The Impact of the Network Environment in Tibet on the Information Technology Application Ability of Preschool Teachers—A Mediation Model

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Abstract: Studying the impact of the network environment in Tibet on the information technology application ability of Tibetan preschool teachers is of great significance for developing preschool education and improving the overall quality of education in Tibet. This study investigated 688 Tibetan preschool teachers and constructed an intermediary model to explore the impact mechanism of the network environment in Tibet on the information technology application ability of Tibetan preschool teachers. The results show that the network environment in Tibet, the self-efficacy of Tibetan preschool teachers, and the application ability of information technology are all at a medium level; The network environment has a significant predictive effect on the information technology application ability of Tibetan preschool teachers; Self-efficacy plays a partial mediating role between the network environment and Tibetan preschool teachers' information technology application ability.

Keywords: Tibet; Preschool teachers; Network environment; Information technology application capability

1. Introduction

The international research on information literacy has sprouted since 1973, [1]and the research on information literacy in China has developed since 1995. [2]As a multi-dimensional model, the information literacy framework points to the growth of a person who is complete in emotion, ability and attitude in the network environment. [3]Network environment and information technology application ability are an indispensable part of information literacy. However, in this type of research, China mainly focuses on the developed eastern regions, with few studies involving the western and ethnic regions. In 2019, the Ministry of Education of China formulated the "Education Informatization 2.0 Action Plan",which requires teachers and students to comprehensively improve their information literacy, improve the quality of preschool education, care and teaching, and require preschool teachers to have good information literacy. [4] Early childhood education in Tibet has developed vigorously in recent years. As a part of preschool teachers' information literacy, the improvement of information technology application ability has also become the key to improve the quality of care and education. However, there are indeed unique aspects of education in Tibet. Firstly, Tibet is located in a rare plateau environment in the world, and high cold and hypoxia are its inevitable natural environment. Secondly, Tibet has undergone tremendous changes in recent years, achieving significant leaps in social, economic, and other aspects. Finally, due to issues such as Tibet's geographical environment and natural climate, the overall level of education development lags behind the national average in China.[5] At present, few scholars have paid attention to the information technology application ability and its influencing mechanism of Tibetan preschool education teachers. Therefore, it is necessary to conduct in-depth research on the influencing factors of information technology application ability of Tibetan preschool teachers.

Drawing on the perspective of UNESCO, [6] the study of teachers' information literacy is carried out from six dimensions: understanding ICT in education (hereinafter referred to as "understanding ICT"), curriculum and evaluation, teaching methods, using ICT, organization and management, and teachers' professional development. Among them, "using ICT" refers to examining whether teachers can proficiently master computer software, hardware, and internet operation technology, especially the use of application programs related to subject teaching; Can we build an ICT based learning community, guide students to engage in professional communication, and guide and monitor their activities.

[7]Professor Zhang Yi found through investigation that teachers' attitudes towards information technology, electronic lesson preparation skills, online teaching and research abilities, teacher machine ratio, ability to use digital resources, information technology training content, and ability to communicate online all have a significant impact on their information technology application abilities.[8]

This study intends to build a model of factors that affect the ability of Tibetan preschool teachers to apply information technology. It uses statistical analysis software such as SPSS and AMOS to verify hypotheses, explore the impact mechanism of the network environment on the ability of Tibetan preschool teachers to apply information technology, so as to improve the information literacy of Tibetan preschool teachers, and then provide guidance for the modernization of Tibetan preschool education, To provide theoretical basis and practical support for improving the quality of preschool education in Tibet.

2. Literature Review

2.1 Network Environment and Information Technology Application Capability

Network environment refers to various environments that have an impact on information literacy, including symbiotic environment (the network behavior of symbiotic environment groups), virtual environment (the dissemination of new media information on the school network) and social environment (the control and guidance of society or schools on the network). [9]Scholars such as Zhu Zhiting summarized the "teacher's information technology application ability" as "the ability of primary and secondary school teachers to use information technology to promote work efficiency, improve student learning effectiveness, and support their sustainable development". [10]Professor Liu Yang and others believe that the information technology application ability of preschool teachers specifically refers to the ability to use auxiliary teaching software platforms to design, produce, and develop courseware that meets the cognitive characteristics of children, is vivid and vivid, and meets the requirements of new teaching materials.[11]

The research found that the infrastructure and the resource construction promoted by the school as a whole, as a technical part, will have an impact on education, including the improvement of teachers' information literacy, education informatization and education modernization. [12]The online environment can have positive consequences for individuals. The social cognitive theory mainly based on Bandura suggests that the (network) environment can affect individual behavior. [13]Zimmer man et al. believe that the (online) environment is related to the specific effectiveness of autonomous learning. [14]The research by Huang Jiarong et al. shows that the learning atmosphere in the online environment and whether various learning resources contribute to learners' memory and understanding have a significant impact on their cognitive behavior. [15]Poor network environment can also have negative consequences for individuals. Luo Luhuiying's research found that most teachers' information literacy is low due to the late construction of the network environment in most schools in China, and the overall teaching orientation of information technology in teaching applications is relatively traditional. [16]Wang Yi and Shi Weilin found that due to the poor construction of the network environment in most schools, China has not truly achieved the effective integration of information technology and teaching, let alone formed a soft environment where information technology is organically integrated into teaching practice.[17] Therefore, this study proposes the first hypothesis:

H1: The online environment will significantly predict the information technology application ability of Tibetan preschool teachers.

2.2 Mediation of self-efficacy

Self-efficacy refers to the degree of confidence that an individual can complete a task through his own ability. [13]The social cognitive theory believes that the environment can have an impact on the formation of an individual's own cognition, which in turn can have a certain impact on their behavior. [18]The online environment, as a part of the environment, is likely to have a certain impact on individuals' ability to enhance cognition. Individuals who are in a good network environment, with good hardware facilities and a good learning atmosphere, will have their own understanding of how to improve their information technology application abilities. This will lead to more motivation for individuals to learn and communicate about information technology application abilities, leading to the improvement of their information technology application abilities.

The research of Hu Fangang and Zhou Tingting shows that all factors of the network environment are significantly related to the level of self-efficacy. The "learning science and technology" EVC platform they studied is the embodiment of the online community in the educational context. According to their research, the quality of the network environment will directly affect the learning situation in EVC. If learners cannot get lost in massive network resources in the process of EVC learning. And they have certain information search and sorting ability, can quickly find the required information, subconsciously will affirm their ability, enhance the confidence to solve problems, and improve self-efficacy. The quality of the network speed will affect the speed of information retrieval, thus affecting the mood of learners when learning, and thus affecting the self-efficacy of learners. [19]The improvement of individual self-efficacy will also have an impact on information technology application ability. The data analysis by Luo Yi and Wei Zhichun shows that personal traits directly and positively affect the two key components of information technology understanding ability and application ability. [9]Zhai Xuge, Lu Xiaojun and Zhang Guoliang's research confirmed that network environment factors also have an important positive impact on individual characteristics, indicating that self-efficacy, goal setting, information search, communication and cooperation, network conditions and network resources all have a significant positive impact on the effectiveness of college students' online independent learning. [20]Although there are some differences, this research also shows that self-efficacy is likely to play a mediating role between the network environment and information technology application capabilities. Therefore, this study proposes a second hypothesis:

H2: self-efficacy plays a partial mediating role between the network environment and the IT application ability of Tibetan preschool teachers.

3. Research Design

3.1 Research subjects and data collection

An online survey was conducted in five cities in Tibet using the Questionnaire Star platform, and a total of 688 questionnaires were collected. Among them, there are 106 male teachers (15.41%) and 582 female teachers (84.59%); 506 people under 30 years old (73.55%), 144 people between 31 and 40 years old (20.93%), and 38 people aged 41 and above (5.52%); 410 people (59.59%) have a bachelor's degree or below, and 278 people (40.41%) have a bachelor's degree or above.

3.2 Research tools

This survey consists of two parts: basic information and subjective scale. The basic information section includes gender, age, educational background, location city, etc. There are three subjective scales in the subjective scale section, all of which use the mature scale for educational context modification. The scales all use Likert's 5-point positive scoring, and the higher the score, the more agreement it indicates.

(1) Network Environment Scale. This scale mainly comes from the scale of Hu Fangang et al.,[19] with a total of 4 measurement items. Cronbach's of this scale α It is 0.871.

(2) Self-efficacy Scale. The scale items mainly refer to the Chinese version of the self-efficacy scale compiled by Schwaraer et al. [21] and revised by Zhang Jianxin et al., [22] with a total of 8 measurement items. Cronbach's of this scale α is 0.924.

(3) "Information Technology Application Power Table". This scale is derived from the self-evaluation of information technology application ability of normal school students by Yan Hanbing and others, [23] with a total of 6 measurement questions. Cronbach's of this scale α Is 0.939.

3.3 Analytical methods

SPSS24.0 was used to analyze the demography characteristics of the sample, the reliability and validity of the scale, descriptive statistics and correlation coefficients, and AMOS24.0 was used for confirmatory factor analysis and structural model analysis.

4. Research results

4.1 Common method deviation test

There is a possibility of common method bias in self reporting questionnaire surveys. In the questionnaire guidance, prior control is carried out by informing the respondents that they are anonymous, confidential, for research purposes only, and to conceal the meaning of the questions. Using AMOS24.0 for confirmatory factor analysis, the Hamann single factor method was used to detect common method bias. When there was a common method bias, the single factor model explained all variations, and the model fit should be higher than the four factor model fit. [24]The results show that the fitting indicators of the single factor model are poor(χ^2/df=26.395,RMSEA=0.192,GFI=0.486), while the three factor model has better fitting results(χ^2/df=4.853, RMSEA=0.075, GFI=0.905), and there is a significant difference in chi square values between the single factor and three factor models($\Delta\chi^2$=2922.825,Δdf=3, P<0.001), indicating that the problem of common method bias in this study is not serious.

4.2 Descriptive Statistics

According to the scoring standard of Likert 5 points, Tibet's network environment, preschool teachers' self-efficacy, and information technology application ability are all at a medium level. Correlation analysis found a moderate correlation between the three latent variables, with a correlation coefficient between 0.433 and 0.568, and significant at the 0.01 level (Table 1), which is in line with theoretical expectations.

Table 1: Mean, standard deviation, and correlation coefficients of each variable

	M	SD	NE	SE	ITC
NE	3.557	0.769	1		
SE	3.542	0.571	0.433**	1	
ITC	3.548	0.681	0.526**	0.568**	1

**: P<0.01, NE: network environment, SE: self-efficacy, ITC: the Information Technology Application Ability.

4.3 Structural Model Analysis
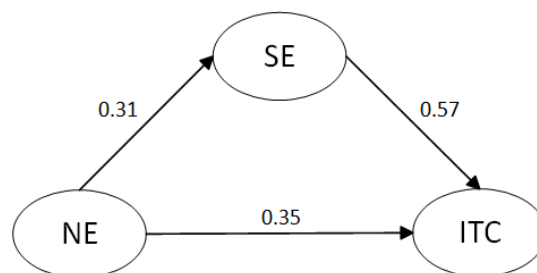
(1) Structural model fitting

Figure 1: Theoretical Model Empirical Research Results

Construct a structural model in AMOS24.0 (Figure 1) and import 18 measurement questions into the structural model. The results show that the model fit index χ^2/df=4.853, RMSEA=0.075, GFI=0.905, TLI=0.937, CFI=0.946, AGFI=0.877. It can be seen that the structural model fits well and can be used for the next hypothesis test.

(2) Hypothesis testing

AMOS24.0 was used to test the direct effect H1, and the Bootstrapping of structural equation model was used to test the mesomeric effect H2. As shown in Figure 1 and Table 2, the standardized path coefficient of the network environment on the information technology application ability of Tibetan preschool teachers is 0.35, which is significant at the 0.001 level. Therefore, hypothesis H1 is validated. Under the condition of bootstrapping 2000 times, the direct effect size value is 0.383, and the BC95% CI is [0.261, 0.518], excluding 0, indicating that the direct effect exists; The indirect effect size value was 0.285, and the BC95% CI was [0.114, 0.285], excluding 0, indicating that the mesomeric effect

existed and accounted for 52.7% of the total effect (0.285/0.521=0.527). Therefore, assuming H2 passes the validation.

Table 2: Test Results of mesomeric effect

	Estimate	SE	Z	Bootstapping(2000 times)			
				Pecentile95%CI		BC-Pecentile95%CI	
				Lower	Upper	Lower	Upper
Total Effects	0.521	0.048	10.85	0.43	0.621	0.427	0.615
Direct Effects	0.345	0.059	5.847	0.232	0.461	0.234	0.465
Indirect Effects	0.176	0.039	4.513	0.109	0.259	0.108	0.257

5. Conclusion and Discussion

5.1 Conclusion

Based on the sample data of 688 Tibetan preschool teachers in Tibet, this paper uses structural equation model and SPSS to analyze the relationship between the network environment in Tibet and preschool teachers' self-efficacy, information technology application ability. The research hypothesis is supported by sample data, and the following conclusions are drawn: (1) The network environment perceived by preschool teachers in Tibet, preschool teachers' self-efficacy, and information technology application ability are high; (2) The network environment in Tibet significantly predicts the information technology application ability of preschool teachers; (3) Self-efficacy plays a partial mediating role between the network environment in Tibet and the ability of preschool teachers to apply information technology.

5.2 Discussion

(1) The network environment in Tibet has a significant positive impact on the information technology application ability of preschool teachers

In the current information age, the network environment has become an indispensable part of the environment. A good network environment, such as the construction of hardware infrastructure such as fiber optic, broadband, and wireless networks, as well as a soft environment such as network atmosphere and network resources, all determine an individual's ability to apply information technology. In the educational perspective, the network infrastructure, online learning atmosphere, online learning resources, and school management measures and guidance in this regard in schools will directly affect teachers' information technology application abilities. If a teacher is in a school with complete network hardware facilities and advocates the application of information technology in teaching, and the school also organizes various types of information technology application training, it is not surprising that the teacher's personal information technology application ability will be improved to a certain extent.

(2) Analysis of the mediating effect of self-efficacy

Self-efficacy plays a partial mediating role between the network environment in Tibet and preschool teachers' information technology application ability. The network environment and self-efficacy are very important in the formation of teachers' information technology application ability, of which the network environment is an external factor and self-efficacy is an internal factor. A good network environment will allow individuals to have full confidence in their ability to improve their information technology application capabilities in this environment. External good atmosphere and resources will have a positive impact on individual self-efficacy. And good self-efficacy is that individuals have sufficient motivation to carry out relevant learning and communication, which ultimately leads to good information technology application ability of individuals.

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