A Survey on the Current Situation of Digital Literacy of Secondary School Teachers in Ethnic Areas and Strategies for Improving It

--Liangshan Yi Autonomous Prefecture as an example

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Abstract. Promoting the digital transformation of education has become an important task in China's current educational reform and development, and teachers' digital literacy is a core influence factor in promoting digital transformation. In order to understand the current situation of the development of secondary school teachers' digital literacy in ethnic areas, this study prepared a questionnaire based on the framework of the industry standard of "Teachers' Digital Literacy", and used the questionnaire method to survey 346 secondary school teachers in Liangshan Yi Autonomous Prefecture, Sichuan. The survey results show that the digital literacy of secondary school teachers in Liangshan Yi Autonomous Prefecture as a whole shows a moderate trend, and there are differences among all digital literacy dimensions; the digital literacy of teachers shows an overall decreasing trend with the growth of teaching years, age, education, and title, and even though the gap between the educational resources of the cities and counties, townships, and rural areas has been reduced in the process of pushing forward the digitalization of education, it still has a significant digital literacy Impact. The study suggests that we should further stimulate the teachers' subjective consciousness and enhance their willingness to participate in digital teaching; optimize the training programs for teachers' digital literacy and enhance the effectiveness of the training; improve the evaluation and incentive mechanism of teachers' digital literacy, and form a good ecology for teachers' development, so as to continuously improve the digital literacy of secondary school teachers in ethnic areas.

Keywords: ethnic areas; teachers' digital literacy; digitalization of education; teachers' professional development.

1 Introduction

Digitalization has gradually become the dominant way of human existence and practice. Technologies such as the Internet, big data, cloud computing, artificial intelligence and blockchain have not only brought about major changes in human production, life and way of thinking, but also profoundly affected the development of the education

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system[1]. The report of the 20th Party Congress clearly puts forward: "Promote the digitization of education, and build a learning society and a learning country with lifelong learning for all people.[2] "Therefore, promoting the digital transformation of education has become an important task in the current reform and development of education in China. Teachers are the foundation and source of education, and the teachers here are not traditional teachers, but teachers with digital literacy. A high level of teachers' digital literacy can not only promote teachers to adapt to the development of the digital era and educational innovation and change, but also play a key role in cultivating students' digital literacy and training high-quality talents[3].

The relevance and importance of the digital transformation of the educational process is caused by the global process of transitioning to a digital economy and digital society[8]. In recent years, the Liangshan Yi Autonomous Prefecture (hereinafter referred to as Liangshan Prefecture) region has achieved certain results in strengthening the construction of education digital infrastructure, building high-quality education digital resources, and building a management digital platform. However, in the process of education digitalization transformation, it is not only necessary for the government, schools and other related subjects to make efforts from policy formulation, platform construction, promotion and application, but also necessary to continuously improve the digital literacy of teachers, so as to provide a strong assistance for the comprehensive promotion of education digitalization[4]. Therefore, this study analyzes the current situation of digital literacy of secondary school teachers in Liangshan Prefecture through the questionnaire survey method, and based on this, we hope to provide suggestions for the future development of digital literacy of teachers in ethnic areas in China.

2 A Survey on the Current Status of Digital Literacy among Secondary School Teachers in Ethnic Areas

2.1 Questionnaire Design

This study is based on the industry standard of Digital Literacy for Teachers, which was officially released to the public by the Ministry of Education in February 2023[5] (hereinafter referred to as the industry standard) to investigate the digital literacy of secondary school teachers in Liangshan Prefecture. The document gives a framework for teachers' digital literacy, stipulating "digital awareness", "digital technology knowledge and skills", "digital application", "Digital Social Responsibility" and "Professional Development". This questionnaire is based on the industry standard to prepare a questionnaire on the status of digital literacy of secondary school teachers in Liangshan State, which is divided into two parts: basic information and the status of digital literacy. Among them, the basic information part includes teachers' gender, age, education, teaching age, title, and location of the teaching school. Based on the framework of Digital Literacy for Teachers, the current status of digital literacy section was designed with 33 questions centered on five first-level dimensions (Table 1), and a five-point Likert scale was used to rate each question, with values ranging from "not at all

in line with" to "very much in line with", allowing teachers to assess their digital literacy status. The Likert scale was used to rate each question, assigning values from "not at all in line" to "very much in line" on a scale of 1 to 5, so that teachers could assess their own current situation, and the higher the score, the higher the digital literacy of teachers.

2.2 Research Target

This study used the questionnaire survey method, through the questionnaire star for online distribution of questionnaires in secondary schools in Liangshan Prefecture, a total of 364 questionnaires were recovered, of which 346 were valid questionnaires, with a validity rate of 95.055%.

2.3 Data Processing Methods

In this study, SPSS26.0 software was used to organize and enter and process the data, perform descriptive statistics and conduct analysis of variance, and finally conduct post hoc tests as a way to explore the current status of digital literacy of secondary school teachers in Liangshan Prefecture and its influencing factors.

Reliability of Questionnaires.

Cronbach's alpha coefficient test was conducted for each dimension of teachers' digital literacy. The results showed that the overall Cronbach's coefficient of the questionnaire was 0.962, indicating that the questionnaire had good reliability overall and internally. In terms of the validity of the questionnaire, exploratory analysis of the questionnaire was conducted, and KMO and Bartlett's spherical test were conducted for structural validity, and the resulting KMO value was 0.963, with a significance of less than 0.05, which indicates that the questionnaire has good structural validity.

3 Analysis of the Current Situation of Digital Literacy of Secondary School Teachers in Ethnic Areas

3.1 Overall Analysis of Digital Literacy of Secondary School Teachers in Liangshan State

The data obtained by statistically analyzing the overall digital literacy level of the survey respondents through the descriptive statistics method showed (as shown in Table 1) that the overall digital literacy of secondary school teachers in Liangshan Prefecture was at a medium level.

Table 1. Analysis of the mean values of digital literacy of secondary school teachers

	N	average value	standard deviation
digital awareness	346	3.877	0.709
Digital technology and knowledge	346	3.574	0.938
Competence in digital teaching and learning applications	346	3.747	0.741
Digital security and social responsibility	346	4.155	0.743
Digital professional development	346	3.878	0.681
population (statistics)	346	3.846	0.612
Effective number of cases (in columns)	346		

3.2 Differential Analysis of Digital Literacy among Secondary School Teachers in Liangshan Prefecture

Gender Difference.

The analysis of independent samples t-test on digital literacy of teachers of different genders revealed that there was no significant difference in digital literacy of teachers of different genders (P=0.851). The mean score of digital literacy of male teachers was 3.854 and the mean score of digital literacy of female teachers was 3.840.

Differences in Academic Qualifications.

Through one-way ANOVA on digital literacy of teachers of different genders, the analysis revealed that there was no significant difference in the digital literacy of teachers with different academic qualifications (P=0.210). The mean value of digital literacy scores of teachers with education at doctoral level was 3.748, the mean value of digital literacy scores of teachers with master's degree was 3.975, the mean value of digital literacy scores of teachers with bachelor's degree was 3.837, and the mean value of digital literacy scores of teachers with specialized degree was 3.675.

Age Difference.

Using one-way ANOVA, it was found that there was a significant difference in the digital literacy of teachers by age (P=0.000). The results showed that the digital literacy of teachers aged "below 30 years" was significantly higher than the digital literacy of teachers of other ages. Particularly in the dimensions of "digital awareness", "digital technology and knowledge", "digital teaching and learning ability" and "digital professional development", there were significant differences (P=0.000). There are significant differences in the four dimensions of "digital awareness", "digital technology and knowledge", "digital teaching application ability" and "digital professional development".

Difference in Teaching Age.

There may be some gap in digital literacy among teachers of different teaching ages, but this does not mean that teachers of older or younger teaching ages are not digitally literate, only that there may be some differences in technological proficiency and educational philosophy and teaching style. Under this assumption, the one-way ANOVA method was used to analyze the difference in the level of digital literacy among teachers of different teaching ages, and the results showed that (P=0.001) teachers with a teaching age of "1-5 years" were the most digitally literate, followed by "11-15 years", "6-10 years", "20+ years", and "16-20 years", specifically in the areas of "digital awareness", "digital literacy", "digital literacy", "digital literacy", "digital literacy", "digital literacy", "digital literacy", "digital literacy", "digital literacy", and "digital literacy". There were significant differences in the four dimensions of "digital awareness", "digital technology and knowledge", "digital teaching and learning ability", and "digital professional development" (Table 2). There are significant differences in the four dimensions of "digital awareness", "digital technology and knowledge", "digital teaching application ability" and "digital professional development" (Table 2).

Difference in Titles.

There was a significant difference in digital literacy among teachers with different job titles. When analyzed (P=0.001), overall the digital literacy level of teachers with the title of "Secondary 3" was higher than that of teachers with the titles of "Secondary 2", "Secondary 1", and "Senior Secondary". teachers with the title of "Senior Secondary School". The digital literacy levels of teachers with different titles were higher in "digital awareness", "digital technology and knowledge", "digital teaching and learning ability", "digital safety and social responsibility" and "digital literacy". There were significant differences in the five dimensions of "digital awareness", "digital technology and knowledge", "digital teaching application ability", "digital safety and social responsibility" and "digital professional development" (Table 2).

Differences in Schools of Instruction.

The teaching schools were categorized into cities, counties, towns and villages. Through one-way ANOVA test, it was found that there was a significant difference in the digital literacy level of teachers between different schools (P=0.000), and the highest digital literacy level was found in "urban" teachers, followed by "township", and the lowest was found in "rural", "county", and the lowest was "rural". There were significant differences in the overall five dimensions of teachers' digital literacy levels (Table 2).

Table 2. Comparison of Differences between Secondary School Teachers and Dimensions of Digital Literacy in Liangshan Prefecture

variant	form	N	digital awareness (M±SD)	digital technology with knowledge (M±SD)	Competence in digital teaching and learning applications (M±SD)	Digital Security and Social Responsibility (M±SD)	digital profession Development (M±SD)
(a person's) age	Under 30	121	4.021±0.692	3.818±0.935	3.952±0.729	4.253±0.690	4.051±0.681
	30-40 years old	120	3.855±0.666	3.567±0.922	3.767±0.674	4.171±0.770	3.870±0.663
	41-50 years	71	3.650±0.722	3.268±0.863	3.536±0.710	4.026±0.702	3.679±0.635
	51-60 years	34	3.911±0.709	3.372±0.938	3.400±0.854	4.020±0.880	3.712±0.707
	F		4.274**	6.034**	8.034***	1.83	5.517**
length of teaching experience	1-5 years	135	4.014±0.722	3.775±0.981	3.934±0.743	4.253±0.712	4.047±0.690
	6-10 years	41	3.678±0.657	3.594±0.808	3.695±0.731	4.256±0.735	3.766±0.706
	11-15 years	71	3.932±0.532	3.545±0.864	3.827±0.586	4.080±0.702	3.833±0.591
	16-20 years	52	3.615±0.802	3.314±0.913	3.488±0.737	4.022±0.802	3.727±0.687
	More than 20 years	47	3.860±0.746	3.312±0.949	3.426±0.793	4.046±0.811	3.728±0.678
	F		3.675**	3.594**	6.619***	1.636	3.767**
title	Secondary III	83	4.065±0.658	3.896±0.968	4.026±0.737	4.372±0.644	4.060±0.686
	Secondary II	139	3.755±0.748	3.456±0.882	3.699±0.729	4.091±0.763	3.823±0.685
	Secondary level	83	3.848±0.667	3.538±0.918	3.648±0.658	4.034±0.719	3.793±0.639
	Higher secondary	41	3.965±0.683	3.398±0.981	3.552±0.823	4.179±0.842	3.873±0.701
	F		3.655*	4.650**	5.775**	3.508*	2.756*
school of study	municipalities	88	4.116±0.569	3.841±0.807	3.988±0.614	4.349±0.560	4.071±0.593
	county seat	98	3.814±0.637	3.497±0.923	3.675±0.739	3.966±0.743	3.837±0.653
	townships	97	3.887±0.740	3.509±1.029	3.758±0.761	4.174±0.785	3.833±0.706
	countryside	63	3.625±0.840	3.423±0.934	3.510±0.792	4.151±0.842	3.746±0.758
	F		6.969***	3.363*	6.431***	4.235**	3.461*

Note: * indicates P<0.05, ** indicates P<0.01, and *** indicates P<0.001.

4 Conclusions

4.1 Stimulating Teachers' Sense of Subjectivity and Enhancing Their Willingness to Participate in Digital Teaching and Learning

Today, many countries are emphasizing that "teachers must know how to integrate digital technologies into their teaching and be able to use them effectively". Liangshan Prefecture is no exception[6]. Although the digital literacy of secondary school teachers in Liangshan Prefecture as a whole is at a medium level, they should first realize that digital technology is regarded as an important tool to promote teaching innovation and improve the quality of education, not just an auxiliary tool, and they should correct their

position as the main body of the digital transformation of education. Therefore, the majority of teachers should establish a sense of ownership, actively participate in digital teaching practice, according to the characteristics of the subjects they teach and the needs of students, design creative and interactive digital teaching programs and apply them to practice, and improve their digital literacy in practice.

4.2 Optimizing the Digital Literacy Training Program for Teachers to Enhance Training Effectiveness

Digital literacy training for secondary school teachers in Liangshan Prefecture should be based on the real needs of teachers to carry out digital teaching. In terms of content, the training should be designed in a hierarchical manner based on existing resources and comprehensive consideration of teachers' educational background, teachers' age, different regions, teaching needs, etc. In terms of form, the training should be carried out in a targeted manner in combination with the implementation of digital equipment in the region, e.g., schools with complete digital equipment can carry out centralized online and offline training combined with hands-on tracking, and the content of online training can be available for teachers in other schools to learning, organizing regular digital literacy training work and seminars, inviting professionals and experienced teachers to share their successful cases and experiences in digital teaching, actively sorting out and summing up the experience of the training work, selecting excellent cases through teaching competitions, and forming typical cases for demonstration, and so on.

4.3 Improving the Evaluation and Incentive Mechanism for Teachers' Digital Literacy and Forming a Good Ecology for Teachers' Professional Development

The improvement of teachers' digital literacy is also influenced by evaluation incentives. Designing appropriate evaluation tools based on evaluation criteria and self-assessment tools can help teachers assess their performance and identify areas for improvement, thus identifying professional development needs[7] The government and schools should establish appropriate incentives for teachers to improve their performance. The government and schools should establish appropriate incentive mechanisms to recognize and reward teachers who have achieved significant results in digital teaching practice, so as to motivate more teachers to participate in digital teaching reform. According to the evaluation results, the evaluation content, tools and processes should be continuously improved and optimized to ensure the scientificity and effectiveness of the evaluation and incentive system. By improving the evaluation and incentive mechanism of teachers' digital literacy, a good teacher professional development ecology is formed, so as to continuously improve the digital literacy of teachers.

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