https://doi.org/10.37420/j.cer.2024.072

The Status Quo and Development Recommendations of Teachers' Digital Literacy in Secondary Vocational Schools —An Empirical Study Based on Ten Secondary Vocational Schools in Zhanjiang City

Jing Li[1*], Jinhao Huang[2], Qiongfang Luo[3]

1 Zhanjiang Department, Guangdong Open University, Zhanjiang, Guangdong, China

2 Zhanjiang Municipal Education Bureau, Zhanjiang, Guangdong, China

3 Guangdong agricultural,industrial and Commercial Vocational and technical school, Zhanjiang, Guangdong, China

***Corresponding author, E-mail: 13922089542@139.com**

Abstract:

Research into Teachers' Digital Literacy is a focal point of academic inquiry during the phase of national digital transformation and remains at the forefront of global educational development in the digital era. This paper is grounded in the 'The Scale for Teachers' Digital Literacy in Vocational Schools' and utilizes a questionnaire survey methodology to gather 283 valid responses from teachers across ten secondary vocational schools in Zhanjiang City for empirical analysis. This paper concentrates on precisely delineating the macroscopic profile and the microscopic nuances across various dimensions of teachers' digital literacy in the secondary vocational schools. It seeks to identify existing issues and challenges associated with teachers' digital literacy, offering a methodology that combines quantitative research findings with philosophical discourse to enhance the digital literacy of secondary vocational educators and elevate the standards of digital education in these schools.

Keywords:

Teachers' Digital Literacy, The Scale, Empirical Study, Digital Technologies, Teaching Methods, Future Education

1. Introduction

In the era of digital transformation, the integration of digital technologies into educational practices has become imperative, particularly within the context of secondary vocational schools. These institutions play a pivotal role in preparing students for the future workforce, where digital literacy is a key competency. As such, the cultivation of teachers' digital literacy is not only a reflection of the nation's digital intelligence

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

transformation but also a critical aspect of global educational advancement. This study aims to address the gap in understanding the digital literacy landscape among secondary vocational teachers, with a focus on the empirical analysis of teachers in Zhanjiang City.

The importance of this study is underscored by the need to align teacher competencies with the evolving demands of digital integration in educational settings. While digital literacy has been recognized as a critical skill set for educators, there is a paucity of research that specifically targets secondary vocational teachers. This study seeks to contribute to the existing body of knowledge by providing a comprehensive assessment of the current state of digital literacy among this cohort.

Our research approach is grounded in a mixed-methods design, employing both quantitative and qualitative analyses. We utilize a questionnaire survey, based on 'The Scale for Teachers' Digital Literacy in Secondary Vocational Schools', to collect data from 283 teachers across ten secondary vocational schools in Zhanjiang City. This scale was selected for its comprehensive coverage of the multidimensional aspects of digital literacy, including digital concepts and awareness, digital technology knowledge and skills, digital application and evaluation, digital security and responsibility, and digital professional development.

The introduction is organized as a funnel, beginning with the broader context of national digital transformation and the significance of digital literacy in education. It narrows down to the specific research questions that guide our investigation: What are the current levels of digital literacy among secondary vocational teachers? How do various factors such as gender, educational background, professional title, and years of teaching experience influence these levels? By addressing these questions, we aim to provide targeted recommendations for enhancing teachers' digital literacy, which in turn will contribute to the overall quality of digital education in secondary vocational schools.

This study is expected to generate findings that will not only inform educational policymakers and practitioners but also stimulate further research into the intersection of teacher development and digital technology integration in vocational education. The introduction concludes with a specific statement of our research approach, highlighting the significance of our empirical investigation and its potential to inform future educational strategies and practices.

2. Materials and Methods

2.1. Research Participants

The study sample was drawn from ten secondary vocational schools in Zhanjiang City, Guangdong Province. Utilizing an online survey method, data from 298 respondents were collected across the ten schools during July to August 2024, with 283 valid questionnaires obtained, yielding a response rate of 94.97%. The sample was relatively well-distributed across gender, educational background, professional title, and years of teaching experience, exhibiting good representativeness. For specific details, see Table 1.

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

Table 1. Demographic characteristics of subjects(N=283)

	N	%
Gender		
Male	128	45.23
Female	155	54.77
Educational Background		
Associate Degree	31	10.95
Bachelor's Degree	223	78.80
Postgraduate Degree (which includes Master's Degree and above)	29	10.25
Academic Rank		
Teaching Assistant	126	44.52
Lecturer	104	36.75
Associate Professor	53	18.73
Full Professor	0	0.00
Years of teaching		
1-9	100	35.34
10-19	108	38.16
20-29	52	18.37
30>	23	8.13

2.2. Methodology

Building upon a comprehensive literature review and systematic synthesis, the research team determined that the scale developed by scholars Wang Xiaojun and Zhao Wenping [9] is most suitable for this study. Since the research subject is teachers from secondary vocational schools, the content of the scale was integrated and modified. The number of items was reduced from 33 to 26, and some questions were rephrased to construct 'The Scale for Teachers' Digital Literacy in Secondary Vocational Schools'. A pilot study was initially conducted on a small scale in two schools. Experts and scholars reviewed and revised the scale based on the pilot results. After four rounds of refinement, the scale was applied to a larger online survey across ten secondary vocational schools. This study primarily utilized SPSS 27 for statistical analysis and processing. It began with validating the internal reliability of the scale's items and dimensions, followed by a descriptive analysis of the mean scores of teachers' digital literacy and each dimension. Using gender, educational background, professional title, and years of teaching experience as independent variables, the study analyzed the differences in digital literacy and the mean scores of each dimension among various groups of respondents.

2.3. Research Tools

To assess the basic situation of digital literacy among secondary vocational teachers, this study developed a survey questionnaire based on the research of Wang Xiaojun, Du Yanyan [10]. The questionnaire is divided into two parts: first, basic information of the respondents, including gender, educational background, professional title, and years of teaching experience; second, 'The Scale for Teachers' Digital Literacy in Secondary Vocational Schools', which consists of 5 dimensions and a total of 26 questions. A Likert five-point scale is used for scoring, with higher scores indicating a stronger match between the item and the respondent, i.e.,

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

'Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree' corresponding to scores of 1-5, respectively.

Based on the connotative meaning of teachers' digital literacy, this study uses five dimensions: Digital Concept and Awareness, Digital Technology Knowledge and Skills, Digital Application and Evaluation, Digital Security and Responsibility, Digital Professional Development, to cover the basic situation of teachers' digital literacy in secondary vocational schools. The results of the reliability of the scale are shown in the Table 3. The Cronbach's alpha values for each of the survey dimensions indicate the reliability of the measurement scale used. The overall Cronbach's alpha value for the scale is 0.929 (N=283), and the Cronbach's alpha values for the five dimensions are 0.910, 0.949, 0.961, 0.862, and 0.925 respectively (N=283), each of them obtained a Cronbach's alpha value >0.8, indicating that this measurement scale has good reliability and a high level of internal consistency. For a detailed description of the scale items, see Table 2.

Table 2. Questions of the scale

Dimension	Question
Digital Concept and Awareness	1.I am aware of the application and impact of current digital technology in vocational education.
	2.I believe that utilizing digital tools can effectively enhance students' motivation and engagement in learning.
	3.I think the application of digital technology in vocational education can improve teaching efficiency.
	4.I am willing to actively learn new digital technologies to enrich my teaching methods.
	5.I am willing to encourage and guide students to use digital technology to promote their learning.
Digital Technology Knowledge and Skills	6. I am familiar with the characteristics of common digital technologies such as multimedia and the internet, as well as methods for solving problems.
	7. I can select appropriate digital resources based on student needs and course requirements.
	8. I regularly review and adjust the use of digital resources to ensure the effectiveness of teaching.
	9. I am proficient in operating digital devices, software, or platforms, and can solve common problems.
	10. I can effectively use digital technology to design course content and learning activities.
	11. I can filter and integrate digital resources according to teaching needs.
Digital Application and Evaluation	12. I can use digital tools to analyze students' learning situations.
	13. I can adjust my teaching methods based on feedback provided by students through digital platforms.
	14. I focus on cultivating and improving student' digital literacy in teaching.
	15. I can guide students to use digital tools to complete practical projects to enhance their professional skills.
	16. I can effectively use digital tools to assess students' understanding of course content.
	17. I can effectively evaluate whether the digital teaching tools used have improved the quality of teaching.
	18. I encourage students to participate in online skill competitions and evaluate their practical skills accordingly.

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

Digital Security and Responsibility	19. I can manage and protect student and personal information data.
	20. I can identify and guard against online risky behaviors.
	21. I always comply with relevant laws and regulations when using and sharing digital resources.
	22. I adhere to the order of online communication and use the internet to spread positive energy.
Digital Professional Development	23. I actively seek professional development opportunities, such as online seminars, to enhance my digital technology capabilities.
	24. I regularly reflect on my teaching practices and adjust the use of digital technology resources based on this reflection.
	25. I actively conduct research projects to explore the application of digital technology in vocational education.
	26. I actively use digital technology resources to innovate traditional teaching models.

Table 3. Reliability of the scale

Dimension	Cronbach's alpha
Digital Concept and Awareness	0.910
Digital Technology Knowledge and Skills	0.949
Digital Application and Evaluation	0.961
Digital Security and Responsibility	0.862
Digital Professional Development	0.925
Overall	0.929

3.Results and Discussion

This study, with 283 valid samples as the subject of analysis, delved into the basic situation of digital literacy among secondary vocational school teachers, assessing the team building from both an overall perspective and individual dimensions. Additionally, taking into account potential influencing factors such as gender, educational background, professional title, and years of teaching experience, the study further conducted comparative analyses to identify differences under specific conditions across various independent variables.

3.1. The Overall Status and Dimensional Performance of Teachers' Digital Literacy in Secondary Vocational Schools

Upon examining the overall sample data, the mean score (M) for digital literacy among the 283 surveyed teachers is 4.17 with a standard deviation (SD) of 0.54. There are 111 respondents, accounting for 39.22%, scoring above the mean, while 172 respondents, accounting for 60.78%, scored below the mean, indicating a relatively lower proportion of teachers with above-average digital literacy. The overall digital literacy and the mean scores (M) along with the standard deviations (SD) for each dimension, as well as the number (N1) and percentage of respondents scoring above the mean, and the number (N2) and percentage scoring below, are presented in Table 3. Analysis of the table reveals that teachers performed best in the dimensions of Digital Security and Responsibility and Digital Concept and Awareness, with mean scores of 4.29 and 4.28, respectively. The lowest scoring dimension is Digital Application and Evaluation, with a mean of 4.06, and a

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

notably smaller number of respondents (102) scoring above the mean compared to those (181) scoring below, with the latter being 1.77 times the number of the former. For detailed information, please refer to Table 4.

These findings suggest that while secondary vocational teachers exhibit good digital literacy in the areas of digital security, responsibility, and awareness, there is a significant deficiency in the application of digital technology in teaching and evaluation. This reflects a lack of familiarity with digital tools, insufficient training, and a lack of confidence in the effectiveness of digital teaching methods among teachers. It is commendable that the high mean score in the area of digital security and responsibility indicates a strong emphasis on data protection and online ethics among secondary vocational teachers. Overall, the level of digital literacy among secondary vocational teachers requires further enhancement, particularly in the application and evaluation of digitalization. It necessitates a joint effort from educational administrative departments, schools, and teachers themselves to provide professional training, optimize educational resources, and increase practical opportunities to foster the comprehensive development of teachers' digital literacy.

Table 4. Descriptive Statistics of Teachers' Digital Literacy（N=283）

Dimension	M±SD	N1（%）	N2（%）
Digital Concept and Awareness	4.28±0.60	122（43.11%）	161（56.89%）
Digital Technology Knowledge and Skills	4.07±0.64	98（34.63%）	185（65.37%）
Digital Application and Evaluation	4.06±0.67	102（36.04%）	181（63.96%）
Digital Security and Responsibility	4.29±0.54	113（39.93%）	170（60.07%）
Digital Professional Development	4.16±0.61	104（36.75%）	179（63.25%）
Overall	4.17±0.54	111（39.22%）	172（60.78%）

N1:The number of individuals above the mean score.

N2:The number of individuals below the mean score.

3.2. Mean Scores and Performance of the Top and Bottom Three Items in the Scale

To ascertain the strongest and weakest areas of teachers' digital literacy, SPSS 27 was utilized to calculate the mean scores and variances for all items on the scale, and to identify the top three and bottom three items based on their mean values, as presented in Table 5.

The data presented in Table 5 indicate that within the digital literacy scale, the item 'I adhere to the order of online communication and use the internet to spread positive energy' ranks first with a mean score of 4.44, demonstrating the high regard and self-expectation teachers have for online ethics and positive communication. Following closely are the items 'I always comply with relevant laws and regulations when using and sharing digital resources' and 'I am willing to actively learn new digital technologies to enrich my teaching methods', with mean scores of 4.40 and 4.37 respectively, reflecting teachers' adherence to legal norms and their proactive attitude towards professional development and the learning of new technologies.

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

The item 'I can use digital tools to analyze students' learning situations' has the lowest mean score of 4.00, ranking last. 'I can skillfully operate digital devices, software, or platforms, and solve common problems' and 'I can effectively evaluate whether the digital teaching tools used have improved the quality of teaching' both have mean scores of 4.02, ranking second and third from the bottom. These lower scores for these items point to deficiencies in teachers' use of digital tools for teaching analysis, equipment operation, and assessment of teaching effectiveness.

The results suggest that in enhancing the digital literacy of secondary vocational teachers, particular attention should be given to training and support in the application of digital tools and the assessment of teaching effectiveness. At the same time, the positive attitudes of teachers in online ethics and continuous learning should be acknowledged and encouraged. Through targeted intervention measures, further improving teachers' digital literacy will promote innovation in teaching methods and the enhancement of educational quality.

Table 5. The top three and bottom three items ranked by mean score and their respective values

Ranking	Items	M±SD
Top 1	22. I adhere to the order of online communication and use the internet to spread positive energy.	4.44±0.56
Top 2	21. I always comply with relevant laws and regulations when using and sharing digital resources.	4.40±0.58
Top 3	4.I am willing to actively learn new digital technologies to enrich my teaching methods.	4.37±0.67
Bottom 1	12. I can use digital tools to analyze students' learning situations.	4.00±0.76
Bottom 2	9. I am proficient in operating digital devices, software, or platforms, and can solve common problems.	4.02±0.76
Bottom 3	17. I can effectively evaluate whether the digital teaching tools used have improved the quality of teaching.	4.02±0.75

3.3. Heterogeneity Analysis

This study sequentially employs gender, educational background, professional title, and years of teaching experience as independent variables, with the performance of various dimensions of teachers' digital literacy as the dependent variables, applying the one-way ANOVA method for differential analysis. The distribution of the data is presented in Table 6.

Table 6. Mean Scores and ANOVA Test of the Teachers' Digital Literacy in Secondary Vocational Schools with Related Influencing Factors (N=283)

Variable	Group	D1	D2	D3	D4	D5	Overall
Gender	Male	4.32±0.61	4.20±0.62	4.17±0.64	4.33±0.55	4.23±0.59	4.25±0.54
	Female	4.25±0.60	3.97±0.65	3.98±0.68	4.25±0.53	4.11±0.62	4.11±0.53
	F	1.01	9.43**	6.11*	1.51	3.04	4.83*

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

Educational Background	Associate Degree	4.30±0.53	4.21±0.58	4.23±0.55	4.27±0.48	4.19±0.61	4.24±0.52
	Bachelor's Degree	4.26±0.62	4.06±0.67	4.06±0.68	4.29±0.55	4.16±0.61	4.17±0.55
	Postgraduate Degree	4.37±0.58	4.01±0.53	3.93±0.61	4.30±0.51	4.20±0.56	4.16±0.46
	F	0.38	0.85	1.56	0.02	0.09	0.25
Academic Rank	Teaching Assistant	4.37±0.51	4.22±0.58	4.19±0.62	4.38±0.53	4.22±0.59	4.27±0.51
	Lecturer	4.26±0.63	4.02±0.67	4.01±0.69	4.23±0.54	4.13±0.61	4.13±0.54
	Associate Professor	4.11±0.71	3.84±0.67	3.87±0.68	4.20±0.55	4.08±0.66	4.03±0.56
	Full Professor	0.00	0.00	0.00	0.00	0.00	0.00
	F	3.59*	7.27**	4.82**	3.12*	1.17	4.74**
Years of teaching	1-9	4.4±0.60	4.26±0.56	4.23±0.60	4.43±0.54	4.27±0.59	4.32±0.52
	10-19	4.16±0.61	3.97±0.66	3.97±0.66	4.19±0.51	4.09±0.56	4.08±0.52
	20-29	4.26±0.59	4.02±0.64	4.03±0.67	4.24±0.52	4.12±0.63	4.14±0.54
	30>	4.31±0.49	3.85±0.77	3.86±0.79	4.25±0.63	4.11±0.79	4.08±0.62
	F	2.93*	5.03**	3.82*	3.80*	1.70	4.10**

Note□* means P<0.05□** means P<0.01.

3.3.1 Differences in Digital Literacy among Teachers of Different Genders

Among the 283 surveyed teachers, there were 128 males (45.23%) and 155 females (54.77%). Using gender as the independent variable and the mean scores of digital literacy and its dimensions as the dependent variables, one-way ANOVA analysis revealed significant differences in overall digital literacy scores between male and female teachers, with mean scores of 4.25 and 4.11, respectively. Overall, male teachers demonstrated significantly higher digital literacy scores than females. In all five dimensions, male teachers scored higher than their female counterparts, with particularly pronounced effects in the second dimension (Digital Technology Knowledge and Skills) and significant effects in the third dimension (Digital Application and Evaluation).

The study's findings indicate that gender significantly influences teachers' digital literacy. Male teachers, with a mean score of 4.25, significantly outperformed female teachers, who had a mean score of 4.11, suggesting that males have an advantage in the application and understanding of digital technology. In the analysis of the five dimensions, the effect of gender was extremely pronounced in the second dimension (Digital Technology Knowledge and Skills) and significant in the third dimension (Digital Application and Evaluation), which correlates with the proficiency of male teachers in mastering digital tools and evaluating teaching. Although male teachers also generally scored higher than females in other dimensions, these differences did not reach statistical significance. The primary insight provided by the study is that when formulating teacher training and development plans, attention must be paid to gender differences, especially in

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

providing more support for female teachers to enhance their confidence and capabilities in the field of digital technology. Additionally, education policymakers and school administrators should encourage all teachers to participate in digital teaching practices to promote professional growth and gender equality among teachers. Further research should explore the underlying causes of gender differences and take corresponding measures to ensure that teachers can fully utilize digital technology to improve teaching effectiveness.

3.3.2 Differences in Digital Literacy among Teachers with Different Educational Backgrounds

This study categorized the educational background into three groups. Among the 283 surveyed teachers, the number and proportion of teachers with associate, bachelor's, and master's or higher degrees were 31 (10.95%), 223 (78.80%), and 29 (10.25%), respectively. Using educational background as the independent variable and digital literacy along with its dimensions and overall score as the dependent variables, one-way ANOVA analysis indicated that, unlike the case with age as the independent variable, the impact of educational background on teachers' digital literacy was not significant. Teachers with different educational backgrounds showed some differences in the mean scores of various dimensions of digital literacy. Specifically, teachers with master's degrees or higher scored the highest on the first dimension (Digital Concept and Awareness) with a mean of 4.37 and also had higher means on the fourth (Digital Security and Responsibility) and fifth dimensions (Digital Professional Development) compared to the other two groups. However, they scored the lowest on the second (Digital Technology Knowledge and Skills) and third dimensions (Digital Application and Evaluation) with means of 4.01 and 3.93, respectively. Teachers with associate and bachelor's degrees had relatively balanced scores across all dimensions.

Despite some differences in mean scores among teachers of different educational levels on certain dimensions, statistical analysis results showed that these differences were not statistically significant. This implies that, at least within the sample of this study, educational background is not a key factor affecting the digital literacy of secondary vocational teachers. Therefore, the level of digital literacy is related to factors such as in-service training, personal learning habits, and teaching needs, which play a more significant role among teachers of different educational backgrounds. In summary, the results of this study show that the impact of educational background on the digital literacy of secondary vocational teachers is limited. Consequently, when designing professional development plans for teachers, more attention should be paid to the actual teaching needs and personal development aspirations of teachers, rather than just their educational background.

3.3.3 Differences in Digital Literacy among Teachers with Different Professional Titles

Among the 283 surveyed teachers, classified by professional title, there were 126 teachers (44.52%) with the rank ofTeaching Assistant, 104 (36.75%) with an intermediate title, 53 (18.73%) with a deputy senior title, and 0 (0.00%) with a senior title. Looking at the mean scores, teachers with the rank of Teaching Assistant achieved the highest scores in overall digital literacy and across all dimensions, with a range of 4.19 to 4.38. In contrast, teachers with deputy senior titles scored the lowest across all dimensions, with a range of 3.84 to 4.20. ANOVA one-way analysis of variance revealed that the professional title has a highly significant effect on overall digital literacy, the second dimension (Digital Technology Knowledge and Skills), and the third

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

dimension (Digital Application and Evaluation) ($P<0.01$), a significant effect on the first dimension (Digital Concept and Awareness) and the fourth dimension (Digital Security and Responsibility) ($P<0.05$), and no significant effect on the fifth dimension (Digital Professional Development).

The analysis indicates that there are significant differences in digital literacy across various dimensions among teachers of different professional ranks. Teachers with the rank of Teaching Assistant scored the highest in overall digital literacy and all dimensions, likely due to their younger age structure and more frequent engagement with technology as digital natives, which makes them more accustomed to using digital tools for teaching and learning, thus providing an advantage for professional development in a digital teaching environment. In contrast, teachers with deputy senior titles scored the lowest across all dimensions, suggesting that as teachers' ranks increase, their involvement in the application and updating of digital technology may decline, or they may require more support and training to enhance their digital literacy in the face of a rapidly changing digital environment. In summary, for educational decision-making, the cultivation of digital literacy among secondary vocational teachers should be approached from the following three aspects: First, provide more opportunities for teachers with the rank of Teaching Assistant to share their digital skills and innovative teaching methods; second, design specific plans to improve digital literacy for teachers with deputy senior titles to reduce the gap with other ranks; third, include the assessment of digital literacy in the professional title evaluation criteria to encourage all teachers to continue learning and adapting to digital teaching.

3.3.4 Differences in Digital Literacy among Teachers with Different Teaching Experiences

Teachers were categorized based on their years of engagement in vocational education (teaching experience), with the distribution of participants ranging from most to least as follows: 10-19 years (108 individuals, 38.16%), 10 years or less (100 individuals, 35.34%), 20-29 years (52 individuals, 18.37%), and 30 years or more (23 individuals, 8.13%). Statistical analysis revealed that teachers with 10 years or less of experience scored the highest in overall digital literacy and across all dimensions. In contrast, teachers with 10-19 years and over 30 years of experience had relatively lower scores, especially those with more than 30 years of experience who scored the lowest on the second dimension (Digital Technology Knowledge and Skills), with a mean of 3.85. One-way ANOVA tests indicated highly significant differences in the overall digital literacy and the second dimension among teachers of different teaching experience groups. Significant differences were also observed in the first, third, and fourth dimensions, while no significant differences were found in the fifth dimension.

The data suggest that younger teachers' rapid adaptation to new technologies and commitment to continuous learning contribute to their higher scores in overall digital literacy and all dimensions. Conversely, teachers with 10-19 years and over 30 years of experience tend to score lower on most dimensions, reflecting a weaker ability to adapt to new digital technologies and a less proactive attitude towards continuous learning as teaching experience increases. Therefore, teachers with longer teaching experience require additional support to enhance their digital literacy, particularly in the area of digital technology knowledge and skills. Educational authorities should consider providing these teachers with regular technology training and professional development opportunities to help them meet the demands of digital teaching. Encouraging young teachers to share their digital skills and innovative teaching methods will also promote cross-generational educational exchange and knowledge sharing. When formulating teacher development policies, educational de-

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

cision-makers should take teaching experience into account and provide differentiated digital literacy training programs for teachers of different age groups. Establishing a continuous digital literacy training mechanism will foster teachers' professional growth and improve the quality of education.

4.Conclusions

The present study, conducted across ten secondary vocational schools in Zhanjiang City, has yielded significant insights into the digital literacy landscape of teachers within this educational context. Our findings underscore the importance of digital literacy as a critical competency for teachers in the digital age, with implications for both teaching practices and professional development.

The main conclusions of this work are as follows: firstly, the status quo of Teachers' Digital Literacy. The study revealed a general need for enhancement in teachers' digital literacy across various dimensions. While teachers demonstrated a strong awareness of digital concepts and a commitment to digital security and responsibility, there were notable deficiencies in the application and evaluation of digital technologies in teaching practices. Secondly, gender differences: Male teachers exhibited higher levels of digital literacy compared to their female counterparts, particularly in the areas of digital technology knowledge and skills, and digital application and evaluation. This suggests that targeted interventions may be necessary to support female teachers in enhancing their digital capabilities. Thirdly, impact of educational background: Contrary to expectations, the educational background of teachers did not significantly influence their digital literacy levels. This finding indicates that other factors, such as professional training and personal engagement with digital tools, may play a more substantial role in shaping digital literacy. Fourthly, professional title and teaching experience: Teachers with higher academic ranks and longer teaching experience did not necessarily demonstrate higher digital literacy. In fact, teachers with less than 10 years of experience showed higher digital literacy scores, suggesting that recent exposure to digital technologies and continuous learning may be more influential than accumulated experience. Last but not least, policy recommendations: The study highlights the need for tailored professional development programs that address the specific digital literacy needs of teachers. It also calls for the integration of digital literacy into the evaluation criteria for professional titles to incentivize ongoing learning and skill enhancement.

The relevance of these conclusions lies in their potential to inform educational policy and practice. By identifying areas for improvement and suggesting targeted strategies, the study contributes to the broader goal of preparing teachers to effectively integrate digital technologies into their teaching. This is particularly pertinent in the context of vocational education, where the application of digital skills is critical for equipping students with the competencies required for the modern workforce. In conclusion, while the study has provided a comprehensive assessment of teachers' digital literacy, it also reveals areas that require further attention and support. The findings serve as a call to action for educational stakeholders to prioritize the development of digital literacy among teachers, ensuring that they are well-equipped to navigate the digital landscape of the 21st-century classroom.

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

Author Contributions

Conceptualization: Li Jing; Methodology: Li jing; Software: Li jing; Validation: Li jing; Formal analysis: Li jing; Investigation: Li jing and Luo Qiongfang; Resources: Li Jing; Data Curation: Li Jing and Huang Jinhao; Writing – original draft preparation: Li Jing; Writing – review and editing: Li Jing; Visualization: Li Jing; Supervision: Li Jing; Project administration: Li Jing; Funding acquisition: Li Jing

Funding

This work was supported by the Zhanjiang Municipal Education Bureau, as part of the key project for the 2023 Zhanjiang Primary and Secondary School Education Science Planning, titled 'An Empirical Study on the Digital Literacy of Secondary Vocational Teachers from the Perspective of Chinese-Style Modernization: A Case Study of Zhanjiang City,' with the grant number 2023ZJZD019.

Acknowledgments

The authors gratefully acknowledge the financial support from the Zhanjiang Municipal Education Bureau for this research. We extend our thanks to the participating schools and teachers for their valuable contributions to the study. Appreciation is also due to the research assistants and colleagues who provided assistance during the data collection and analysis phases.

References

[1]Gilster P. Digital Literacy. New York: Wiley Computer Publications, 1997: 1-2.0-471-14603-4.

[2]Education and Teaching Foundation (ETF). Digital Teaching Professional Framework. https://www.et-foundation.co.uk/wp-content/uploads/2023/06/ETF-DTPF-Full.pdf(2024-09-01).

[3]Song Jia, Wang Rui. The Ten Major Trends of Global Basic Education Reform. China Basic Education, 2024, (01): 65-69.

[4]Ministry of Education. Notice on the Release of the 'Teacher Digital Literacy' Education Industry Standard. https://www.gov.cn/zhengce/zhengceku/2023-02/21/content_5742422.htm(2023-10-25]).

[5]Wang Yongzhao, Cheng Yang, Li Lijun. The Rich Connotation, Practical Dilemmas, and Practical Approaches of Vocational College Teachers' Digital Literacy in the Digital Intelligence Era. Education and Profession, 2023 (9): 87-90.

[6]Yi Ye, Xue Feng. Research on the Improvement of Digital Literacy of Teachers in Higher Vocational Colleges under the Background of "Digital Economy" — An Empirical Analysis Based on 335 Full-time Teachers in Zhejiang Province. Chinese Vocational and Technical Education, 2022 (5): 55-61.

[7]Gong Huafeng, Wu Xueping. An Analysis of the Enhancement of Digital Literacy of Vocational Education Teachers in the UK. Vocational and Technical Education, 2023, 44(19): 72-79.

[8]Li Xiaojuan, Wang Yi. Technology Empowerment: The Essence, Challenges, and Improvement of Digital Literacy of Teachers in Vocational Colleges. Chinese Vocational and Technical Education, 2021 (23): 31-37+45.

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)

[9]Wang Xiaojun, Zhao Wenping. Digital Literacy Structural Dimensions and Scales Development of Vocational College Teachers under the Background of Digital Transformation. Chinese Vocational and Technical Education,2024,(17):34-45.
[10]Du Yanyan, Huang Qingshuang. How to Improve the Digital Literacy of Primary and Secondary School Teachers: An Empirical Study Based on Survey Data from Province X and Province Y. Educational Research and Experimentation.2021,(04):62-69.

© 2024 by the author(s); licensee Mason Publish Group, this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (http://creativecommons.org/licenses/by/4.0/)