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The Strategies For Improving The Level Of Educational Technology Literacy Of Teachers In Universities In Guangxi

Wang Lili [1], Assoc. Prof. Dr. Jittawisut Wimuttipanya [2], Assoc. Prof. Dr. Niran Sutheeniran[3], Asst. Prof. Dr. Kulsirin Aphiratvoradej [4], Asst. Prof. Dr. Patchara Dechhome[5]

[1]Doctoral Candidate, BSRU, Thailand.
[2]Faculty of Education, BSRU, Thailand.
[3]Faculty of Education, BSRU, Thailand.
[4]Faculty of Education, BSRU, Thailand.
[5]Faculty of Education, BSRU, Thailand.

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Abstract-: The objectives of this research were:1) to study the current situation of the technical literacy level of teachers in Guangxi; 2) to formulate strategies to improve the technical literacy level of teachers in Guangxi; and 3) to study and evaluate strategies to improve the technical literacy level of teachers in Guangxi. The sample were from six different types of universities, totaling 403. Research instruments include : 1) questionnaire, 2) interview forms, 3) evaluation form. data analysis by using percentage, mean, standard deviation, independent sample T-test and one-way ANOVA.

The results were found that that Guangxi university teachers education technology literacy level is higher, in addition to different working fixed number of years of teacher education technology literacy level has no significant difference, different gender, different degree, different disciplines, different age, different titles, different universities between teacher's education technology literacy level have significant differences. Therefore, this study suggests a scientific and reasonable promotion strategy from three levels of government, universities and teachers.

Keywords-College teachers, educational technology literacy, promotion strategy

1. Introduction

Teachers are the foundation of education; the professionalism of teachers is one of the key elements in the successful development of education. With the increasingly widespread use of artificial intelligence technology in education, it is urgent to improve the education technology literacy of teachers. As a result, UNESCO, the European Union, research institutes around the world, various countries and the Chinese government are placing greater emphasis on the development of AI education.

In 2016, the U.S. published "Preparing for the Future of Artificial Intelligence", in which it was stated that AI should be integrated into the national education system to raise awareness of AI among all citizens.

In 2017, the U.K. published "Developing Artificial Intelligence in the UK", in which it was proposed that data science and AI should be widely embedded in education.

In 2019, UNESCO published "Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development", in which it was stated that "improving teachers' AI literacy" was an important element in building an educational ecosystem in the era of AI.

In 2019, the United Nations Educational, Scientific and Cultural Organization (UNESCO) released the report "Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development", in which it identified "improving the AI literacy of teachers" as an important element in building an educational ecosystem in the AI era.

In 2020, at the international level, the Institute for the Future Today released the latest edition of the Science and Technology Trends report 2020, which points out: the development of educational technology, understanding the link between science and technology and future uncertainty.

Saudi Arabia's Vision 2030 and the National Transformation Programmed recognize the importance of AI in the country's future. In October 2020, Saudi Arabia hosted the Global AI Summit to become the world leader in AI events.

In collaboration with the Ministry of Education, the Ministry of Communications and Information Technology (MCIT) of Saudi Arabia, developed training programs on machine learning that will be incorporated into the curriculum of the Ministry of Education, key STEM training and courses were also introduced to enhance AI and technology skills.

In order to enable teachers to adapt to the development of educational technology as soon as possible, university administrators need to formulate systematic training strategies and programs, and actively explore training strategies suited to the development of educational technology in the era of educational information development. train teachers' working ability scientifically, help and guide each teacher to improve the level of teachers' educational technology literacy, and then improve the educational quality of colleges and universities. Only in this way can the educational technology of university teachers quickly adapt to the development of the educational information age. Therefore, the research on college teachers' educational technology literacy is imperative.

2. Research Questions

1. What is the current situation of the level of educational technology literacy of teacher in Universitiesin Guangxi?

2. How to formulate strategies of improving the level of educational technology literacy of teacher in Universities in Guangxi?

3. How to study and evaluate strategies of improving the level of educational technology literacy of teacher in Universities in Guangxi?

3. Literature Review

3.1 Background of Guangxi colleges and universities

According to the statistics of Guangxi Department of Education, as of September 30, 2021, there are 85 colleges and universities in Guangxi, including 38 undergraduate colleges and 47 junior colleges, among which there are 26 public undergraduate colleges and 12 private colleges.The universities studied in this paper are mainly 26 public undergraduate colleges and universities.

3.2 College teachers in Guangxi

Zhou Liangfa et al. (2022, p.6) pointed out that it is necessary to strengthen theoretical research, attach importance to education guidance, construction of smart campus, strengthen supervision and assessment, and improve evaluation and incentive links, so as to provide strong support for the cultivation of digital literacy of university teachers, and then cultivate a large number of high-quality, professional and excellent digital teachers.

SuJingya et al. (2021, p.13) pointed out that in order to improve the information teaching ability of college teachers, it is necessary to rebuild the role identity and subjectivity awareness of teachers

Yan Guangfen, Liu Li. (2022) pointed out that the social level: establish information literacy evaluation standards and increase investment in schools. School level: increase the degree of attention and support of school leaders, increase the investment in related hardware equipment and software equipment.

Yang Yan. (2019) put forward the following promotion strategy: consolidate the positive information consciousness, actively update the education teaching idea, expand information knowledge learning, adhere to the subject teaching and information technology close integration, strengthen information skills application

Yi Ye. &Xue Feng. (2022)points out that the need to promote teachers digital accomplishment internalization and sublimation, speed up the promotion teachers "digital + teaching" practice skills, adhere to the principle of combining integration and classification guidance, develop vocational education teachers digital literacy evaluation standards and establish digital technology and professional skills to support each other of lifelong learning community.

Sui Xinghua et al. (2020) proposed a series of coping strategies: enhance the vitality of teachers and stimulate the information teaching efficiency of teachers; strengthen the construction of information teaching, guarantee the sustainable development of teachers 'information teaching; and carry out information teaching development

projects to enrich teachers' information teaching experience.

3.3 Strategies to improve teachers' educational technology literacy

QiuJianxin (2020) points out that teachers' professional accomplishment is a synthesis of the qualities and accomplishment that teachers show in performing their duties in the practice of education and teaching**.**

Huang Youchu (2019) Teacher professionalism is the quality and accomplishment that teachers gradually develop through various acquired approaches such as upbringing, education and practice on the basis of innate conditions, which has a significant impact on teachers' education and teaching activities.

Li Zhaoyi and Yang Xiaohong (2019) believe that teacher professionalism refers to "the collection of teachers' knowledge, abilities and beliefs related to teaching". Teachers' professional literacy in the Internet + era mainly includes: new professional concepts based on Internet thinking, new professional knowledge based on discipline literacy and scientific and cultural literacy, and new professional skills based on information technology literacy.

3.4 Technical literacy in teacher education

Teresa Pozo-Rico (2020) points out the importance of training teachers in information and communication technology (ICT) capacities during COVID-19, as ICTs have become a key resource for 21st century education, especially during the COVID-19 pandemic. Face-to-face classrooms are no longer available, and some studies have shown that the introduction of information and communication technologies in teaching and learning can improve the quality of education. Of course, integrating ICT into education also places significant professional demands on teachers.

Xing Xishen (2022) points out that the future of basic digital education needs to improve the relevant standards, the construction application wisdom education platform, promote teachers and student's digital literacy and skills, ensure the security of network and information data**.**

Pei Yingzhu (2022, p.130) pointed out that in the era of digital economy, the importance of digital literacy is becoming more and more prominent, prompting more and more countries and regions to integrate digital literacy education into the national quality education system.

3.5 Related studies

Chen min (2020) in eastern X province 5820 primary and secondary school teachers as the research object to carry out the empirical research, using the comprehensive index method of primary and secondary school teacher's information literacy index, analyzes the current situation of teachers' information literacy development and differences.

Su Hong (2022) of four medical universities of Guangdong province 198 foreign language teachers research, randomly selected 22 teachers interview, find out the university foreign language teachers information literacy and information application status, and actively explore the construction of foreign language teachers information literacy promotion strategy, strengthen the application of information technology tools in foreign language teaching.

Lukasz Tomczyk (2022,p.1) was conducted at the Krakow Education University, the largest university in Poland that trains educators.450 pedagogy teachers in Poland, described issues related to self-assessment of digital literacy using text editors, spreadsheets, Presentation and graphics software; also described experiences of participating in compulsory online learning, searching for information on the Internet, attending paid and free online learning courses, and attending information-based study groups.

4. Research Conceptual Framework

Figure 1 Research Framework

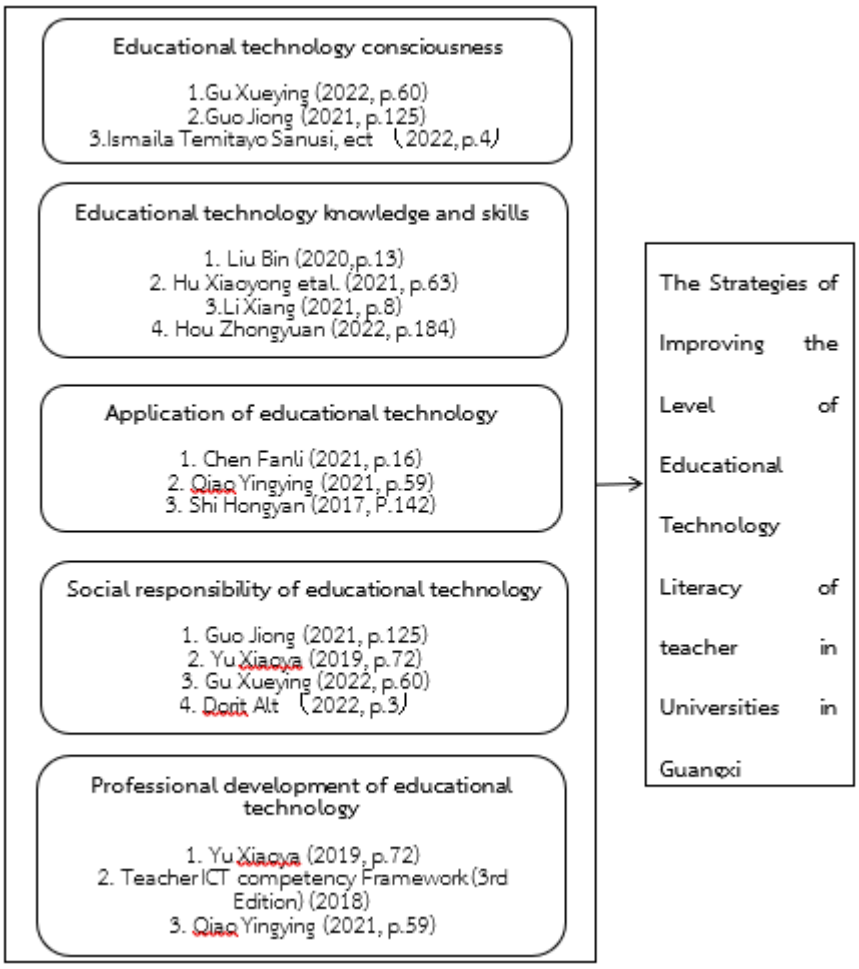

Figure1the framework of the Strategies of Improving the Level of Educational Technology Literacy of teacher in Universities in Guangxi

5. Objectives Of The Research

1. To study the current situation of the level of educational technology literacy of teacher in Universitiesin Guangxi.
2. To formulate strategies of improving the level of educational technology literacy of teacher in Universities in Guangxi.
3. To Study and evaluate strategies of improving the level of educational technology literacy of teacher in Universities in Guangxi.

6. Research Methodology

6.1 Population and Sample

6.1.1 Population

The sample schools in this study are six public undergraduate universities in Guilin, Guangxi, namely Guangxi Normal University, Guilin University of Electronic Technology, Guilin University of Technology, Guilin Tourism Institute, Guilin Medical College, and Guilin Institute of Aerospace Technology. The total number of full-time teachers in these six public undergraduate universities is 7,690.

6.1.2 Sample

The sample of questionnaire group

Sample size selection for questionnaire survey: Based on the formula for estimating sample size (group size =7000/8000, sample =364/367) provided by the Research Division of the National Education Association in the article "Small Sample Technique" (Krejcie&Morgan, 1970), a stratified sampling method was used to sample 367 out of 7690 people for the questionnaire. The sampling ratio is 367/7690=4.8%. The sample number calculated according to the current total number of teachers in each university (the total number of teachers in each university is from the undergraduate teaching quality report of each university in 2021-2022 academic year) is:

Guangxi Normal University: 1793*4.8%=86 students
Guilin University of Electronic Technology: 1,993 *4.8%=90 students
Guilin University of Technology: 1472*4.8%=70
Guilin Medical College: 987*4.8%=47 people
Guilin Institute of Aerospace Technology: 922*4.8%=44
Guilin Tourism Institute: 623*4.8%=30 students

Research Instruments

Research methods and steps

This study uses a variety of research methods such as literature analysis, questionnaires and interviews to conduct research and collect data. To ensure the correctness of the data, both quantitative and qualitative data were included in this study. This study investigates teachers and administrators in six public undergraduate colleges and universities in Guilin, Guangxi, conducts questionnaires on the current situation of intelligent educational literacy in colleges and universities, structured interviews, assessment of the suitability of development strategies, and ultimately proposes development strategies to improve the level of intelligent educational literacy in colleges and universities. There are five steps in this study, as follows.

Step 1: Set the research idea.

(1) Literature and policy analysis. By combing relevant literature at home and abroad, I am familiar with teacher information literacy theory, teacher intelligent literacy theory, educational technology literacy theory, educational digital literacy theory, scientific management theory, etc., understand the relevant policies of the Chinese government on educational technology literacy, and learn the relevant practices of colleges and universities on the improvement of educational technology literacy level.

(2) Setting research ideas. According to the previous literature, there are many dimensions of intelligent educational literacy level. According to the needs, in this study, five dimensions of educational technology awareness, educational technology knowledge and skills, educational technology application, educational technology social responsibility and educational technology professional development were selected as the indicators of questionnaire setting.

Step 2: Design research tools.

Analyze the materials and design the questionnaire. This paper analyzes the relevant documents, rules and regulations of educational technology literacy in 6 universities in Guilin, Guangxi. According to the five dimensions of educational technology literacy, as the first-level index, this paper designs the questionnaire and interview outline of the current situation of educational technology literacy in colleges and universities in Guangxi. Experts are invited to evaluate the two research tools.

Step 3: Data survey, collection, collation and analysis.

Selecting a suitable research method: this study used online (Questionnaire Star) research to distribute and collect questionnaires from teachers in six universities in Guilin, Guangxi; a combination of online and offline interviews were conducted with 24 teachers and managers. SPSS was used to process the recovered questionnaire data, to collate the interview transcripts and finally to compare and analyse the influence of different factors on the level of educational technology literacy universities in Guangxi.

Step 4: Make strategies.

Analyze the data from the current situation and formulate strategies to improve the educational technology literacy of teachers in colleges and universities in Guangxi.

Step 5: Suitability assessment.

Prepare the relevant materials of the evaluation and design the form of the evaluation strategy, and evaluate the strategy by the combination of online and offline.

Select experts, full-time teachers, managers and students from 6 colleges and universities, as well as 20 major policy makers in educational management, human resources development, educational management innovation and educational informatization to evaluate the suitability of the strategy.

7. Research Results

Table1 Main factors affecting teachers to use educational technology to carry out teaching in the teaching process

Through the specific analysis of the research data, the main factors that affect teachers to use educational technology in the teaching process are obtained. The questionnaire data analysis is shown in Table1

Option	Subtotal	percentage	position in a name list
Lack of necessary educational information equipment and environmental support	275	68.24%	1
Unable to use a variety of strategies to regulate the time duration, rhythm and sequence of technology application and non-technology application in real time to maintain students' interest and attention	207	51.36%	2
Teaching management is not enough attention, the lack of the corresponding intelligent teaching atmosphere	204	50.62%	3
They lack the necessary modern educational technology operation skills and knowledge theory	201	49.88%	4
The traditional teaching methods and concepts are deeply rooted	172	42.68%	5
There are lack of plans to deal with emergencies in teaching	131	32.51%	6
Please indicate other	9	2.23%	7
This question is valid for filling in the number of people	403		

According to the table above, 68.24% of the teachers believe that educational information equipment and environmental support are the most important influencing factors; 51.36% of the teachers felt that using multiple teaching strategies, Real-time regulation of the duration, rhythm and sequence of technology application and non-technology application links, Maintaining students' interest and attention is the second most important influencing factor; 50.62% of the teachers believed that the teaching management paid insufficient attention, Lack of lack of corresponding intelligent teaching atmosphere is the third main factor; 49.88% of the teachers believe that their lack of necessary modern educational technology operation skills and knowledge theory is the fourth main influencing factor; 42.68% of teachers believe that the traditional teaching methods and concepts are the fourth main influencing factor; 32.51% of teachers in response to the emergency in teaching will also affect their educational technology literacy.

8. Conclusion And Discussion

8.1 Conclusion

The status quo of the educational technical literacy level of university teachers in Guangxi

This part corresponds to the study aim 1. The status quo is specific as follows:

The educational technical literacy level of surveyed teachers is higher; and that of male teachers is significantly higher than that of female teachers. The results of ANOVA of teachers with different qualifications reached a significant level, Among them, teachers with doctoral degree have the highest level of educational technical literacy; Significant levels of educational technology literacy in different disciplines, Teachers who teach in engineering subjects are significantly higher than those in other subjects; There are significant differences in educational technical literacy levels among teachers of different ages, The level of teachers aged 31-40 is significantly higher than those of other age groups; The results of ANOVA of teachers with different titles reached a significant level, Among them, the level of teachers

with intermediate or below professional titles is significantly higher than that of other professional titles; There are significant differences in the educational technology literacy levels of teachers in different universities, The educational technology literacy of teachers in B universities (engineering universities) is significantly higher than that in other universities. There was no significant difference in the level of educational technical literacy among teachers with different working years.

Strategies to improve the educational technical literacy level of college teachers in Guangxi

This part corresponds to the research objective 2. The improvement strategy is specified as follows:

This research mainly forms a scientific and reasonable promotion strategy from three levels of government, universities and teachers.

Government level

1. The state formulates relevant policies for the improvement of educational technology literacy
2. The state formulates the educational technology information management system in colleges and universities to ensure the security of educational technology information in colleges and universities and standardize the safety behavior of educational technology
3. The state establishes a supervision mechanism for educational technology literacy to evaluate the moral behavior of educational technology
4. The state will strengthen the improvement of educational technology literacy
5. The state will build and improve a resource sharing and information exchange platform conducive to the improvement of educational technology literacy

University level

6. Colleges and universities actively improve and implement relevant supporting policies for improving teachers' educational technical literacy
7. Create a full-coverage and multi-level systematic training mode combining overall improvement and classified guidance
8. Establish a multi-functional digital literacy platform integrating skill evaluation, online courses, self-study platform, skill training and skill assessment
9. Improve the level of information education
10. Simplify the process of using educational technology tools
11. Build a cooperative community of teacher education and technical literacy learning
12. Build a research team on educational technology literacy
13. Colleges and universities will hold various educational informatization competitions

Teachers' own development level

14. Improve the awareness of independent learning and stimulate the drive of digital development
15. Actively try the use of educational technology tools in teaching
16. Pursue the professional development of educational technology and literacy
17. Actively design teaching activities that integrate educational technology resources according to the teaching objectives.
18. Abide by Internet laws and regulations, consciously regulate all online behaviors, and pay attention to the management and protection of personal and students' information and private data.

Strategy evaluation results of the educational technology literacy level of university teachers in Guangxi

This part corresponds to the research purpose 3. The strategy evaluation results are as follows: After the suitability evaluation of experts, the overall average value of the improvement strategy proposed in this study is 4.54, which indicates that the suitability of the improvement strategy proposed in this study is scientific and applicable, which can provide certain basis and reference for the country and universities.

8.2 Discussion

This research mainly forms 18 scientific and reasonable promotion strategies from three levels: government, universities and teachers.

Government level

Strategy 1. The state formulates relevant policies to improve educational technology literacy. This is similar to the view of Liu Bin (2020,p.15), who believes that the country should take policies as the guidance and vigorously promote the improvement of teachers' intelligent education

literacy; this is also similar to the view of Wu Junqi et al. (2023,p.78) Pei Yingzhu (2022,p.130), who believes that the country should do a good job in the top-level design of policies.

Strategy 2. The state shall formulate the educational technology information management system of colleges and universities to ensure the security of educational technology information in colleges and universities and standardize the safety behavior of educational technology. This is similar to the view of Song Fangfang (2017,p.46), who pointed out that information security laws and regulations should be improved, and the supervision and management mechanism of the network should be improved.

Strategy 3. The state establishes a supervision mechanism of educational technology literacy and evaluates the educational technology moral behavior.This is consistent with the views of Yan Guangfen (2022,p.11), who pointed out that strengthening the construction of digital technology ethics and legal norms should be strengthened to guide teachers to develop the awareness of digital ethics.

Strategy 4. The state should strengthen the investment in improving educational technology literacy, which is consistent with the views of HeYonghuan (2022,p.57), Zhang Liping (2021,p.23) and Song Fangfang (2017,p.46), who believe that the state should increase the investment in schools, especially the investment.

Strategy 5. The country builds and improves the resource sharing and information exchange platform conducive to the improvement of educational technology literacy, which is consistent with the research views of HeYonghuan (2022,p.57) and Zhang Liping(2021,p.23), who believes that the country should build an online training and communication platform.

University level

Strategy 6. Colleges and universities actively improve and implement the relevant supporting policies for the improvement of teachers' education technology literacy. Song Quanhua (2020,p.82), Zhou Liangfa (2022,p.6), and SuJingya (2021,p.13) pointed out that the system construction should be improved, supervision and assessment should be strengthened, evaluation and assessment should be improved, the incentive mechanism should be improved, and the incentive and evaluation system should be established.

Strategy 7. Build the overall promotion and classification guidance combined full coverage, multi-level system training mode, this with 8 man (2023, p54), He Yonghuan (2022,p.57), Yan Guangfen (2022,p.11), Yi Ye (2022,p.60), Song Quanhua (2020,p82) research view is basically the same, they all think that university teacher education information technology training to targeted, adhere to the principle of combining integration promotion and classification guidance, build "classification stratified segmentation", diversified cultivation mode.

Strategy 8. Establish a multi-functional digital literacy platform integrating skill evaluation, online courses, self-study platform, skill training, skill assessment, etc. This is similar to the conclusion of Ismaila Temitayo Sanusi, ect (2022,p.10), which recommends introducing a peer collaboration platform across borders.SuJingya et al. (2021,p.13) also pointed out that an information teaching platform should be built.

Strategy 9. Improve the level of education information infrastructure construction, this (2023,p.54), He Yonghuan (2022,p.57), Pei Yingzhu (2022,p.130), Yan Guangfen (2022,p.11), SuJingya (2021,p.13), Song Quanhua (2020,p.82) are similar, he believes that universities should increase the investment in hardware equipment and software equipment, improve the hardware and software environment, create a good digital environment.

Strategy 10. Simplify the process of using educational technology tools.

This is consistent with the view of Song Fangfang (2017,p.46), who pointed out that the operation procedures of local university teachers on the information system should be simplified.

Strategy 11. Build a cooperative community of teacher education, technology and literacy learning. This is similar to the research results of Yan Guangfen (2022,p.11), Liang Huiyi (2021,p.40), SuJingya et al. (2021,p.13), Lu Shuang (2020,p.30) and Li Chunyan (2018,p.74). She believes that it is necessary to build an information technology learning community, practice community and interactive platform, and realize the sharing of knowledge of information tools.

Strategy 12. Build an educational technology literacy research team. This is similar to the views of Zhu Yi (2022,p.47), Wang Ru (2022,p.57) and Song Fangfang (2017,p.46). He pointed out that academic salons about information technology should be established to create a good academic atmosphere and build a teaching and research community for teachers.

Strategy 13. Colleges and universities hold various education information competitions, which is consistent with the research results of Wang Lin (2022,p.174), who proposed that universities should carry out teachers' information teaching ability competition.

Teachers' own development level

Strategy 14. Improve the awareness of independent learning and stimulate the drive of digital development. This is consistent with the views of Lu Shuang (2020,p.30) and Liu Yongchao (2018,p.245), who pointed out that teachers should strengthen independent learning and establish the concept of lifelong learning.

Strategy 15. Actively try the use of educational technology tools in teaching, which is similar to the research results of Fu Yun (2017,p.34). He pointed out that efforts should be made to learn the basic means of information teaching and fully integrate information tools with the classroom.

Strategy 16. Seek the professional development of educational technology literacy. This is similar to the research results of Li Chunyan (2018,p.74), who believes that only by integrating information teaching into daily classroom teaching can we continuously promote our professional development.

Strategy 17. Actively design teaching activities that integrate the resources of educational technology based on the teaching objectives. This is similar to the view of Yang Yan et al. (2019,p.121), who pointed out that we should expand information knowledge learning, adhere to the close integration of subject teaching and information technology, strengthen the application of information skills, and continuously improve the teaching design.

Strategy 18. Abide by Internet laws and regulations, consciously regulate various online behaviors, and pay attention to the management and protection of personal and student information and private data. This is similar to the views of Yang Yan et al. (2019,p.121) and Song Fangfang (2017,p.46), who pointed out that teachers should strictly abide by the bottom line of information ethics and improve self-cultivation.

9. Recommendations

For the level of teachers' educational technology literacy, this study can provide some suggestions and references for the management of university teachers.

First of all, according to the research results, there are certain differences among teachers in different genders, ages, professional titles, teaching disciplines, and working years. Therefore, when designing the training program, the school management department should be targeted (He Yonghuan,2022, p82), formulate hierarchical training programs (Song Quanhua,2020,p.82); provide high-level training for teachers with doctoral education, application training for basic skills, relevant training for teachers with master education, and improve the level of educational technology literacy at different levels and levels, so as to promote the sustainable development of teachers.

Secondly, the level of teacher education technology varies greatly between different colleges and universities. So different university teachers teachers management department, in the formulation of education technology literacy system file and training plan, in addition to the reference to the national requirements and standards, should also be according to their university teachers education technology literacy level, develop personalized, in line with the actual situation of school teachers system and scheme, targeted to enhance the level of teachers' quality.

Finally, this study summarized the five dimensions of educational technology literacy level, compiled the questionnaire, and obtained a series of data, which provides reference and reference for future studies.

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