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Development of Digital Literacy Evaluation Model for Tourism Management of Undergraduate Students

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Abstract

Background and Aims: The digital economy, digital transformation of tourism enterprises, and new forms of employment have created new demands for the study and future career development of tourism management among undergraduate students. The digital literacy level of these students directly impacts their future employment opportunities, skill development, and even the pace of digital development in tourism professional education. The objectives of this research are 1) to extract the components of digital literacy in the tourism management of undergraduate students and 2) to develop a digital literacy evaluation model for the tourism management of undergraduate students.

Methodology: The research reviews relevant theoretical concepts, including digital literacy and information literacy. The processes in this research are as follows: 1) reviewing the theoretical basis of the study 2) defining related concepts such as digital literacy, information literacy, etc. Reviewed research on the digital literacy for tourism management of undergraduate students, providing a theoretical and practical foundation for this paper's research. 2) To take 1,308 tourism management undergraduate students in China as the survey subjects, the current status of their digital literacy was investigated. To analyze the survey results and extract the components of digital literacy among tourism management undergraduate students. 3) We selected 21 experts, used the Delphi method to determine the components of the digital literacy evaluation model, and then used the network analysis method to determine the weight of each component. Finally, we designed a digital literacy evaluation model that is suitable for undergraduate students studying tourism management.

Results: The study's results indicate that the model clearly demonstrates the relationships and relative importance of the components of tourism management for undergraduate students. Teachers can effectively use this model to assess students' digital literacy levels and provide them with personalized support and guidance. Students can use this model to improve their digital literacy levels and adapt to the digital age's development sequentially and purposefully.

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Conclusion: The model clearly shows how tourist management instructional features are weighted. Teachers can measure students' digital literacy with this strategy. Students' digital tourist management skills are improving as teachers customize aid and advise. This method could streamline and personalize education to better prepare students for tourism.

Keywords: Digital Literacy; Digital Literacy Evaluation Model; Tourism Management of Undergraduate Students

Introduction

In the digital age, possessing digital literacy has become a survival skill and a core requirement for individuals to cope with current challenges. It is essential that everyone has good digital literacy (Binytska, 2023The current digital landscape, which includes 5G, big data, artificial intelligence, and the Internet of Things, is significantly impacting people's lives, education, and work. As a result, the talent standards required for a digital society are constantly evolving (Uysal & Kilic, 2022). Therefore, it is imperative that undergraduates possess digital literacy as a necessary survival skill to integrate into society. To enhance their competitiveness, it is urgent that they develop digital skills, abilities, and ethics. Undergraduate students' tourism management skills require improvement in their digital literacy. They should possess a mastery of basic theories, specialized knowledge, and professional skills in tourism management, as well as an international perspective, management skills, technical potential, service awareness, and an innovative spirit. This will enable them to effectively engage in business management within the tourism industry. Undergraduate tourism management students can use digital technology for both their studies and personal lives. However, many students exhibit a relatively low level of digital literacy, evident in their limited comprehension of digital knowledge and skills. This lack of competence may hinder their future work in the tourism industry.

There is currently no digital literacy evaluation model for undergraduate tourism management. The tourism industry's increasing digitalization necessitates professional, versatile, and systematic evaluation tools for assessing students' digital literacy. This will enable students to identify their strengths and weaknesses and improve their digital literacy levels, thereby adapting to the digital world. Additionally, teachers can use these tools to formulate and optimize training goals, plans, and teaching systems for digital literacy education, ultimately improving the overall quality of digital literacy education. However, current research on the digital literacy evaluation model for undergraduate students in China mainly focuses on those majoring in teaching, information, and other fields. There is a lack of a model for evaluating undergraduate students' digital literacy in tourism management. This prevents both teachers and students from clearly defining the digital literacy objectives for

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tourism management majors and from independently achieving these goals. It is important to continuously improve in this area.

Digital literacy covers a variety of abilities, such as proficiently utilizing digital tools, critically assessing digital content, and comprehending the ethical consequences of digital involvement (Ng, 2012). Digital literacy is essential in higher education as it equips students with the necessary skills to meet the digital requirements of the contemporary workforce (Gilster, 1997).Conclude the reserch problems. As the tourism industry increasingly relies on digital technologies, the ability to effectively use these tools becomes essential for future professionals (Huang et al., 2017). The European Digital Competence Framework for Citizens (DigComp) offers a thorough method for evaluating digital skills (Ferrari, 2013). Similarly, the Jisc framework provides a customized model for higher education, emphasizing the significance of digital capacity in academic environments (Jisc, 2014). Incorporating digital literacy into tourism curricula, as proposed by Cantoni and Xiang (2013), entails more than just instructing students on the use of various tools and technology. It also involves cultivating their comprehension of digital marketing, e-tourism, and online consumer behavior.

The creation of a digital literacy evaluation model that is specifically designed for undergraduate students studying tourism management is imperative. This paradigm facilitates educators in accurately evaluating students' levels of digital literacy and serves as the foundation for offering tailored assistance and guidance. These competencies can be developed by educational institutions to better equip students for the digital requirements of the tourism industry.

Objectives

1) to extract the components of digital literacy in the tourism management of undergraduate students and

2) to develop a digital literacy evaluation model for the tourism management of undergraduate students.

Literature Review

Researchers have conducted relevant research to develop a digital literacy evaluation model for the tourism management of undergraduate students. The main contents are as follows:

A. Complexity theory

Edgar Morin, the French thinker, and philosopher is an important contributor to complexity theory. He provides a detailed discussion of the complexity, disorder, and uncertainty of complex systems. What is complexity? Edgar Moran pointed out: "Complexity, derived from the Latin word complexus, means something intertwined (Moran, 2004).

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Complexity is the core of this theory, which believes that human problems are intricate, diverse, and multidimensional. In complex systems, various elements interact, feedback, and influence each other. From the perspective of complexity theory, this study regards the digital literacy evaluation model for tourism management of undergraduate students as a complex system. The evaluation elements in the model are components of this complex system. Complex thinking methods are needed to understand the digital literacy of tourism management of undergraduate students.

B. Digital literacy

Foreign scholars and related institutions and organizations have made relevant definitions and research on the concept and framework of digital literacy. The more representative ones include: Eshet-Alkalai (1994) first proposed the conceptual framework of digital literacy. He believed that digital literacy should include the following contents: picture literacy, recreation literacy, branch literacy, information literacy and social emotions (Eshet-Alkalai, 2004). Allan Martin and Jan Grudziecki (2006) believes that digital literacy is the un-derstanding, attitude and ability of individuals to identify, acquire, manage, integrate, evaluate, and create digital resources using media tools, and to com-municate and express their new knowledge with others (Martin & Grudziecki, 2006). The European Union broadly defines digital literacy as “the ability to use in-formation technologies confidently, critically and innovatively in work, employment, study, leisure and participation in society”. The UNESCO (2018) defines digital literacy as: “The ability to use digital devices and network technologies to securely and reasonably access, manage, understand, integrate, communicate, evaluate and create information for employment, decent work and entrepreneurship, Includes various competencies, namely computer literacy, information and communication technology literacy, information literacy and media literacy”.

Domestic scholars have also conducted research on the concept and framework of digital literacy, but most of them are based on research on the connotation of foreign digital literacy. There is no authoritative conclusion yet. A tonal definition is as follows: Xiao (2006) introduced the concept of digital literacy into China for the first time and introduced Professor Yoram Alkalay's "Digital Literacy Conceptual Framework", pointing out that digital literacy includes not only technical skills, but also cognitive skills, Emotional and social skills are included Xiao, 2006)). Wang et al (2013) proposed that digital literacy is the ability to sublimate and expand based on media literacy, computer literacy, network literacy, information literacy and other literacy. It is people's "survival skills in the digital age" and "the key important asset in the information society". Ling (2020) also compared the definitions proposed by various scholars or institutions and believed that digital literacy is a comprehensive concept, which is formed through the evolution of several literacy such as computer literacy, data literacy, media literacy, information literacy, and network literacy (Ling, 2020).

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To sum up, digital literacy is a survival skill for people based on the digital society. With the rapid development of digital technology and its increasingly profound impact on all areas of society, the components of digital literacy will become increasingly rich. Its connotation mainly includes the following aspects: first, general literacy, which means the use of digital tools, identification, acquisition, sharing, communication and evaluation of digital resources; second, innovative literacy, which means the use of innovative and critical thinking methods to solve problems in study and work; the third is security ethics literacy, which refers to taking the initiative to learn national laws and regulations and maintain the security of the network environment.

C. Digital literacy evaluation model

The main foreign digital literacy evaluation models include: the Horizon Report released by the American New Media Alliance, the "Seven-Component Model of Digital Literacy" proposed by the British Joint Information Systems Committee, the European Union Digital Literacy Framework and the UNESCO's "Global Digital Literacy Framework". The more representative ones are as follows:

Proposed by the European Union in 2022 includes five literacy domains: information and data literacy domain, communication and cooperation domain, digital content creation domain, security domain and problem-solving domain, among which there are 21 specific competencies.

Released a global framework for digital literacy in 2018, including 7 literacy domains including operational domain, information domain, communication domain, content creation domain, safety ethics domain, problem solving domain and career-related domain, among which there are 26 items Specific literacy.

Most domestic research on digital literacy evaluation models draws on foreign experience and constructs corresponding digital literacy evaluation models or index systems for different groups. The target groups studied are mainly teachers, college students, primary and secondary school students, government personnel, etc. The more representative ones include:

Based on the combing of existing concepts and theories, Ping, 2018) summarized the digital literacy of college students into four elements, namely digital attitude, digital thinking, digital knowledge, and digital skills (Ping, 2018).

Liu (2019) conducted an in-depth analysis of the EU DigComp2.1 version of the digital literacy framework, and further adjusted it based on the characteristics of undergraduates in colleges and universities under China's "Double First-Class" construction to arrive at a digital literacy framework for college undergraduates, including 5 literacy domains and 15 Secondary indicators Liu, 2019)

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To sum up, foreign digital literacy evaluation models are more authoritative and comprehensive, while there are fewer domestic digital literacy evaluation models, and there is no digital literacy evaluation model specifically for tourism management of undergraduate students.

D. Related Research

The Relevant research here mainly includes digital literacy, information literacy and media literacy among tourism management of undergraduate students. Representative foreign studies are as follows: Caldevilla-Domínguez et al. (2021) analyzed the scientific results of university-level digital literacy published in the Scopus database. Due to the use of information and communication technology in the above-mentioned Relevance in professional fields, with special emphasis on the study of tourism Caldevilla-Domínguez et al., 2021). Adeyinka Ojo et al (2020) explore the role of digital literacy and employability skills in the emerging digital economy and the disruptive impact on hospitality and tourism operations (Adeyinka Ojo et al, 2020)

Representative domestic studies are as follows: Fu et al. (2021) used literature research, expert consultation, and other methods to construct an evaluation system and evaluation model for tourism undergraduate information literacy and used questionnaire surveys to obtain data for empirical research Fu et al, 2021). Wang (2019) pointed out that in the context of the integration of culture and tourism, tourism colleges that cultivate applied talents also urgently need to strengthen the media literacy of college students and improve their ability to acquire, understand, create, and communicate Wang, 2019)

In summary, scholars have conducted extensive research on information literacy among undergraduate students in tourism management, with digital literacy and media literacy following closely behind. Research on the information literacy of tourism management among undergraduate students focuses mainly on current situation surveys, evaluation systems, training strategies, training models, and so on.

Conceptual Framework

An undergraduate tourism management digital literacy evaluation model is described in the conceptual framework. The Delphi method assures that the model is based on expert consensus, making it a powerful tool for improving digital literacy teaching in the field. It specifies important competencies and evaluation criteria and gives a methodical methodology to building and validating the model, assuring its relevance and success in education.

Methodology

This study administered a questionnaire to 1,308 tourism management undergraduate students in China. Additionally, the researcher consulted 21 experts to understand their

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perspectives on the components and weights of digital literacy among tourism management undergraduate students. The researcher will delve into the following topics. The research methodology was divided into the two following phases:

A. The first phase is to answer research objective: to extract the components of digital literacy of tourism management of undergraduate students.

Research steps

1. Design a questionnaire on digital literacy for tourism management of undergraduate students.

2. Send the questionnaire to five experts to solicit their opinions.

3. Collect and process expert opinions using the Index of Item Objective Congruence (IOC) and the rating scale. If the consistency of expert opinions is not high, the questionnaire will be modified and resent to the experts. If the consistency of expert opinions is high, the content of the questionnaire will be determined.

4. Conduct a presurvey at Leshan Normal University and analyze the survey data. If there are errors in the questions and logic, revise them. If there are no questions, a formal questionnaire will be finalized.

5. Submit the formal questionnaire to Questionnaire Star on the internet, and send the address link of the questionnaire to the tourism management of undergraduate students via WeChat or QQ.

6. Collect and process data.

7. Analyze the data using Statistical Package for the Social Sciences.

8. Extract the components of digital literacy of tourism management of undergraduate students.

Population and Sample Group

This phase opted for a non-probability/purposive sampling and employed convenience and purposeful sampling technique. The targeted population was the tourism management of undergraduate students from Chinese universities. A total of 1308 students participated. There are 430, 417 and 420 people in eastern, central, and western China, respectively. There are 355 freshmen, 366 sophomores, 318 juniors, and 309 seniors. There were 627 males and 681 females. There were 692 students who were born in rural areas and 616 students in urban areas. This ensures that the sample data is representative.

Research Instruments

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It mainly includes questionnaire and statistical analysis software. The questionnaire is mainly about the digital literacy of tourism management of undergraduate students. The statistical analysis software is Statistical Package for the Social Sciences.

Data Collection

First, we obtained data collection permission from the university and students, then published the questionnaire on the Internet Questionnaire Star, then sent the questionnaire address link to students via WeChat, and finally collected data through Questionnaire Star.

Data Analysis

We used statistical analysis software to analyze the reliability and validity of the questionnaire. The reliability analysis result of the questionnaire, Cronbach's Alpha, is 0.982, which shows excellent reliability, indicating that the results measured using this questionnaire have very high reliability. This study used KMO and Bartlett's test of sphericity (Bartlett) to test the validity of the questionnaire. The KMO value was 0.972, the Bartlett sphericity test statistic was 35898.736 (degrees of freedom 153), and the corresponding significance probability was 0.000. The questionnaire the validity is very good and suitable for data analysis. Due to the correlation between the items of Q14-Q31, the maximum variance method was chosen based on the use of principal component analysis.

B. The second phase is to answer research objective: to develop a digital literacy evaluation model for tourism management of undergraduate students.

Research steps

1. Be based on the results of the first phase of the research, design an expert consultation questionnaire for teachers.

2. Send the questionnaire to five experts to solicit their opinions.

3. Collect and process expert opinions. If the consistency of expert opinions is not high, the questionnaire will be modified and resent to the experts. If the consistency of expert opinions is high, the content of the questionnaire will be determined.

4. Send the questionnaire to 21 experts via WeChat or email (round1).

5. Collect and process the information from the expert questionnaire, conduct consistency analysis, and determine the primary and secondary components if the expert consistency is relatively high.

6. Design an expert consultation questionnaire based on the content of the components and send it to 21 experts via WeChat or email (round 2).

7. Collect and process information from expert questionnaires and conduct reliability analysis.

8. Analyze and explain the components and construct an evaluation model of digital literacy for tourism management of undergraduate students.

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9. Be based on the components of the model, prepare an expert consultation questionnaire on the correlation between the components and send it to 21 experts via WeChat or email (round 3).

10. Collect and process information from expert questionnaires, deter-mine the weights of primary and secondary components, and analyze the weights to form the final digital literacy evaluation model for tourism management of undergraduate students.

Population and Sample Group

This phase opted for a judgment sampling technique. The targeted population was the full-time teachers in Chinese universities. A total of 21 experts participated in the study, comprising of 11 male and 10 female experts. The experts were from various fields including education, computer science, and tourism management, with 7 experts from each field. The participating experts were affiliated with domestic universities such as Leshan Normal University, Northwest Normal University, Chongqing Second Normal University, Huangshan University, Shanxi Normal University, Taishan University, Hezhou University, and Hainan Normal University. Twenty experts have over 10 years of teaching experience, while only one expert has less than 10 years of teaching experience.

Research Instruments

Research instruments mainly includes questionnaire and statistical analysis software. They are the consultation on the components of digital literacy for tourism management of undergraduate students (the first round), the consultation on the components of digital literacy for tourism management of undergraduate students (the second round), and the consultation on the component weights of digital literacy for tourism management of undergraduate students (the third round).

The statistical analysis software includes Microsoft Excel. Statistical Package for the Social Sciences and Super Decisions.

Data Collection and analysis

First, we obtained the consent of 21 experts, then sent the expert consultation questionnaire to 21 experts via WeChat or email, and finally collected data via WeChat or email. We used the Delphi method to distribute, collect, organize and revise two rounds of expert consultation questionnaires in related fields, and then came up with relatively scientific, reliable and complete components and expressions of digital literacy for tourism management of undergraduate students.

We used the analytical network hierarchy process to construct the correlation structure and hierarchy among the components of digital literacy for the tourism management of undergraduate students and used Super Decisions software to determine the relative weight of each component of digital literacy for the tourism management of undergraduate students.

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Results

A. The components of digital literacy of tourism management of undergraduate students.

We used statistical analysis software to analyze the questionnaire data. As shown in Table 1, a total of four common factors were extracted, and a total of 4 abilities with factor loadings greater than 0.45 were obtained, and the cumulative explanatory variables were 76.388 %.

In addition, since "common factor one" includes Q14, Q 15, Q16, Q17, and Q18. Through the explanation of these questions in the questionnaire, it can be found that these jointly reflect the dynamic reflection of objectively existing digital-related activities in the mind, so "common factor one" is named "Digital awareness."

"Common factor two" includes Q19, Q20, Q21, and Q22. Through the explanations of these questions in the questionnaire, it can be found that these jointly reflect the digital technology knowledge that should be understood in daily study and life, so "common factor 2" is Factor two" is named "Digital technology knowledge and capabilities".

"Common factor three" includes Q23, Q24, Q2, Q26, and Q27. Through the explanation of these questions in the questionnaire, it can be found that these questions jointly reflect the ability to use digital technology resources to carry out learning activities. Therefore, the "common factor three" is named "Digital application".

"Common factor four" includes Q28, Q29, Q30, and Q 31. Through the explanation of these questions in the questionnaire, it can be found that these questions jointly reflect the responsibility for moral cultivation and behavioral norms in digital activities, so Name "Common Factor Four" "Digital Social Responsibility".

By analyzing the valid data from the digital literacy questionnaire for tourism management of undergraduate students, it can be found that the digital literacy recognized by tourism management of undergraduate students consists of four factors. As shown in Table 2, the Cronbach's alpha of the four common factors above is all above 0.90, indicating that these common factors have very high internal consistency reliability. This also shows that the respondents believe that the digital literacy of tourism management of undergraduate students is divided into the above four categories, which has a certain degree of reliability.

Table 1 Summary table of factor analysis results

Variables	Common factor				Commonality
	one	two	three	four	
Q14	0.741				0.755
Q15	0.733				0.795
Q16	0.636				0.792

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Variables	Common factor				Commonality
	one	two	three	four	
Q17	0.632				0.835
Q18	0.539				0.826
Q19		0.785			0.825
Q20		0.824			0.866
Q21		0.839			0.861
Q22		0.876			0.861
Q23			0.803		0.861
Q24			0.695		0.848
Q25			0.713		0.847
Q26			0.782		0.832
Q27			0.785		0.832
Q28				0.851	0.892
Q29				0.871	0.912
Q30				0.833	0.879
Q31				0.852	0.885
Eigenvalues	13.75	4.452	2.565	1.344	
Variance percentage cumulative	76.388	84.454	87.593	89.503	

Table 2 Scale reliability and descriptive statistics

Factor	n	Cronbach's alpha	*M*	*S.D.*
Digital awareness	5	.96 2	3.743	4.548
Digital technology knowledge and skills	4	.958	3.515	3.681
Digital applications	5	.967	3.580	4.525
Digital social responsibility	4	.972	3.884	4.062

B. Results of the first and second rounds of expert consultation

After the first and second rounds of expert consultation, the consistent results are shown in the Table 3. The average score (M) of the 4 primary components and 15 secondary components of digital literacy for tourism management of undergraduate students is all above 4 points, accounting for 100%, the full score rate(K) is also higher than that of the previous

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round. In addition, it can be seen from the four-point difference (Q+-Q-) that the four-point difference of all components is less than 1, indicating that the experts have a high degree of consistency in the second round of consultation. In terms of the consistency of expert opinions reflected by the standard deviation, the overall standard deviation values are less than 1, indicating that all components are consistent. The above data can show that in the second round of consultation questionnaires for 21 experts, the opinions obtained are highly consistent.

Table3 Consistency reflection form for the second round of expert consultation opinions

Components	M	K	Middle number	Mode	S. D	Q +	Q-	Q + - Q-	Degree of consistency
First level components									
Digital awareness	4.00	80.00	4.00	4	0.548	4.00	4.00	0.00	high
Digital knowledge	4.43	88.57	4.00	4	0.507	5.00	4.00	1.00	high
Digital ability	4.71	94.29	5.00	5	0.463	5.00	4.00	0.00	high
Digital responsibility	4.29	85.71	4.00	4	0.561	5.00	4.00	0.00	high
Secondary components									
Digital understanding	4.19	83.81	4.00	4	0.602	5.00	4.00	1.00	high
Digital willingness	4.10	81.90	4.00	4	0.539	4.00	4.00	0.00	high
Digital determination	4.10	81.90	4.00	4	0.539	4.00	4.00	0.00	high
Digital basic knowledge	4.24	84.76	4.00	4	0.700	5.00	4.00	1.00	high
Digital professional knowledge	4.38	87.62	4.00	4	0.498	5.00	4.00	1.00	high
Digital hardware knowledge	4.29	85.71	4.00	4	0.561	5.00	4.00	1.00	high
Digital software knowledge	4.57	91.43	5.00	5	0.507	5.00	4.00	1.00	high
Data collection and processing	4.38	87.62	4.00	5	0.669	5.00	4.00	1.00	high
Digital content creation	4.19	83.81	4.00	4	0.680	5.00	4.00	1.00	high
Digital communication cooperation	4.29	85.71	4.00	4	0.644	5.00	4.00	1.00	high

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Components	M	K	Middle number	Mode	S. D	Q +	Q-	Q + - Q-	Degree of consistency
Professional problem solving	4.33	86.67	4.00	4	0.483	5.00	4.00	1.00	high
Digital innovation and entrepreneurship	4.29	85.71	4.00	4	0.561	5.00	4.00	1.00	high
Digital ethics	4.19	83.81	4.00	4	0.602	5.00	4.00	1.00	high
Digital governance	4.24	84.76	4.00	4	0.539	5.00	4.00	1.00	high
Digital security	4.24	84.76	4.00	4	0.700	5.00	4.00	1.00	high

In addition, for the degree of consistency of the 21 expert opinions, in addition to the analysis of the above basic data, it is still necessary to calculate the coordination coefficient of expert consultation opinions to further determine the degree of consistency. The value range of Kendall's coordination coefficient (W) is between 0 and 1. The closer the value is to 1, the higher the degree of expert consistency. After non-parametric testing in SPSS, the coordination coefficient table of the two rounds of expert consultation opinions was calculated as shown in Table 4. The coordination coefficient of the first round of expert consultation questionnaire was 0.298 and 0.036 respectively for the primary and secondary components. Compared with the first round, the expert coordination coefficient of the second round was 0.298 for the primary and secondary components. reached 0.340 and 0.052 respectively, which were both higher than the coordination coefficients of the first round of expert consultation opinions, and the difference between the results of the two rounds of expert consultation opinions was extremely significant. The results of the first and second rounds of expert consultation are highly consistent, and the results of the two rounds of surveys are advisable.

Table 4 The degree of coordination between the two rounds of expert consultation questionnaires

Index	First round			Second round		
	Kendall's Harmony Coefficient	Chi-square value	Significance	Kendall's Harmony Coefficient	Chi-square value	Significance
	W	X^2	*P*	*W*	X^2	*P*
First level components	0.298	18.796	0.000	0.340	21.449	. 000

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Index	First round			Second round		
	Kendall's Harmony Coefficient	Chi-square value	Significance	Kendall's Harmony Coefficient	Chi-square value	Significance
	W	X^2	*P*	*W*	X^2	*P*
Secondary components	0.036	9.096	0.003	0.052	15.255	. 000

In addition to the basic identity information of experts, the degree of authority of consulting experts (Cr) is also an important basis for measuring the reliability of expert consultation in the Delphi method. The expert's authority is calculated by the formula Cr = (Cs + Ca)/2. Among them, Cs is the expert's familiarity with the consulting problem, and different familiarity levels are assigned different quantitative values; Ca is the basis for the expert's judgment on the consulting problem (i.e., intuitive feeling, theoretical analysis, practical (work) experience, relevant understanding at home and abroad), and different quantitative values should be given based on the judgment basis that affects the degree of expert judgment (large, medium, small).

Combining the distribution of expert familiarity and the frequency distribution of expert judgments, it can be calculated that the familiarity (Cs) of 21 experts with the digital literacy of tourism management undergraduates is about 0.857, the judgment basis (Ca) is about 0. 833, and then it can be concluded that the authority coefficient (Cr) of the experts is 0.845, indicating that the 21 experts have a high degree of authority and overall good reliability.

C. The weighting of components of the digital literacy evaluation model

Referring to the previous components of digital literacy for tourism management of undergraduate students, the control layer is composed of "digital literacy for tourism management of undergraduate students " and the primary components, including digital awareness, digital knowledge, and digital ability. and digital responsibility, while the network layer consists of 15 secondary components.

This study first designed an expert consultation questionnaire on the correlation between the elements of digital literacy for tourism management of undergraduate students, and then recycled and processed it to obtain the correlation between each element and element set. Secondly, based on the correlation of each element, a consultation questionnaire on the weight of digital literacy components for tourism management of undergraduate students was designed, using the Satty1-9 scaling method. Ten copies of the above two expert consultation questionnaires were distributed and collected, respectively. The experts surveyed were all experts from the first and second rounds. Through the sorting and analysis of the questionnaire, it was found that all elements (primary components) and element set (secondary components) are not independent of each other there is mutual

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influence and interdependence within them. Therefore, based on the interaction between each element and element set, a network analysis model of digital literacy for tourism management of undergraduate students was formed.

Calculation of the weight of digital literacy components for tourism management of undergraduate students. First, use software to construct a network structure diagram; second, establish a judgment matrix and assign values (note: the judgment matrix must pass a consistency test, C.R. is less than 0.1,); third, calculate the unweighted super matrix and weighted super matrix; third, calculate the limit matrix; Finally, determine the comprehensive ordering of elements.

It can be seen from Table 5 that the weight values of the primary components of digital literacy for tourism management of undergraduate students are ranked as follows: digital ability (0.570) > digital knowledge (0.215) > digital awareness (0.161>digital responsibility (0.054). From the above weight from the ranking of values, it can be found that: first, digital ability has the highest weight value. The current development of educational informatization and the digital living environment have a multi-dimensional impact on students, so they need to have corresponding abilities so that they can adapt to social development. This shows that it is reasonable for experts to assign the highest weight value to it. Secondly, Digital responsibility has the lowest weight value. Possible reasons: Compared with other components, Digital responsibility is the most basic requirement, and the focus of attention is gradually move to knowledge and ability aspects.

On the weight analysis of secondary components. Judging from the total weight value, the top three are digital innovation and entrepreneurship, professional problem solving, and digital security. Digital innovation, entrepreneurship and professional problem solving are relatively high and difficult abilities for students to master. Digital security has now become a focus of attention in the digital society. The last three are digital willingness, digital determination, and Digital understanding, all of which belong to digital awareness.

Table 5 Weight distribution of digital literacy components for tourism management of undergraduate students.

Primary components and their weights	Ranking	Secondary components and their weights	Ranking
Digital awareness (0.161)	3	Digital understanding (0.033)	14
		Digital willingness (0.016)	15
		Digital determination (0.028)	13
		Digital basic knowledge (0.070)	10

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Primary components and their weights	Ranking	Secondary components and their weights	Ranking
Digital knowledge (0.215)	2	Digital professional knowledge (0.077)	7
		Digital hardware knowledge (0.074)	9
		Digital software knowledge (0.076)	8
Digital ability (0.570)	1	Data collection and processing (0.072)	6
		Digital content creation (0.084)	4
		Digital communication cooperation (0.078)	5
		Professional problem solving (0.105)	2
		Digital innovation and entrepreneurship (0.116)	1
Digital responsibility (0.054)	4	Digital ethics (0.042)	11
		Digital governance (0.038)	12
		Digital security (0.091)	3

D. The digital literacy evaluation model for tourism management of undergraduate students.

After the previous analysis, the digital literacy evaluation model for tourism management of undergraduate students as shown in Figure 1 was finally developed.

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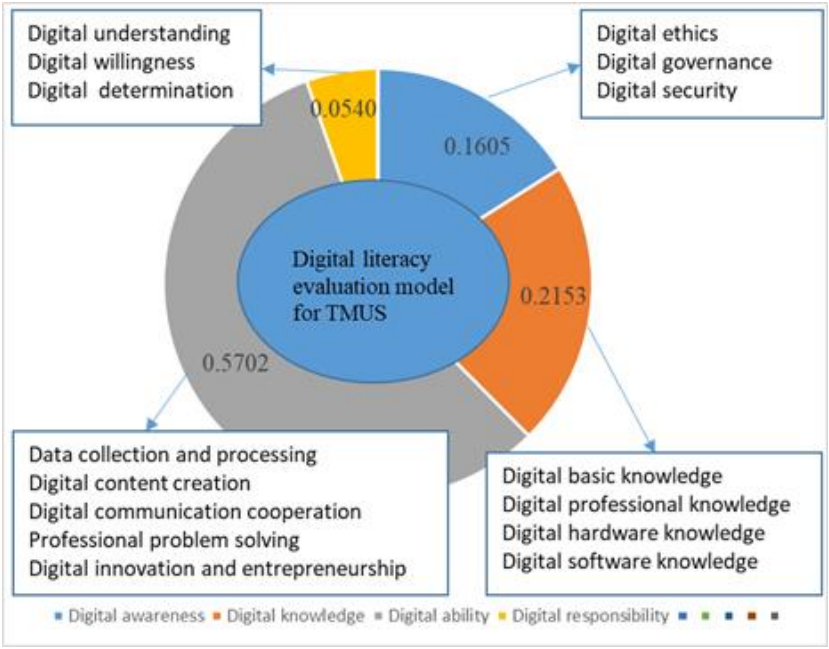

Figure 1 Digital literacy evaluation model for tourism management of undergraduate students (TMUS)

This model is explained and described below:

1) Digital awareness

Digital awareness is the dynamic reflection of objectively existing digital-related activities in the mind, which mainly includes digital awareness, digital will, and digital will. Digital understanding is to understand the value of digital technology in tourism development and professional learning, and to understand the opportunities and challenges that the development of digital technology brings to tourism and professional learning. Digital willingness is the willingness to actively learn and use tourism professional digital technology resources, and the initiative to carry out professional learning digital practice, exploration, and innovation. Digital determination is the confidence and determination to overcome the difficulties and challenges encountered in the digital practice of tourism major learning.

2) Digital knowledge

Digital knowledge is the digital technology knowledge that should be understood in tourism major studies, including digital basic knowledge, digital professional knowledge, digital hardware knowledge, and digital software knowledge. Digital basic knowledge refers to the conceptual connotation, basic theories, principles, and methods of common digital technologies, including cutting-edge knowledge such as big data, virtual reality, and artificial intelligence. Digital professional knowledge refers to the basic theories and research methods of the tourism discipline as well as cutting-edge knowledge related to tourism and digital technology. Digital hardware knowledge refers to the working principles, system composition and operating skills of computers, intelligent terminals, hotel robots, etc. Digital software knowledge is related to tourism majors. Knowledge of the principles, composition and operating skills of relevant application software and system software.

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3) Digital ability

Digital ability is the ability to apply digital technology resources to carry out tourism professional learning, including data collection and processing, digital content creation, digital communication and cooperation, professional problem solving, and digital innovation and entrepreneurship. Data collection processing is the ability to browse, search, filter, evaluate and manage tourism professional data, information, and digital content. Digital content creation is the ability to create and edit tourism professional digital content and express one's ideas through digital means. Digital communication and collaboration Ability to interact and collaborate using digital technologies to share tourism professional information and content with others. Professional problem-solving ability to creatively use digital technologies to solve travel professional problems. Digital innovation and entrepreneurship are the use of digital technology to innovate, start a business or improve existing business models in the tourism industry.

4) Digital responsibility

Digital responsibility is the responsibility for moral cultivation and behavioral norms in the digital society, including digital ethics, digital governance, and digital security. Digital ethics is the observance of moral codes and ethics related to the digital activities of the tourism profession. Digital governance is compliance with laws and regulations related to digital activities in the tourism profession. Digital security is the protection of personal information and privacy, focusing on network security protection.

The digital literacy evaluation model for tourism management of undergraduate students has following advantages: Firstly, the model's construction is guided by complexity theory. This article uses the network analytic hierarchy process, which makes the evaluation model more rational and scientific. Secondly, the model clearly displays the relationship and relative importance of the components of digital literacy for tourism management of undergraduate students. Teachers can effectively use this model to assess students' digital literacy levels and provide them with personalized support and guidance. Students can refer to this model to improve their digital literacy levels and adapt to the development of the digital age sequentially and purposefully. Additionally, the model meets the current ability development needs of tourism management of undergraduate students. It adapts to the development of the times and meets the complex and diverse learning needs of tourism management of undergraduate students. It has also been revised and verified by 21 experts.

Discusion

The findings of this research indicate that digital ability is the most critical component of digital literacy for undergraduate students in tourism management, This hierarchy underscores the paramount importance of equipping students with practical digital skills that enable them to navigate and utilize digital tools effectively in their professional practice. As the tourism industry increasingly integrates digital technologies into its operations, students must develop robust digital abilities to remain competitive and adaptable in a rapidly evolving

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landscape (Buhalis & Law, 2008). The results align with previous studies emphasizing the necessity for higher education institutions to prioritize digital competency development to meet the demands of modern workplaces (Ng, 2012)

Conclusion

Using previous research and analysis, this article defines the connotation of digital literacy for tourism management among undergraduate students. It determines the components and descriptions of digital literacy for this group and proposes an evaluation model. The study employed the network hierarchy method to analyze expert judgments on the importance of digital literacy components for undergraduate students' tourism management. The study resulted in a digital literacy evaluation model for the tourism management of undergraduate students, which considers different levels of importance.

Recommendation

Based on the research findings that identified the weight values of the primary components of digital literacy for tourism management of undergraduate students, the following recommendations aim to enhance the development and assessment of digital literacy within this educational context.

1. Prioritize the Development of Digital Abilities by enhance the Curriculum that integrate advanced digital skills training into the curriculum.

Also arrange practical training which increase opportunities for hands-on experience through simulations, internships, and real-world projects that require the application of digital tools and technologies.

2. Enhance Digital Awareness. Develop students' critical thinking skills by engaging them in activities that require evaluating digital information and sources for credibility and reliability. Furthermore, educator should organize awareness campaigns and guest lectures by industry experts to discuss the impact of digital technologies on tourism and the importance of being digitally aware.

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