

INFORMATION LITERACY MANAGEMENT MODEL FOR TEACHERS IN PRIVATE UNIVERSITIES IN HAINAN PROVINCE

Sijia Yu¹, Ganratchakan Lertamornsak² and Suttipong Boonphadung³

¹Graduate School, Suan Sunandha Rajabhat University, Bangkok, Thailand

^{2,3} Department of Educational Administration, Graduate School, Suan Sunandha Rajabhat University.

*Corresponding author e-mail: 2910837201@qq.com

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Abstract

This study aims to construct a normative management model for teachers' information literacy in private universities in Hainan Province, to address the pressures and challenges posed by the continuous iteration and updating of new technologies and tools. The research objective is: 1) To study the level of information literacy management for teachers in private universities in Hainan Province; 2) To analyze the exploratory factor analysis of information literacy management for teachers in private universities in Hainan Province; and 3) To propose the information literacy management model for teachers in private universities in Hainan Province. This study employed a mixed-methods approach. The quantitative research used stratified random sampling and surveyed 500 respondents from three private universities in Hainan Province. The qualitative research involved nine experts who assessed the importance of the identified factors. Research instruments included structured questionnaires and semi-structured interviews. combining exploratory factor analysis (EFA) to determine the model and thematic content analysis to interpret qualitative interview data. Findings revealed that: 1) The information literacy level of teachers in private universities in Hainan Province is relatively high. 2) Exploratory factor analysis of Hainan's private university teachers revealed seven key factors: information literacy, information application and safeguarding, information resource management and services, communication and collaboration, management support, innovation and development, and foundational information literacy; 3) The results of the study proposed the information literacy management model for teachers in private universities in Hainan Province.

Keywords: Information Literacy Management Model, Private Universities, Hainan Province

Introduction

In the era of Artificial Intelligence, where technological development is rapidly changing, teachers' information literacy is a growing concern in higher education institutions around the world, especially in China. With the emergence of new technologies and tools, teachers in private higher education institutions are facing increasing pressure and challenges, which are exacerbated by the widening differences in information literacy levels among teachers.

The significance of information literacy in the AI era. Teachers with a stronger grasp of information technology can carry out their teaching tasks and practices more efficiently, while those who lack this ability teach less efficiently, and the gap between the two will widen over time. Information literacy has become a key indicator of teachers' professional competence. Teachers' information literacy not only affects the quality of education and teaching in universities, but also directly impacts universities' survival and development amid fierce competition. (Luo, 2021)

The Current challenges in private universities. The current information literacy of universities teachers exists in such dilemmas as an imperfect training system, imperfect assessment and evaluation content, and inconsistent standards, teachers' motivation and ability to use information technology to carry out education and teaching, and the level of information ethics being educated is not high (Guo, 2022). With the deep integration of information technology and education and teaching, improving the information literacy of university teachers has become a crucial part in promoting the development of digitalization of education. Information literacy is essentially a kind of self-adaptive ability of human beings in the information society, and teachers' information literacy development faces the challenges of the applicability of information facilities, the compatibility of information technology, and the ethics of information data (Liu, 2023). Strategies for the Enhancement of Information Literacy among universities Teachers (Xie et al, 2021) found through a literature study that, at present, the development of information literacy among universities teachers is characterized by insufficient understanding of information literacy, lack of attention to information technology application ability, differences in the level of information technology competence, and a lack of objective conditions for the enhancement of information technology competence, which results in insufficient information application ability and needs to be urgently solved. Existing information literacy models do not fully address the needs of private universities in Hainan.

The research gap. Researching information literacy among private university faculty not only supports the development of teaching teams within these institutions but also provides crucial support for the overall high-quality development of China's higher education sector. This study not only fills an existing research gap by developing an information literacy management model for teachers in private universities in Hainan Province but also offers

actionable recommendations for policy development. Future research may build on this foundation by conducting longitudinal analyses to evaluate the evolution of faculty information literacy over time and explore the effectiveness of specific information literacy interventions based on this model.

Contribution of this study. Teachers' information literacy is a key element of professional development, and it is difficult to meet educational development needs without strong information literacy. The level of information literacy of teachers in universities will directly affect the modernization process of education and the quality of social talents in China in the future. The information literacy management of private universities should be standardized. By selecting managers with rich management experience, teachers' information technology awareness should be improved; system construction should be improved, a sound teaching evaluation mechanism should be established, and an effective incentive mechanism for information literacy education should be set up; pilots should lead the way, excellent demonstrations should be encouraged, and the training mechanism should be improved. (Yu, Y., & He, M. X. 2021)

This paper explores an information literacy education, evaluation, and incentive system suitable for the growth and development of university teachers in the new era by studying the impact of standardizing university teachers' information literacy management models on the management development of private universities.

Research Objectives

1. To study the level of information literacy management for teachers in private universities in Hainan Province.
2. To analyze the exploratory factor analysis of information literacy management for teachers in private universities in Hainan Province.
3. To propose the information literacy management model for teachers in private universities in Hainan Province.

Scope of the Research

1. Population Scope

This study focuses on the teachers of private universities in Hainan Province. The population size was 3948 teachers from 3 private universities in Hainan Province. A stratified random sampling approach was conducted; a total of 500 valid questionnaires were collected.

2. Variable Scope

In this study, we examined the 120 questionnaire items using exploratory factor analysis. This approach identified core latent factors representing teachers' information literacy from the potential factor structure encompassing all items. All items underwent an initial factor

extraction phase, and items with excessively low factor loadings or cross-loadings were considered for removal to establish a clear and reliable factor structure.

3. Time Scope

The research was conducted between September 2024 and September 2025, including the design, distribution, and collection of the questionnaire, the conduct of semi-structured interviews, as well as statistical analysis and interpretation of the results.

Research Methodology

1. Research Design

This study employed a mixed-methods approach. The quantitative research used stratified random sampling and surveyed 500 respondents from three private universities in Hainan Province. The qualitative research involved nine experts conducting importance assessments of the identified factors. The research instruments included structured questionnaires and semi-structured interviews. Combining exploratory factor analysis (EFA) to determine the model and thematic content analysis to interpret qualitative interview data.

2. Research Steps

The research process followed three main steps:

1. Develop research tools, including pilot studies and expert review; use SPSS software to test the reliability indicators of the questionnaire to determine its reliability; based on the test results, improve the questionnaire;
2. Distribute questionnaires to the sample of private universities in Hainan Province;
3. Conduct statistical analysis of the data using EFA.

3. Data Collection

The questionnaire was distributed online to teachers at three private universities in Hainan Province. We collected and verified 500 valid responses after screening. A stratified random sampling method was employed to ensure the representativeness of the sample.

4. Data Analysis

We analyzed the components of the information literacy management model using descriptive statistics (percentages, means, and standard deviations), Kaiser-Meyer-Olkin (KMO) tests, and Bartlett's sphericity tests in SPSS to examine model fit and the correlation matrix among variables. Furthermore, principal component analysis was used to extract factors and identify key variables, including factors, eigenvalues, variance explained, and cumulative variance percentages. Varimax rotation was employed to clarify inter-variable correlations. Based on a factor loading threshold of ≥ 0.40 and the number of variables within each factor group, the core factors of the information literacy management model were ultimately identified.

The reliability value of the questionnaire scale items measured in this study is 0.991, this suggests that the variables in the questionnaire exhibit high stability, and the reliability has generally passed the test;

This research proposal was already considered by Suan Sunandha Rajabhat University Ethics Committee. Ethics Committee agreed to the implementation of this research proposal. Before the final survey, researchers sent letters to respondents at three private universities in Hainan seeking permission to collect survey data. Upon receiving consent, they contacted the teachers via WeChat and sent them questionnaire links to participate in the survey.

Research Results

Based on the research objectives, the data from the study on the Information Literacy Management Model for private university teachers in Hainan province were analyzed, and the findings were categorized into the following four parts:

Part 1: Results of the analysis of frequency and percentage of the personal status of the respondents. The demographic frequency and number analysis of the sample were analyzed as follows: 1) Gender 2) Age 3) Working Experience 4) The Highest Education Level and 5) Professional Title.

Table 1 Results of respondents' Demographics

General Basic information	Subgroup	Frequency	Percentage (%)
1. Gender	Male	196	39.20
	Female	304	60.80
	Total	500	100.00
2. Age	25 years old and below	50	10.00
	26-35 years old	175	35.00
	36-45 years old	184	36.80
	46-55 years old	77	15.40
	56 years old and above	14	2.80
	Total	500	100.00
3. Working Experiences	5 years and below	158	31.60
	6-10 years	97	19.40
	11-15 years	81	16.20
	16-20 years	67	13.40
	Above 20 years	97	19.40
	Total	500	100.00

Table 1 (Continue)

General Basic Information	Subgroup	Frequency	Percentage (%)
4. The Highest Education Level	Bachelor	114	22.80
	Master	313	62.60
	Doctor	70	14.00
	Other	3	0.60
	Total	500	100.00
5. Professional Title	Assistant Lecturer	171	34.20
	Lecturer	174	34.80
	Associate Professor	127	25.40
	Professor	28	5.60
	Total	500	100.00

Part 2: Results of analysis of the mean ($\bar{X}$) and standard deviation (S.D.) of the component of information literacy for private university teachers in Hainan Province.

The factors for the Information Literacy Management Model for private university teachers in Hainan province: all 120 items have an arithmetic mean value ($\bar{X}$) between 3.42-3.84 and a standard deviation (S.D.) between 0.37-0.62 indicates that the respondents' opinions are relatively concentrated. Regarding the importance levels of various key factors, their distributions are all at relatively high levels (Average 3.51 - 4.50 refers at is at a high level). In terms of respondents' opinions, most respondents' evaluations of factor importance levels are concentrated at Level 4, with some at Level 3, and occasional instances of Level 2 and Level 1. Respondents generally agree with most of the content in the questionnaire.

Part 3 Results of the Exploratory Factor Analysis of the component on information literacy management model for teachers in private universities in Hainan Province.

1. KMO and Bartlett's Test of Sphericity values;

Table 2 KMO and Bartlett's Test of Sphericity values

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.977
Bartlett's Test of Sphericity	Approx. Chi-Square	68493.496
	df	7140
	Sig.	.000

Normally, a KMO coefficient above 0.7 is a reasonable level of validity. According to the table, The value of questionnaire KMO in this time was 0.977, the chi-square value of

Bartlett spherical test was 68493.496, the degree of freedom was 7140, and the significance was $0.000 < 0.05$, which indicated that the data passed the validity test and was suitable for subsequent factor analysis. The detailed data is shown in Table 2.

2. Communalities in 120 items;

Communalities is the sum of squares of the loadings of a primary variable on all common factors, representing the degree to which the information contained in each variable can be explained by the extracted principal components, reflecting the degree to which all common factors explain the variance (variation) of the primary variable. According to the analysis of the measured variance, the load coefficients of Q18 and Q62 are all below 0.4, so the load level of the variable factor is insufficient, which can be considered for elimination.

3. Factor Extraction and Rotation;

After Q18 and Q62 items were eliminated, 118 items were left. Factor rotation was performed again after excluding the factor loadings. In the explanatory analysis of the variables' total variance, seven common factors were extracted from the factor analysis. The factors explained 67.53% of the cumulative variance, and the variance explained was above 60%, indicating that the seven screened factors were well represented. As shown in Table 3, the variance explanatory rates of the seven factors are 14.25%, 10.75%, 10.09%, 9.83%, 9.14%, 8.19%, and 5.29%, respectively. Additionally, in Table 3 and Table 4, the descriptive definitions for each Factor are as follows:

Factor 1 = Information literacy Factor (ILF)

Factor 2 = Information Application and Safeguarding Factor (IASF)

Factor 3 = Information Resource Management and Service Factor (IRMSF)

Factor 4 = Communication and Collaboration Factor (CCF)

Factor 5 = Innovation and Development Factor (IDF)

Factor 6 = Management Support Factor (MSF)

Factor 7 = Foundational Information Literacy Factor (FILF)

Table 3 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared			Rotation Sums of Squared		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	61.99	52.54	52.54	61.99	52.54	52.54	16.81	14.25	14.25
2	5.59	4.74	57.28	5.59	4.74	57.28	12.69	10.75	25.00
3	3.45	2.93	60.20	3.45	2.93	60.20	11.91	10.09	35.09
4	2.85	2.42	62.62	2.85	2.42	62.62	11.60	9.83	44.91
5	2.12	1.80	64.42	2.12	1.80	64.42	10.79	9.14	54.06
6	1.96	1.66	66.08	1.96	1.66	66.08	9.67	8.19	62.25
7	1.72	1.46	67.53	1.72	1.46	67.53	6.24	5.29	67.53

*Extraction Method: Principal Component Analysis.

During the item purification process, to ensure the validity and scientific rigour of the scale structure, this study applied stringent criteria for item selection: each item must achieve an absolute factor loading of 0.40 or above on its assigned factor, and the difference in loadings across factors must exceed 0.10. This standard aims to enhance the clarity and discriminative power of the factor structure.

Specifically, Q44 had a maximum factor loading below 0.40 on its assigned factor, indicating a weak association with the latent variable being measured and an inability to reflect the factor's core meaning. It was therefore excluded. Items Q8, Q17, Q30, Q31, Q39, Q40, Q42, Q45, Q46, Q47, Q53, Q55, Q56, Q58, Q59, Q82, Q83, Q84, Q85, Q87, Q88, Q90, Q91, Q92, Q93 and Q94, exhibited factor loadings exceeding 0.40 on their target factors. However, their loadings on other factors were very similar (differences < 0.10), indicating pronounced cross-loading. This tendency risks obscuring the factor structure and reducing each factor's independent explanatory power. These items were also removed. This leaves 91 questions, after removing 29 items.

During the exploratory factor analysis, the authors also applied the principal component analysis method and extracted seven factors with eigenvalues greater than 1. The results showed that these seven common factors explained a total variance of 67.53%, exceeding the 60% standard. Therefore, the survey questionnaire in this study has good structural validity. When evaluating this value, weights are assigned to each component of the 118 items after rotation. We applied an orthogonal rotation using the Varimax method to enhance interpretability. Table 4 presents the detailed results below.

Table 4 The component matrix after the rotation

Item	Component						
	1	2	3	4	5	6	7
Q70	0.70						
Q71	0.66						
Q69	0.64						
Q77	0.64						
Q78	0.64						
Q76	0.64						
Q72	0.63						
Q73	0.62						
Q66	0.62						
Q67	0.62						
Q79	0.59						
Q74	0.58						
Q75	0.56						
Q86	0.56						
Q64	0.55						
Q65	0.54						
Q63	0.54						
Q80	0.53						
Q81	0.53						
Q68	0.53						
Q95	0.52						
Q60	0.48						
Q61	0.48						
Q115		0.78					
Q114		0.77					
Q113		0.76					
Q111		0.74					
Q110		0.67					
Q109		0.67					
Q112		0.66					
Q117		0.65					
Q116		0.64					
Q120		0.63					
Q89		0.53					
Q119		0.52					
Q118		0.49					
Q104			0.73				
Q105			0.73				
Q103			0.71				
Q107			0.69				
Q102			0.67				
Q100			0.67				
Q106			0.66				
Q108			0.64				
Q99			0.63				
Q98			0.63				
Q97			0.61				
Q96			0.59				
Q101			0.56				
Q13				0.70			
Q14				0.67			
Q21				0.67			
Q22				0.66			
Q15				0.65			

Item	Component						
	1	2	3	4	5	6	7
Q11				0.65			
Q20				0.64			
Q12				0.63			
Q19				0.63			
Q10				0.58			
Q16				0.54			
Q41				0.52			
Q9				0.49			
Q36					0.60		
Q34					0.56		
Q35					0.55		
Q37					0.55		
Q57					0.55		
Q33					0.54		
Q52					0.54		
Q54					0.52		
Q38					0.51		
Q48					0.50		
Q43					0.48		
Q32					0.47		
Q23						0.74	
Q28						0.73	
Q25						0.73	
Q27						0.71	
Q24						0.70	
Q29						0.67	
Q26						0.58	
Q50						0.53	
Q49						0.51	
Q51						0.50	
Q2							0.71
Q3							0.69
Q1							0.63
Q4							0.62
Q5							0.60
Q7							0.58
Q6							0.55

Extraction Method: Principal Factor Analysis

Rotation Method: Varimax with Kaiser Normalization

The Figure1, the ideal principal component fraction should be included before the "inflection point" of the gravel plot, that is, those principal components before the significant decrease in variance explained increase rate. The slope between the seventh and eighth factors flattens, indicating a significant reduction in the information explained by the subsequent eighth factor. This shows that the first seven factors already capture most of the information, making the selection of seven factors appropriate.

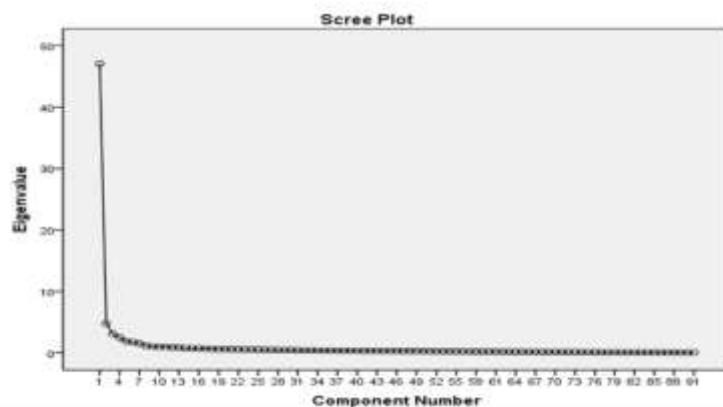


Figure 1 Scree plot

Part 4 Results of content analysis, to propose the Information literacy management Model for private universities teachers in Hainan province.

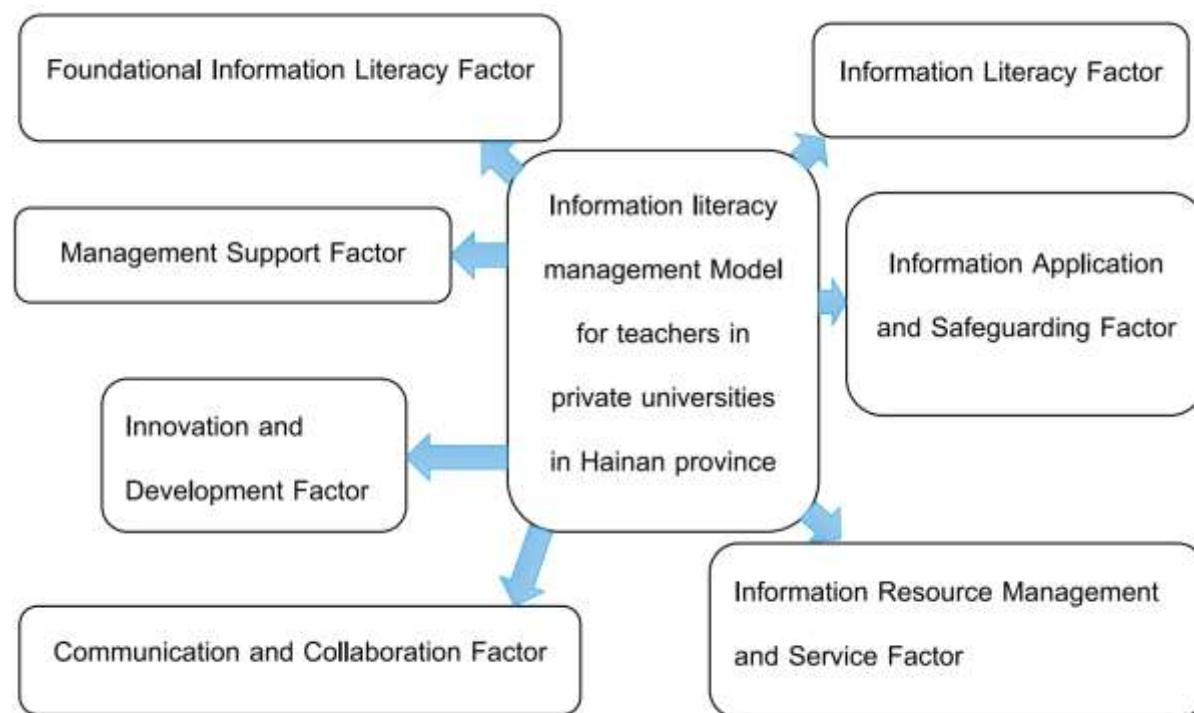


Figure 2 The Information literacy management Model for private universities teachers in Hainan province

As shown in Figure 2, this teacher information literacy management model can be enhanced and improved through seven Factors: Information Literacy Factor, Information Application and Safeguarding Factor, Information Resource Management and Service Factor, Communication and Collaboration Factor, Innovation and Development Factor, Management Support Factor, and Foundational Information Literacy Factor.

Discussion

Through exploratory factor analysis of 120 variable items, 29 items with substandard conditions were excluded, and 7 common factors were extracted. The results are as follows: Component 1 Information Literacy (23 items), which has the highest eigenvalues of 16.81 and the variance got 14.25%; Component 2 Information Application and Safeguarding Factor (13 items), which has the highest eigenvalues of 12.69 and the variance got 10.75%; Component 3 Information Resource Management and Service Factor (13 items), which has the highest eigenvalues of 11.91 and the variance got 10.09%. Component 4 Communication and Collaboration Factor (13 items), which has the highest eigenvalue of 11.60 and the variance is 9.83%. Component 5 Innovation and Development Factor (12 items), which has the highest eigenvalue of 10.79 and the variance is 9.14%. Component 6 Management Support Factor (10 items), which has the highest eigenvalue of 9.67 and the variance is 8.19%. Component 7, Foundational Information Literacy Factor (7 items), has the highest eigenvalue of 6.24 and a variance of 5.29%. These factors not only underscore the multidimensional nature of teachers' information literacy, but also highlight the specific competencies required to meet the digitalization needs of private universities in Hainan Province.

Private universities are a vital component of China's higher education system, and teacher information literacy is a key driver of educational informatization quality. The information literacy management model developed for Hainan's private universities not only establishes benchmarks for teacher information literacy development but also constructs an operational framework. This study identifies and synthesizes seven core elements specifically for Hainan's private universities: 1) Information literacy Factor. Employ diverse information tools to solve problems. Establish a comprehensive, dynamic support network for teacher information literacy through collaborative development involving multiple stakeholders, including administrators, educators, universities, and professional organizations. Centered on inquiry-based teaching and growth mindset, implement diverse interventions (policy ethics, AI technology, internationalization strategies), with Repetition and Follow-up and external engagement. 2) Information Application and Safeguarding Factor. Master the design and development of core digital teaching resources, utilize data analytics models to track learning progress in real time, and construct integrated digital learning environments. Adhere to information ethics and legal regulations, maintain awareness of system security safeguards, and possess comprehensive competencies in technical implementation, resource creation, and risk prevention to ensure secure information-based teaching practices and uphold data integrity. 3) Information Resource Management and Service Factor. The library establishes a systematic framework. Through peer review, it ensures quality control; via document delivery and interlibrary loan services, it enriches content; by providing training, it fosters an information culture and implements an evaluation system. 4) Communication and Collaboration Factor. Share information and collaborate with others. Effectively convey information and utilize team

collaboration tools for interdisciplinary and cross-cultural communication. Employ technological tools to support teaching and gather feedback; within collaborative contexts, respect intellectual property rights, share resources, and foster interdisciplinary cooperation. 5) Innovation and Development Factor. With the support of higher education institutions and expert guidance, transform information into new knowledge, technologies, and solutions through creative thinking, critical thinking, and self-reflection. This encompasses integrating information, creative thinking, and continuous learning. 6) Management Support Factor. Emphasize the provision of resources, policies and environmental support for internal members. This encompasses the development of information infrastructure, training and development, policy formulation, and the cultivation of a supportive culture. The state and higher education institutions provide a multi-faceted support network covering policy, systems, funding and technology. 7) Foundational Information Literacy Factor. Teachers should have foundational knowledge of information security and regulations, information technology and its application in education, information rights, and routine software operations, along with the ability to assess the authenticity, applicability, and timeliness of information.

Integrating this management model into the professional development framework for teachers at private higher education institutions can address pressing issues concerning their information literacy capabilities. For instance, some teachers show insufficient information awareness and lack the capacity to use information resources effectively or employ information technology to solve practical problems. This results in neglecting the transmission of learning methodologies to students and low levels of student information literacy, both of which are detrimental to the healthy and sustainable professional development of private university teachers. (Wang, M., 2024; Ma and Zhou, 2021; Lü, H., 2023; Luo, T., 2021). Specifically, priority should be given to implementing multi-dimensional information literacy management initiatives. This involves establishing a comprehensive, dynamic support network for teacher information literacy through collaborative efforts among multiple stakeholders—including management, faculty members, institutions, and professional organizations. Such collaboration should foster interdisciplinary cooperation to stimulate innovative thinking and establish incentive mechanisms to promote the cultivation of information literacy. By integrating these measures, we can not only address existing shortcomings in information literacy management but also forge a sustainable pathway for the continuous development of teacher information literacy. This model will ultimately enhance the overall quality and effectiveness of information literacy among teachers in private university.

For Further Research

The Sample restricted to 3 universities/reliance solely on EFA without CFA validation. Therefore, to better understand construct validity, it is necessary to conduct confirmatory factor analysis (CFA). Future researchers should use CFA to compare relationships between

factors, more precisely measure the constituent elements of the information literacy management model for teachers in private universities in Hainan Province, and further refine this framework.

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