RESEARCH AND INNOVATION IN TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING
e-ISSN: 2785-8138

RITVET

Vol. 5 No. 1 (2025) 211-216
https://publisher.uthm.edu.my/periodicals/index.php/ritvet

The Use of Interactive Whiteboards in Teaching and Learning among Teachers of the Design and Technology Course

Nur Arifa Mohd Yussof[1], Normah Zakaria[1*]

[1] *Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia*

*Corresponding Author: norma@uthm.edu.my
DOI: https://doi.org/10.30880/ritvet.2025.05.01.021

Article Info

Received: 2 February 2024
Accepted: 5 June 2025
Available online: 30 June 2025

Keywords

Interactive Whiteboards, Design and Technology, Frequency, Digital Literacy

Abstract

This study aims to examine the competency of digital literacy in the use of Interactive Whiteboards (IWB) for Design and Technology among teachers. Quantitative methods were used to conduct this study to identify the frequency of Interactive whiteboards used among Design and Technology teachers during the teaching and learning session and the level of digital literacy competency in the use of IWB for Design and Technology teachers. The study sample was selected from 120 teachers who teach the Design and Technology subject in secondary schools in Batu Pahat, Johor. The data was analyzed using Statistical Package for the Social Sciences (SPSS) Version 27. The results of the study found that the frequency of use of IWB among teachers during the Teaching and Learning session is at a low level while the level of digital literacy in the use of IWB for Design and Technology teachers was also at a low level. This shows that the level of digital literacy competence in the use of IWB for Design and Technology teachers depends on the frequency of use of IWB digital technology during the teaching and learning session. Therefore, the school needs to be more proactive in ensuring that each classroom is equipped with interactive whiteboards as well as encouraging the use of IWB in teaching and learning sessions among teachers.

1. Introduction

Interactive Whiteboard (IWB) is an electronic device first introduced in 1991, located in Canada (Shi et al., 2023). The use of Interactive Whiteboards began to expand throughout the country and was applied in teaching and learning sessions (Bayar et al., 2021). The production of Interactive Whiteboards has gone through several phases in technological innovation such as touchscreen technology, Multi-user Operating System, and the ability to connect to the internet (Baharudin et al., 2021). Interactive Whiteboards is suitable for teaching the academic subjects in school (Khor and Mohamed Noh, 2016). The importance of using Interactive Whiteboards in teaching and learning sessions were integrated into the implementation of the "Smart Classroom" program (Alias, 2020). The implementation of the "Smart Classroom," commonly known for incorporating Interactive Whiteboard technology, has a positive impact on the smoothness of the teaching and learning process (Wang et al., 2022). This observation supported by research from Cebrián et al. (2020), which asserts that the use of Interactive Whiteboards can create an interactive learning environment and enhance collaboration between teachers and students during teaching and learning sessions. The effective application of Interactive Whiteboards in teaching and learning sessions requires comprehensive and sustainable preparation among teachers (Bayar et al., 2021).

This highlights the necessity for teachers to be well-prepared and competent in utilizing Interactive Whiteboard technology to fully leverage its benefits for an interactive and collaborative learning experience.

1.1 Frequency of Using Interactive Whiteboard (IWB)

The frequency of the use of technology in Teaching and Learning sessions was influenced by the provision of facilities by the school to educators. According to a study by Manickam and Khalid (2023), the frequency of using Interactive Whiteboards in teaching and learning sessions can help in improving the quality of student learning. The frequency of use of this technology is influenced by teachers' acceptance of the use of digital technology (Khor and Mohamed, 2016). The frequency of using digital technology is at a low level where most teachers are comfortable using conventional methods in Teaching and Learning sessions. A study conducted by Mohd Taha (2014), explained that most teachers are more inclined to deliver teaching and learning sessions using the conventional method of "chalk and talk" without applying the use of digital technology. This gives impact on the frequency of use of Interactive Whiteboards in teaching and learning sessions. The research conducted by Chau et al. (2020) provides insight into the infrequent utilization of Interactive Whiteboard facilities by teachers in school during learning sessions, citing various emerging factors contributing to this trend. Additionally, the regularity of Interactive Whiteboard usage is affected by age-related considerations, as older teachers tend to use Interactive Whiteboards less frequently, showing a preference for traditional teaching methods (Bicak, 2019).

1.2 Digital Literacy Competency in Using Interactive Whiteboard (IWB)

Prioritizing digital literacy among teachers is crucial, especially in its impact on the effective utilization of Interactive Whiteboards in teaching and learning sessions (Wang et al., 2018). Digital literacy encompasses the teacher's proficiency in utilizing technology as an instructional aid during these sessions. Chew & Mohamed (2021) reveal that a significant portion of teachers lack mastery in digital literacy competency, particularly in the context of Interactive Whiteboard usage. The specific digital literacy skills examined in the study include the ability to analyze information from diverse sources to align with teaching content and the application use of Audio-Visual Media technology relevant to the learning topic. Recognizing the importance of these competencies is vital for enhancing the overall educational experience (Teo et al., 2021). Moreover, digital literacy extends to various aspects such as basic knowledge about hardware and software, information and data literacy involving search and management, communication and collaboration skills, digital content production, data protection and privacy awareness, technical problem-solving, and competence in career-specific fields (UNESCO, 2023). Prioritizing these aspects ensures that teachers are well-equipped to navigate and harness the benefits of technology, enhancing their effectiveness in facilitating meaningful teaching and learning sessions. Acknowledging and addressing the multifaceted nature of digital literacy is imperative for empowering teachers to leverage technology, particularly Interactive Whiteboards, in the educational field (Chau et al., 2020). Strengthening these competencies contributes not only to individual teacher development but also to the overall advancement of educational practices. According to Noh (2017), digital literacy competence in the use of Interactive Whiteboards encompasses skills related to technology usage, proficiency in technical problem-solving, information management and critical assessment. Proficiency in using Interactive Whiteboard includes the user's ability to on and off digital devices, operate software and comprehend basic functions within the Interactive Whiteboard. Technical problem-solving skills involve the user's ability to address issues that may arise during the usage of the Interactive Whiteboard.

2. Methodology

The main objective of the research methodology is to examine the frequency of Interactive Whiteboard (IWB) usage among Design and Technology teachers and the level of Digital Literacy Competence in using IWB. The process in the implementation of this study begins with identifying the problem statement, formulating research questions, stating research objectives, reviewing the literature, identifying the research methodology, creating research instruments, collecting and analyzing data, and presenting the study's findings.

2.1 Population and Sample

The sample size was determined using Krejcie and Morgan sample size tables table, and the data was collected from 120 Design and Technology teachers at Batu Pahat. The population for this study is among Design and Technology teachers in secondary schools located in Batu Pahat District. For the pilot study, a sample of 30 Design and Technology teachers was selected to analyze the frequency of Interactive Whiteboard (IWB) usage and assess their digital literacy competence in IWB utilization during Teaching and Learning sessions. Therefore, the purposive sampling method was used to answer the questions in this study.

Quantitative research methods were used in this study to achieve the objectives of the study by using a survey questionnaire. Based on Chua (2014), this quantitative method is suitable to answer the objective and purpose of

this study. Questionnaires were distributed to respondents to study the use of an Interactive Whiteboard. The research carried out requires data from Design and Technology teachers in secondary schools located in Batu Pahat, Johor. This research instrument is an adaptation from a study by Manickam et al. (2023) who studied the use of Interactive Whiteboards among English teachers. The selection of the items from his study is due to the similarity of the subject studied, which is the use of Interactive Whiteboards among teachers during Teaching and Learning sessions. This questionnaire was developed using a 5-point Likert scale to answer the questions and achieve the objective of the study. The questionnaire was produced based on previous studies related to the use of technology in education. There are several forms of questions and the selection of scaled answers to achieve the objectives of the study which include parts A, B, and C as shown in Table 1.

Table 1 *Item Description in Survey Questionnaire*

Section	Description	No of Items
A	Background Demography (Gender, Age, Education Level, Working Experience, Internet connectivity at School, Amount of Interactive Whiteboard at School, Number of classes)	8
B	Frequency of Interactive Whiteboard Usage in Teaching and Learning Sessions	13
C	Literacy Digital Competency of Interactive Whiteboard Usage among Design and Technology Teachers	15

2.2 Instrument Validity

The validity of the instrument is ensured through expert reviews in the field of Technology Education and Design and Technology teachers (Newman et al., 2009). Subsequently, a pilot study is conducted to ensure that the developed questions are relevant and aligned with the research objectives. The survey forms were distributed to Design and Technology teachers working in secondary schools in Batu Pahat. The selection of teachers is based on their experience in teaching the Design and Technology subject to secondary school students. The reliability of the research instrument is measured using Cronbach's Alpha. Table 2 is Cronbach's Alpha Score by Bond & Fox, 2015)

Table 2 *Cronbach's Alpha Score (Bond & Fox, 2015)*

Cronbach's Alpha Score	Internal Consistency
0.8 – 1.0	Excellent (High degree of consistency)
0.7 – 0.8	Good and acceptable
0.6 – 0.7	Acceptable
< 0.6	Poor (Item need to be repaired)
< 0.5	Unacceptable (Item need to be dropped)

According to Sekaran (2003), reliability is a measurement tool that indicates the extent to which survey items are free from bias (errors), ensuring consistent measurements across all components of the instrument over time. The preliminary study data has been analysed using Statistical Software for Social Sciences (SPSS) Version 27. The Alpha Cronbach value is recorded as 3.8. The results of the reliability test confirm the level of reliability of the survey questionnaire to be used in the actual research. According to the value of 3.8, the alpha indicates that all questions in the survey questionnaire are highly reliable and suitable to use, with a reliability value exceeding 0.8. Table 3 shows the results for Cronbach's Alpha Score

Table 3 *Results for Cronbach's Alpha Score*

Variable	N	Item	Alpha Cronbach
Frequency of the Use of Interactive Whiteboards	30	13	0.864
Digital Literacy Competence in the Use of Interactive Whiteboards	30	15	0.831

3. Result and Discussions

The descriptive statistical value of the independent variable, which is the frequency in the use of the interactive whiteboard, is shown in Table 4 below. Based on the overall survey, the mean score for this variable ranges from 1.93 to 4.23, while the grand mean score is 2.29. The results show that respondents have a low frequency of using interactive whiteboards in school. The standard deviation measures how far the data is scattered from the mean. The average standard deviation of all is 0.946, which is < 1. This shows the uniformity in the answers given by the respondents to the various statements in the survey. The descriptive statistical value of the dependent variable, which is digital literacy competence in the use of interactive whiteboards is shown in Table 4 below. Based on the overall survey, the mean score for this variable is between 2.17 to 2.95, while the grand mean score is 2.53. The results of the study show that respondents have low digital literacy skills in the use of interactive whiteboards. At the same time, the standard deviation measures how far the data is scattered from the mean. The mean standard deviation of all is 1.084. This shows some disagreement in the answers given to various statements in the survey.

Table 4 *Mean Score and Standard Deviation*

No	Items	Mean Score	Standard Deviation
1.	Frequency of Use of Interactive Whiteboards	2.29	0.946
2.	Digital Literacy Competencies in the Use of Interactive Whiteboards	2.53	1.084

Spearman's correlation was conducted to determine the relationship between the frequency of use of Interactive Whiteboards and digital literacy competence in the use of Interactive Whiteboards. Table 5 shows that there is a positive correlation between the frequency of using the Interactive Whiteboard and the digital literacy competence in the use of the Interactive Whiteboard, which is statistically significant ($r(119) = .29.1$, $p = .001$). This explains that the higher the frequency of teachers in the use of Interactive Whiteboards in schools, the higher the level of digital literacy competence among teachers. The results of Spearman's correlation analysis have been presented in Table 5 below.

Table 5 *Spearman Correlation Analysis*

			Frequency of Use of Interactive Whiteboards	Digital Literacy Competence in the Use of Interactive Whiteboards
Spearman's Rho	Frequency of Use of Interactive Whiteboards	Correlation Coefficient	--	
		Sig. (2-Tailed)	.	
		N	119	
	Levels of Digital Literacy Competence in the Use of IWB	Correlation Coefficient	.291**	--
		Sig. (2-Tailed)	.001	.
		N	119	119

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

In response to the first research question, a descriptive analysis was performed, and the results indicated that the frequency of Interactive Whiteboard (IWB) usage is at a low level. The second research question revealing that the level of digital literacy competence in using Interactive Whiteboard among Design and Technology teachers is also at low-level. Next, a Spearman correlation analysis was conducted to assess the relationship between the frequency of Interactive Whiteboard usage and the level of digital literacy competence among Design and Technology teachers. Table 6 shows every finding of research questions

Table 6 *Findings of research questions*

Research Question	Research Analysis	Findings
What is the frequency of use of Interactive Whiteboards among Design and Technology teachers during teaching and learning session?	Descriptive analysis	Low level
What is the levels of Digital Literacy Competence in the use of Interactive Whiteboards for Design and Technology teachers?	Descriptive analysis	Low level
What is the relationship between the frequency of use of Interactive Whiteboards among Design and Technology teachers during teaching and learning session the levels of Digital Literacy Competence in the use of Interactive Whiteboards	Spearman's correlation	Positive correlation

4. Conclusion

The findings underscore a noteworthy conclusion regarding the limited used of Interactive Whiteboard (IWB) in Teaching and Learning sessions. This finding is closely linked to external factors, primarily the insufficient availability of Interactive Whiteboard facilities across educational institutions. Although the Ministry of Education and Culture has implemented initiatives to supply Interactive Whiteboard (IWB) facilities in day schools, the allocation remains limited, with only five units provided per school. This inadequacy poses a significant challenge, considering the substantial number of both teachers and students in these educational settings. The constrained availability of Interactive Whiteboards has substantial effects on the integration of Interactive Whiteboard into the teaching and learning sessions. Due to resource scarcity, teachers face significant barriers in adopting innovative and interactive teaching strategies, which adversely impacts students' educational outcomes.

Examining the situation from a demographic perspective, most respondents are involved in Form 2 subject. The Design and Technology subjects for Form 2 encompass a diverse syllabus that combines practical and theoretical learning components. The study reveals that time constraints play a pivotal role in the low frequency of Interactive Whiteboard usage. Design and Technology teachers, tasked with managing both practical activities and theoretical instruction, find themselves pressed for time during Teaching and Learning sessions. The necessity to coordinate practical activities conducted in Design and Technology Workshops further complicates the scheduling and utilization of Interactive Whiteboards within the classroom setting. Additionally, the study investigates the level of digital literacy competence among Design and Technology teachers concerning Interactive Whiteboard usage. The findings highlight a low level of digital literacy competence within this group. Several factors contribute to this phenomenon, one of which is the limited experience of teachers in operating Interactive Whiteboard facilities during Teaching and Learning sessions. The lack of hands-on experience diminishes teachers' confidence and proficiency in incorporating these technological tools effectively.

In conclusion, the study sheds light on the intricate interplay of factors influencing the frequency of Interactive Whiteboard usage in Teaching and Learning sessions. From the insufficient availability of facilities to the intricate demands placed on Design and Technology teachers, the findings emphasize the need for strategic interventions to enhance both the accessibility and competency of Interactive Whiteboard technology in educational settings.

Acknowledgment

The authors would like to thank the Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia for the opportunity given. The author would also like to express her appreciation and gratitude to her supervisor Dr. Normah binti Zakaria, for guiding and helping throughout this study.

References

Alias, S. B. (2020). Design and development of smart whiteboard cleaner in classroom application. Southeast Asian Journal of Technology and Science, 1(1), 6–11. https://www.jurnal.iteet.org/index.php/sajis/article/view/565

Al-Sabbagh, R. S. (2022). The impact of interactive whiteboard use on teaching grammar to grade seven EFL learners. International Journal of Learning and Teaching, 8(3), 160–167. https://doi.org/10.18178/ijlt.8.3.160-167

Baharudin, H. H., Masnan, A. H., & Zain, A. (2021). Learning module development using Android technology application based on interactive whiteboard on preschool reading proficiency: Theoretical framework review. Jurnal Pendidikan Bitara UPSI, 14(1), 1–14.

Bayar, M. F., & Kurt, U. (2021). The effect of using smart boards in science lessons on middle school students' attitudes towards smartboards and reflective thinking skills. Educational Policy Analysis and Strategic Research, 16(3), 23–38.

Bicak, F. (2019). Investigation of the views of teachers toward the use of smart boards in the teaching and learning process. Journal of Pedagogical Research, 3(1), 15–23.

Bond, T., & Fox, C. (2015). Applying the Rasch model: Fundamental measurement in the human sciences (3rd ed.). Routledge.

Cebrian, G., Palau, R., & Mogas, J. (2020). The smart classroom as a means to the development of ESD methodologies. Sustainability, 12(7), 2005–2014. https://doi.org/10.3390/su12073010

Chau, K. T., Zainuddin, D. A. B., Ling, S. K., Ng, L. M., & Yang, J. (2020). The perception of teachers towards smart board technology in 4G Malaysian primary schools. International Journal of Information and Education Technology, 10(6), 405–409.

Chew, F. P., & Mohamed, A. F. (2021). Digital literacy competence among teachers: A review of recent literature. Journal of Educational Technology, 15(2), 45–60.

Fawaz, M. M. B. (2022). The effect of using smart board on primary stage students' motivation to learn English. Middle Eastern Journal of Research in Education and Social Sciences, 3(1), 15–27.

Hill, J. E., & Uribe-Flórez, L. (2019). Understanding secondary school teachers' TPACK and technology implementation in mathematics classrooms. International Journal of Technology in Education, 3(1), 1–15. https://doi.org/10.16228/ijte.3118

Khor, A. L., & Mohamed, K. (2016). Interactive whiteboards in Malaysian schools: A systematic review of adoption challenges. Journal of Technical Education and Training, 8(2), 22–35.

Manickam, J., & Khalid, F. (2023). Kebolehsanan dan penggunaan papan putih interaktif dalam pembelajaran dan pemudahcaraan subjek Bahasa Inggeris [Efficacy and use of interactive whiteboards in English language teaching and facilitation]. Jurnal Dunia Pendidikan, 5(2), 109–119.

Moh, A. R. N. (2017). Repuasan pengajaran dan pembelajaran Bahasa Melayu di SJK(C) melalui penggunaan papan putih interaktif [Satisfaction in teaching and learning Malay language in Chinese vernacular schools using interactive whiteboards]. Jurnal Teknologi Pendidikan, 18, 1–10.

Newman, M., & Gough, D. (2020). Systematic reviews in educational research: Methodology, perspectives and application. In O. Zawacki-Richter et al. (Eds.), Systematic reviews in educational research (pp. 3–22). Springer. https://doi.org/10.1007/978-3-658-27602-7_1

Shi, Y., Zhang, J., Yang, H., & Yang, H. H. (2021). Effects of interactive whiteboard-based instruction on students' cognitive learning outcomes: A meta-analysis. Interactive Learning Environments, 29(2), 283–300. https://doi.org/10.1080/10494820.2020.1712429

Teo, T., Unwin, S., Scherer, R., & Gardiner, V. (2021). Initial teacher training for twenty-first century skills in the Fourth Industrial Revolution (IR 4.0): A scoping review. Computers and Education, 170, 104223. https://doi.org/10.1016/j.compedu.2021.104223

UNESCO-UNITWIN. (2023). Digital literacy for e-learning [Training programme]. Asian Association of Open Universities. https://www.aaou.org/unesco-unitwin-training-programme

Wang, W., Schmidt-Crawford, D., & Jin, Y. (2018). Preservice teachers' TPACK development: A review of literature. Journal of Digital Learning in Teacher Education, 34(4), 234–258. https://doi.org/10.1080/21532974.2018.1498039