Construction of Information Literacy Model for Rural Primary School Teachers

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Abstract

This study aimed to establish a model of information literacy for rural primary school teachers. By conducting two rounds of consultations with 21 experts using the Delphi method, a model was developed comprising six primary indicators including information awareness, information knowledge, information skills, information application, information ethics and safety, and professional development, along with 21 secondary indicators and 66 tertiary indicators. This preliminary model of information literacy for rural primary school teachers provides a valuable reference framework for assessing the information literacy levels of teachers in rural areas.

Keywords: Rural primary school teachers; Information literacy; Model construction

Introduction

Education plays a crucial role in modern society, with teachers being one of the key drivers of education. The teaching level and educational literacy of teachers directly influence students' learning outcomes and overall quality. Furthermore, the reform of educational models imposes new requirements for enhancing the teaching information literacy of rural primary school teachers. However, opportunities for professional development among rural primary school teachers are limited, lacking systematic training and guidance, which makes it difficult for them to access timely updates on teaching information and quality professional training. Therefore, the urgent issue in the education field is how to establish an effective model for enhancing the information literacy of rural primary school teachers to meet their practical needs.

Given the current situation and issues outlined above, this study will focus on the elements of information literacy for rural primary school teachers, the importance of each element in the information literacy model, and how they differ in their impact on educational quality. Due to constraints in resources, the research will select rural primary school teachers in Sichuan Province as the study sample and utilize text analysis and the Delphi method to construct a model for enhancing the information literacy of rural primary school teachers.

Research Objectives

The objective of this study is to construct a comprehensive and practical model of information literacy for rural elementary school teachers, aiming to support their educational practice in the digital era and enhance their information literacy levels in rural areas of Sichuan Province. Specific research purposes include:

1. To analyze the model of information literacy for rural primary school teachers.
2. To design a model of information literacy of teachers in rural primary schools.

Research Methodology

1. Text analysis method

Textual analysis method is a research approach primarily utilized for in-depth, systematic analysis of textual data to unveil implicit information, comprehend the meaning of the text, and explore the underlying societal, cultural, psychological, and other dimensions of significance. This study is based on typical standards or frameworks for teacher information literacy at home and abroad, which are respectively the United Nations Educational, Scientific and Cultural Organization (hereinafter referred to as " UNESCO"), the United States, the United Kingdom, Australia, Europe, and China . This study analyzes typical assessment frameworks/standards related to teacher information literacy, as shown in Table 1.

Based on the interpretation and analysis of the standard/framework text content and common elements specified by these countries or institutions, an indicator system for the information literacy model of rural primary school teachers was initially extracted.

Table 1 Analysis of International Typical Teacher Information Literacy Framework/Standards

Country	Year	Framework/ standard name	Index content					
			Information Awareness	Information Knowledge	Information Ability	Information Application	Information Ethics	
Australia	2004	Australian Higher Education Information Literacy Competency Standards	√	√	√	√	√	
Japan	2007	Guidance Standards for Teachers Using ICT	√	√	√	√	√	
U. K	2008	Information Literacy Standards for Teacher Education	—	—	√	√	—	
UNESCO	2011	ICT Competency Framework for Teachers	√	√	√	√	√	
USA	2017	ISTE Educator Standards	—	√	√	√	√	
Europe	2017	Digital Competency Framework for European Educators	√	—	√	√	√	
China	2022	Teacher Digital Literacy	√	√	√	√	√	

Country	Year	Framework/ standard name	Index content				
			Information Awareness	Information Knowledge	Information Ability	Information Application	Information Ethics
		Frequency	5	5	7	7	6

2. Delphi method

The Delphi method is a systematic expert consultation approach that employs multiple rounds of anonymous surveys to gather expert opinions, establish consensus, or forecast future events. This method enables experts to gradually approach consensus through a series of surveys without face-to-face interaction, thereby providing decision support on complex issues. The preliminary constructed evaluation index system was adapted into a corresponding expert consultation questionnaire. The questionnaire consists of two main parts: the first part includes experts' basic information, while the second part comprises 21 expert consultation scales, each corresponding to the content of indicators in the first, second, and third-level dimensions. Each scale includes two components: suggestions for modifying the indicators and assessing the importance level of the indicators through a 5-point scoring method ranging from "not important at all" to "extremely important," scoring 1 to 5 points, respectively(Yu Kailian et al.,2021:52).

Research Scope

The overall focus of this study is the entirety of teachers in rural primary schools in Sichuan Province. Given the wide scope of the research, which encompasses a significant number of teachers in rural primary schools, a regional sampling method will be utilized. The author will select 500 teachers from 21 different regions in Sichuan Province (including various subjects and grade levels) as participants for the questionnaire survey. Additionally, 21 experts will be selected as interviewees, consisting of 10 education experts and 11 rural primary school administrators.

Research Findings

1. Analysis of Information Literacy Needs of Rural Primary School Teachers in Sichuan Province

The survey on the information literacy needs of rural primary school teachers was conducted with the assistance of the "Wenjuanxing" platform. The questionnaire allowed for both mandatory and optional responses, and all successfully submitted surveys were considered valid, totaling 494 responses. Surveys in various regions of Sichuan (including Chengdu, Mianyang, Zigong, Panzhihua, Luzhou, Deyang, Guangyuan, Suining, Neijiang, Leshan, Ziyang, Yibin, Nanchong, Dazhou, Ya'an, Aba Tibetan and Qiang Autonomous Prefecture, Ganzi Tibetan Autonomous Prefecture, Liangshan Yi Autonomous Prefecture, Guang'an, Bazhong, and Meishan) were distributed with the assistance of local educational administrative authorities. Additionally, a small number of responses were completed by classmates of the researchers currently serving as rural primary school teachers.

The survey statistics indicate that the average score for all items is 4.405. The order of average scores for the six dimensions of rural primary school teachers' information literacy from high to low is as follows: information awareness, professional development, information knowledge, information skills, information ethics, and information application. According to the Likert five-point scale with four intervals, scores falling between 4-5 show a high demand for the six dimensions of teachers' information literacy; while scores between 1-2 indicate a very low demand for the six dimensions of teachers' information literacy. Therefore, it can be observed that rural primary school teachers in Sichuan Province have a high demand for information literacy in these six dimensions. In order to visually represent the demand for information literacy of rural primary school teachers in each dimension, the survey examined the level of demand for information literacy across six different dimensions, with the specific mean values for each dimension shown in Tables 2.

Table 2 presents an analysis of the primary dimensions of information literacy requirements among rural elementary school teachers (N=494).

No.	Primary Dimension Name	$\bar{\mathbf{X}}$	Sd
1	Information Awareness	4.449	0.577
2	Information Knowledge	4.406	0.578
3	Information Skills	4.397	0.561
4	Information Application	4.364	0.589
5	Information Ethics and Morality	4.368	0.596
6	Professional Development	4.408	0.566

2. Construction of information literacy model for rural primary school teachers
   (1) Literature review
   Drawing upon the information literacy standards for elementary school teachers set forth by advanced countries such as UNESCO, the United States, the United Kingdom, Australia, Europe, and China, as well as relevant research domestically and internationally, the author has initially developed the fundamental index system for information literacy of rural elementary school teachers, as illustrated in Figure 1.
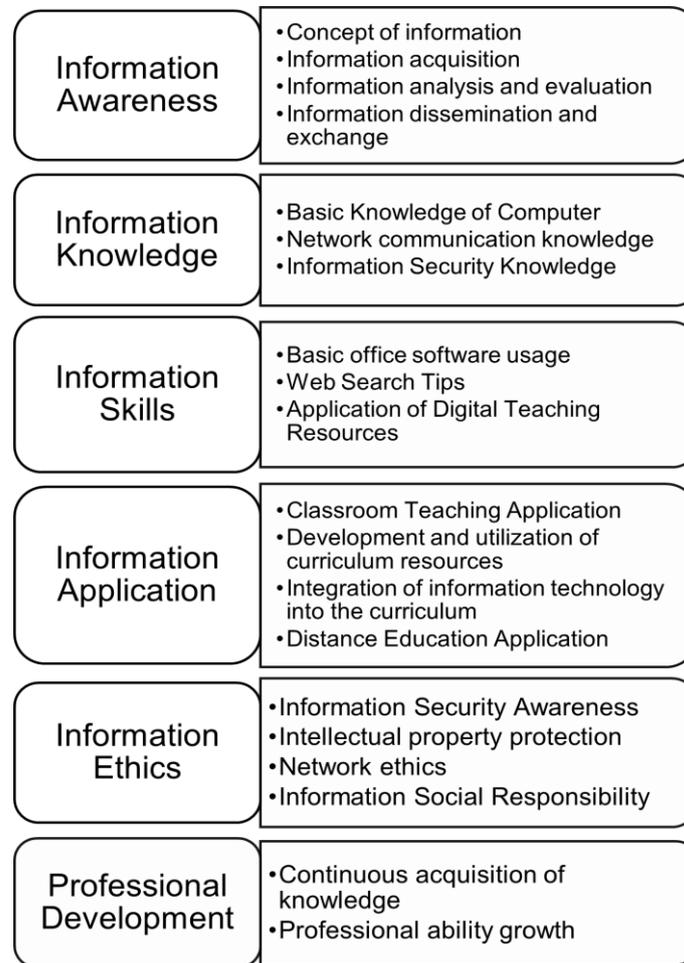
Figure 1 Preliminary Model of Information Literacy for Elementary School
Teachers in Rural Areas
Source: Constructed by the researcher

(2) The Delphi Method of two rounds

The first round of expert opinion statistical results analysis:

This study conducted two rounds of expert consultations. In the first round, 21 expert consultation questionnaires were distributed and all 21 were returned, resulting in a 100% response rate and a 100% positive response rate, indicating high interest and active participation from all experts in the study. Based on the Delphi method, the concentration of expert opinions was primarily analyzed by the mean $\bar{x}$ and Interquartile Range (IQR). A larger mean indicates greater importance of a particular factor, while IQR is calculated using the formula IQR < a (an-a1) to reflect the concentration of expert opinions, with a value of 0.45 assigned to a in this study. Since a five-point Likert scale was used in the expert consultation questionnaire, with a maximum value of an=5 and a minimum value of a1=1, the benchmark for the concentration of expert opinions is a(an-a1)=1.8. When IQR=0, the concentration of expert opinions is highest; when 0<IQR<1.8, the concentration is considered good; when 1.8≤IQR≤2.0, the concentration is moderate and acceptable; and when IQR>2.0, the

concentration of expert opinions is poor, indicating that the significance represented by the mean and median values is unacceptable(Wu Jianxin et al.,2014:76).

The results of the first round of expert consultations revealed that among the IQR values of the 6 secondary constitutive elements, 2 had an IQR value of 0, while 4 secondary indicators had an IQR value of 1. Within the 24 secondary constitutive elements, 2 had an IQR value of 0, 18 had an IQR value of 1, and 4 had an IQR value of 2, specifically in the areas of information innovation awareness, network communication knowledge, information legal policy knowledge, and remote education application. Among the 73 tertiary indicators, 5 had an IQR value of 0, 61 had an IQR value of 1, and only 7 had an IQR value of 2.

Overall, the experts generally agreed on the first, second, and third-level indicators of information literacy for rural primary school teachers. Based on the IQR values and feedback from 21 experts, all first-level indicators were unanimously accepted by the experts. For the second-level indicators, modifications were made to certain indicator names: "Information Security Knowledge" and "Information Legal Policy Knowledge" were combined and renamed as "Information Regulations and Security Knowledge"; "Network Communication Knowledge" was changed to "Network Communication Collaboration Knowledge"; "Curriculum Resource Development and Utilization" and "Information Technology and Curriculum Integration" were replaced with "Information Technology Application in Teaching" and "Evaluation of Information Technology Application in Teaching." Four second-level indicators were removed: "General IT Knowledge," "Information Processing Skills," "Information Presentation Skills," and "Remote Education Application." Two new second-level indicators were added: "Adaptability to Rural Information Development Status" and "Innovativeness in Rural Information Development Status." For the third-level indicators, modifications were made to certain indicator names: "Creative Use of Information" was changed to "Creative Use of Information Technology," "Information Property Rights Knowledge" was modified to "Information Regulatory Knowledge," "Word Processing Software" was changed to "Text Processing Capability," "Spreadsheet Software" was altered to "Data Processing Capability," and "Presentation Software" was suggested to be "Multimedia Presentation Development Capability." "Subject-specific Software Application" was amended to "Subject-specific Software Usage Skills." Some indicators were removed, such as "Concepts and Principles of Information Technology," while new indicators were introduced, including "Network Security," "Data Protection," "Prevention of Network Attacks," and "Fundamentals of Networking." Additional third-level indicators were added, namely "Generative Artificial Intelligence Retrieval Skills," "Multimedia Teaching," "Online Teaching," "Mobile Teaching," "Evaluation of Teaching Content Design," "Evaluation of Teaching Process," "Evaluation of Student Learning Outcomes," "Evaluation of Information Technology Application Skills," "Monitoring and Guiding Online Student Behavior," "Upgrading and Deepening Subject Knowledge," "Interdisciplinary Learning," "Self-directed and Lifelong Learning," "Adaptation to Hardware Conditions," "Adaptation to Teaching Content," "Adaptation to Student Characteristics," "Innovative Teaching Methods," "Innovative Teaching Resources," and "Innovative Evaluation System."

The second round of expert opinion statistical results analysis:

Judging from the statistical results of the first round of questionnaires, see Table 3 for details. First, from the perspective of the mean importance, the mean importance of 21 secondary indicators is 4.14, of which 20 secondary indicators have an average importance greater than 4.00 , and only one secondary component has an average importance less than 4.00, which is network communication. Collaborative knowledge . The average importance value of 65 third-level indicators is 4.52, and the average importance value of 65 third-level indicators is greater than 4.00. Finally, from the perspective of IQR, among the 21 secondary component IQR values, 4 have an IQR value of 0, 16 indicators have an IQR value of 1, and 1 indicator has an IQR value of 2. It is network communication collaboration knowledge . Among the 65 third-level indicators with IQR values, 10 have IQR values of 0 and 55 indicators have IQR values of 1.

Overall, the author combined the importance mean, IQR and feedback from 21 experts and found that the second round of experts had high opinions on the second- and third-level indicators of rural primary school teachers' information literacy. So only minor modifications were made this round. At the same time, the two third-level indicators of "autonomous learning and lifelong learning" and "mobile teaching" were deleted.

Table 3 The Second round of expert opinion consultation on second and third-level indicator scores

Secondary indicators	$\overline{X}$	IQR	Level three indicators	$\overline{X}$	IQR
Information concept awareness	4.81	0	Information Social Cognition	4.81	0
			Teaching Concepts in the Information Age	4.9	0
			Interdisciplinary Information Awareness	4.62	1
Information acquisition awareness	4.86	0	Awareness of multiple information sources	4.62	1
			Initiative in obtaining information	5	0
			Consciously use multiple methods to obtain information	4.76	1
Information analysis and evaluation awareness	4.57	1	Information screening awareness	4.62	1
			Information analysis awareness	4.52	1
			Information evaluation awareness	4.33	1
			Information integrated awareness	4.71	1
Information dissemination and communication awareness	4.33	1	Information sharing and dissemination awareness	4.43	1
			Willingness to communicate	4.62	1
Information security awareness	4.43	1	Privacy protection awareness	4.67	1
			Cyber Security Awareness	4.57	1
			Information integrity awareness	4.43	1
Information innovation awareness	4.1	1	Sensitivity to new technologies	4.33	1
			Innovative thinking awareness	4.62	1
			Creative use of information technology	4.76	1

Information regulations and security knowledge	4.52	1	Knowledge of information regulations	4.29	1
			Information security knowledge	4.24	1
Subject information knowledge	4.43	1	Teaching Resources	4.48	1
			Discipline Frontier	4.19	0
Network communication collaboration knowledge	3.71	2	Remote collaboration	4.33	1
			Online teaching platform	4.52	1
Basic office software usage skills	4.52	1	Word processing skills	4.57	1
			Data processing skills (C12)	4.52	1
			Multimedia courseware production skills	4.62	1
			Office software collaborative operation skills	4.29	1
Information search skills	4.67	1	Search engine usage	4.71	1
			Information filtering	4.76	1
			Advanced Search	4.14	0
			Generative AI retrieval skills	4.29	1
Information teaching skills	4.81	0	Multimedia teaching aid operation skills	4.81	0
			Online education platform usage skills	4.52	1
			Electronic textbook usage skills	4.38	1
			Online quizzes and feedback	4.29	1
			Subject professional software usage skills	4.48	1
Informatization teaching application	4.76	0	Multimedia teaching	4.86	0
			Online teaching	4.67	1
			Mobile teaching	4.19	0
Information-based teaching evaluation	4.48	1	Teaching content design evaluation	4.62	1
			Teaching process evaluation	4.52	1
			Evaluation of Student Learning Effects	4.57	1
			Information technology application ability evaluation	4.14	0
Intellectual property protection	4.19	1	Reference specification	4.38	1
			Innovation protection	4.38	1
			Tort	4.38	1
Ethics in Internet Behavior	4.48	1	Information authenticity	4.67	1
			Cyberbullying	4.76	1
			Acquisition of normative information	4.67	1
Information social responsibility	4.38	1	Social Participation	4.48	1
			Spread positive energy	4.38	1
			Online Student Behavior Monitoring and Guidance	4.29	1
	4.67	1	Update and deepen subject knowledge	4.43	1

Continuous acquisition of subject knowledge		Interdisciplinary Learning	4.24	1
		Independent learning and lifelong learning	4.43	1
Professional ability growth	4.57	1	Informatization Teaching Design	4.76	0
		Evaluation and reflection on information technology support	4.71	1
		Teaching research supported by information technology	4.62	1
Adaptability to the current situation of rural information development	4.52	1	Adapt to hardware conditions	4.67	1
		Adapt to teaching content	4.57	1
		Adapt to students' characteristics	4.62	1
Current status of rural information development and innovation	4.14	1	Innovative teaching methods	4.52	1
		Innovative teaching resources	4.33	1
		Innovation evaluation system	4.29	1

(3) Finalize model

After two rounds of expert consultations and revisions, a general consensus was reached among the experts regarding the constituent elements of the model for information literacy among rural primary school teachers, the author has developed the final model for rural primary school teacher information. This model consists of 6 primary indicators, 21 secondary indicators, and 66 tertiary indicators. The detailed model is presented in Table 4.

Table 4 Constituent Elements of Information Literacy Index System for Rural Primary School Teachers (including abbreviated secondary and tertiary indicators)

Primary Indicator Name	Secondary Indicator Name	Tertiary Indicator Name
Information Awareness	Information Values Awareness(IVA)	Cognitive Awareness of Informatized Society(CAIS)
		Informatized Teaching Philosophy(ITP)
	Information Acquisition Awareness(IAA)	Informatized Subject Integration(ISI) Diversity of Information Source Channels(DISC)
		Proactiveness in Information Acquisition(PIA)
		Diversity in Information Acquisition Methods(DIAM)
	Information Analysis and Evaluation Awareness(IAEA)	Awareness of Information Analysis(AIA)
		Information Evaluation Awareness(IEA) Comprehensive Information Awareness(CIA) Information Sharing Awareness(CSA)

Information Knowledge	Information Dissemination and Communication Awareness(IDCA)	Information Communication Awareness(ICA)
	Information Security Awareness(ISA)	Privacy Protection Awareness(PPA)
		Cyber Security Awareness(CSA)
		Awareness of Information Integrity(AII)
		Data Security Awareness(DSA)
	Information Innovation Awareness(IIA)	Awareness of Emerging Technologies(AET)
		Innovative Thinking Awareness(ITA)
		Awareness of Innovative Technological Applications(AITA)
	Subject-specific Information Knowledge(SSIK)	Teaching Resources(TR)
		Frontiers of the Subject(FS)
		Interdisciplinary Information Technology Application Knowledge(IITAK)
	Network Communication Collaboration Knowledge(NCCK)	Remote Collaboration(RC)
		Online Teaching Platforms(OTP)
Information Skills	Basic Office Software Skills(BOSK)	Word Processing Skills(WPS)
		Data Processing Skills(DPS)
		Multimedia Courseware Production Skills(MCPS)
		Collaborative Operation Skills in Office Software(COSOS)
	Information Search Skills(ISS)	Search Engine Usage(SEU)
		Information Filtering(IF)
		Advanced Searching(AS)
		Generative Application Skills(GAS)
	Information Technology Teaching Skills(ITTS)	Multimedia Teaching Tool Operation Skills(MTTOS)
		Online Education Platform Usage Skills(OEPUS)
		Electronic Textbook Utilization Skills(ETUS)
		Online Testing and Feedback(OTF)
		Subject-specific Software Usage Skills(SSSUS)
Information Application	Informatized Teaching Application(ITA)	Multimedia Teaching(MT)
		Online Teaching(OT)
	Informatized Teaching Evaluation(ITE)	Evaluation of Teaching Content Design(ETCD)
		Evaluation of Teaching Process(ETP)
		Evaluation of Student Learning Outcomes(ESLO)
		Evaluation of Information Technology Application Ability(EITAA)

Information Ethics and Morality	Protection of Intellectual Property Rights(PIPR)	Citation Norms(CN)
		Innovation Protection(IP)
		Acts of Infringement(AI)
	Ethics of Online Behavior(EOB)	Authenticity of Information(AUI)
		Prohibition of Cyber Bullying(PCB)
		Regulation of Information Acquisition(RIA)
	Information Social Responsibility(ISR)	Social Participation(SP)
		Dissemination of Positive Energy(DPE)
		Monitoring and Guidance of Student Online Behavior(MGSOB)
	Information Security and Privacy Protection Regulations(ISPPR)	Privacy Protection Regulations(PPR)
		Information Security(IS)
Professional Development	Continuous Acquisition of Subject Knowledge(CASK)	Updates and Deepening of Subject Knowledge(UDSK)
		Interdisciplinary Learning(IL)
	Professional Competence Growth(PCG)	Informatized Teaching Design(ITD)
		Evaluation and Reflection Supported by Information Technology(ERSIT)
		Teaching Research Supported by Information Technology(TRSIT)
		Collaboration and Communication Among Teachers(CCAT)
		Establishment of Sustainable Professional Development Mechanisms(ESPDM)
	Adaptability to Current Rural Information Development Status(ACRIDS)	Hardware Adaptation(HA)
		Adaptation to Teaching Content(ATC)
		Adaptation to Student Characteristics(ASC)
	Innovativeness in Current Rural Information Development Status(ICIDS)	Innovative Teaching Methods(ITM)
		Innovative Teaching Resources(ITR)
		Innovative Evaluation Systems(IES)

      The author draws the information literacy model of rural primary school teachers according to the above abbreviated indicators, as shown in Figure 2.
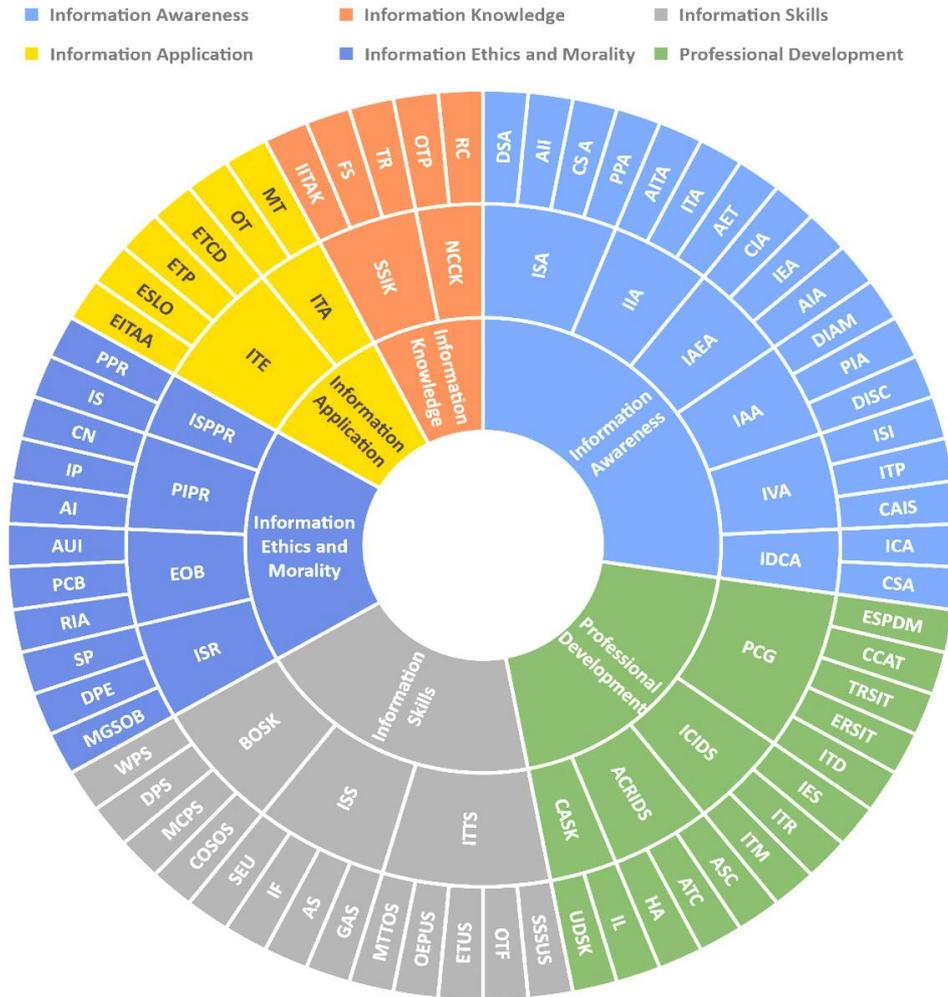
Figure 2 Model of Information Literacy for Rural Primary School Teachers
Source: Constructed by the researcher

Discussion

1. Conclusion

The analysis of previous studies leads to the following conclusions:

Firstly, understanding the basic needs of information literacy among rural primary school teachers in Sichuan Province. The author, with the assistance of relevant leaders in the local education administration, distributed questionnaires through the Wenjuanxing platform to 21 prefectures and cities in Sichuan Province, collecting 494 valid questionnaires. The analysis of the questionnaires revealed that rural primary school teachers have the highest demand for information literacy in terms of information awareness, followed by professional development. The order of importance from high to low is information awareness, professional development, information knowledge, information skills, information ethics and morality, and information application.

Secondly, constructing an information literacy model for rural primary school teachers in Sichuan Province. This study, through reviewing domestic and international research on the composition of information literacy for primary school teachers and considering the reality of rural primary school teachers, constructed an information literacy model for rural primary school teachers in Sichuan Province using literature analysis, questionnaire surveys, and three rounds of Delphi method. The model defines the components of information literacy for rural primary school teachers, including information awareness, information knowledge, information abilities, information application, information ethics and morality, and professional development as the primary components, along with 21 secondary indicators and 66 tertiary indicators. The model not only reflects rural characteristics but also integrates the specific features of primary school teachers in a particular region, aligning with the educational characteristics of rural primary school teachers in Sichuan Province. This model can be used for assessing the information literacy levels of rural primary school teachers in Sichuan Province, providing a reliable reference standard and promoting the improvement of their information literacy levels, thereby contributing to the development of information literacy among rural primary school teachers. It also serves as a reference and guidance for information literacy assessment of rural primary school teachers and has reference value for enhancing the information literacy of teachers in other regions.

2. Discussion

This study may have some limitations that could impact the research findings and their practical applications.

Firstly, the breadth and sample size of the survey on information literacy of rural primary school teachers are inadequate. Due to constraints in time and resources, the sample size for assessing the information literacy of rural primary school teachers is insufficient. Moreover, the sampling proportions of teachers from different schools, subjects, and economic backgrounds are not sufficiently balanced, which may lead to certain biases in the survey results.

Secondly, this study primarily focuses on the research of information literacy among rural primary school teachers in Sichuan Province, China. It does not encompass teachers from secondary schools or universities, nor does it specifically target teachers from particular subject areas. Therefore, the research findings are not applicable for evaluating and studying the information literacy of secondary school and university teachers, and fail to reflect the differences in information literacy among teachers of different subjects.

Recommendations

1. Theoretical Recommendations

Establish a systematic framework: Construct a systematic and clearly hierarchical information literacy model, specifying the requirements for information literacy at various levels and dimensions, ensuring the model comprehensively reflects the information literacy needed by primary school teachers in the information age.

Strengthen the integration of theory and practice: When constructing the model, emphasis should be placed on integrating theoretical knowledge with practical applications, ensuring that teachers can effectively apply information knowledge to their teaching practices while mastering it.

Emphasize dynamic development: Information literacy is a concept that evolves dynamically. As information technology continues to evolve, the model also needs continuous revision and improvement to adapt to the needs of the era.

2. Policy Recommendations

Enhance policy support: The government should enact relevant policies to support the enhancement of information literacy among rural primary school teachers, including providing training funds, establishing training plans, and creating incentive mechanisms.

Promote resource sharing: Through policy guidance, encourage the sharing of quality information resources between urban and rural areas, and among schools, to provide rural primary school teachers with more learning opportunities and resources.

Establish an evaluation system: Establish a scientific information literacy evaluation system to regularly assess the information literacy of rural primary school teachers, promoting teachers' self-improvement and development.

3. Practical Recommendations

Strengthen teacher training: Conduct regular training activities to enhance information literacy, helping teachers master basic information technology knowledge and operational skills, and improve their ability to acquire, analyze, and apply information.

Promote inter-school exchanges: Encourage rural primary school teachers to engage in inter-school exchanges with teachers from other regions, sharing experiences and resources in information technology teaching to broaden their perspectives and approaches.

Guide teachers in self-learning: Provide abundant learning resources and platforms, guiding teachers to engage in self-learning during leisure time to continuously improve their level of information literacy.

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