



An Empirical Analysis on the Information Literacy of College Students in Guizhou Province

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Abstract. In today's era of intelligence, personal information literacy is becoming more and more important, and the university stage is an important period for the development of information literacy. Research on how to improve college students' information literacy is very necessary. This study takes college students from a university in Guizhou Province as the research object, investigates their network information literacy through a questionnaire survey. The collected data were analyzed by ANOVA and T test, and results indicate that: (1) There are significant differences in information understanding and information creation among college students of different genders; (2) The information literacy of college students increases with the increase of grades. (3) There are also differences in the information literacy of college students in different disciplines, and (4) there is no significant difference in information literacy whether students study information courses or not. On this basis, corresponding suggestions are put forward, which have certain reference significance for the education of information literacy of college students in other universities in Guizhou Province.

Keywords: Information Literacy · College students · ANOVA · T-test

1 Introduction

We are now in the era of intelligence. Many new things and rapid changes are the characteristics of this era. This requires us to maintain continuous learning and establish the concept of lifelong learning [1]. Secondly, the amount of information generated every two days is the record of human history and civilization. Since 2003, the sum of all the information has been complicated. How to better extract the information you need? These will eventually test a person's information literacy. Contemporary college students are a new generation accompanied by the Internet. During their university studies, they need to acquire a large amount of information for more effective learning, which requires higher information literacy for students [2].

Guizhou Province is one of the underdeveloped provinces in higher education in my country. According to the second round of the national double-first-class universities list announced by the Ministry of Education in 2022, there is currently only one double-first-class university in Guizhou Province, and the school has only one double-first-class major. The road to prosperity of higher education in Guizhou Province still needs

a long process. However, the economic construction of Guizhou Province requires a large number of outstanding graduates. Most of these students come from colleges and universities in the province. Information literacy is one of the most important skills in the work process. Information literacy of university students is directly related to the future talent development of the country [3]. Therefore, the information literacy education of college students is placed in front of colleges and universities. This paper selects the students of a university in Guizhou Province as the research object, this university is not a double first-class university, investigates and analyzes the information literacy of the university students, and puts forward suggestions for improving students' information literacy. Cultivation has certain reference significance.

2 Information Literacy

In 1974, Paul Zurkowski, president of the American Information Industry Association, first defined information literacy (Information Literacy), he pointed out that information literacy is to obtain a large amount of information from multiple information sources by relying on information tools, which can improve the ability to solve technical and technical problems. Scholars agree with this concept [4], but different scholars have their own interpretations of the dimension of information literacy. The author reviewed relevant literature and sorted out the definition of the dimension of information literacy for college students by Chinese information literacy researchers. Luo Yi [5] believes that college students' information literacy should have six dimensions, namely information understanding, information selection, information application, information evaluation, information reflection and information creation ability; Zeng Lifang and Yang Tonghua [6] believe that college students' information literacy has four dimensions, namely intelligent knowledge, computing Thinking, programming ability and intelligence ethics; Zhang Min et al. [7] believe that there are four dimensions of college students' information literacy, namely information awareness, computational thinking, digital learning and innovation, and information social responsibility; Luo Yi and Wei Zhichun [8] Information literacy is divided into two dimensions, namely, college students' information technology understanding ability and college students' information technology application ability. Wu, ChunYu et al. [9] also divided the information literacy dimension of medical students into four dimensions: information awareness, information knowledge, information ability and information ethics.

3 A Sample Survey on the Information Literacy of Students in a University in Guizhou Province

3.1 Questionnaire Determination

The research object of this paper is the college students of a university in Guizhou Province. 95% of the students in this university are from Guizhou Province. After graduation, most of the students work in Guizhou Province, providing talent support for the development of the commercial and trade circulation industry in Guizhou Province. In order to more comprehensively measure the information literacy of college students in

this school, we adopt the classification of information literacy (Luo Yi, 2021), including information understanding (IU), information selection (IS), information application (IA), information evaluation (IE), information reflection (IR) and information creation ability (IC). Likert 5-level scale, 1 means strongly disagree, 3 means not necessarily, 5 means strongly agree; and added personal information including gender, grade, subject studied, whether they have received library admission education and training, whether they have studied Have taken computer basic courses for college students, whether you have studied information courses, etc.

3.2 Implementation of Sample Survey

Put all the students of the university into the sample box. The major categories of students in this university are engineering, management and economics. The number of students in management is the largest, followed by economics, and the number of students in engineering is the least. According to grades and subjects, random sampling is carried out according to 10% of the total number of students, 270 samples are taken from the first and second grades, 280 samples are taken from the third grade, and 230 samples are sampled from the fourth grade to generate 1050 samples., the questionnaire survey started on May 1, 2022 and ended on May 30, 2022. A total of 943 questionnaires were recovered, with a recovery rate of 89.8%. The recovered questionnaires were eliminated according to three principles. One is the answer to the questionnaire The time is less than 120 s; the second is that the questionnaires are from the same IP; the third is that all the options in the questionnaire are the same, 89 waste papers are excluded, 40% of the waste papers are concentrated in the fourth grade, because these students are approaching graduation., and some students did not answer seriously at work. After eliminating the invalid questionnaires, 854 valid questionnaires were obtained, with an effective rate of 90.6%.

The results of the questionnaire survey showed that there were 518 female students and 336 male students, 365 management students, 307 economics students, and 182 engineering students, which were roughly in line with the actual ratio of male and female students and the number of subjects in the schools surveyed. There are 261 first-year undergraduates, 217 s-year undergraduates, 270 third-year undergraduates, and 106 fourth-year undergraduates. 686 people have studied basic computer courses for college students, 720 people have studied information courses, and 485 people have received training such as school library admission education.

4 An Empirical Analysis of Students' Information Literacy in a University in Guizhou Province

4.1 Reliability and Validity Test

The reliability of the questionnaire was tested by using SPSS for reliability analysis to obtain the Cronbach's coefficient. Reliability analysis was carried out on the total 59 items and six dimensions of the questionnaire. The results showed that the total Cronbach's coefficient was 0.970. The Cronbach's coefficient of variable IU is 0.785, the

Cronbach's coefficient of variable IS is 0.887, the Cronbach's coefficient of variable IA is 0.900, the Cronbach's coefficient of variable IE is 0.899, the Cronbach's coefficient of variable IR is 0.929, and the Cronbach's coefficient of variable IC is 0.881. The Cronbach's coefficient of variables are all greater than 0.7, indicating that the questionnaire has good reliability.

The validity of the questionnaire was tested by factor analysis to verify the construct validity of the scale. The KMO value of the questionnaire was 0.972, which was much higher than the standard of 0.7, indicating that the questionnaire had good construct validity.

4.2 Descriptive Statistics of Variables

A descriptive statistical analysis was conducted on the six dimensions of information literacy, and the results showed that the mean of IC was the lowest, only 3.0172, and the highest mean was IR, which was 3.5693. The mean of IU is 3.0180, the mean of IS is 3.2101, the mean of IA is 3.3780, and the mean of IE is 3.3728. Through this analysis, we can find that the information literacy level of the students in this college is low. The order of each information literacy ability is: $IR > IA > IE > IS > IU > IC$.

4.3 Difference Analysis of Information Literacy Among College Students of Different Genders

Are there differences in information literacy between male and female students? We analyzed the collected data and found that there were significant differences in IU and IC among students of different genders in the surveyed schools. The average IU of male students (3.07) is higher than that of female students (2.98), and there is a significant difference between male and female students in the IU of college students ($p = 0.042$); the average IS of male students (3.23) is higher than female students (3.20), and there is no difference between male and female students in IS of college students ($p = 0.589$); the average IA of male students (3.36) is lower than that of female students (3.39). There is no difference in the ability of college students to use information ($p = 0.402$); the mean value of IE of male students (3.374) is higher than that of female students (3.372), and there is no difference between male and female students in evaluation ability of college students ($p = 0.971$); The mean value of male students' IR (3.51) is lower than that of female students (3.60), and there is no difference between male and female students in college students' ability to reflect on information ($p = 0.096$); the mean value of male students' IC (3.13) is higher than female students (2.94), and the difference between male and female students in the creative ability of college students is significant ($p = 0.000$). The details are shown in Table 1 and Table 2:

4.4 Difference Analysis of Information Literacy Among College Students of Different Grades

At the university stage, with the in-depth study of the course, theoretically speaking, the literacy level of the students gradually increases. After analyzing the collected data,

Table 1. Comparative analysis of the mean values of information literacy for college students of different genders

Gender		IU	IS	IA	IE	IR	IC
male	mean	3.07	3.23	3.36	3.374	3.51	3.13
	standard deviation	0.73	0.75	0.74	0.73	0.78	0.75
female	mean	2.98	3.20	3.39	3.722	3.60	2.94
	standard deviation	0.58	0.62	0.56	0.57	0.66	0.61
Total	mean	3.02	3.21	3.38	3.37	3.56	3.02
	standard deviation	0.64	0.68	0.63	0.63	0.71	0.68

we can see that the information literacy of the students increases with the increase of the grade. The mean value of IU in the fourth grade (3.12) > the mean value of IU in the third grade (3.07) > the mean value of IU in the second grade (3.04) > the mean value of IU in the first grade (2.87), and there is a significant difference ($p = 0.000$); the mean value of IS of the fourth grade (3.34) > the mean value of IS of the third grade (3.32) > the mean value of IS of the second grade (3.13) > the mean value of IS of the freshman grade (3.09), and there were significant differences in information selection among different grades ($p = 0.000$); the mean of IA in the fourth grade (3.50) > the mean of IA in the third grade (3.43) > the mean of IA in the second grade (3.32) > the mean value of IA in the freshman year (3.28), and there is a significant difference in the use of information in different grades ($p = 0.000$); the mean value of IE in the fourth grade (3.49) > the mean value of IE in the third grade (3.44) > the mean value of IE in the second grade (3.32) > the mean value of the IE in the first grade (3.27), and there is a significant difference in the information evaluation of different grades ($p = 0.000$); the mean value of IR in the fourth grade (3.71) > the mean value of IR in the third grade (3.66) > the mean value of IR in the second grade (3.52) > the mean value of IR in the first grade (3.44), and there is a significant difference in the information reflection of different grades ($p = 0.001$); the mean value of IC in the fourth grade (3.08) > the mean value of IC in the third grade (3.07) > the mean value of IC in the second grade (3.00) > the mean value of IC in the freshman grade (2.94), and the difference was not significant ($p = 0.086$). The details are shown in Table 3 and Table 4:

4.5 Difference Analysis of Information Literacy Among College Students in Different Disciplines

Our data analysis also found that the information literacy of college students in different disciplines is also different, the mean of IU of management students (3.12) > the mean of economics students' IU (2.98) > the mean of engineering students' IU (2.87), and there are significant differences in information comprehension of students in different disciplines ($p = 0.000$); the mean of IS of management students (3.32) > the mean of IS of economics students (3.15) > the mean of IS of engineering students (3.10), and there is a significant difference in the information selection of subject students ($p = 0.000$); the

Table 2. Analysis of variance in information literacy of college students of different genders

Information literacy dimension		sum of square	df	mean square	F	Sig.
IU	Between groups	1.704	1	1.704	4.133	0.042
	within group	351.231	852	0.412		
	Total	352.935	853			
IS	Between groups	0.134	1	0.134	0.292	0.589
	within group	390.080	852	0.458		
	Total	390.213	853			
IA	Between groups	0.284	1	0.284	0.704	0.402
	within group	343.522	852	0.403		
	Total	343.806	853			
IE	Between groups	0.001	1	0.001	0.001	0.971
	within group	344.509	852	0.404		
	Total	344.510	853			
IR	Between groups	1.398	1	1.398	2.780	0.096
	within group	428.551	852	0.503		
	Total	429.949	853			
IC	Between groups	7.546	1	7.546	16.773	0.000
	within group	383.311	852	0.450		
	Total	390.857	853			

mean of IA of management students (3.50) > the mean of IA of economics students (3.30) > the mean of IA of engineering students (3.26), and there is a significant difference in the use of student information ($p = 0.000$); the mean of IE of management students (3.48) > the mean of IE of economics students (3.30) > the mean of IE of engineering students (3.27), and there is a significant difference in information evaluation ($p = 0.000$); the mean value of IR of management students (3.70) > the mean value of IR of economics

Table 3. Comparative analysis table of the mean information literacy of college students of different grades

Grade		IU	IS	IA	IE	IR	IC
first-year undergraduates	mean	2.87	3.09	3.28	3.27	3.44	2.94
	standard deviation	0.64	0.66	0.60	0.60	0.66	0.62
second-year undergraduates	mean	3.04	3.13	3.32	3.32	3.52	3.00
	standard deviation	0.60	0.68	0.65	0.66	0.74	0.65
third-year undergraduates	mean	3.07	3.32	3.43	3.44	3.66	3.07
	standard deviation	0.57	0.65	0.57	0.53	0.68	0.63
fourth-year undergraduates	mean	3.12	3.34	3.50	3.49	3.71	3.08
	standard deviation	0.68	0.67	0.65	0.67	0.72	0.76
Total	mean	3.02	3.21	3.38	3.37	3.56	3.02
	standard deviation	0.64	0.68	0.63	0.64	0.71	0.68

students (3.47) > the mean value of IR of engineering students (3.45), and there is a significant difference in reflection ($p = 0.000$); the mean value of IC by management students (3.09) > the mean value of IC by engineering students (2.98) > the mean value of IC by economics students (2.95), and there is a significant difference ($p = 0.015$); the specific conditions are shown in Table 5 and Table 6:

4.6 Differential Analysis of Information Literacy by Study Background During University

1) The difference analysis of receiving library admission education on information literacy.

According to the feedback from the teachers of the university, the school library will take turns to conduct library admission education for each class in the first semester of freshmen. It shows that 43.2% of the classmates indicated that they have not participated in this kind of training. Further cross analysis, we can see that the more senior classmates think they have not participated in the library entry training, the more students think that they have not participated in the library entry training.

Students who were deeply impressed by the library's admission education and training and those who were not impressed or forgotten were further tested by independent samples T-test. The results showed that there were significant differences in IU, IS, and IA. There were no significant differences in IE, IR, and IC. As shown in Table 7:

2) The difference analysis of information literacy in learning computer basic courses for college students.

Does the study of basic computer courses of college students have an impact on information literacy? We conducted an independent sample t-test, and the results showed

Table 4. Analysis of variance in information literacy of college students of different grades

Information literacy dimension		sum of square	df	mean square	F	Sig.
IU	Between groups	9.002	3	3.001	7.416	0.000
	within group	343.933	850	0.405		
	Total	352.935	853			
IS	Between groups	10.746	3	3.582	8.024	0.000
	within group	379.468	850	0.446		
	Total	390.213	853			
IA	Between groups	7.434	3	2.478	6.262	0.000
	within group	336.372	850	0.396		
	Total	343.806	853			
IE	Between groups	7.401	3	2.467	6.220	0.000
	within group	337.109	850	0.397		
	Total	344.510	853			
IR	Between groups	8.769	3	2.923	5.899	0.001
	within group	421.180	850	0.496		
	Total	429.949	853			
IC	Between groups	3.013	3	1.004	2.201	0.086
	within group	387.844	850	0.456		
	Total	390.857	853			

Table 5. Comparative analysis of the mean values of information literacy of students in different disciplines

Disciplines		IU	IS	IA	IE	IR	IC
Management	mean	3.12	3.32	3.50	3.48	3.70	3.09
	standard deviation	0.67	0.68	0.65	0.64	0.72	0.73
Economics	mean	2.98	3.15	3.30	3.30	3.47	2.95
	standard deviation	0.60	0.65	0.62	0.63	0.68	0.62
Engineering	mean	2.87	3.10	3.26	3.27	3.45	2.98
	standard deviation	0.63	0.68	0.60	0.60	0.70	0.66
Total	mean	3.02	3.21	3.38	3.37	3.56	3.02
	standard deviation	0.64	0.68	0.63	0.64	0.71	0.68

that there was no significant difference in information literacy whether or not having studied computer basic courses. As shown in Table 8:

Table 6. Analysis of variance for information literacy of students in different disciplines

Information literacy dimension		sum of square	df	mean square	F	Sig.
IU	Between groups	8.325	2	4.163	10.279	0.000
	within group	344.609	851	0.405		
	Total	352.935	853			
IS	Between groups	7.751	2	3.876	8.623	0.000
	within group	382.462	851	0.449		
	Total	390.213	853			
IA	Between groups	9.892	2	4.946	12.605	0.000
	within group	333.914	851	0.392		
	Total	343.806	853			
IE	Between groups	7.707	2	3.854	9.737	0.000
	within group	336.802	851	0.396		
	Total	344.510	853			
IR	Between groups	11.270	2	5.635	11.453	0.000
	within group	418.680	851	0.492		
	Total	429.949	853			
IC	Between groups	3.815	2	1.907	4.194	0.015
	within group	387.042	851	0.455		
	Total	390.857	853			

Table 7. Received independent sample t-test for library admission education and information literacy

Information literacy dimension	Levene test for variance equation		T-test for the mean equation				
	F	Sig.	t	df	Sig. (Bilateral)	mean difference	standard error value
IU	1.5283	0.2167	-2.4217	852	0.0157	-0.1073	0.0443
IS	4.7740	0.0292	-2.5290	852	0.0116	-0.1178	0.0466
IA	0.0198	0.8880	-2.2493	852	0.0247	-0.0984	0.0438
IE	0.3131	0.5759	-1.5147	852	0.1302	-0.0664	0.0439
IR	0.6404	0.4238	-0.9348	852	0.3502	-0.0458	0.0490
IC	1.5507	0.2134	-0.1885	852	0.8505	-0.0088	0.0468

Table 8. Whether you have studied basic computer courses and independent sample T test of information literacy

Information literacy dimension	Levene test for variance equation		T-test for the mean equation				
	F	Sig.	t	df	Sig. (Bilateral)	mean difference	standard error value
IU	0.8951	0.3444	0.2102	852	0.8335	0.0116	0.0554
IS	6.5396	0.0107	0.2788	852	0.7805	0.0162	0.0583
IA	4.0400	0.0447	0.4339	852	0.6645	0.0237	0.0547
IE	3.4690	0.0629	-0.0087	852	0.9931	-0.0005	0.0547
IR	5.7216	0.0170	0.2473	852	0.8047	0.0151	0.0611
IC	7.1594	0.0076	-0.2171	852	0.8282	-0.0127	0.0583

3) The difference analysis of information literacy after learning information courses.

The six management majors of the school will offer the course “Management Information System”, and the engineering majors offer the course “System Analysis and Design”. Will the opening of these courses have an impact on students’ information literacy? We conducted an analysis, and the results showed that there was no significant difference in information literacy between the learning of information courses or not, as shown in Table 9.

Table 9. Independent sample t-test for whether you have studied information courses and information literacy

Information literacy dimension	Levene test for variance equation		T-test for the mean equation				
	F	Sig.	t	df	Sig. (Bilateral)	mean difference	standard error value
IU	0.0167	0.8973	-0.5580	852	0.5770	-0.0338	0.0605
IS	1.6857	0.1945	0.6883	852	0.4915	0.0438	0.0637
IA	0.2296	0.6319	0.6889	852	0.4911	0.0412	0.0597
IE	0.6769	0.4109	0.3788	852	0.7050	0.0227	0.0598
IR	0.6390	0.4243	0.5653	852	0.5720	0.0378	0.0668
IC	2.8618	0.0911	0.6400	852	0.5223	0.0408	0.0637

5 Conclusions and Recommendations

5.1 Empirical Analysis Results

Through the above analysis, we get the following results:

First, the average value of each dimension of information literacy of the students in the surveyed schools is not high. The highest average is IR, and the lowest is IC. The order of each information literacy ability is: $IR > IA > IE > IS > IU > IC$.

Second, there are significant differences in IU and IC among college students of different genders. The average value of male students is higher than that of female students in terms of IU and IC, and there is no significant difference in IS, IA, IE and IR.

Third, students of different grades have significant differences in IU, IS, IA, IE and IR, and the average value of IU, IS, IA, IE and IR among students in senior grades is higher than the lower grade students, the higher the grade corresponds to the greater the value. There were no significant differences in IC among students of different grades.

Fourth, students of different disciplines have significant differences in IU, IS, IA, IE, IR and IC. The data shows that the average value of management students in IU, IS, IA, IE, IR and IC are higher than those of the other two subjects, and the average value of IC in engineering is slightly higher than that of economics. The rest are lower than management and economics.

Fifth, there is no significant difference in information literacy between students who have studied basic computer courses and information courses. The data also show that there is a significant difference in information literacy between students who have studied library admission education seriously and students who have not studied seriously.

5.2 Recommendations

In today's era, information literacy is the technical basis for a person's lifelong learning. Information literacy is very important to us, and university is a critical period for the

formation of information literacy. Through the above analysis, combined with the actual situation of the school, we propose the following Suggest:

The first is to strengthen the cultivation of students' information literacy. In the teaching process, we have added library admission training, computer basic courses and information courses. However, due to the different emphases of these courses, the computer basic courses mainly focus on the use of office suites. For students, it mainly focuses on analyzing the effectiveness of the existing system and improvement measures. For students in engineering, this course focuses more on the process of building a new system. Therefore, for students, if better to improve information literacy capabilities, then these are not enough. The school library organized students to participate in the information retrieval skills competition, but information retrieval skills are one of the information literacy skills for students. We need to improve the information literacy of students as a whole, which requires students to study related to this course.

The second is to strengthen the management of the information literacy cultivation process. First of all, it is recommended that the school's Academic Affairs Office offer courses related to information literacy. This course should have a course group to determine the course content, training goals, etc. It is recommended to be offered in the public elective module, but it is recommended to offer this course in the It is offered in the second semester of the first year of the university or the entire second year of the university. According to the survey data, the average information literacy of the students increases with the improvement of the grade. Therefore, if you study this course before the second year of the university, the students can master this course. This course is very helpful for their study in the third-year and fourth-year professional courses of the university; secondly, we suggest that the practice center of the school can take the lead in organizing an information literacy competition, requiring everyone to pass the test, and further urging students to master this. Third, organize students to participate in relevant college students' information literacy competitions [10], promote learning through competitions, and better improve students' information literacy as a whole.

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② Guizhou University of Commerce 2020 College-level Education Reform Project (yjk202031).

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