

Research on the Influencing Factors of Information Literacy of University Teachers and Students in the Age of Digital Intelligence

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Abstract. With the rapid development of information technology, information literacy has become one of the basic literacies of college teachers and students. Based on the research of the existing literature, this paper studies the influencing factors of the information literacy of teachers and students in universities in the age of digital intelligence, and uses the binary logistic regression method to distinguish and explore the degree of each influencing factor. This article uses SPSS for data analysis. From the analysis results, it can be seen that the network computer technology, the network autonomous learning ability and the comprehensive quality of teachers and students in colleges and universities are positively correlated with the information literacy level. Based on the factors affecting the information literacy of teachers and students in colleges and universities, this paper discusses the relevant countermeasures to improve the information literacy level of teachers and students in colleges and universities.

Keywords: Information literacy; Influencing factors; The age of digital intelligence.

1. Introduction

The report of the 20th National Congress of the Communist Party of China put forward the idea of promoting the digitalization of education, building a learning society and a learning country with lifelong learning for all, which points out the direction for improving the overall information literacy of the public. In the digital intelligence society with the continuous development of information technology, modern education has influenced the implementation way and evaluation system of traditional education in colleges and universities, and put forward transformative requirements for the basic quality of teachers and students in colleges and universities. Information literacy has become one of the basic quality of teachers and students in colleges and universities. Therefore, facing the impact of big data, cloud computing, artificial intelligence, the Internet of Things, blockchain and other technologies, as the first resource of education development, colleges and universities must keep pace with the times, constantly improve the awareness of information literacy of college teachers and students, make full use of online libraries, big data, cloud computing, artificial intelligence and other multimedia digital tools, change the original education model, and promote the integration and innovative application of information literacy and education.

2. Literature Review

The concept of Information Literacy can be traced from media literacy, digital literacy and network literacy, which are superimposed and unified with each other, and finally constitute Information literacy, a relatively independent and generalized conceptual category. Many scholars at home and abroad have creatively proposed a new information literacy based on American book retrieval skills. This idea is a product of the comprehensive informatization of society in the process of the rapid development of information. With the development of information technology, there is a large amount of indiscriminated and various types of information from computer networks, information communication systems and information databases in the American education process. Therefore, American scholars creatively put forward the concept of information literacy, the main purpose of

which is to teach people how to process, apply and transfer information in the information age. It can be seen from the origin of information literacy that the proposal of information literacy is based on a field of science and technology, with the purpose of cultivating people's ability to acquire and use information. The introduction of such an applied concept makes countries pay more attention to it and provides a strong impetus for the development of information literacy education.

2.1 Foreign Research Status

Information literacy refers to a kind of basic ability that people need to possess in the information age such as big data, cloud computing, artificial intelligence, Internet of Things and blockchain, including three levels of cultural literacy, information awareness and information skills. It was first proposed by Paul Zekowski, president of the Information Industry Association of the United States in 1974, and then it was gradually expanded and enriched into four aspects which contained information awareness, information ability, information ethics and information creation [1]. With the continuous development of science and technology, the importance of information literacy in the Internet environment is becoming increasingly prominent. In 1979, the Information Technology Industry Council of the United States proposed that in order to ensure the quick and effective solution of various problems, the degree of people's use of information technology and skills is called information literacy. Patrieia Breivik (1987) proposed that information literacy is the best channel for people to acquire information, to fully understand and analyze information, and to screen valuable information and improve the ability to store information through the analysis of information structure. In 1989, in the annual report of the American Library Association (ALA) on information literacy, information literacy was defined as the ability of individuals to effectively search for the information they need and make reasonable use of it. In 2000, the ACRL promulgated the Standards for Information Literacy Competence in Higher Education, which continued to define information literacy as a combination of the following abilities. They were identifying information needs, locating information, evaluating and effectively using information [2]. Dufva pointed out that in order to grasp the nature and future of the digital age and break the information dilemma, it is necessary to understand the importance of digitalization more widely in the field of education and improve their own ability [3].

2.2 Domestic Research Status

Xinmin Sang focused on the structure and goal system construction of information literacy. He divided information literacy into three levels and six aspects. The three levels were the ability to control information, the ability to use information technology to learn and communicate, and the cultivation of citizen personality in the information age [4]. Keqiang Li believed that a person's information literacy mainly included three aspects which contained the level of information technology, the ability to obtain information and the attitude of integrating information into society [5]. Guonong Nan believed that information literacy mainly included information technology awareness, information technology knowledge, information technology ability, information processing ability, information exchange ability, information processing ability and information technology ethics [6]. Information literacy had become the basic ability of people to survive in the information society, which was of great significance to the development of individuals and society. Nan Jiang discussed the overview of college students' information literacy, the way of information retrieval and how to improve the innovative education of college students' information literacy [7]. Zhiting Zhu pointed out that information literacy was people's understanding of information and the comprehensive quality reflected in relevant information activities, including consciousness, thinking, means, ethics and other contents. Jiqing Wang pointed out that information literacy was people's ability to obtain, utilize and develop information, which could be realized through cultivation [8]. Yang Wang studied the influencing factors of information literacy through algorithm recommendation technology and pointed out that only by improving users' own information literacy could they avoid being trapped in information cocoon and other difficulties [9]. Xiaen Jin and

Bangyou Ding believed that the realization of the value of big data depended on people's information literacy level and the ability of big data processing technology [10]. Yicheng Wang pointed out that strengthening users' own information literacy level was the long-term countermeasure to improve information literacy by building an embedded information literacy education model [11].

2.3 Review of Research Status

With the development of society, the connotation of information literacy is constantly enriched and expanded. It has gradually become a necessary basic ability for teachers and students in colleges and universities in the age of digital intelligence, as well as one of the basic qualities for innovative talents. According to the concept of information literacy and its historical evolution, information literacy is a concept that keeps pace with the times. Many scholars at home and abroad have been constantly studying the issue of information literacy. With the change of the times, the research of information literacy is also changing, and keeps pace with the times. The United States Department of Education believes that it is necessary to incorporate information literacy courses into the existing curriculum content, change the traditional education model, and adopt more open and flexible education methods, so that every college student can play their information wisdom in the information ecosystem. In the process of information technology and knowledge explosion, countries all over the world have been paying continuous attention to information literacy. Although the existing literature has explained the importance and necessity of information literacy from various perspectives, there is a lack of in-depth analysis of its influencing factors. Therefore, by integrating relevant literature and issuing questionnaires and other forms, this paper analyzes the influencing factors of information literacy of teachers and students in colleges and universities.

3. Analysis of Influencing Factors of Information Literacy in the Age of Digital Intelligence

Through the study of a large number of relevant literature and the release of the questionnaire on factors affecting information literacy of teachers and students in colleges and universities, it can be concluded that three important factors affecting information literacy are computer network technology, network autonomous learning ability and the comprehensive quality of teachers and students in colleges and universities, as shown in Figure 1. Computer network technology refers to the realization of resource sharing and information transmission under the management and coordination of network operating system, network management software and network communication protocol. Network autonomous learning ability refers to the ability of learners to make learning plans by themselves using network media. The comprehensive quality of college teachers and students refers to their knowledge level, moral cultivation and information literacy ability.

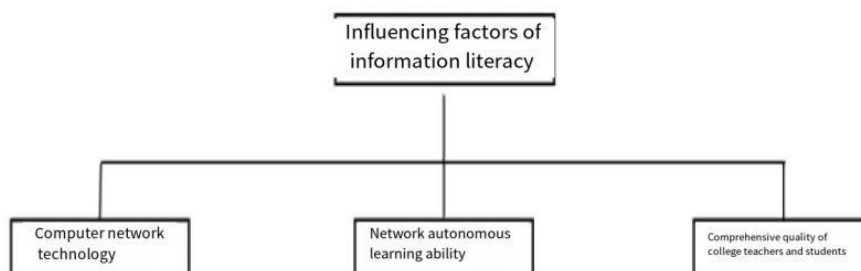


Figure 1. Influencing factors of information literacy

In the construction and development of information society, the level of computer network technology is closely related to the improvement of information literacy. The rapid development of information provides a way for network independent learning. The development of comprehensive quality and the level of information literacy complement each other. In this paper, IBM SPSS Statistics will be used to analyze the three influencing factors of information literacy, to find out the

specific relationship between influencing factors and information literacy, so as to facilitate the development of relevant suggestions on improving information literacy.

3.1 The Relationship between Network Autonomous Learning ability, Computer Network Technology and Information Literacy

In recent years, with the popularization of computer and Internet, colleges and universities have launched college curriculum teaching reform in the Internet era, and advocated the establishment of a college curriculum teaching model based on computer and network in accordance with the new Curriculum Requirements [12]. The introduction of multimedia technology, teaching software and digital learning platform provides a broad platform for training college students' self-learning ability. Students can use wireless networks, computers and smart phones for independent learning anytime and anywhere [13]. In this context, the requirement of network autonomous learning ability of teachers and students in colleges and universities is becoming higher and higher. Using the Internet autonomous learning ability and mastering computer network technology have become important factors affecting information literacy.

In this thesis, network autonomous learning ability is divided into four stages, which are strong, strong, average and weak, and IBM SPSS Statistics will be used to analyze the specific relationship between network autonomous learning ability and information literacy.

Classification variable coding						
			Parameter coding			
			Frequency	(1)	(2)	(3)
Network autonomous learning ability	0		15	000.	000.	000.
	1		39	1.000	000.	000.
	2		27	000.	1.000	000.
	3		19	.	000.	1.000

Figure 2. Classification and coding table of network autonomous learning ability

As can be seen from the classification and coding table of network autonomous learning ability in Figure 2, weak network autonomous learning ability is the reference item. Code (1) is average network autonomous learning ability. Set as a. Code (2) is strong network autonomous learning ability. Set as b. Code (3) is strong network autonomous learning ability. Set as c. Meanwhile, computer network technology is set as d.

Omnibus test of model coefficients				
		Chi-square	Degrees of freedom	Salience
Step 1	Steps	22.182	4	000.
	block	22.182	4	000.
	Models	22.182	4	000.

Figure 3. Omnibus test diagram of model coefficients

As can be seen from the Omnibus test diagram of model coefficient in Figure 3, the significance P value of the model is <0.05, indicating that the model is feasible.

Model summary

Steps	-2 logarithmic likelihood	Cox-snell R squared	Nagorko R square
1	120.0223	148.	199.

Figure 4. Model Summary 1

Model summary

Steps	-2 logarithmic likelihood	Cox-snell R squared	Nagelkerke R square
1	113.876	199.	268.

Figure 5. Model Summary 2

As can be seen from the -2 log-likelihood comparison between model abstract 1 in Figure 4 and model abstract 2 in Figure 5, the -2 log-likelihood decreases somewhat, indicating that the fitting effect of the model is better at this time.

Hosmer-lemeshaw test

step	Chi-square	Degrees of freedom	Salience
1	.912	6	.989

Figure 6. Homes-Lemeshaw test diagram

According to the HL fitting coefficient in Homers-Lemeshaw test figure in Figure 6, its significance is $0.989 > 0.05$, which also indicates that the model has a good fitting effect.

Variable in an equation

		B	Standard error	Wald	Degrees of Freedom	Salience	Exp(B)
Step 13	Computer Networking Techniques (1)	1.123	463.	5.892	1	.015.	3.074
	Network autonomous learning capability			11.828	3	.008.	
	Network autonomous learning ability (1)	2.490	850	8.591	1	.003.	12.065
	Web-based autonomous learning Ability (2)	2.771	890.	9.689	1	.002.	15.974
	Network autonomous learning ability (3)	3.102	.951	10.643	1	.001.	22.252
	Constant	2.651	850.	9.720	1	.002.	.071

a. Variables entered in Step 1: computer network technology, network autonomous learning ability.

Figure7. Logistic regression equation

It can be seen from the table of logistic regression equation in Figure 7, compared with teachers and students in colleges and universities with poor network autonomous learning ability, the information literacy of teachers and students in colleges and universities with average network autonomous learning ability will be improved by 12.065 times. Compared with teachers and students with poor network autonomous learning ability, the information literacy of teachers and students with high network autonomous learning ability will be improved by 15.974 times. Compared with teachers and students with poor network autonomous learning ability, the information literacy of teachers and students with high network autonomous learning ability will be improved by 22.252 times. Compared with the teachers and students with poor network autonomous learning ability, the information literacy of the teachers and students with higher computer network technical ability is 3.074 times higher.

At the same time, the logistic regression equation about information literacy can also be obtained:

$$\ln \frac{p}{1-p} = 2.49a + 2.771b + 3.102c + 1.123d - 2.651$$

3.2 The Relationship between Comprehensive Quality and Information Literacy of Teachers and Students in Colleges and Universities

In the rapid development of digital intelligence era, the development level of comprehensive quality and the level of information literacy complement each other, while college students are the new force of national scientific and technological innovation and development, university teachers are the craftsmen who cultivate and shape senior scientific and technological talents, and the overall improvement of the comprehensive quality of college teachers and students is the general requirement and trend of social development. This paper will use IBM SPSS Statistics to specifically analyze the correlation between the comprehensive quality and information literacy of teachers and students in colleges and universities.

Categorical variable coding

		Frequency	Parameter coding		
			(1)	(2)	(3)
Comprehensive quality of teachers and students in colleges and universities	weak	15	000.	000.	000.
	1	39	1.000	000.	000.
	2	27	000.	1.000	000.
	3	19	000.	000.	1.000

Figure 8. Classification and coding of comprehensive quality of teachers and students in universities

The comprehensive quality of teachers and students in colleges and universities is divided into four stages, namely high, high, average and low. As can be seen from the classification and coding of comprehensive quality of teachers and students in colleges and universities in Figure 8, low comprehensive quality of teachers and students in colleges and universities is the reference item, code (1) is average comprehensive quality of teachers and students in colleges and universities, set as X1, code (2) is high comprehensive quality of teachers and students, set as X2, code (3) is high comprehensive quality of teachers and students in colleges and universities, set as X3.

Omnibus test of model coefficients

		Chi-square	Degrees of freedom	Salience
Step 1	Steps	16.036	3	001.
	block	16.036	3	001.
	Model	16.036	3	001.

Figure 9. Test diagram of model coefficient

As can be seen from the model coefficient test chart in Figure 9, the significance P value of the model is <0.05, indicating that the model is feasible.

Hosmer-lemeshaw test

step	Chi-square	Degrees of freedom	Salience
1	000.	2	1.000

Figure 10. Homes-Lemeshaw test diagram

As can be seen from the HL fitting coefficient in Homers-Lemeshaw test figure in Figure 10, its significance is >0.05, indicating that the model has a good fitting effect.

		Variable in an equation					
		B	Standard error	Wald	Degrees of Freedom	Salience	Exp(B)
Step 13	Comprehensive quality of college teachers and students			10.937	B	.012	
	Comprehensive quality of teachers and students in colleges and universities (1)	2.342	.828	8.003	1	.005	10.400
	Comprehensive Quality of teachers and students in colleges and Universities (2)	2.565	.862	8.848	1	.003	13.000
	Comprehensive quality of teachers and students in colleges and universities (3)	2.901	.921	9.923	1	.002	18.200
	Constant	1.872	.760	6.073	1	.014	154

a. Variable input in Step 1: comprehensive quality of college teachers and students.

Figure 11. Logistic regression equation

According to the logistic regression equation table in Figure 11, compared with teachers and students with low comprehensive quality in universities and colleges, the information literacy of teachers and students with average comprehensive quality will be improved by 10.4 times. Compared with teachers and students in colleges and universities with low comprehensive quality, the information literacy of teachers and students in colleges and universities with high comprehensive quality will be improved 13 times. Compared with teachers and students in colleges and universities with low comprehensive quality, the information literacy of teachers and students in colleges and universities with high comprehensive quality will be increased by 18.2 times.

At the same time, the logistic regression equation about information literacy can also be obtained:

$$\ln \frac{p}{1-p} = 2.342X_1 + 2.565X_2 + 2.901X_3 - 1.872$$

4. The Countermeasures to Improve the Information Literacy of College Teachers and Students in the Age of Digital Intelligence

The above logistic regression analysis results show that the level of information literacy is positively correlated with the three influencing factors. In order to effectively improve the information literacy level of teachers and students in colleges and universities, most of the management departments of colleges and universities ignore the importance and necessity of information literacy education and have not built a systematic curriculum system of information literacy education, leading to the weak awareness of teachers and students in colleges and universities. There are a series of problems, such as the lack of independent learning ability and the general or even weak computer network technology of college teachers and students. This paper suggests that colleges and universities should comprehensively improve the awareness of information literacy of teachers and students, and urge them to make full use of digital intelligence tools such as big data and cloud computing. At the same time, it is also necessary to speed up the pace of changing the traditional education model and improving the information literacy of teachers and students.

4.1 Improving Awareness of Information Literacy

Improving information literacy is the key to the overall development of college teachers and students in the age of digital intelligence. In the future society, with the rapid development of information technology and the development of online learning resources, the ability of teachers and students in colleges and universities to effectively obtain, evaluate and utilize the required educational information has become one of the indispensable qualities of innovative talents in the future society. At the same time, college teachers need to improve their awareness of information literacy, actively

adapt to the changes of educational informatization such as artificial intelligence and information technology, change their educational concepts, improve the educational concepts of information literacy, and flexibly use information technology to carry out education and teaching, which are the fundamental requirements for future teacher career development [14]. College students must improve their awareness of information literacy, develop good moral character of information literacy and enhance their comprehensive quality. It includes actively abiding by the social norms of Suzhi, legally communicating with the world of Suzhi and actively participating in the governance of Suzhi space.

4.2 Make Full Use of Digital Intelligence Tools

For college teachers and students in the digital intelligence era, college teachers should update their original educational concepts and make full use of sufficient educational resources such as National Library of China, provincial official libraries, university libraries and national public service platform of educational resources to improve their information literacy. At the same time, digital intelligence tools such as cloud computing, big data and blockchain can also be used to pay attention to the training of information technology for college students, requiring future teachers to have the awareness of improving information literacy fundamentally. In addition, college teachers should have the initiative awareness, application ability and continuous practice, including making full use of digital tools such as online library and multimedia as well as flexible use of information tools to select resources of high-quality education and teaching practice and appropriate teaching mode to improve the comprehensive information literacy of teachers and students.

For college students, they should establish a positive learning attitude, uphold the concept of lifelong learning, make full use of rich learning resources on various network platforms such as China National Digital Library, China Digital Science and Technology Museum, National Map Open Course and China MOOCs, and constantly improve their information literacy level and relevant application ability [15]. At the same time, college students should not only strengthen information literacy, but also improve information awareness and screen real information. Make full use of digital intelligence tools such as cloud computing, big data and blockchain in the age of digital intelligence to constantly enrich and strengthen oneself, read extensively, accumulate and filter, and integrate knowledge structure comprehensively until it becomes a part of oneself [16]. As a result, college students should promote the lifelong learning system of our country to a higher level and higher quality, and contribute to building a learning society and a learning country.

4.3 Change the Traditional Education Model

Promote the transformation of higher education models in the era of digital intelligence, and change traditional techniques and methods. In the modern digital-intelligent society, the rapid development of information technology not only promotes the revolution and innovation of education, but also profoundly changes the education mode of all kinds of schools at all levels. Various practical conclusions show that the educational concept, teaching method, school-running mode, management system and guarantee mechanism will develop with the development of information technology and science and technology. Therefore, in view of the problems existing in information literacy education and teaching in colleges and universities, it is urgent to promote the reform of college education mode in order to improve the continuous improvement of information literacy of teachers and students in the age of digital intelligence.

5. Conclusion

The reform of modern education has impacted the implementation method and evaluation system of the original education in colleges and universities, and put forward transformative requirements for the basic quality of teachers and students in colleges and universities. Information literacy will become one of the basic quality of teachers and students in colleges and universities. Taking teachers and students in colleges and universities as an example, this study uses logistic regression to analyze

the influencing factors of information literacy of teachers and students in colleges and universities in the digital-intelligence era and puts forward suggestions. Generally speaking, only by constantly improving the awareness of information literacy of college teachers and students, making full use of digital intelligence tools such as big data and cloud computing, and changing the traditional education mode, can the information literacy level of college teachers and students in the digital intelligence era be effectively improved, helping to build a high-quality education support system, and accelerating the realization of education modernization.

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