International Journal of Modern Education
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

CHARACTERISING THE KEY ELEMENTS AFFECTING RBT TEACHERS' COMPETENCE IN TVET EDUCATION IN PENANG

Suraya Zakaria[1], Siti Zuraidah Md Osman[2*]

[1] School of Educational Studies, Universiti Sains Malaysia, 11800 Pulau Pinang
Email: zsuraya@student.usm.my
[2] School of Educational Studies, Universiti Sains Malaysia, 11800 Pulau Pinang
Email: sitizuraidah@usm.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 24.10.2024
Revised date: 10.11.2024
Accepted date: 12.12.2024
Published date: 23.12.2024

To cite this document:

Zakaria, S., & Osman, S. Z. M. (2024). Characterising The Key Elements Affecting RBT Teachers' Competence In TVET Education In Penang. *International Journal of Modern Education, 6* (23), 544-559.

DOI: 10.35631/IJMOE.623037

Abstract:

In the subject of Design and Technology (RBT), the application of Information and Communication Technology (ICT) elements through technology applications can strengthen basic skills in a more effective learning process. Some issues arise as a result of the increase in technology, but there are gaps in the provision and support for teachers to adapt technology in their teaching. This study aims to identify the factors that cause RBT teachers to lack the skills to integrate technology into teaching practice and analyze the weaknesses of using technology in the classroom. Using qualitative research methods, five RBT teachers in Penang were interviewed. The results of the study found lack of knowledge, training and support, technology skills, as well as problems with devices and technology infrastructure to be the main obstacles. Despite the challenges, the findings of the study also show that the use of technology has great potential to increase the interest and effectiveness of teaching. This study suggests stakeholders to provide adequate equipment and more comprehensive training for RBT teachers. This study also contributes to the technology education literature by providing empirical evidence on the challenges faced as well as strategies to improve the use of technology in teaching.

Keywords:

Primary School, RBT Teaching, Teacher Training, Technology Devices, Technology Skills

Introduction

Reka Bentuk dan Teknologi (RBT) is an important component of the Technical and Vocational Education (TVET) curriculum in Malaysia. The level of problems that are too high in implementing project-based learning activities in subjects, especially Reka Bentuk dan

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

Teknologi in Malaysia needs to be addressed through the development of modules to meet user needs (Tze Kiong, Mohd.Rusly, Abd Hamid, Charanjit Kaur Swaran, & Hanapi, 2022). Effective teaching in this area requires teachers who are competent in integrating technology into their teaching practices. Teachers believe that teaching combined with the use of technology can improve teaching practices, make learning interesting and interactive, and can increase student motivation (Akram, Abdelrady, Al-Adwan, & Ramzan, 2022). However, research shows that many RBT teachers in primary schools in Penang lack competence in the use of technology, which in turn affects the quality of TVET teaching and learning. Knowledge, skills and attitudes play a major role in ensuring the level of teacher competence where knowledge is the most critical factor to describe the competence of TVET teachers (Omar, Zahar, & Rashid, 2020).

The main issue identified is that many RBT teachers show a lack of skills in integrating technology into their teaching practice. This results in ineffective and less interesting teaching for students. According to Herdina & Ningrum (2023), challenges faced by teachers in integrating technology include lack of technology and internet facilities, teacher skills in technology mastery and student motivation. Furthermore, there are significant deficiencies in the ability of these teachers to use technology in the classroom, which hinders the overall achievement of TVET teaching objectives. The problem of lack of technology skills may be caused by several factors such as lack of continuous training, time constraints, and lack of technical support in schools. Digital literacy and educational technology if not implemented properly in schools will affect the quality of education (Sangaji & Pribadi, 2023). In addition, teachers' attitudes and perceptions towards the use of technology also play an important role in determining the extent to which they are ready to integrate technology in their teaching. Teachers' attitudes towards the use of Information and Communication Technologies (ICT) in education have a significant impact on their willingness to integrate technology, and affect the effectiveness and attractiveness of the teaching and learning process for both teachers and students (Kabita Choudhury & Khatun, 2024). Without adequate skills and support, efforts to improve the quality of TVET teaching will continue to stagnate.

Therefore, this study aims to investigate the factors that affect the competence of RBT teachers in delivering TVET content in Penang. Specifically, this study aims to identify the factors that cause RBT teachers' lack of skills in integrating technology into their teaching practices. In addition, this study also aims to analyze deficiencies in the ability of RBT teachers to use technology in the classroom. By understanding these factors, it is hoped that the findings of the study can provide guidance to policy makers and stakeholders in devising more effective strategies to improve the competence of RBT teachers in the use of technology. Actively implementing a methodology supported by technology tools in the virtual classroom can improve the digital competence of future teachers (Romero-García, Buzón-García, & de Paz-Lugo, 2020). This will not only improve the quality of TVET teaching and learning but also prepare students with relevant skills to face future challenges in an increasingly technology-driven world.

Research Objectives

This study aims to address the RBT teachers in primary schools lack competence in the use of technology. Specifically, this study have two objectives:

1. To identify the factors that cause the lack of skills of RBT teachers in integrating technology into their teaching practices.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

2. To analyze the deficiency in the ability of RBT teachers to use technology in the classroom.

Study Issues

This study focuses on RBT teachers in primary schools in Penang because it was found that many RBT teachers in primary schools are less efficient in the use of technology due to insufficient skills in integrating technology in their teaching practices and there are also significant weaknesses in the ability of RBT teachers to use technology in their classrooms. The integration of ICT in primary schools can increase students' academic achievement, increase interest in learning, and make teachers' teaching practices from teacher-centered to student-centered (Roshan, Ahmed, Bano, & Hussain, 2022). The scope of the study includes the evaluation of the competence of these teachers in integrating technology into their teaching practices. Teachers as educators show willingness to use ICT through teacher education programs, but face obstacles such as equipment challenges, large teaching loads and time limitations (Ngao, Sang, & Kihwele, 2022). This study involves RBT teachers who have been teaching for more than three years, as this experience is considered sufficient to provide an in-depth perspective on the challenges and constraints faced in the use of technology. It also focuses on the factors that cause a lack of skills in the use of technology as well as analyzing the deficiency in their ability to use technology in the classroom. Data was collected through interviews with five RBT teachers to obtain in-depth and detailed information about their experiences and views.

Literature Review

In a study on the competence of RBT teachers in TVET at Malaysia, this literature review provides an important context about the use of technology in education and the competence of teachers in this field. RBT education plays an important role in the primary education system, and the integration of technology in teaching is considered a critical step to improve the quality of education. Digital interactive technology has great potential to improve learning in primary schools, but its use should be justified to ensure that the balance between digital and traditional learning can comply with the principles of security and privacy (Shvardak, 2023). Integrating technology in elementary curriculum development can improve the quality of education by providing students who are prepared to face technological advances that can make teaching more interesting and effective in the digital age (Ikrianibangga et al., 2023). Studies show that technology brings many benefits in teaching, including increased interaction and student engagement. However, there are significant challenges in integrating technology into teaching, including a lack of training and technical support for teachers.

Previous studies show that the level of competence of teachers in the use of technology is often insufficient. Many teachers lack the confidence and skills to integrate technology effectively which can hinder their educational potential (Rofi'i, Nurhidayat, & Firharmawan, 2023). Factors such as lack of formal training, negative attitudes towards technology, and time constraints play a role in reducing the effectiveness of technology use in the classroom. Personal factors, professional factors and barriers such as lack of computers, poor internet access and malfunctioning computers and printers are the main factors affecting the integration of technology in the classroom (Pelila, Bag-ongan, Talania, & Wakat, 2022). This leads to a lack of skills in integrating technology into their teaching practices, and often results in a less effective teaching experience for students. Teacher effectiveness improves when they use classroom technology and other resources with technology that serve as an intermediary for efficiency and effectiveness in teaching (Iskandar Fellang, Alwan Suban, & Ilham, 2022).

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

Additionally, deficiencies in the use of technology in the classroom revolve around practical problems faced by teachers, including the lack of resources and support needed to implement technology effectively.

The literature review also shows some gaps in existing studies. Many previous studies focus on the use of technology in general without specifically focusing on RBT or the context of primary schools in Malaysia. Uyub et al., (2021) stated that students' interest, attitude, knowledge, and skills in RBT are at a moderate level even though there is a significant relationship to those factors in obtaining outstanding academic achievement. This raises the need for a more in-depth study on the factors that affect RBT teachers' technology competence specifically.

Based on the literature review, a conceptual framework that can be considered is a model that links teacher training, technical support, attitudes towards technology, and the effectiveness of technology use in teaching. The main findings show that although technology has great potential to improve education, deficiencies in teacher competence and insufficient support are still major issues. In conclusion, this literature review emphasizes the need for further research to address existing gaps and to devise more effective strategies in increasing the use of technology in RBT teaching.

Table 1: Teachers' Competence In Using Technology In Education Field

Author (Year)	Title	Finding
Shvardak, M. (2023)	Digital Interactive Technologies in Educational Process of Primary School	Digital interactive technologies have significant potential to improve learning in primary schools. Use of digital interactive technologies should ensure a balance between digital and traditional learning.
Ikrianibangga, Cici Fatmasari, Sriwindari Supit, Sri Atika Sudarto, Fitriyani Daud, Septiani Sanustika Suleman, Melani Samau, Indri Oktaviani To'onau, Elvia Rahmawati Hippy, & Marsellad.Gui. (2023)	Integrating Technology in Primary Curriculum Development: Improving the Quality of Education	Technology integration improves elementary education quality. Enhances digital skills, adaptive learning, and real-time curriculum progress.
Rofi'i, A., Nurhidayat, E., & Firharmawan, H. (2023)	Teachers' Professional Competence in Integrating Technology: A Case Study at English Teacher Forum in Majalengka	Teachers showed increased confidence in technology integration. Students demonstrated improved motivation and learning outcomes.

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

Pelila, J. R. O., Bag-ongan, Q. F. L., Talania, J. L. P., & Wakat, G. S. (2022)	Factors and Barriers Influencing Technology Integration in the Classroom	Personal and professional factors influence technology integration. Barriers to technology integration include limited resources and technical issues.
Iskandar Fellang, Alwan Suban, & Ilham. (2022)	The Effect of Competence on Teacher Performance through the Ability to Use Technology	Teachers' effectiveness improves when they make effective use of classroom technology. Ability to utilize technology can serve as a go-between for a teacher's competence and effectiveness.
Uyub, N., Noh@Seth, N. H., Ahmad Alhassora, N. S., Mohd Ahyan, N. A., Jambari, H., & Pairan, M. R. (2021)	Factors Contributing to Students' Attainment in Design and Technology Project Work	Strengthening teacher competence and resource allocation. Cultivating student interest and preparedness.

Methodology

This study uses qualitative research methods to understand in depth the factors that affect the competence of RBT teachers in the teaching of TVET. The chosen methodology is 'Basic Qualitative Inquiry' which is in line with the objective of the study which aims to identify and analyze the lack of skills and the use of technology by RBT teachers in Penang where qualitative research can explore human experiences, behaviours, perceptions and social phenomena through interviews interview participants, which emphasizes the social, economic and political context (Subedi, 2023). It also allows for an in-depth explanation and interpretation of the participants' experiences and views, which is in line with the objectives of the study in addition to exploring and understanding the complex factors in this context.

Data was collected through interviews with five participants who were RBT teachers in primary schools. Semi-structured interviews were used as the main instrument to collect data, allowing the participants to share their views freely and in-depth about the use of technology in their teaching. The interview method was chosen because it is the preferred data collection tool in qualitative research methods that emphasize definition, purpose, importance, planning, strengths, weaknesses, ethical dimensions, and validity (Dursun, 2023). The use of interviews is also in line with the objective of the study which seeks to obtain views and experiences directly from teachers.

The sampling strategy used is purposive sampling, where five RBT teachers who have been teaching for more than three years are selected. This sample size is considered sufficient to obtain in-depth and representative information about teachers' experiences in the context of this study. The selection of participants based on these criteria ensures that the information collected is relevant and can provide useful insight to achieve the objectives of the study. Purposive sampling in educational research involves the views of key stakeholders in determining the sample to help ensure the reliability of the findings (Denieffe, 2020).

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

Data analysis techniques involve coding and thematic analysis which is done manually using Microsoft Word. The coding process enables the categorization of data into main themes, while thematic analysis helps in identifying and understanding the patterns that emerge from the data. Thematic synthesis is a method that integrates diverse findings in qualitative research that preserves transparency and allows for the explicit production of new concepts and hypotheses (Thomas & Harden, 2008). This method is suitable for this study because it allows in-depth analysis of complex qualitative information, as well as helps in understanding the factors that affect the competence of teachers in the use of technology.

Ethical considerations were taken by ensuring that all participants gave written consent before the interview was conducted, and the data collected was kept confidential and used only for research purposes. Ethical considerations in qualitative research include anonymity, voluntary participation, privacy, confidentiality, the option to withdraw and avoiding misuse of findings (Nii Laryeafio & Ogbewe, 2023). The validity and reliability of the data is guaranteed through systematic data collection and careful analysis. Nha (2021) noted that using validity and reliability criteria in research can improve rigor and avoid inappropriate research design and evaluation. In conclusion, this methodology meets the objectives of the study, providing an in-depth insight into the lack of skills and deficiencies in the use of technology among RBT teachers, as well as allowing the researcher to better understand this issue.

Research Findings

This study aims to identify factors that cause RBT teachers' lack of skills in integrating technology into their teaching practices as well as analyze deficiencies in RBT teachers' ability to use technology in the classroom. Through interviews with five RBT teachers in primary schools in Penang, several main themes were identified related to the challenges and experiences of teachers in the use of technology.

One of the main findings in this study is the lack of technology knowledge and skills among RBT teachers. Self-efficacy, intrinsic motivation, ICT skills, and support training are very important in contributing to teacher readiness in teaching Design and Technology in the new Primary School Standard Curriculum (Endot & Jamaluddin, 2023). Based on the interview responses, the majority of teachers stated that they did not have sufficient basic knowledge about technology. Participant 1 stated, "Eh, actually, mmm... the teacher lacks knowledge, aaa. After that, the teacher is not interested in using technology for a long time." This shows that not only is basic knowledge lacking, but there are also motivational issues among more senior teachers. Participant 2 and Participant 3 also stated lack of skills in the use of technology as the main obstacle in their teaching. Participant 4 and Participant 5 emphasized that this lack of knowledge stems from no formal training and lack of meetings or discussions in the RBT committee that can help improve teachers' technology skills.

Apart from the lack of knowledge and skills, teachers also face a lack of training and support in the use of technology. Participant 1 stated that no workshops were held to improve technology use skills, and suggested that such workshops be held. Participant 2 and Participant 3 also stated the lack of training and exposure related to the use of technology. Participant 4 stated that the level of training and support received was moderate and required personal initiative to improve technology skills. Participant 5 stated that there was no support due to teachers being busy with other programs and lack of competition with other teachers. All of

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037
this points to the urgent need to provide more structured training and ongoing support to RBT teachers. Effective collaboration between School Improvement Specialist Coaches (SISC+) TVET and RBT teachers can encourage reflective practice and improve teaching methods (Ramli & Mohd Hashim, 2023).

The problem of technological devices and infrastructure is also a big obstacle faced by RBT teachers. Participant 1 stated, "Uh, no basic skills, mmm... not enough time, aaa... and there's a device problem too." Lack of devices and technical problems such as unstable internet were mentioned by Participant 2, Participant 3, and Participant 4. Participant 5 stated that the supply of devices was insufficient and only gave basic exercises such as taking notes and asking students to find answers on the internet. These problems show that apart from the lack of skills and training, infrastructure problems also need attention to improve the effectiveness of the use of technology in teaching RBT. Skills enhancement training programs can improve the digital competence of teachers, resulting in a positive attitude towards the use of technology through collaboration, learning and productivity (ElSayary, 2023).

The attitude and motivation of teachers towards the use of technology is also an important factor that affects the effectiveness of their teaching. Usually teachers with technology can improve classroom teaching and influence student learning motivation (Shuwei Sun, 2023). Participant 1 stated that old teachers' interest in technology is low, which prevents them from using technology in teaching. Participant 4 stated that although the level of training is moderate, teachers need to take their own initiative to improve their technology skills. This shows that motivation and a proactive attitude are important to overcome the lack of technological skills and knowledge. Learning motivation mediates the relationship between technology acceptance and technology self-efficacy, as well as leads to attitudes that lead to technology-based self-directed learning (Pan, 2020).

Although there are many obstacles, some teachers state that the use of technology can increase the effectiveness of teaching if used correctly. Participant 1 stated, "When the teacher understands the use of technology, mmm... then it will attract students' interest." Participant 2 stated that technology makes it easier for teachers and students, and teaching will be more interesting if teachers understand how to use technology. Participant 3 stated that exposure to technology helps students understand and teachers can also learn together. Participant 4 stated that technology allows students to learn hands-on rather than theory, and they can learn something new while teaching students. Participant 5 stated that students' interest increased when they won a robotics competition organized at the school level. This shows that the use of technology has great potential to improve teaching and learning if teachers are given adequate training and support. Interactive technology, such as digital whiteboards and educational software, can increase engagement, efficiency in lesson planning and delivery and improve student understanding (Al-Sindi, Putra, & Ghozi, 2023).

Deficiencies in the use of technology in the classroom include device, internet, and time issues (Mdhlalose & Mlambo, 2023). Participant 1 stated device problems and insufficient time as the main obstacles. Participant 2 and Participant 3 also stated device and internet problems as a big challenge. Participant 4 stated that the insufficient device was caused by damage that was not maintained and the limited use of the device in a short period of time. Participant 5 stated that the teacher only gave basic training and asked students to search for answers on the internet due to the lack of devices. All this shows that technical and logistical problems are major

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

obstacles that need to be overcome to increase the use of technology in teaching. Most teachers lack confidence, training and insufficient time in using technology tools in their classrooms (Pohan, Suherdi, & Purnawarman, 2023).

Table 2: The Deficiencies Of RBT Teachers' Ability To Use Technology In The Classroom

Authors (Year)	Title	Finding
Endot, Z., & Jamaluddin, R. (2023)	Antecedent Factors Influencing Teacher's Readiness in Teaching Design and Technology Education	Factors influencing teacher readiness: self-efficacy, intrinsic motivation, ICT skills, support training. All factors contribute significantly to teacher readiness at 40.4%.
Ramli, R., & Mohd Hashim, M. H (2023)	Pengalaman Pembimbing Instruksional Pendidikan dan Latihan Teknikal Vokasional (PLTV) dalam Menyokong Refleksi Pengajaran Guru Reka Bentuk dan Teknologi (RBT)	SISC+ TVET facilitates guidance for RBT teacher reflection. Collaboration promotes reflective teaching practices among RBT teachers.
ElSayary, A. (2023)	The Impact of a Professional Upskilling Training Programme on Developing Teachers' Digital Competence	The upskilling training programme effectively developed teachers' digital competence. Teachers exhibited a positive attitude towards using technology for collaboration and learning.
Shuwei Sun. (2023)	Teachers' Technological Skills in Influencing Students' Learning Motivation	Teachers' technology use improves classroom instruction quality. Individualized education needed for diverse student backgrounds.
Pan, X. (2020)	Technology Acceptance, Technological Self-Efficacy, and Attitude Toward Technology-Based Self-Directed Learning: Learning Motivation as a Mediator	Technology acceptance and technological self-efficacy are related to attitude toward technology-based self-directed learning. Learning motivation mediates the relations between technology

International Journal of Modern Education
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

		acceptance, technological self-efficacy, and attitude toward technology-based self-directed learning.
Al-Sindi, T., Putra, H. D., & Ghozi, S. (2023)	Integrating Technology into Classroom Training	Technology integration enhances student engagement and comprehension in classrooms. Challenges include resource availability and technical support for educators.
Mdhlalose, D., & Mlambo, G. (2023)	Integration of Technology in Education and its Impact on Learning and Teaching	Effects of technology on education are contradictory Technology can enhance classroom collaboration and learning
Pohan, E., Suherdi, D., & Purnawarman, P. (2023)	A Review of Challenges to Applying Information and Communication Technology in English Language Instruction	Teachers lack confidence, training, and time using technology tools. Administrations should provide training and reduce teachers' workload for success.

Main Results and Observation

Based on interviews with five RBT teachers in primary schools in Penang, several main themes have been identified related to the challenges and experiences of teachers in the use of technology.

Lack of Technology Knowledge and Skills

This theme was formed based on coding such as 'lack of teacher knowledge', 'old teachers are not interested', and 'no basic skills'. RBT teachers in primary schools face a lack of sufficient technology knowledge and skills to integrate technology into their teaching. Participant 1 and Participant 2 stated that teachers do not have enough basic knowledge in the field of technology. Participant 3 and Participant 4 also emphasized that teachers lack the necessary technology skills. This situation shows that technology knowledge and skills among teachers need to be improved through more intensive training and exposure.

Lack of Training and Support

This theme is formed from coding such as 'lack of training', 'lack of workshop exposure', 'moderate level of training', and 'no support'. Teachers stated that they faced a lack of training and support in the use of technology. Participant 1 insisted that no workshops were held to improve technology use skills, while Participant 2 and Participant 3 stated a lack of training and exposure about technology use. Participant 4 stated that the level of training is moderate

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037
and requires own initiative to improve technology skills. Participant 5 stated that there was no support because teachers were busy with other programs and lack of competition with other teachers. All this suggests that there needs to be more structured training and ongoing support for RBT teachers.

Technology Device and Infrastructure Issues

This theme is formed from coding such as 'device problem', 'unstable internet', 'insufficient device', 'need to share device', 'broken device not maintained', 'short teaching time', and 'short time limited device use' '. Teachers face various technical and logistical problems that prevent them from using technology effectively in the classroom. Participant 1 stated device problems and insufficient time as the main obstacles. Participant 2 and Participant 3 also stated device and internet problems as a big challenge. Participant 4 stated that there were insufficient devices due to damage that was not maintained, while Participant 5 stated that the supply of devices was insufficient and only gave basic exercises such as taking notes and asking students to find answers on the internet. This shows that technical and logistical problems are major obstacles that need to be overcome to increase the use of technology in teaching.

Teacher's Attitude and Motivation

This theme is formed from coding such as 'low motivation' and 'needs own initiative'. The attitude and motivation of teachers towards the use of technology is also an important factor that affects the effectiveness of their teaching. Participant 1 stated that old teachers' interest in technology is low, which prevents them from using technology in teaching. Participant 4 stated that although the level of training is moderate, teachers need to take their own initiative to improve their technology skills. This shows that motivation and a proactive attitude are important to overcome the lack of technological skills and knowledge.

Effective Use of Technology

This theme is formed from coding such as 'attracting students' interest', 'teaching is more interesting', 'students understand technology', 'learning with technology', 'hands-on learning', and 'winning robotics competition'. Although there are many obstacles, some teachers state that the use of technology can increase the effectiveness of teaching if used correctly. Participant 1 stated, "When the teacher understands the use of technology, mmm... then it will attract students' interest." Participant 2 stated that technology makes it easier for teachers and students, and teaching will be more interesting if teachers understand how to use technology. Participant 3 stated that exposure to technology helps students understand and teachers can also learn together. Participant 4 stated that technology allows students to learn hands-on rather than theory, and they can learn something new while teaching students. Participant 5 stated that students' interest increased when they won a robotics competition organized at the school level. This shows that the use of technology has great potential to improve teaching and learning if teachers are given adequate training and support.

Deficiencies in the Use of Technology

This theme is formed from coding such as 'basic note-taking exercises' and 'students looking for answers on the internet'. Deficiencies in the use of technology in the classroom include device, internet, and time issues. Participant 1 stated a device problems and insufficient time as the main obstacles. Participant 2 and Participant 3 also stated device and internet problems as a big challenge. Participant 4 stated that the insufficient device was caused by damage that was not maintained and the limited use of the device in a short period of time. Participant 5

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037
stated that the teacher only gave basic training and asked students to search for answers on the internet due to the lack of devices. All this shows that technical and logistical problems are major obstacles that need to be overcome to increase the use of technology in teaching.

Conclusion

In this study, there is some supporting evidence that reinforces the main findings related to the lack of skills and knowledge of RBT teachers in the use of technology, lack of training and support, problems with technology devices and infrastructure, as well as the effectiveness of technology use. The dialogues taken from the study participants provide a clear picture of their challenges and experiences.

For example, one participant stated, "These old teachers, mmm... are not very interested in using technology in teaching." This shows that there is a lack of interest among old teachers to adapt technology in their teaching. In addition, another participant stated, "We don't have a workshop at all, so we have to hold a workshop to improve technology use skills." This reinforces the finding that there is a lack of adequate training and support for RBT teachers in the use of technology. Other participants also emphasized the problem of insufficient devices and internet problems that are often encountered in the classroom, as stated by one participant, "There are not enough devices, and the internet always has problems."

In the discussion of the main findings, it is clear that the lack of technology skills and knowledge among RBT teachers is a critical issue. These teachers do not have sufficient basic knowledge about technology, which prevents them from effectively integrating technology in teaching. Furthermore, the lack of training and exposure to technology workshops further complicates their efforts to improve these skills. The training provided is simple and insufficient to meet the real needs of these teachers.

Device and technology infrastructure problems are also a big challenge. The lack of devices, the need to share devices, as well as internet problems that often disrupt the teaching process show that the technology infrastructure in schools needs to be improved. For example, one participant stated, "We have to share devices, and sometimes the internet doesn't work well." This shows how important it is to improve the provision of better internet devices and infrastructure to support the use of technology in teaching.

The effectiveness of the use of technology in teaching also received attention in this study. Some participants stated that technology can increase student interest and make teaching more interesting. One participant stated, "When the teacher understands the use of technology, mmm... then it will attract students' interest." This shows that with adequate training and support, technology can be an effective tool in improving the effectiveness of teaching and learning.

However, there are also findings that are unexpected or contrary to initial expectations. For example, despite the lack of adequate training, some teachers still show their own initiative to learn technology and try to integrate it into their teaching. One participant stated, "Even though there is not much practice, aaa... I try to learn by myself using technology to teach students." This shows that there are teachers who have the motivation and desire to improve their skills even with limited support.

International Journal of Modern Education
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

In conclusion, the findings of this study show that there are several factors that prevent RBT teachers in primary schools from integrating technology effectively in their teaching. Lack of technology skills and knowledge, lack of training and support, as well as problems with technology devices and infrastructure are the main challenges faced by these teachers. However, with adequate support and improvements in the provision of devices and infrastructure, technology has great potential to improve the effectiveness of RBT teaching and learning in primary schools. This study also shows that there are teachers who take the initiative to improve their skills, which is a positive sign towards the more effective use of technology in teaching in the future.

Recommendation Model

Based on the discussion above, the appropriate model to overcome the lack of technology skills and deficiencies in the use of technology by RBT teachers is the Comprehensive Technology Training and Support Model (MLSKT). This model consists of several main components have been designed.

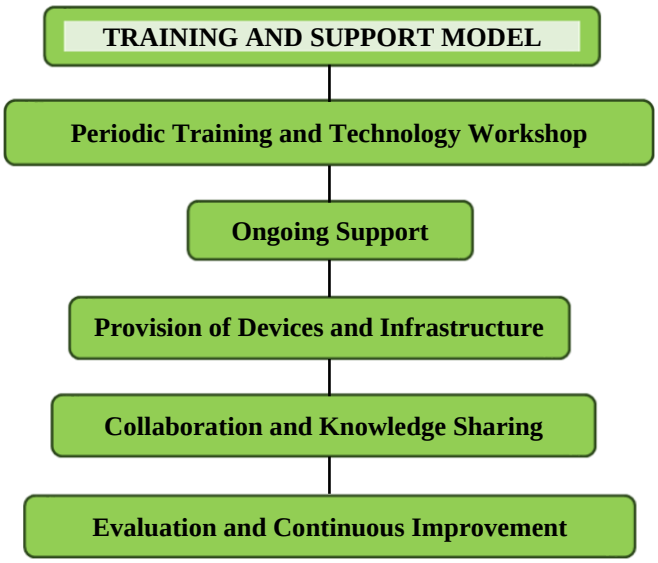

Figure 1: Comprehensive Technology Training And Support Model (MLSKT)

The formation of this model involves the following steps:

Periodic Training and Technology Workshops: Hold regular technology workshops for teachers, with a focus on basic and advanced skills in the use of technology. These workshops should be run by educational technology experts who can provide hands-on training and ongoing guidance.

Continuous Support: Create a continuous support system where teachers can get technical and pedagogical help whenever needed. This can be done through online platforms that provide tutorials, discussion forums, and virtual coaching sessions.

Preparation of Technology Devices and Infrastructure: Ensure that each school has sufficient devices and a stable internet connection. Damaged devices should be maintained immediately

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037
and schools should be provided with sufficient provision to replenish devices if necessary.

Collaboration and Knowledge Sharing: Encourage collaboration between teachers through a professional learning community (PLC) where they can share best practices, experiences, and new ideas in the use of technology.

Evaluation and Continuous Improvement: Perform periodic evaluation of the effectiveness of the training and support provided, as well as collect feedback from teachers to improve the program carried out.

Summary

The summarizes of this article related to the lack of skills and knowledge of RBT teachers in the use of technology, lack of training and support, problems with technology devices and infrastructure, as well as the effectiveness of the use of technology in teaching. This study found that RBT teachers in primary schools in Penang face various challenges in integrating technology into their teaching. The lack of skills and basic knowledge of technology among teachers is one of the main obstacles. Inadequate training and support also contribute to this problem, where teachers do not get enough exposure through the workshops and training provided.

The problem of technology devices and infrastructure is also a big challenge faced by teachers. The lack of sufficient devices, the need to share devices, as well as frequent internet problems that disrupt the teaching process show that there is an urgent need to improve the technology infrastructure in schools. Despite these challenges, the use of technology in teaching has the potential to increase student interest and make teaching more interesting. Teachers who understand the use of technology find that it can help in improving the effectiveness of teaching and learning.

In the discussion of the findings, the objective of this study to identify the factors that cause the lack of skills of RBT teachers in integrating technology and to analyze the deficiency in the ability of teachers to use technology in the classroom has been achieved. Key themes identified include lack of technology knowledge and skills, lack of training and support, and problems with technology devices and infrastructure. Based on the code analysis, the theme "Lack of Technology Knowledge and Skills" arose from the participants' answers that expressed a lack of basic technology and interest in learning new technologies. Meanwhile, the theme "Lack of Training and Support" emerged from the lack of sufficient workshops and exposure for teachers. The theme "Technology Device and Infrastructure Issues" reflects issues related to the availability and quality of devices and internet connections.

This study makes a significant contribution to the field of technology and vocational education by providing a deep insight into the challenges faced by RBT teachers in primary schools in the use of technology. These findings can be used by stakeholders, including the government, to plan and implement a more comprehensive and comprehensive training program to improve skills and technological knowledge among teachers. By understanding the shortages and needs of teachers, schools and the ministry of education can take proactive steps to provide more relevant and ongoing training, as well as ensure the availability of adequate devices and infrastructure.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

In addition, this study also contributes to the education community by emphasizing the importance of support and cooperation between teachers in advancing the use of technology in teaching. Teachers can use these findings to improve their skills through joint efforts and knowledge sharing. In the education industry, this discovery can drive the development of more effective and user-friendly educational technology, which is adapted to the real needs of teachers and students.

In terms of contribution to knowledge, this study enriches the literature in the field of technology education by providing empirical evidence on the challenges and needs of RBT teachers in primary schools. The findings of this study can be used as a reference for future studies that aim to improve the use of technology in teaching and learning. This study also opens the door for further research on the best strategies to overcome the identified challenges, as well as to evaluate the effectiveness of the training and support programs introduced.

Limitations

This study is limited to five RBT teachers in a primary school in Penang, which may not represent the entire population of RBT teachers. In addition, this study uses a qualitative approach that may be limited in terms of generalizing the findings to a wider context.

The findings of this study suggest the need for further research with a larger sample and involving schools outside Penang to get a more comprehensive picture of the challenges in the use of technology in teaching RBT. Studies can also evaluate the effectiveness of training programs designed specifically to improve teachers' technology skills. A quantitative approach can be used to strengthen these findings and provide more generalizable and concrete data on the issues identified.

This study emphasizes the importance of more comprehensive training and support for RBT teachers in the use of technology. Schools and the ministry of education need to take proactive measures to provide relevant workshops and training programs and ensure the availability of adequate technology devices and infrastructure in schools.

Acknowledgements

We are appreciate to the School of Educational Studies, Universiti Sains Malaysia and all who are directly and indirectly involved in the making of writing.

References

Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' Perceptions of Technology Integration in Teaching-Learning Practices: A Systematic Review. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.920317

Al-Sindi, T., Putra, H. D., & Ghozi, S. (2023). Integrating Technology into Classroom Training. *Journal of Training, Education, Science and Technology*, 1–6. https://doi.org/10.51629/jtest.v1i1.168

Denieffe, S. (2020). Commentary: Purposive Sampling: Complex or Simple? Research Case Examples. *Journal of Research in Nursing*, *25*(8), 662–663. https://doi.org/10.1177/1744987120928156

Dursun, B. (2023). A Qualitative Research Technique: Interview. *Disiplinlerarası Eğitim Araştırmaları Dergisi*, *7*(14), 100–113. https://doi.org/10.57135/jier.1245193

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

ElSayary, A. (2023). The Impact of a Professional Upskilling Training Programme on Developing Teachers' Digital Competence. *Journal of Computer Assisted Learning*, *39*(4), 1154–1166. https://doi.org/10.1111/jcal.12788

Endot, Z., & Jamaluddin, R. (2023). Antecedent Factors Influencing Teacher's Readiness in Teaching Design and Technology Education. *Journal of Technical Education and Training*, *15*(3). https://doi.org/10.30880/jtet.2023.15.03.007

Herdina, G. F., & Ningrum, A. S. B. (2023). Teachers' Perceptions and Challenges in Integrating Technology in English Reading Course: A Systematic Research Review. *English Education:Journal of English Teaching and Research*, *8*(1), 91–101. https://doi.org/10.29407/jetar.v8i1.19133

Ikrianibangga, Cici Fatmasari, Sriwindari Supit, Sri Atika Sudarto, Fitriyani Daud, Septiani Sanustika Suleman, … Marsellad.Gui. (2023). Integrating Technology in Primary Curriculum Development: Improving the Quality of Education. *International Journal of Advanced Technology and Social Sciences*, *1*(4). https://doi.org/10.59890/ijatss.v1i4.1111

Iskandar Fellang, Alwan Suban, & Ilham. (2022). The Effect of Competence on Teacher Performance Through the Ability to Use Technology. *International Journal of Scientific Research in Science and Technology*, 670–679. https://doi.org/10.32628/IJSRST229499

Kabita Choudhury, Dr., & Khatun, H. (2024). Teachers' Attitudes Towards The Use of ICT in Education. In *Futuristic Trends in Social Sciences Volume 3 Book 11* (pp. 37–42). Iterative International Publishers, Selfypage Developers Pvt Ltd. https://doi.org/10.58532/V3BESO11P3CH1

Mdhlalose, D., & Mlambo, G. (2023). Integration of Technology in Education and its Impact on Learning and Teaching. *Asian Journal of Education and Social Studies*, *47*(2), 54–63. https://doi.org/10.9734/ajess/2023/v47i21021

Ngao, A. I., Sang, G., & Kihwele, J. E. (2022). Understanding Teacher Educators' Perceptions and Practices about ICT Integration in Teacher Education Program. *Education Sciences*, *12*(8), 549. https://doi.org/10.3390/educsci12080549

Nha, V. T. T. (2021). Understanding Validity and Reliability from Qualitative and Quantitative Research Traditions. *VNU Journal of Foreign Studies*, *37*(3). https://doi.org/10.25073/2525-2445/vnufs.4672

Nii Laryeafio, M., & Ogbewe, O. C. (2023). Ethical Consideration Dilemma: Systematic Review of Ethics in Qualitative Data Collection Through Interviews. *Journal of Ethics in Entrepreneurship and Technology*, *3*(2), 94–110. https://doi.org/10.1108/JEET-09-2022-0014

Omar, M. K., Zahar, F. N., & Rashid, A. M. (2020). Knowledge, Skills, and Attitudes as Predictors in Determining Teachers' Competency in Malaysian TVET Institutions. *Universal Journal of Educational Research*, *8*(3C), 95–104. https://doi.org/10.13189/ujer.2020.081612

Pan, X. (2020). Technology Acceptance, Technological Self-Efficacy, and Attitude Toward Technology-Based Self-Directed Learning: Learning Motivation as a Mediator. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.564294

Pelila, J. R. O., Bag-ongan, Q. F. L., Talania, J. L. P., & Wakat, G. S. (2022). Factors and Barriers Influencing Technology Integration in the Classroom. *Journal of Language Education and Educational Technology (JLEET)*, *7*(1), 1. https://doi.org/10.33772/jleet.v7i1.18704

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 23 (December 2024) PP. 544-559
DOI: 10.35631/IJMOE.623037

Pohan, E., Suherdi, D., & Purnawarman, P. (2023). A Review of Challenges to Applying Information and Communication Technology in English Language Instruction. *Journal of English Language Studies*, *8*(2), 285. https://doi.org/10.30870/jels.v8i2.19515

Ramli, R., & Mohd Hashim, M. H. (2023). Pengalaman Pembimbing Instruksional Pendidikan dan Latihan Teknikal Vokasional (PLTV) dalam Menyokong Refleksi Pengajaran Guru Reka Bentuk dan Teknologi (RBT). *Online Journal for TVET Practitioners*, *8*(1). https://doi.org/10.30880/ojtp.2023.08.01.001

Rofi'i, A., Nurhidayat, E., & Firharmawan, H. (2023). Teachers' Professional Competence in Integrating Technology: A Case Study at English Teacher Forum in Majalengka. *International Journal of Language Education and Culture Review (IJLECR)*, *9*(1), 64–73. https://doi.org/10.21009/ijlecr.v9i1.37683

Romero-García, C., Buzón-García, O., & de Paz-Lugo, P. (2020). Improving Future Teachers' Digital Competence Using Active Methodologies. *Sustainability*, *12*(18), 7798. https://doi.org/10.3390/su12187798

Roshan, M., Ahmed, M., Bano, S., & Hussain, N. (2022). Effectiveness of Information and Communication Technology (ICT) Integrated Teaching and Learning in Primary Schools. *International Journal of Innovation in Teaching and Learning (IJITL)*, *8*(1), 53–69. https://doi.org/10.35993/ijitl.v8i1.2231

Sangaji, A. C., & Pribadi, I. A. (2023). Effect of Digital Literacy and Educational Technology on School Quality: Case Study of The Tiara Bangsa School. *Jurnal Penelitian Pendidikan IPA*, *9*(2), 721–728. https://doi.org/10.29303/jppipa.v9i2.2827

Shuwei Sun. (2023). Teachers' Technological Skills in Influencing Students' Learning Motivation. *Applied & Educational Psychology*, *4*(9). https://doi.org/10.23977/appep.2023.040913

Shvardak, M. (2023). Digital Interactive Technologies In Educational Process Of Primary School. *Scientific Journal of Khortytsia National Academy*, (2023–8), 39–48. https://doi.org/10.51706/2707-3076-2023-8-3

Subedi, M. (2023). Sampling and Trustworthiness Issues in Qualitative Research. *Dhaulagiri Journal of Sociology and Anthropology*, 61–64. https://doi.org/10.3126/dsaj.v17i01.61146

Thomas, J., & Harden, A. (2008). Methods for the Thematic Synthesis of Qualitative Research in Systematic Reviews. *BMC Medical Research Methodology*, *8*(1), 45. https://doi.org/10.1186/1471-2288-8-45

Tze Kiong, T., Mohd.Rusly, N. S., Abd Hamid, R. I., Charanjit Kaur Swaran, S., & Hanapi, Z. (2022). Inventive Problem-Solving in Project-Based Learning on Design and Technology: A Needs Analysis for Module Development. *Asian Journal of University Education*, *18*(1), 271. https://doi.org/10.24191/ajue.v18i1.17196

Uyub, N., Noh@Seth, N. H., Ahmad Alhassora, N. S., Mohd Ahyan, N. A., Jambari, H., & Pairan, M. R. (2021). Factors Contributing to Students' Attainment in Design and Technology Project Work. *Journal of Technical Education and Training*, *13*(1). https://doi.org/10.30880/jtet.2021.13.01.007