore, the IWB can facilitate students' comprehension of a narrative and better prepare them to compose a whole-class response by expanding their access to a variety of multimodal resources. It also addressed how the interactive capabilities of the IWB can facilitate students' access to multimodal resources (Maher, 2011).

Al-Kahlan & Khasawneh (2023) Determine the benefits of utilizing the IWB in the classroom as a teaching tool. Four factors are used to evaluate the benefits: the student, the learning process, the instructor, and the educational material. The advantages of the IWB and its use in the educational process were created to disrupt the status quo, provide a shift from the range of instructional methods, and address some of the issues with the conventional whiteboard. By encouraging the learner to learn and increasing his attention and awareness of everything going on in the classroom, this way of teaching makes learning more successful than other approaches. The IWB, according to the respondents, helps set clear objectives, highlight important ideas, understandably organize the content, and simplify difficult concepts as well as potentially hazardous or perplexing natural occurrences. Allowing students to create, alter, and animate shapes also promotes student involvement with the subject matter. Provides the advantages of the visual aspect of the curriculum, helps to overcome all the drawbacks associated with using chalk, inspires a desire to learn through various instructional methods, and breaks up the monotony of the classroom environment by drawing students' attention and boosting their motivation to learn.

Interactive Whiteboard is an electronic whiteboard that allows users to write, draw, and operate a computer via a touch screen. This tool is very useful in learning because teachers can project teaching material from the computer onto the blackboard, and students can interact with the material using digital pens or their fingers. The advantages of Whiteboard Interactive for classroom learning methods include: 1) It can increase new knowledge for students with new technology that continues to develop. 2) Can provide innovations to students so that they can increase student learning motivation in a classroom learning atmosphere. 3) Can improve the quality of student learning in class and create an effective teaching and learning atmosphere that is not monotonous. 4) facilitate interaction between the teaching team and students so that the teaching and learning process in class will be more effective and efficient. Students can be more involved in learning because they can directly interact with the material displayed on the screen. This can increase students' creativity and understanding of teaching material. 5) Can improve teaching efficiency. IWB can help teachers prepare and present teaching material more easily and quickly. Teachers can project material from the computer directly onto the whiteboard and explain interactively with students. 6) Can reduce paper usage. By using IWB, teachers can reduce the use of paper and ink in the learning process. This is very environmentally friendly and can help reduce school operational costs.

Katwibun (2014) Examines the impacts of incorporating an interactive whiteboard (IWB) into vocabulary instruction. The findings suggested that the students' vocabulary proficiency, engagement, and demeanor had significantly improved after implementing the IWB. (Schmid, 2008) Indicates that the students considered the integration of multimedia into the IWB technology-driven classroom to be beneficial for learning a language. The authors specifically

Journal of English Language and Pedagogy (JELPA)
Vol. 2, No. 2, November 2024 | Fitria. *Using Interactive Whiteboards (IWB) in......*

81

discussed its impact on their motivation, focus, and attention levels, its ability to aid in the comprehension and retention of novel vocabulary terms, and its potential to accommodate diverse learning preferences. The present study utilized the IWB as a framework to incorporate various forms of ICT, including CD-ROMs, digital videos, and Web-based materials. The implementation of interactive whiteboards (IWBs) in the classrooms facilitated my access to an extensive array of multimedia resources during the research sessions. Amiri & Sharifi (2014) Demonstrate students' greater accuracy in their writing when instructed using an interactive whiteboard. It can be claimed that IWB, as a new medium for instruction, can promote learners' motivation and improve their performance.

According to Şen & Ağir (2015), the use of IWB improves the academic achievement of students in English in comparison to the use of blackboards, and the implementation of IWB in English instruction has a positive impact on the achievement of students. Implementing smart boards in English classes has a higher student success rate. One could hypothesize that this was the consequence of their fascination with technology. In English classes, using the blackboard has also been discovered to enhance the success rate. However, IWB, as a smart board, exhibits a greater capacity to enhance achievement rates than blackboards. Then, IWB technology can greatly enhance language teaching and any other subject wherein learners and teachers engage with audio, video, or educational content in the classroom (Johnson et al., 2010).

3. Implementation of Interactive Whiteboard in Several Countries in the World

Numerous studies have been undertaken to investigate the use of interactive whiteboards (IWBs) in classroom environments in developed countries around the world (Slay et al., 2008). Numerous investigations were conducted across multiple countries to assess the efficacy of interactive whiteboards.

Beauchamp (2004) explains that the increasing adoption of IWB in primary education is an element of several initiatives that promote the use of ICT in learning and teaching within the institutions of the United Kingdom. Specifically concerning staff development and training, the IWB provides teachers with both obstacles and prospects. Shenton & Pagett (2007) Explain that IWB has been implemented in a significant number of primary classrooms in England in recent years. They investigate how they are being implemented within the framework of literacy instruction in six primary schools located in the southwestern region. The report examines how the use of IWBs has affected the instruction and acquisition of literacy. The report concludes that although IWBs support a more interdisciplinary approach to literacy and increase student engagement, their implementation varies from classroom to classroom. The utilization of IWBs in the examined classrooms varies according to the technical expertise and experience of the teachers.

Coyle et al. (2010) Explain that IWB is gaining popularity as an instructional tool in countries other than the United Kingdom, including Spain. The findings of the study indicate that although the teacher utilized the IWB to facilitate the student's learning through the incorporation of multimedia presentations on numeracy and literacy and by allowing for tactile interaction with the board, opportunities for dialogic interaction beyond the production of one or two-word utterances were considerably restricted, with the majority of the group consisting of NS students. Yáñez & Coyle (2011) Introduce IWB into schools in Britain, as it seeks to determine their impact on the learning and teaching processes. Thus far, the preponderance of research has been conducted in English institutions' mainstream numeracy and literacy classes.

Biró (2011) States that In Hungary, the implementation of IWB has increased students' inquisitiveness, interest, and motivation. The new digital generation demands reform and, in

addition to conventional education, requires digital resources and supplementary information, as obtaining such data about a specific curriculum is considerably simpler. They devote considerable time to computer use and web browsing, as evidenced by the following survey. If the instructor piques the student's interest in the subject matter rather than presenting tedious and difficult-to-comprehend material, they will be inclined to conduct internet research on the subject, thereby facilitating their knowledge expansion.

Yang et al. (2012) Have seen the introduction of the IWB in Taiwan, a novel educational technology. It alters not only the conventional instructional setting of the classroom but also the course of whiteboard history. The findings show that students in the IWB group acquire knowledge more efficiently than other groups. Besides, students in the IWB group hold considerably more favorable views of the learning environment than other groups. Ormanci et al. (2015) explain the importance of the rise of IWB in Turkey and numerous other nations. As a result, the IWB's contribution to the educational process, its application in classroom settings, and issues that arise when using the IWB are the subject of research in these nations. Karsenti (2016) explains that the IWB has been widely implemented in schools throughout the Canadian province of Quebec over the past five years. However, IWB may be more difficult and time-consuming to integrate than others. Besides the technical issues reported by teachers, the IWB seems to possess real educational capabilities.

4. Challenges of Interactive Whiteboard in English Language Classroom

There are several challenges in the implementation of interactive whiteboards. Aytaç (2013) Explains the technical issues encountered during the implementation of IWBs and the lack of adequate e-materials, which were identified as substantial challenges associated with IWB use. It was found that the materials and content presented on the IWB failed to adequately fulfill the demands and expectations of the students. Karsenti (2016) Explains the IWB has been widely implemented in schools. However, IWB may be more difficult and time-consuming to integrate than others. Besides the technical issues reported by teachers, the IWB seems to possess real educational capabilities.

Baharudin et al. (2020) Explain that teachers encounter several obstacles when attempting to incorporate IWB into the learning process: limited time to prepare lessons, inadequate training, negative teacher attitudes, and insufficient technical support. The integration of technologies into the classroom enhances the effectiveness and caliber of existing instruction. IWB-using teachers are selected based on their pedagogical expertise and how they deliver the lesson through the use of this technology. Mokoena et al. (2022) Explain that 75.6% of teachers are unable to resolve 90% of problems when utilizing IWBs in the classroom. The obstacles include technology, instructional materials and lessons, student disengagement, health, and electricity. It was suggested that teachers could achieve success in resolving the issue through implementing IWBs if they adopt a positive problem orientation.

According to Alfaki & Khamis (2018), English language teachers encounter various obstacles when implementing Interactive Whiteboard (IWB) technology in the classroom. These challenges arise for a variety of reasons. The reasons cited include the inadequate computer proficiency of teachers, a lack of consensus among decision-makers regarding the objectives of the schools, insufficient ongoing technical support, and students possessing greater technological proficiency than their teachers. Instructional techno-savvy students could present a difficulty for teachers who lack proficiency in computer usage. The convergence of these obstacles impedes the integration of IWBs into English language instruction and learning. The study suggests that ongoing technical and pedagogical support is necessary for teachers. The administration of the

school should have a well-defined vision for the smart board and the resources and materials it should provide. It is recommended that the technician team's membership be expanded. Teachers should also be cognizant of the requirements of digital learners. Alfaki & Khamis (2018) Add that the challenges that teachers encounter within the classroom environment. These challenges are classified into four distinct categories. These factors include students, school administrations, and technical support. Each factor presents a variety of obstacles. The study's results indicate that teachers encounter numerous obstacles when implementing interactive whiteboards. Together, these obstacles impede the integration of IWBs into the learning and teaching process.

Herawati et al. (2023) Explain that teachers encountered several obstacles when implementing IWB in EFL classrooms. The aforementioned obstacles pertained to the development of lessons, internet resources that needed to be incorporated into the lessons via IWB, time management, collaborative efforts, technical difficulties, school assistance, and professional growth. Lesson development presented the teachers with several obstacles, including time to prepare the lessons, technical difficulties with the IWB, and internet connectivity issues. Besides, Mosina (2019) emphasizes specifically the challenges that teachers and learners encounter while utilizing an IWB in the classroom and potential resolutions to those challenges. The potential factors contributing to suboptimal outcomes when utilizing an Interactive Whiteboard for material study are examined. Considerable emphasis is placed on the statement, "An interactive whiteboard functions as a supplement to a teacher but does not serve as a replacement for them."

5.   Teacher and Students' Perception of Interactive Whiteboard

There are several perceptions of using interactive whiteboards from the perspective of teachers and students. Based on research findings Emron & Dhindsa (2010), the implementation of interactive whiteboard technology in institutions may effectively reduce the achievement disparity between the sexes and increase academic success among science students, thereby assisting in resolving its national issue. Large-scale implementation of IWB in schools necessitated teacher training and the provision of IWB in classrooms. Additional credence is lent to the suitability of interactive whiteboard technology for teaching through the perspectives of teachers who have received training.

Xu & Moloney (2011) Indicate that the student's belief that the IWB is efficacious in augmenting diverse facets of their acquisition of the foreign language. Additionally, research indicates that a teacher's favorable disposition towards the integration of innovative instructional technologies significantly influences the success and implementation of the IWB, which in turn facilitates effective language acquisition. This study enhances scholarly focus on the utilization of emerging technologies in the context of language acquisition. (Şad & Özhan, 2012) Explain that students prefer IWB teaching for the following reasons/capabilities such as practical and economical use, enhanced visual presentation, and utilization of assessments. The majority of students express discomfort regarding the technical issues. They believe that IWB instruction positively influences their learning, particularly due to motivational factors, effective presentation, visualization and contextualization, and test-based application. Ultimately, it is deduced that the full potential of IWBs has not been realized, as technical issues and prevalent practices suggested that teachers are in their nascent phase of integrating IWBs into their lessons and required instruction in both technical and pedagogical domains.

According to Aytaç (2013), students exhibited a favorable perception of the utilization of IWB. Concerns expressed by students regarding radiation and eye health, technical difficulties,

Journal of English Language and Pedagogy (JELPA)
Vol. 2, No. 2, November 2024 | Fitria. *Using Interactive Whiteboards (IWB) in......*

84

and the inadequacy of e-materials were cited by students as issues with the IWB implementation by teachers. Students generally consider IWBs to be a beneficial addition to the classroom's learning environment. Furthermore, the research indicates that teacher preparation, practice time, technological leadership, school culture, technical support, and lesson planning are all factors that may be associated with these effects. Additional research is required to determine when and how IWB should be implemented to promote greater student engagement and achievement.

Öz (2014) Explains that students and teachers have generally favorable perceptions and attitudes about IWB. They routinely express high levels of excitement for the technology provided by IWBs. They are confident in their ability to use IWB and believe they are highly innovative and strongly supportive of language learning. Furthermore, they believe that IWBs have the best supplemental role in developing language competence as a good teaching tool. To guarantee that this passion and interest in interactive whiteboards is applied to a practice that is effective, meaningful, and promising, curriculum designers, administrators, and technological decision-makers should take care of the rising interest in new technology.

Bakadam & Asiri (2012) Indicate that the majority of teachers consider IWB to be a practical and efficient method of delivering educational material and that it enhances classroom engagement, thereby improving the overall learning experience. Nevertheless, the majority of teachers utilize the IWB primarily for internet research, and as an overhead projector, they fail to capitalize on its numerous other beneficial functionalities. Given the teachers' hesitancy to fully exploit the functionalities of the IWB due to their restricted understanding of the full extent of what IWB technology has to offer, they should receive additional training to acquire a comprehensive understanding of how to optimize its usage. Additionally, reducing the number of students in the classroom to facilitate more interactive learning is suggested.

Shams & Ketabi (2015) state that teachers' beliefs regarding the use of IWBs were analyzed, including the four major themes: frequency, motivational effects, instructional effects, and usability. The result shows that teachers have generally favorable views regarding the effects of IWB implementation in the classroom. It is also discovered that teachers' IWB competencies increase in correlation with the frequency of their IWB usage. Radzak & Noh (2016) Indicate that students are pleased with the utilization of IWB in the classroom setting. By utilizing IWB in the classroom, students can acquire knowledge in an engaging setting. The results indicated that teachers held favorable attitudes toward the utilization of interactive whiteboards in language teaching and learning. With the use of IWB in the classroom, teachers agree that students experience joy and enjoyment. According to teachers, the implementation of technology in the workplace will increase productivity and work quality. Therefore, all institutions should be permitted to utilize the interactive whiteboard, and teachers should receive training on how to use it.

Türel & Johnson (2012) indicate that teachers believe that IWBs have the potential to be implemented across various academic disciplines. In addition, teachers hold the belief that IWBs have the potential to enhance learning and instruction provided that certain conditions are met: 1) collaboration among teachers, 2) instruction regarding effective IWB-based instructional strategies, and 3) increased frequency of IWB usage by teachers to enhance IWB competency. This statement is supported by Lai (2010), the fact that teachers emphasized that understanding practical IWB applications was critical and beneficial for effectively incorporating this promising instrument into their lessons. Concerning teaching and learning, several recommendations have been put forth to enhance the caliber of training seminars.

According to Gashan & Alshumaimeri (2015), teachers perceive IWBs as practical tools that can be utilized to improve the learning and teaching process and to generate novel instructional scenarios. English lessons utilizing IWBs were regarded as more pleasant for teachers. Nevertheless, teachers reported encountering certain technical challenges when implementing IWBs. Additionally, it is proposed that teachers must receive training to effectively utilize technological devices. EFL teachers require additional training to resolve technical and system issues and comprehend how to utilize every feature of the IWBs. Teachers hold the belief that professional development is necessary to enhance their competencies and proficiency in utilizing the IWB effectively (Akcay et al., 2015).

Herawati et al. (2023) Find teachers and students who have a favorable opinion of the implementation of IWB in the classrooms. Regarding the development of lessons utilizing IWB, internet resources, and technical support, teachers held favorable opinions as well. Concerns regarding time, collaboration, and professional development prompted the negative feedback. Those statements are similar to those 'of Zhang & Deng (2015) who revealed that teachers utilized IWB in distinct ways. Furthermore, divergent perspectives exist between teachers and learners concerning the use of IWBs in language teaching and learning. Although the teachers maintained favorable perspectives regarding the impact of IWB, the majority of students believed that IWB alone would not invariably enhance their English proficiency. Instead, the matter is how educators pedagogically utilize technology.

6. Teacher's Training in Using Interactive Whiteboard

The number of interactive whiteboards (IWBs) has quickly expanded over the past few years in many areas of the world. However, there is still a relatively limited amount of teacher training materials and pedagogical support for designing, developing, and implementing IWB-based materials in classrooms that teach foreign languages (Biebighäuser & Zibelius, 2012). Han (2016) Also indicates that teachers encountered challenges with the use of interactive whiteboards (IWBs) and seating configurations in classrooms. It is proposed that teachers receive training on utilizing IWBs more efficiently in various classroom settings.

Teaching regarding the proper operation of IWBs is a major factor in the teachers' ability to implement them successfully in the classroom. The trained teachers comprehensively comprehended the most efficient methods for utilizing the IWBs (Alparslan & İçbay, 2017). Then, Wang et al. (2019) explain how the proficiency of teachers with interactive whiteboards significantly influences the incorporation of technology in educational environments where the capabilities of the technology are utilized. The comprehensive training programs related to IWB cover three dimensions: general use of IWB, pedagogical use, and how to find and design materials (Al-Rabaani, 2018).

According to Gashan & Alshumaimeri (2015), teachers must receive training to effectively utilize technological devices. EFL teachers require additional training to resolve technical and system issues and comprehend how to utilize every feature of the IWBs. Therefore, the effective use of an IWB in teacher-education institutions depends strongly on student teachers' intention to use it (Wong et al., 2015). Öz (2014) Also revealed that teachers need training for this technology to acquire the essential competencies in pre-service and in-service training programs.

CONCLUSION

Interactive Whiteboards (IWB) are large interactive displays that are used as input devices for computers. They can be used in educational institutions, combining traditional presentation

Journal of English Language and Pedagogy (JELPA)
Vol. 2, No. 2, November 2024 | Fitria. *Using Interactive Whiteboards (IWB) in......*

86

benefits with cutting-edge technology. IWB technology consists of a digital board, computer, and projector, which can be linked to a personal computer for easy use. It offers various tools, such as graphics, word processing, database, and multimedia tools. The advantages of using IWB as an educational tool include increasing new knowledge, providing innovations to students, improving the quality of students' learning, facilitating interaction between teaching teams and students, improving teaching efficiency, and reducing paper usage. IWB has significantly improved students' English skills, vocabulary proficiency, engagement, and demeanor. However, the implementation of IWBs in schools presents numerous challenges, including high costs, insufficient technical support, technical issues, lack of adequate e-materials, limited time for lesson preparation, negative attitudes, lack of consensus among decision-makers, inadequate proficiency, and inadequate training for teachers. Then, teachers need to master this technology well so they can use it effectively in the learning process. Then, teachers need to master this technology well so they can use it effectively in the learning process. It is proposed that teachers receive training on utilizing IWBs more efficiently in various classroom settings. Teaching regarding the proper operation of IWBs is a major factor in the teachers' ability to implement them successfully in the classroom. The trained teachers comprehended the most efficient methods for utilizing the IWBs.

REFERENCES

Abdussamad, Z. (2021). Metode Penelitian Kualitatif. CV. Syakir Media Press.

Akcay, A. O., Arslan, H., & Guven, U. (2015). Teachers' Attitudes toward Using Interactive WhiteBoards. Middle Eastern & African Journal of Educational Research, 1(17), 22–30. https://arastirmax.com/en/publication/middle-eastern-african-journal-educational-research/1/17/22-30-teachers-attitudes-toward-using-interactive-whiteboards/arid/adf5e6fd-315b-4034-9049-8d90548b6899

Alfaki, I. M., & Khamis, A. H. A. (2018, August 6). Difficulties Facing Teachers in Using Interactive Whiteboards in Their Classes. https://www.semanticscholar.org/paper/Difficulties-Facing-Teachers-in-Using-Interactive-Alfaki-Khamis/d43451cef368a33d00abf2de2a1e8f72b7af95ba

Al-Kahlan, T. B. S., & Khasawneh, M. A. S. (2023). Advantages of using the Interactive Whiteboard as an Educational Tool from the Point of View of Middle School Teachers in Asir Region. Migration Letters, 20(S1), 889–900. https://doi.org/10.59670/ml.v20iS1.3641

Alparslan, E. M., & İçbay, M. A. (2017). Teachers' Perception of Interactive White Boards: A Case Study. Uluslararası Türkçe Edebiyat Kültür Eğitim (TEKE) Dergisi, 6(3), 1778–1797. https://dergipark.org.tr/en/pub/teke/issue/31471/344475

Al-Rabaani, A. H. (2018). Social Studies Teachers' Perspectives on the Advantages and Challenges of Interactive Whiteboard Application in Oman. European Journal of Educational Research, 7(4), 753–762. https://doi.org/10.12973/eu-jer.7.4.753

Amiri, R., & Sharifi, M. (2014). The Influence of Using Interactive Whiteboard on Writings of EFL Students Regarding Adverbs. Procedia - Social and Behavioral Sciences, 98, 242–250. https://doi.org/10.1016/j.sbspro.2014.03.413

Aytaç, T. (2013). Interactive Whiteboard factor in Education: Students' points of view and their problems. Educational Research Review, 1(1), 25–33. https://www.semanticscholar.org/paper/Interactive-Whiteboard-factor-in-Education%3A-points-Ayta%C3%A7/a90014bbc15f6cbf05123e36a40c2795aa50451d

Bahadur, G., & Oogarah, D. (2013). Interactive whiteboard for primary schools in Mauritius: An effective tool or just another trend? International Journal of Education and Development Using ICT, 9(1), 19–35. https://www.learntechlib.org/p/111902/

Baharudin, H. H., Masnan, A. H., & Zain, A. (2020). The developments and challenges of the integration of interactive whiteboard technology in teaching and learning reading skills for preschool children. Jurnal Pendidikan Awal Kanak-Kanak Kebangsaan, 9(2), 48–57. https://doi.org/10.37134/jpak.vol9.2.5.2020

Bakadam, E., & Asiri, M. J. S. (2012). Teachers' Perceptions Regarding the Benefits of using the Interactive Whiteboard (IWB): The Case of a Saudi Intermediate School. Procedia - Social and Behavioral Sciences, 64, 179–185. https://doi.org/10.1016/j.sbspro.2012.11.021

Balta, N., & Duran, M. (2015). Attitudes of Students and Teachers towards the Use of Interactive Whiteboards in Elementary and Secondary School Classrooms. Turkish Online Journal of Educational Technology - TOJET, 14(2), 15–21. https://eric.ed.gov/?id=EJ1057345

Beauchamp, G. (2004). Teacher use of the interactive whiteboard in primary schools: Towards an effective transition framework. Technology, Pedagogy and Education, 13(3), 327–348. https://doi.org/10.1080/14759390400200186

Belinda, L. N., Iskandar, S., & Kurniawan, D. T. (2023). Penggunaan Media Pembelajaran Papan Tulis Interaktif di Kelas Pada Abad 21. Jurnal Lensa Pendas, 8(1), 23–31. https://doi.org/10.33222/jlp.v8i1.2555

Betcher, C., & Lee, M. (2009). The Interactive Whiteboard Revolution: Teaching with IWBs. Aust Council for Ed Research.

Biebighäuser, K., & Zibelius, M. (2012). Aufgaben 2.0: Konzepte, Materialien und Methoden für das Fremdsprachenlehren und -lernen mit digitalen Medien. BoD – Books on Demand.

Biró, P. (2011). Students and the Interactive Whiteboard. Acta Didactica Napocensia, 4, 29–38. https://eric.ed.gov/?id=EJ1056121

Campbell, C., & Kent, P. (2010). Using interactive whiteboards in pre-service teacher education: Examples from two Australian universities. Australasian Journal of Educational Technology, 26(4). https://doi.org/10.14742/ajet.1064

Coyle, Y., Yañez, L., & Verdú, M. (2010). The impact of the interactive whiteboard on the teacher and children's language use in an ESL immersion classroom. System, 38(4), 614–625. https://doi.org/10.1016/j.system.2010.10.002

De Vita, M., Verschaffel, L., & Elen, J. (2014). Interactive Whiteboards in Mathematics Teaching: A Literature Review. Education Research International, 2014, e401315. https://doi.org/10.1155/2014/401315

Dvorak, R. (2012). SMART Board Interactive Whiteboard For Dummies. John Wiley & Sons.

Emron, S., & Dhindsa, H. (2010). Integration of Interactive Whiteboard Technology to Improve Secondary Science Teaching and Learning. International Journal for Research in Education.

Farr, F., & Murray, L. (2016). The Routledge Handbook of Language Learning and Technology. Routledge.

Fitria, T. N. (2021). The Use Technology Based on Artificial Intelligence in English Teaching and Learning. ELT Echo : The Journal of English Language Teaching in Foreign Language Context, 6(2), 213–223. https://doi.org/10.24235/eltecho.v6i2.9299

Journal of English Language and Pedagogy (JELPA)
Vol. 2, No. 2, November 2024 | Fitria. *Using Interactive Whiteboards (IWB) in......*

88

Gage, J. (2013). How to Use an Interactive Whiteboard Really Effectively in your Secondary Classroom. Routledge.

Gashan, A. K., & Alshumaimeri, Y. A. (2015). Teachers' Attitudes toward Using Interactive Whiteboards in English Language Classrooms. International Education Studies, 8(12), 176–184. https://eric.ed.gov/?id=EJ1083951

Gregorcic, B., Etkina, E., & Planinsic, G. (2018). A New Way of Using the Interactive Whiteboard in a High School Physics Classroom: A Case Study. Research in Science Education, 48(2), 465–489. https://doi.org/10.1007/s11165-016-9576-0

Han, T. (2016). Student teachers' experiences and attitudes towards using interactive whiteboards in the teaching and learning of young children [Undergraduate Paper, Kafkas University Graduate School of Social Sciences, Kars, Turkey]. https://www.researchgate.net/publication/228808535_Student_teachers'_experiences_and_attitudes_towards_using_interactive_whiteboards_in_the_teaching_and_learning_of_young_children

Harlow, A., Cowie, B., & Heazlewood, M. (2010). Keeping in touch with learning: The use of an interactive whiteboard in the junior school. Technology, Pedagogy and Education, 19(2), 237–243. https://doi.org/10.1080/1475939X.2010.491234

Herawati, S., Sundari, H., & Suciati, S. (2023). Teachers' Experiences and Perceptions in Using Interactive Whiteboards in EFL Classrooms. Journal on Education, 5(4), 11592–11603. https://jonedu.org/index.php/joe/article/view/2109

Holubnycha, L., Голубнича, Л. О., Shatrava, S., & Шатрава, С. О. (2017). Using Interactive Whiteboard at English Lessons for Law Students. http://dspace.pdpu.edu.ua/handle/123456789/dspace.pdpu.edu.ua/jspui/handle/123456789/6576

Humairoh, S., Heryatun, Y., & Hidayani, S. (2023). An Analysis of Technology IWB For Teaching Vocabulary In Elementary School. Innovative: Journal Of Social Science Research, 3(5), 6523–6538. https://doi.org/10.31004/innovative.v3i5.5624

Iskandar, A., M, A. R. J., Mansyur, Fitriani, R., Ida, N., & Sitompul, P. H. S. (2023). Dasar Metode Penelitian. Yayasan Cendekiawan Inovasi Digital Indonesia.

Jang, S.-J., & Tsai, M.-F. (2012). Reasons for using or not using interactive whiteboards: Perspectives of Taiwanese elementary mathematics and science teachers. Australasian Journal of Educational Technology, 28(8), Article 8. https://doi.org/10.14742/ajet.781

Johnson, E. M., Ramanair, J., & Brine, J. (2010). 'It's not necessary to have this board to learn English, but it's helpful': Student and teacher perceptions of interactive whiteboard use. Innovation in Language Learning and Teaching, 4(3), 199–212. https://doi.org/10.1080/17501229.2010.513444

Karsenti, T. (2016). The Interactive Whiteboard: Uses, Benefits, and Challenges. A survey of 11,683 Students and 1,131 Teachers. Canadian Journal of Learning and Technology / La Revue Canadienne de l'apprentissage et de La Technologie, 42(5). https://www.learntechlib.org/p/178020/

Katwibun, H. (2014). Using an Interactive Whiteboard in Vocabulary Teaching. Procedia - Social and Behavioral Sciences, 116, 674–678. https://doi.org/10.1016/j.sbspro.2014.01.278

Kennewell, S., & Morgan, A. (2003, January 1). Student Teachers' Experiences and Attitudes Towards Using Interactive Whiteboards in the Teaching and Learning of Young Children. Young Children and Learning Technologies, UWS Parramatta. https://dl.acm.org/doi/pdf/10.5555/1082060.1082070

Kutluca, T., Yalman, M., & Tum, A. (2019). Use of Interactive Whiteboard in Teaching Mathematics for Sustainability and its Effect on the Role of Teacher. Discourse and Communication for Sustainable Education, 10(1), 113–132. https://doi.org/10.2478/dcse-2019-0009

Lai, H.-J. (2010). Secondary school teachers' perceptions of interactive whiteboard training workshops: A case study from Taiwan. Australasian Journal of Educational Technology, 26(4). https://doi.org/10.14742/ajet.1069

Lewin, C., Somekh, B., & Steadman, S. (2008). Embedding interactive whiteboards in teaching and learning: The process of change in pedagogic practice. Education and Information Technologies, 13(4), 291–303. https://doi.org/10.1007/s10639-008-9070-z

Maher, D. (2011). Using the multimodal affordances of the interactive whiteboard to support students' understanding of texts. Learning, Media and Technology, 36(3), 235–250. https://doi.org/10.1080/17439884.2010.536553

Maher, D., Phelps, R., Urane, N., & Lee, M. (2012). Primary school teachers' use of digital resources with interactive whiteboards: The Australian context. Australasian Journal of Educational Technology, 28(1). https://doi.org/10.14742/ajet.888

Mohamad, N. T., Razak, N. A., Khambari, M. N. M., Ayub, A. F. M., & Mokhtar, M. M. (2022). Papan putih interaktif bagi penguasaan kemahiran abad 21 dalam kalangan kanak-kanak prasekolah: Interactive whiteboard for 21st century proficiency skills among preschool children. Journal of ICT in Education, 9(3), 11–29. https://doi.org/10.37134/jictie.vol9.sp.1.2.2022

Mokoena, M. M., Simelane-Mnisi, S., & Mji, A. (2022). Challenges and Solutions for Teachers' Use of Interactive Whiteboards in High Schools. Universal Journal of Educational Research, 10(1), 36–47. https://doi.org/10.13189/ujer.2022.100104

Mosina, Y. (2019). An Interactive Whiteboard as a Support Tool to a Teacher. Anglistics and Americanistics, 16, 88–94. https://doi.org/10.15421/381911

Nolan, K. K. (2009). SMARTer Music Teaching: Interactive Whiteboard Use in Music Classrooms. General Music Today, 22(2), 3–11. https://doi.org/10.1177/1048371308324104

Northcote, M., Mildenhall, P., Marshall, L., & Swan, P. (2010). Interactive whiteboards: Interactive or just whiteboards? Australasian Journal of Educational Technology, 26(4). https://doi.org/10.14742/ajet.1067

Ormanci, U., Cepni, S., Deveci, I., & Aydin, O. (2015). A Thematic Review of Interactive Whiteboard Use in Science Education: Rationales, Purposes, Methods and General Knowledge. Journal of Science Education and Technology, 24(5), 532–548. https://doi.org/10.1007/s10956-014-9543-3

Öz, H. (2014). Teachers' and Students' Perceptions of Interactive Whiteboards in the English as a Foreign Language Classroom. Turkish Online Journal of Educational Technology - TOJET, 13(3), 156–177. https://eric.ed.gov/?id=EJ1034243

Pardanjac, M. B., Karuović, D., & Eleven, E. (2018). The Interactive Whiteboard and Educational Software as an Addition to the Teaching Process. Tehnički Vjesnik, 25(1), 255–262. https://doi.org/10.17559/TV-20160310173155

Purwanto, P. (2013). Penggunaan Papan Tulis Interaktif di Kelas (The Use of Interactive Whiteboard on Classroom). Jurnal Teknodik, 104–116. https://doi.org/10.32550/teknodik.v17i3.565

Radzak, A. A., & Noh, N. M. (2016). Satisfaction of Teaching and Learning Bahasa Melayu at SJK (C) Through the Use of Interactive Whiteboard. Jurnal Pendidikan Bitara UPSI, 9(2), 52–59. https://ojs.upsi.edu.my/index.php/JPB/article/view/2474

Şad, S. N., & Özhan, U. (2012). Honeymoon with IWBs: A qualitative insight in primary students' views on instruction with interactive whiteboard. Computers & Education, 59(4), 1184–1191. https://doi.org/10.1016/j.compedu.2012.05.010

Saputra, M. R. A., Chalid, F. I., & Budianto, H. (2023). Metode Ilmiah dan Penelitian: Kuantitatif, Kualitatif, dan Kepustakaan (Bahan Ajar Madrasah Riset). Nizamia Learning Center.

Saville, M., Beswick, K., & Callingham, R. (2014). The Use of Interactive Whiteboards in Education: Opportunities and Challenges. In The Future of Educational Research (pp. 203–216). Brill. https://brill.com/display/book/edcoll/9789462095120/BP000018.xml

Schmid, E. C. (2008). Potential pedagogical benefits and drawbacks of multimedia use in the English language classroom equipped with interactive whiteboard technology. Computers & Education, 51(4), 1553–1568. https://doi.org/10.1016/j.compedu.2008.02.005

Schmid, E. C. (2010). Developing competencies for using the interactive whiteboard to implement communicative language teaching in the English as a Foreign Language classroom. Technology, Pedagogy and Education, 19(2), 159–172. https://doi.org/10.1080/1475939X.2010.491218

Şen, M., & Ağir, A. (2015). The Effects of Using an Interactive White Board in Teaching English on the Achievement of Primary School Students. HAYEF Journal of Education, 11(2), 39–54. https://dergipark.org.tr/en/pub/iuhayefd/issue/8801/110028

Shams, N., & Ketabi, S. (2015). Iranian Teachers' Attitudes towards the Use of Interactive Whiteboards in English Language Teaching Classrooms. Journal of Applied Linguistics and Language Research, 2(3), 84–99. http://jallr.com/index.php/JALLR/article/view/44

Shenton, A., & Pagett, L. (2007). From 'bored' to screen: The use of the interactive whiteboard for literacy in six primary classrooms in England. Literacy, 41(3), 129–136. https://doi.org/10.1111/j.1467-9345.2007.00475.x

Siregar, H., & Fahmi, F. (2023). Metodologi Penelitian (Sebuah Pengantar Bidang Pendidikan)—Jejak Pustaka. Jejak Pustaka.

Slay, H., Siebörger, I., & Hodgkinson-Williams, C. (2008). Interactive whiteboards: Real beauty or just "lipstick"? Computers & Education, 51(3), 1321–1341. https://doi.org/10.1016/j.compedu.2007.12.006

Taylor, M., Harlow, A., & Forret, M. (2010). Using a Computer Programming Environment and an Interactive Whiteboard to Investigate Some Mathematical Thinking. Procedia - Social and Behavioral Sciences, 8, 561–570. https://doi.org/10.1016/j.sbspro.2010.12.078

Tosuntaş, Ş. B., Karadağ, E., & Orhan, S. (2015). The factors affecting acceptance and use of interactive whiteboard within the scope of FATIH project: A structural equation model

based on the Unified Theory of acceptance and use of technology. Computers & Education, 81, 169–178. https://doi.org/10.1016/j.compedu.2014.10.009

Türel, Y. K., & Johnson, T. E. (2012). Teachers' Belief and Use of Interactive Whiteboards for Teaching and Learning. Journal of Educational Technology & Society, 15(1), 381–394. https://www.jstor.org/stable/jeductechsoci.15.1.381

Wang, X., Dostál, J., & Bučková, H. (2019). The Use of Interactive Whiteboards for English Foreign Language Education: Proceedings of the 11th International Conference on Computer Supported Education, 169–174. https://doi.org/10.5220/0007720601690174

Wong, K.-T., Teo, T., & Goh, P. S. C. (2015). Understanding the intention to use interactive whiteboards: Model development and testing. Interactive Learning Environments, 23(6), 731–747. https://doi.org/10.1080/10494820.2013.806932

Wood, R., & Ashfield, J. (2008). The use of the interactive whiteboard for creative teaching and learning in literacy and mathematics: A case study. British Journal of Educational Technology, 39(1), 84–96. https://doi.org/10.1111/j.1467-8535.2007.00699.x

Wujec-Kaczmarek, A. (2021). The application of interactive whiteboard technology in general education and English Language Teaching (ELT): A literature overview. Konińskie Studia Językowe, 9(1), 107–129. https://www.ceeol.com/search/article-detail?id=989699

Xu, H. L., & Moloney, R. (2011). Perceptions of interactive whiteboard pedagogy in the teaching of Chinese language. Australasian Journal of Educational Technology, 27(2). https://doi.org/10.14742/ajet.972

Yáñez, L., & Coyle, Y. (2011). Children's perceptions of learning with an interactive whiteboard. ELT Journal, 65(4), 446–457. https://doi.org/10.1093/elt/ccq069

Yang, K.-T., Wang, T.-H., & Kao, Y.-C. (2012). How an interactive whiteboard impacts a traditional classroom. Education as Change, 16(2), 313–332. https://doi.org/10.1080/16823206.2012.745759

Zevenbergen, R., & Lerman, S. (2008). Learning environments using interactive whiteboards: New learning spaces or reproduction of old technologies? Mathematics Education Research Journal, 20(1), 108–126. https://doi.org/10.1007/BF03217471

Zhang, G., & Deng, L. (2015). An Exploratory Study on Interactive Whiteboard Usage on Enhancing Oral English in Secondary Classrooms. In W. W. K. Ma, A. H. K. Yuen, J. Park, W. W. F. Lau, & L. Deng (Eds.), New Media, Knowledge Practices and Multiliteracies (pp. 123–132). Springer. https://doi.org/10.1007/978-981-287-209-8_12