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Assessing the Importance of Digital Literacy as a 21st Century Skill among TVET Educators

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Abstract

The skill of digital literacy is essential for teachers today. This study looked into the difference in importance that teachers in a Malaysian district attributed to digital literacy. The sample consisted of 138 TVET teachers. The research used surveys and interviews to check the level of digital literacy. The average scores for essential digital skills were software use (4.60), digital communication (4.52), and data management (4.47). Teachers stated that digital literacy helps improve teaching by enhancing the communication with students, increasing participation within classes and thus reducing barriers to technology access. Though teachers agree that they need to assist students in gaining digital skills for jobs, they face challenges such as lack of initiative. The study recommends ongoing discussions on development initiatives as well as exploration of new economic features. If some hurdles exist regarding integrating technology, an update is required in tools plus teachers should have to be proactive about creating technology through professional growth. These outcomes could lead educational institutions and policy makers in shaping up a strong system that adapts flexibly as per ongoing changes arising from new technologies.

Keywords: Digital Literacy, 21st-Century Education, TVET, Teacher Digital Skills

Introduction

Nowadays many people use digital technologies in everyday life. Digital literacy means having the skills to communicate, manage information, and solve problems using technology. Educators must update Technical and Vocational Education and Training (TVET) courses with digital tools. This helps students get ready for jobs in the modern work world. In Southern Malaysia, TVET schools and colleges shape a workforce that can work in a digital environment. Digital literacy goes beyond basic computer use, needing the ability to search and evaluate information responsibly online. Teachers need these skills to prepare students for today's job market. Having the core competencies in using technology is crucial in this fast-changing world.

TVET requires technology skills like robotics, AI, and IoT. They are necessary for energy and film careers. Employers want workers with tech skills and flexibility using many digital tools. TVET teachers need digital skills to teach the latest industry tech. Many battle to improve their own tech skills, making it hard to teach. Teachers face few new tools and chances to grow. They resist changes. Without tech resources, teachers cannot teach digital skills for work. This study looks at how key TVET teachers' digital skills are in Southern Malaysia. Surveys will gather student views. Interviews will show the present state of tech use. Findings will reveal areas needing help. The research will guide teaching digital skills for better futures.

This study contains information on using digital technologies in education. Teachers of TVET were seen to be open to using digital literacy which is very important globally. The research findings show that students and teachers need to be capable of using these new technologies well. This is vital for the coming digital world. The article describes the context of the study and its significance. Teaching digital skills is very crucial in preparing students for their future jobs.

Literature Review

Digital literacy is an expansive idea that has become essential for the acquisition of 21st-century skills. It represents a wide set of competencies, which allow the user to effectively manage technology in both environmental and professional contexts. For TVET educators, digital literacy is still crucial for better teaching practices as well as preparing students for the much-needed work skills. This literature review exposes the meaning of the digital literacy, the special connection with the TVET education, the difficulties and strategies that are used for its integration.

The Importance of Digital Literacy in the 21st

Digital literacy, the ability to use information and communication technologies to find, evaluate, create, and communicate information, is a cognitive skill in addition to a technical skill. The most important thing is that people develop digital literacy because, according to (Nieves et al., 2022), it is the primary means through which all citizens can gain access to society and the job market. On the other hand, it is the essential technology that allows the other competence to be successful in the 21st century (Branden et al., 2023). Furthermore, digital literacy is not a fixed set of skills - it is a developing, versatile competence that varies according to the rapidly changing technological environment. According to (María-Cristina et al., 2022), it contains functional elements and critical and social ones, thus, it includes both basic technical skills and critical analysis of digital content, as well as an understanding of social impacts. In this sense, the continued development of digital literacy necessitates its inclusion as a continual learning outcome.

Digital Literacy in TVET Education

TVET educators' contribution is of great importance to the students because they are the ones who will equip them with the practical skills required in the job market that is increasingly looking for digital competencies. As per (María-Cristina et al., 2022), TVET digital literacy means not only the use of digital tools for instructional use but also the training of these tools into vocational training, similar to the real-world applications. This innovation is going to be responsible for successfully guiding students to operate popularly transforming

their business environments. VTED technical courses, as a rule, stress hands-on, technical skills. Nevertheless, the digitalization of industries demands a change in the pedagogy of vocation education as they should also incorporate digital literacy. As pointed out by the (UNESCO, 2022), TVET teachers require digital skills as well so that they can provide not just technical education as well as digital skills. This kind of approach is not only meant to make students capable of executing certain tasks at their current jobs but is also about handholding them on using digital solutions to solve any issues and improve the operations.

Challenges in Digital Literacy Integration

Digital skills are vital for TVET education. However, schools find it hard to include them in the curriculum. A big problem is that schools lack modern technology. Teachers cannot use digital tools in class. The (European Commission, 2023) says many schools have no money for tech or infrastructure. They also lack teacher training. Teachers need professional development programs to learn how to use technology in teaching. Without training, they cannot keep up with new technology. There is a gap between what teachers do and what industry needs. Some teachers resist change. They stick to old methods instead of using tech. (Christopher et al., 2023) says schools should have a friendly climate for trying new ways.

Strategies for Enhancing Digital Literacy in TVET

To effectively embed digital skills into technical and vocational education and training (TVET) curricula, numerous methods are available. To begin with, technology access can double through infrastructure and material provisioning. As (Daniel et al., 2023) hints, the provision of the required equipments to the schools can help bridge the digital divide (the gap between those who can use technology to advance their learning and those who cannot, due to limited access) and ensure that all students are able to develop the needed digital skills. Professional development for educators is also a crucial strategy. According to (Elsayary, 2023), a training course that mainly concentrates on digital skills instructors will be the most successful in the training of the educators to incorporate the digital devices in their teaching. Such training should be designed to be on-going and adaptable to the fast-pace technology. Furthermore, by creating a culture of innovation in educational institutions, instructors can get rid of the resistive behaviors which come along with change. (Kanyarat, 2023) also indicated the need to create an environment that stimulates teachers to try new tools and teaching approaches as a way towards successful integration of digital literacy into the curriculum.

The Future of Digital Literacy in TVET

It is anticipated that as the industry develops, the participation of digital literacy in TVET education will increase. (Rana Hammad et al., 2021) revealed that a growing number of jobs require digital skills in all sectors, respectively, thus, digital literacy education becomes a priority of TVET. Through concentrating on digital literacy issues, teaching staff of TVET lists can center on the forthcoming workforce with the challenges and opportunities these students face in the era when workplace attaint in a digital mode.

There is no doubt that digital literacy is a key element of modern education and it is particularly regards to vocational education and training. Nevertheless, the main things in its establishment are limitations of its adoption, but well-aimed efforts should overcome these

problems and ensure that the tutors and students have the necessary set of skills to be successful in a digital world.

Objectives

i. Evaluate the importance of digital literacy skills among TVET educators.
ii. Assess the impact of digital literacy on teaching effectiveness and professional development.

Methodology

This section details the study's methodology that includes the research design, instruments used, population and sampling, and data analysis methods in the research process. The approach used in the study, on the one hand, is quantitative by nature, while on the other hand, it also has some qualitative features. The study employs a mixed-methods approach to thoroughly evaluate the correlation between digital literacy and its influence on TVET instructors in vocational-technical institutions in South of Malaysia, however, as a positive side, it can also strengthen some qualitative aspects occasionally.

Research Design

The study's research design uses a combination of both qualitative research and uses quant quality research methods. The application of mixed methods research is particularly useful in examining more 'tiger' courses where both quantitative and qualitative strategies separately would not be able to provide the full range of insights (Creswell & Plano Clark, 2023). In its most basic form, it operates by data collection and analysis via survey questions, which are later statistically analyzed to find the relationship of identified parameters. It also involves qualitative data/unnecessary in-depth interviews that are held with individuals to help gather data for structured surveys, which provide a wider variety of issues about the research. This is the part of the overall survey in which educators and students can share their own thoughts and experience with the digital era; qualitative data thoroughly explains insight through interviewing students. Interviews reveal deeper feelings and thoughts of participants. A survey collects data on TVET trainers' digital literacy perceptions. This gives an overall view across many trainers in Southern Zone. Interviews uncover background on digital literacy in education.

Research Instruments

The study employs two primary research instruments: a survey questionnaire and a semi-structured interview guide.

Survey

The main purpose is to looks at how beyond the basic do we need to knowledge of computers and the internet as teachers in vocational colleges. It has four parts. They are about who the teachers are, why computer skills matter, how skills help or hinder teaching, and what barriers there are to using them. The order of the sections lets teachers answer with ease and clarity.

a) Demographics: This section gathers the demographic data on the age, sex, years of teaching experience, and the subjects that the participants teach. This

information is a significant factor in the analysis of how the different factors might influence the perception of digital literacy by educators.

b) Digital Literacy Skills: Participants are asked to rate the importance of specific digital literacy skills, such as software proficiency, data management, cybersecurity awareness, and digital communication, on a five-point Likert scale ranging from "not important" to "very important."
c) Impact on Teaching Practices: This section investigates the way that educators perceive the effect of digital literacy on their teaching effectiveness, student engagement, and overall educational outcomes.
d) Challenges: Participants also are asked to identify the barriers to integrating digital literacy into their teaching, such as access to technology, training opportunities, and institutional support.

The survey was distributed online to facilitate wide participation and ensure that data collection was efficient and comprehensive.

Semi-Structured Interviews

The semi-structured interview guide was developed to explore in-depth the experiences and perceptions of TVET educators regarding digital literacy. Interviews provide the flexibility to further delve into the single issues and consider new subjects that come up during the talk (Brinkmann & Kvale, 2014). The guide is comprised of open-ended queries that are tailored towards clarifying details related to the topics as listed:

(a) Experiences with Digital Literacy: How do educators use digital literacy skills in their teaching? What successes and challenges have they encountered?
(b) Perceptions of Digital Literacy: How important do educators believe digital literacy is for themselves and their students? How do they perceive the role of digital literacy in enhancing educational outcomes?
(c) Integration Challenges: What barriers do educators face in integrating digital literacy into their teaching practices? How do they overcome these challenges?
(d) Professional Development Needs: What training and support do educators require to improve their digital literacy skills?

A purposive sample of interviewees having knowledge and experience had been selected for the study. The interviews were taped and scrupulously analyzed after being written out.

Population and Sampling

This research is centered on teachers at south Malaysia Technical School and College Vocational. Because these schools offer a different variety of technical and vocational subjects and provide a complete viewpoint of the integration of digital literacy in TVET education, they have been chosen for the study. The total number of participants that took part in this research study is 138. A purposive sampling method was applied to get participants to be taken who are supposed to have knowledge and experience in the past of the technical and vocational education and have an interest in digital literacy. This sampling technique is deemed to be the best in making sure that the set includes the right people who can give a lot, vivid data relevant to the research questions (Rahman et al., 2022).

Data Analysis Methodology

Data analysis for this study involves both quantitative and qualitative techniques, allowing for a comprehensive examination of the research questions from multiple angles.

Quantitative Data Analysis

Factual data were gathered, analyzed, and interpreted using descriptive and inferential statistics. Descriptive statistics, including the averaging of means and standard deviations, were utilized to define the ratings of the significance of digital literacy skills. These measures successfully outlined the central tendencies while also describing variability in responses within the sample (Jian-Qiao et al., 2023). Inference statistics were employed to reveal variable relationships and to check for hypotheses regarding the relevance of digital literacy skills. The analysis of alternatives was used to search for the association between educators' beliefs about digital literacy and their reported influence on teaching. Also, an analysis of variance (ANOVA) procedure would determine any noteworthy discrepancies in perceptions of the demographic profile of the respondents, such as age, gender, and years of experience. The SPSS software application was used to analyze the data gathered in this study, which permits the analysis of substantial amounts of data and robust analyses of complex datasets.

Qualitative Data Analysis

The analysis of the qualitative data obtained from the semi-structured interviews was carried out by thematic analysis - a method which finds, analyzes, and reports patterns (themes) within data (Howitt, 2019). The method comprises the following steps:

a) Familiarization: Read through initial transcripts through several iterations in order to familiarize the self with the content and to pick out initial themes.
b) Coding: Data coding is then done faithfully, by tagging special text segments that correspond to research questions. Each code is an important aspect of the theme of digital literacy.
c) Theme Development: Careful inspection of the codes is carried out and the codes sorted into affinity groups that, if necessary, are modified and defined by the importance of the theme and the existing patterns of the data.
d) Theme Review: Then, the investigator is able to go through a stages and still the data and the themes to verify that these are authentic and meaningful.
e) Definition and Naming: A theme is clearly defined, and a succinct title of the data it signifies is assigned to it.
f) Reporting: A narrative is cleaved through and the themes are forged into an organized whole that provides research issues, as well as real insights into the integration and problems of digital literacy in TVET education.

The qualitative analysis was backed by NVivo software which helps in organizing and analyzing bulk textual data aptly. By intermixing quantitative and qualitative methodologies, this research elucidates at length the crucial necessity of digital literacy amongst TVET educators, the difficulties they face in the integration of these skills, and the indications of the support they require for their digital competencies enhancement. This methodological approach guarantees the soundness, dependability, and the manner in which the explanatory data correspond to the complex factualities of digital literacy in educational settings.

Findings and Discussions

Quantitative Findings

The results of the quantified aspects of the study indicate that the digital abilities of educators in Technical and Vocational Education and Training (TVET) teachers are a critical point. For this purpose, a survey was conducted among 138 educators from south Malaysia Technical School and College Vocational which focused on determining various digital literacy competencies. The data analysis focused on calculating the mean importance ratings and standard deviations for each skill, providing a clear picture of the educators' priorities in digital literacy. Table 1 provides a synthesis of the quantitative findings of the importance of different digital literacy aspects, the mean being given along with the standard deviation for them.

Table 1

Mean and standard deviation for every aspect / contruct from quantitive data

Aspect	Mean	Standard Deviation
Digital Communication	4.52	0.68
Data Management	4.47	0.72
Cybersecurity Awareness	4.35	0.75
Software Proficiency	4.60	0.62
Information Retrieval	4.40	0.70

The examination indicates that educators in TVET give the greatest weight to software efficiency, which receives a score of 4.60. This elevated score demonstrates their agreement about how essential a tool of efficiency is in their work. The considerably low standard deviation of 0.62 indicates that there is a strong consensus among educators about the significance of this competency. The prominence of software skills shows their essential role in different areas of the educational process from the instructional delivery and the administrative side of the class to the assessment of students. Similarly, digital communication with a mean score of 4.52 has also been accepted as a very notable skill. This reflects that educators should be capable of communicating and collaborating on digital platforms successfully. The ability to control and present information utilizing online instruments reflects the modern teaching mode and the direct involvement of students through those tools. The standard deviation of 0.68 presents a systematic observation of the importance of this skill within the educator cohort. The skill of Data management is viewed to be the second most important one, receiving a mean of 4.47. It is essential for the effective handling, and analysis of data. Those who have that ability can track the students' progress, evaluate educational outcomes, and finally make informed data-driven decisions. The standard deviation of 0.72 indicates that it is the generally agreed that it is of significance; however, there are still a few opinions where they are broader than for others. The need for the educational experience, which is part of teaching cybersecurity, was only identified by a mean rating of 4.35. This refers to educators giving attention to data security as well as the need to protect sensitive data. The increasing reliance of educational institutions on digital tools leads to the situation where ensuring data security becomes the most crucial factor. Most educators recognize the importance of cybersecurity but the standard deviation of 0.75 shows that there is a slight variability in the perception of this skill. At the end of the line, information retrieval received a rating of 4.40 demonstrating the fact that to be effective, educators must locate and assess information correctly. Not only is this skill a way to access relevant educational sources, but it is also a tool for teaching processes of how to use the

extensive and intricate digital world. The standard deviation of 0.70 indicates a robust agreement on the essential nature of this skill. Overall, the quantitative research results highlight a strong acknowledgement of the necessity of digital literacy skills by TVET educators. These skills are considered as keys to successful teaching and learning in a world governed by technology. The high mean values across all aspects of digital literacy imply that educators see the development of these proficiencies as an integral part of their professional growth and educational tactics. The relatively low standard deviations show that all members actually have a common understanding of the skills improvement necessity to both educators and students in preparing for the digital challenges of today.

Table 2
Most 21st-Century Skills Core Value

Skill	Mean	Standard Deviation
Digital Literacy	4.60	0.62
Creativity	4.35	0.66
Technology Literacy	4.50	0.69
Critical Thinking	4.40	0.70
Problem Solving	4.45	0.68
Innovation	4.30	0.72
Collaboration	4.25	0.75
Communication	4.52	0.68
Information Literacy	4.40	0.70
Media Literacy	4.32	0.73

As evidenced by Table 2, digital literacy is regarded as the most vital skill, demonstrated by the highest average mean score of 4.60 and the notably low deviation of 0.62, showing the wide consensus on the important role of this skill in modern schooling. Digital literacy is composed of the major competencies that are software use, digital communication, and data management that can contribute to the improvement of teachers' efficiency and students' readiness to meet the demands of technology-driven jobs. In addition, technology literacy rates second in terms of significance complete with a mean score of 4.50 and a standard deviation of 0.69, which is indicative of the fact that the teachers should well avail of digital tools and platforms to make technology a part of their teaching processes. Furthermore, creativity is another skill that is highly sought after and is given a mean score of 4.35 with a standard deviation of 0.66, that is, it is necessary to assist students in developing the creative and problem-solving skills which are essential for success in a world where change happens at a fast pace. Additionally, problem-solving and critical thinking are also given a high rating with a mean of 4.45 and 4.40 respectively, which demonstrates how important the development of students' abilities to deal with complex problems is in terms of how they will ultimately do well in their jobs. The relatively high importance placed on communication skills (mean score of 4.52) indicates the necessity of effective interaction and collaboration in both professional and educational contexts. Collectively, the data suggest that technical and vocational education and training (TVET) educators have a consensus about the totality of the skills that the students must gain, as shown by the relatively small standard deviations, thus implying the same level of recognition of their importance in preparing students for the future. This indicates that educational institutions must put these competencies on the top of the priority list among the rest of the subjects in their programs

and the professional development of their teachers so that both the teachers and the students are well-prepared for the constantly changing demands of the modern workforce.

Qualitative Findings

The qualitative research part of the study included semi-structured interviews with a subsection of TVET educators to understand better their feelings and perceptions regarding digital literacy. The data was then thematically analyzed through coding and the recognition of important themes capturing the main ideas of the participants on digital literacy. It is evident from the following sections that the findings of these interviews, including a table which thoroughly investigates 20 important messages, sub-themes, and major themes, were decided upon.

Table 3
Points collected from interview and analyzed into sub-themes and themes

Points	Sub-Themes	Themes
Difficulty in accessing up-to-date digital tools	Access to Technology	Integration Challenges
Need for ongoing training to keep up with technology	Professional Development	Continuous Learning and Development
Positive impact of digital tools on student engagement	Teaching Effectiveness	Benefits of Digital Literacy
Challenges in implementing new technologies	Implementation Barriers	Integration Challenges
Enhanced teaching efficiency through digital resources	Teaching Efficiency	Benefits of Digital Literacy
Resistance to adopting digital tools among some educators	Change Resistance	Integration Challenges
Lack of institutional support for digital initiatives	Institutional Support	Implementation Barriers
The necessity for curriculum updates to incorporate digital skills	Curriculum Relevance	Curriculum Integration
The role of digital literacy in preparing students for future careers	Career Readiness	Benefits of Digital Literacy
Difficulties in balancing traditional teaching methods with new digital tools	Pedagogical Balance	Integration Challenges
Positive feedback from students on the use of digital tools	Student Engagement	Benefits of Digital Literacy
The need for more time allocated to learn and implement new digital tools	Time Management	Professional Development
Challenges in ensuring equal access to digital resources for all students	Equity in Access	Integration Challenges
Perceived increase in workload due to the integration of digital tools	Workload Management	Implementation Barriers
The importance of developing digital assessment methods	Digital Assessment	Curriculum Integration
The benefit of digital tools in facilitating remote and hybrid learning	Learning Flexibility	Benefits of Digital Literacy

The challenge of keeping up with the rapid pace of technological change	Technological Adaptation	Continuous Learning and Development
The necessity of fostering a culture of innovation within the institution	Institutional Culture	Implementation Barriers
The impact of digital literacy on enhancing students' critical thinking and problem-solving skills	Student Skills Development	Benefits of Digital Literacy
The need for collaboration between educators to share best practices in digital literacy	Collaborative Learning	Professional Development

Integration Challenges

A prevalent concern expressed by interviewees was the difficulty of seamlessly introducing digital literacy into existing teaching practices. Numerous educators stressed considerable hurdles in securing the latest digital tools. This constraint was often ascribed to the insufficiency of finances together with poor infrastructure within the institutions which made it impossible to keep up with the quickly changing technologies. As an educator once remarked, "Our devices are usually outmoded, which complicates digital instruction. We are eternally trying to catch up." Another barrier to implementation was failure to adopt the tools. Participants reported that even if the required equipment was available, its embedding in the syllabus proved to be a great obstacle due to the absence of reliable technical support and crystal clear guidelines. The fast pace of technological change made this problem worse, as educators struggled to keep up with new tools and platforms. One participant explained, "It's upsetting to have new technology released without adequate support or training, thus limiting the proper use of our new tools. Eventually, we get used to one tool, and just as we do that, we are bombarded with yet another one we have to learn." Also, reluctance to accept the change was reported as a major obstacle because a number of teachers did not want to take modern digital tools and suggested approaches into account. The roots of such resistance were generally seen in a preference for traditional learning methods, or a lack of self-confidence in using the new technologies. One teacher illustrated this with the words, "I'm more familiar with the techniques I have used for years. Familiarizing myself with new instruments comes across as an added burden instead of a plus." Furthermore, the lack of organizational support for implementing digital systems was mentioned as an important impediment. The educators were of the opinion that their institutions were not sufficiently supportive regarding digital integration and its effective handling. "It's tough to effect meaningful changes without a commitment from the very top, like the college board," a participant pointed out.

The significance of updating the curriculum by including the digital skills was the need of the hour. The instructors pointed out that the traditional syllabus hardly ever covered the required digital literacy, thereby hampering the incorporation of the skills in their teaching. "Digitality should be the core of our syllabus to remain competitive," said an educator. "Relevance is the keyword when it comes to teaching politicians." Recognizing a major challenge in adapting conventional methods of teaching technologies and the Internet was another issue that was found by the educators. They voiced their frustration in keeping a pedagogical equilibrium that would have seen them using the tools of the Internet without compromising traditional teaching techniques. "It's all about efficiency," another educator

explained. "We don't need to change everything, however, availing of the new technologies is imperative." Nonetheless, the assurance of equal opportunities for all students in the use of technology remained the foremost worry. The teachers pointed to the gaps between students and technology, which made it hard for the schools to provide equal learning opportunities. "Not all of our students have the same access to digital tools at home," one educator said. "We should identify ways to make it easier for all students to do this." The social pressures bearing down on educators due to the obligation of instruction via digital tools were also perceived to be a hindrance. New technology adoption was seen as a new layer of complexity to an already quite heavy load the educators were carrying which in turn added stress to their routine. "Another cool gadget means an uphill struggle, and more work," one pupil of the education program indicated. "It's really tough to have all the balls in the air at once."

Continuous Learning and Development

A major theme that was revealed is that further professional training is required to cope with technological developments. Educators continually mentioned the necessity of continuous learning and assistance in order to preserve and improve their digital skills. Many of them showed eagerness for more frequent and tailored professional development opportunities. Under the words of one educator, "We need more regular, relevant training to keep our skills up-to-date. It can't just be a one-time workshop." Participants highlighted the importance of the institutional system as the predictor of success in lifelong learning. Educators spoke about the role of administrations in provision of not only courses but also time and resources for the full application of these skills as key to successful integration. "It's not enough for me to just attend a training session," said one participant. "We need time to practice and integrate what we've learned into our teaching." The problem of maintaining the pace of technological transformation was another frequent topic. Educators articulated the need for continuous training complemented by ongoing technology updates and adoption. In the words of one educator, "The technology changes so fast that it's hard to keep up. Through continuing training we stay relevant ones." Another crucial point of professional development indicated was that more time must be set aside for the acquisition and application of pioneering digital gadgets. Educators pointed out that the time allocated for use of new technologies in teaching was inadequate. "We need more time to explore and understand new tools before we can use them effectively in our classrooms," one educator said. Teachers also underlined the need for the maintenance of an innovative atmosphere at the educational institution. They said that if a school supports risk-taking and the introduction of advanced technologies, it will be the right way to integrate new tools. "We need an expressive environment that supports innovations and permits an authentic trial of novel technologies," one member expressed their concern.

Benefits of Digital Literacy

In spite of the adversities, educators noticed a lot of e-learning literacy, specifically regarding the efficacy of teaching and student involvement. Many educators have remarked that digital tools have tremendously enhanced their teaching efficiency by allowing them to cut back on administrative work, access a variety of teaching resources, and bring in more interactive and interesting classes. "Digital tools have made my teaching more efficient," one head teacher said. "I can teach faster and adapt lessons to the needs of my students." The other main benefit that teachers stated was that digital tools had a significant effect on

students' engagement. Teachers claimed that digital tools were able to grasp students' attention while also making the class more interactive and fun. "My students are much more engaged when I use digital tools," said one teacher. "They love the interactive activities and multimedia materials." The instructors also delineated the role of the digital era on career readiness. They stressed that imparting practical knowledge of digital tools and the information age to the students is a prerequisite for being successful today. "Students should be able to use technology to be successful in today's job market," explained one participant. "We are doing our best to help our students grow by incorporating digital tools into our teaching."

The educators also mentioned the scope of digital tools in making remote and blended education possible. They observed that with the help of digital tools they were able to involve students in learning activities more conveniently, which was especially evident during the COVID-19 crisis. "Digital tools have been essential for providing flexible learning options during the pandemic," said an educator. "They've allowed us to continue teaching even when we can't be in the classroom." Another noteworthy benefit raised was the effect of digital literacy on sharpening students' intellectual and applied research skills. The educators remarked that digital devices gave students chances to participate in a variety of the more complicated and real-world-based learning activities. "Digital tools help students develop critical thinking and problem-solving skills," one member of faculty said. "They are instrumental in facilitating the creation of more engaging and challenging learning experiences." There are worries that we do not have enough digital testing tools. Digital tools offered instructors an opportunity to examine students' knowledge, skills, and creativity in more creative and efficient ways. "We need to develop digital assessment methods that reflect the skills students need in the digital age," one teacher said. "We are aware that conventional tests don't always indicate the skill level of pupils." Finally, the educators mentioned the necessity of close cooperation between teachers in the domain of digital literacy. They pointed out that sharing ideas and experiences with others in the same field was the most important way to make their own digital literacy competencies and instructional approaches better. "Collaboration with colleagues is crucial for developing our digital literacy skills," an academic said. "We exchange a lot of information with each other."

Themes Explained

The insightful analysis in this research reflects that the integration of digital literacy in TVET education is a complex issue influenced by a variety of factors. The theme of integration risks denotes the hardships that teachers face which are either structural or attitudinal in nature like lack of technological devices, reluctance to change, and the necessity of institutional support. The theme of continuous learning and/or development is an absolute must for ongoing professional development, and it necessitates learning institutions to adopt a culture they cannot resist. The educators pointed to the advantages of digital literacy to prepare a strong argument for the integration of such literacies into TVET education. More efficient teaching, greater involvement of students, and better preparation for later life are some benefits which can yield improved educational outcomes. The qualitative data speaks of the direct relationship between the willingness to change and the level of confidence the individual exhibits in using digital tools as well as the practical advantages secured by the tool in class. Summing up, the qualitative results offer a multifaceted perspective on the significance and difficulties of digital literacy on the part of TVET tutors. They stress the urgent

importance of full-scale strategies that cater for both the frequency and the content of the barriers to integration. Through these strategies, educational institutions can assist their educators in the development and use of digital literacy skills therefore enhancing teaching quality and preparing students for success in a digital world.

Discussions

This study provides a clear overview of the factors that are determined to recognize the need for digital competence among educators in the field of technical and vocational education and training (TVET) and at the same time, the constraints faced by them regarding the integration of knowledge into their pedagogy. This section reviews the numerical and descriptive results of the study, presenting the recommendations for the policy, practice, and future investigation with the consideration of the implications. Besides, it indicates the convergence of these outcomes with the existing literature, showing also the global aspect of digital literacy in education.

Integration Challenges and the Need for Institutional Support

From the qualitative data collected, it was apparent that the challenge of integrating digital literacy in TVET education is one of the most vital themes emerging, a finding consistent with previous studies. When asked about the difficulty of accessing current digital tools, educators frequently cited funding limits and inadequate infrastructure as major impediments. This finding is corroborated by the literature stating that resource constraints impact technology's effective adoption in education (European Commission, 2023). Institutional support became a significant factor in tackling these problems. Educators reported that without the right support in funding, technical help, and clear directions, digital tools could not be effectively integrated into the classroom. This brings to light the need for educational institutions to make digital literacy a priority by providing the resources and infrastructure to support its integration. In support of this idea, the literature also emphasizes the role of institutional leadership and support in creating a digital innovation culture (Tiandong et al., 2022). Many teachers do not want to change. They like traditional teaching methods. They do not trust new technology. There is a need for good training. This should teach the skills and change the minds of teachers. Just like (Rajarshi Roy & Arun Kumar, 2023) emphasize that changing educators' beliefs about the technology is as important as the technical training of them, institutions can create a more supportive environment by first of all promoting the culture that allows for innovative teaching practices that involve testing and experimenting.

Professional Development and Continuous Learning

The theme of continuous learning and development shows that teachers need to keep learning. This keeps their skills up to date. Each qualitative finding points out the need for frequent, relevant training in digital literacy. Teachers must update their skills because technology changes so fast. Continuous professional development helps teachers learn digital skills (Hadi et al., 2022). Good learning happens regularly, in context, with hands-on practice. TVET teachers need more time to learn new teaching technologies. They need time and resources to use new skills in class. Continuous learning helps teachers perform better. Having enough time allows them to practice using technology. Programs need to be ongoing for teachers to be useful.

Benefits of Digital Literacy in TVET Education

Even though there were difficulties, digital literacy is helpful for teachers and students. TVET teachers find software skills, online communication, and data handling as the most important digital skills. This supports earlier studies about digital literacy being essential today (Nasreen et al., 2022; UNESCO, 2022). The qualitative results also offer further comprehension of the fact that digital literacy practices the educators and students use are successful practices. Educators stated that they save time due to digital education tools, thus ranging from the one-hour examination of the task at hand to the full presentation during the class. This is in line with the existing literature that notes that digital tools can significantly improve the ability to teach and the students' learning experience (Farhan Mohammed & Waleed Salim, 2023). Furthermore, a highly significant factor for which educators noted the beneficial digital tools made students are the students' engagement. They gave the example of digital tools that seized students' minds and made learning enjoyable, lively, and participative. This is also proven by alumna research, which manifests that digital tools can foster student commitment and participation through offering more interactive and personalized learning experiences (Alfonso Renato et al., 2023; Girdzijauskienė et al., 2022). The role of digital literacy in the career future readiness of students was also pointed out as an important contribution by the educators. They asserted that teaching students how to use digital tools and navigate digital environments is the key to success in the contemporary labor world. This finding prevails in the research of digital literacy which is of paramount importance in workforce readiness, as cited in the numerous reports that are the result of research studies or governmental policies (Nasreen et al., 2022; UNESCO, 2022).

Equity and Access to Digital Resources

The issue of equity and access to digital resources is a concern that educators have deemed to be significant. They remembered how students with some technology, as opposed to others, faced problems in receiving the education they should. This affirmation emphasizes the immediate need to fill the gap in the digital world, which is an obstacle for effective teaching of digital literacy in schools (European Commission, 2023; UNESCO, 2022). The literature has pointed out the determination of the policies and initiatives to ensure that the students have access to the digital resources that they need free of charge, regardless of what socio-economic background they come from. For example, it is necessary to provide students with an adequate number of the necessary technologies in schools to help them learn well through the internet (Thomas & Sun, 2022). Guaranteeing that every student has the same opportunities for learning as any other student at school can lead to more inclusive education as well as development of the skills of communication and the internet which will give all the students the chance to be successful in the future.

Implications for Curriculum Integration

Curriculums must include digital skills for students. Teachers say they can't teach these skills. They need to be useful for jobs. Digital skills matter in all subjects (Achkasova, 2022; UNESCO, 2022). We should teach them as part of every subject. This way, students see how important they are (Nieves et al., 2022). We also talked about digital testing methods. Teachers think these tests show what students really know and can do. Digital tests are getting more popular in schools. They work better for learning in our digital world (Xhelal et al., 2023).

Future Research Directions

Future studies should examine the barriers to digital literacy in education. Knowing these challenges will help develop targeted solutions for teachers. More research is needed on how digital literacy affects student learning outcomes. The benefits of digital literacy have been reported but not measured. This study draws attention to this gap. Research on the effectiveness of teacher training programs in digital literacy is important. Such training should focus on practical skills and integration into classroom practice. Studies should explore the link between digital literacy, job readiness, and economic growth. Knowing how digital skills impact job success and the economy can guide education policy.

Conclusion

As a closing argument, the investigation has been in favor of digital literacy's vital function for TVET educators in Malaysia, giving emphasis to it in both teaching effectiveness and future increased student preparedness for employment. The survey results have the main credit for showing a clear understanding of all the mechanisms necessary to produce the most beneficial educational products. Teachers have pinpointed the need for students to acquire skills like software proficiency, data management, and digital communication that are of critical importance to the modern teaching process. One of the reasons why this research was carried out is the rapid pace at which technology has been growing and educators have had to adapt to this quickly or be left behind. The research adds value by giving a detailed overview of the challenges and opportunities of digitizing education among TVET educators, as well as marking the ways that the educational institutions should support it through the implementation of training, and resource allocation plans. These are the foundation for future educational and policy systems that prominently include digital literacy hence the fact that both instructors and students are skilled and prepared for the demands of a technology-driven workforce. The leading result of this study is that continuing professional development and stronger institutional frameworks, in addition to overcoming barriers, are the most important. Because of this, it is necessary for educational institutions to keep up with technological changes and offer teachers the necessary tools and resources for them to move to digital learning. Digital literacy is not just an engineering skill but also a key to new teaching methods and better student involvement, so it is in line with the broader goal of preparing students for the 21st-century workforce and the complexities it entails.

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