A Quasi Experimental Study on the Influence of Blending Learning on College Students' Information Literacy

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ABSTRACT

To explore the influence of blending learning on College Students' information literacy. Class A and B with similar average level of information literacy were selected as the research objects. Class A (106 students) was the experimental class, and class B (131 students) was the control class. During the research period of one semester (four months), the following measures were implemented for the two classes: The control class studied developmental psychology according to the conventional teaching methods and procedures; The experimental class studied developmental psychology according to the requirements and procedures of blending learning. At the beginning and the end of the course, the two classes were assessed with Network Information Literacy and Competence Scale for College Students (NILCS). At the beginning of the course, the total average NILCS scores of two classes were (2.88 ±0.33) and (2.90 ±0.44) respectively, and the difference was not statistically significant (P > 0.05); At the end of course, the total average NILCS scores of experimental class and control class were (3.38 ±0.29) and (2. 97±0.42) respectively, and the difference was statistically significant (P < 0.001). Blending learning can improve the information literacy of college students to a certain extent.

Keywords: *Blending learning, College students, Information literacy, Quasi experiment.*

Highlights of this paper

- Combine teaching, learning and scientific research.
- Using the randomized controlled trial model, we can better eliminate the influence of interference factors, and definitely attribute the change of dependent variable (Information Literacy) to the role of independent variable (mixed teaching).
- It not only pays attention to the mastery of students' professional knowledge, but also pays attention to the improvement of students' psychological quality (Information Literacy) by teaching activities.

1. INTRODUCTION

Information literacy is the sum of the basic qualities of people's knowledge, ability and affection in identifying, acquiring, processing, applying, managing and innovating information. It can be divided into information consciousness, information knowledge, information ability and information ethics (Association of College Research Libraries American Library Association, 2000). Information literacy is one of the most important survival literacy (UNESCO, 2018) in the Internet plus era. Only with good information literacy can we adapt to the development requirements of information society (Coklar, Yaman, & Yurdakul, 2017; UNESCO, 2018). As digital natives, college students are active experiential learners, good at multi task processing mode (Prenksy, 2001) easy to master unfamiliar technology (Ng, 2012) conducive to learn information technology. However, due to the lax control of social media, the imperfect analysis and self-control ability of college students, and the lack of systematic guidance of schools, college students' information literacy is low, manifested in the lack of search skills (Gross & Latham, 2012) false information connection, mental confusion caused by overloaded information connection, illegal access to information, procrastination (Liu, 2020) and so on. Based on the above problems, cultivation of college students' information literacy has become one of the urgent tasks of higher education (Baidu Encyclopedia, 2018; Grassian, 2018; Liu, 2020; Ministry of Education of People's Republic of China, 2018; World Education Innovation Summit (WISE), 2016).

Blending learning is to combine the advantages of traditional learning methods and digital learning. It not only plays the leading role of teachers in guiding, inspiring and monitoring the teaching process, but also fully reflects the initiative, enthusiasm and creativity of students as the main body of the learning process. With the development of educational informatization, blending learning has become one of the most important development trends of teaching methods.

Previous studies have shown that blending learning can better improve college students' teamwork ability, oral expression ability, autonomous learning ability and critical thinking ability, and promote teacher-student interaction, student-student interaction, knowledge sharing and academic performance (Feng, Wang, & Wu, 2018; Gong, Wang, & Yuan, 2017; Hou, 2021; Shan, Yao, & Song, 2016). There are few domestic researches on whether blending learning can improve the information literacy of college students.

Developmental psychology is a professional required course for undergraduates majoring in Applied Psychology, which is theoretical and experimental. It requires students to have strong theoretical analysis ability and high empirical research ability. In the past, we used the traditional teaching mode, and students reflected that it was difficult to understand. One of the important reasons is that students did not master much background information related to theoretical knowledge.

Last year, we made a teaching reform, and carried out blending learning for some students. We found that compared with the traditional teaching mode, blending learning can better promote the learning effect of students, especially the information literacy.

2. OBJECTS AND METHODS

2.1. Objects and Groups

Class A and B of applied psychology are selected. There are 106 students in class A (42 males and 64 females), with average age of (22 ± 0.6) years; There are 131 students in class B (53 males and 78 females), with average age of (22 ± 0.7) years. There is no significant difference in average age, sex ratio and academic performance between two classes (all $P > 0.05$). Class A is the experimental class and class B is the control class.

2.2. Methods

2.2.1. Teaching Methods

During the research period of one semester (four months), the following teaching measures are adopted for the two classes.

(1) Class A

Blending learning is adopted. It includes three basic links: Students' online autonomous learning, teachers' leading interactive classroom, and students' consolidation and improvement after class. That is, student-centered, teachers regularly assign learning tasks to students through the online learning platform, and students conduct video learning, data search, homework, test, interactive discussion and online real-time communication through the online learning platform; Through online real-time communication tools such as learning platform and QQ, teachers can understand students' learning status and existing problems, regularly interact with students through meeting in class, solve problems, deeply explain a small number of concepts and theories, fully display various disputes, and guide students to share reading, synthesize materials, think about problems, find doubts, state their own opinions, and explain the plan. Teachers encourage students to criticize each other and argue collectively, and finally summarize.

In this process, students often ask or are asked "what is the main point of this part of the content", "what evidences are there", "how the author uses these evidences to support his own view", "do you think the author's argument is sufficient, please talk about your reasons", "what other opinions can be found about the above topics", "what are the similarities and differences between these views", "which view do you agree with", "what different views do you have", and "what are your reasons", and so on.

Therefore, around the theme, students hypotheses, analysis, evaluate, inference, interpret, discuss, and debate. Through full discussion and consultation, we try to improve students' professional knowledge and information literacy. After the unit or meeting learning, students continuously consolidate and improve the learning effect through weekly test, chapter test, midterms and finals, etc. Learning effect is evaluated by the clarity and accuracy of students' discussion on the test topics, the relevance, importance, adequacy, depth and breadth of the arguments provided on the theme, and the logic and fairness of the discussion process.

(2) Class B

The traditional teaching methods and procedures are adopted.

2.2.2. Evaluation Methods

At the beginning and the end of the course, the two classes are evaluated with Network Information Literacy and Competency Scale for College Students (NILCS).

2.2.3. Tools: Network Information Literacy and Competency Scale for College Students (NILCS)

Complied by Wu, Na, and Li (2009). NILCS has 31 items, which are divided into seven dimensions: information awareness, information needs, information acquisition, information evaluation, information organization and communication, information application and creation, as well as information security and morality. Likert 5-point scoring method is used to score from 1 to 5 points **corresponding to** "completely unfamiliar" to "completely proficient".

The higher the score, the stronger the tendency of that dimension (item). If the average score of total scale, a certain dimension or item is higher than 3.5, the subject is considered to have a relatively strong tendency in information literacy, that dimension or item; If the average score of total scale, a certain dimension or item is higher than 2.5 but less than (or equal to) 3.5, the subject is considered to have a moderate tendency in information literacy, that dimension or item; If the average score of total scale, a certain dimension or item is less than or equal to 2.5, the subjects is considered to have a relatively weak tendency in information literacy, that dimension or item. In this study, *Cronbach*'a coefficient of the total scale is 0.80, *Cronbach*'a coefficient of each dimension is 0.71 to 0.75.

3. RESULTS

3.1.Comparison of NILCS Scores Between two Classes Before and After Course

It can be seen from Table 1 that before the course, information awareness of two classes is at a relatively strong tendency, the information acquisition and application of two classes are at relatively weak tendencies, and the total average score of NILCS and scores of the other four dimensions are at moderate tendencies.

From Table 1, it can also be seen that there is no significant difference in the total average of NILCS and score of each dimension between two classes before course (all $P>0.05$). The total average of NILCS and score of each dimension in **experimental class** are higher than those in the control class after course (all $P<0.05$).

Table-1. Comparison of NILCS scores between experimental class and control class.

Dimension	Before Course		t	P	After Course		P	t
	Experimental class	Control Class			Experimental class	Control Class		
Information awareness	3.83±0.36	3.90±0.38	−1.500	0.135	4.36±0.33	4.13±0.37	2.667	0.008
Information needs	2.79±0.66	2.85±0.84	−0.655	0.513	3.12±0.70	2.90±0.83	2.227	0.027
Information acquisition	2.45±0.67	2.48±0.81	−0.290	0.772	3.39±0.59	2.51±0.80	9.799	<0.001
Information evaluation	2.61±0.77	2.58±0.81	0.259	0.796	3.44±0.66	2.65±0.77	8.369	<0.001
Information organization and communication	3.13 ±0.41	3.11±0.38	0.425	0.671	3.52±0.34	3.13±0.38	8.328	<0.001
Information application and creation	2.17±0.49	2.28±0.60	−0.156	0.120	2.44±0.50	2.29±0.59	2.089	0.038
Information security and morality	3.14±0.49	3.07±0.50	1.11	0.237	3.48±0.52	3.08±0.50	5.987	<0.001
Total average	2.88±0.33	2.90±0.44	−0.374	0.709	3.38±0.29	2.97±0.42	9.933	<0.001

3.2. Comparison of The Percentage of Students in Each Grade of NILCS Total Score in Two Classes Before and After Course

It can be seen from Table 2 and Table 3 that before the course, there is no significant difference in the percentage of students in each grade of NILCS total score between two classes ($\chi^2=1.619$, $P=0.445$). After course, there is significant difference between two classes in the percentage of students in each grade of NILCS total score ($\chi^2=19.600$, $P<0.001$). The percentage of students in the relatively strong level in experimental class is higher than that in control class, and the percentages in the moderate and relatively weak levels are lower than those in the control class.

Table-2. Comparison of the percentage of students in each grade of NILCS total score between two classes before course.

Class	Relatively strong (%)	Moderate (%)	Relatively Weak (%)	χ^2	P
Experimental class	2 (1.9)	96(90.6)	8(7.5)	4.335	0.114
Control Class	5 (3.8)	106(80.9)	20(15.3)		

Table-3. Comparison of the percentage of students in each grade of NILCS total score between two classes after course.

Class	Relatively strong (%)	Moderate (%)	Relatively Weak (%)	χ^2	P
Experimental class	22(20.8)	79(74.5)	5(4.7)	19.600	0.001
Control Class	7 (5.3)	105(80.2)	19(14.5)		

4. DISCUSSION

Before the course, more than 90% of students in two classes are at the moderate level of information literacy. Specifically, Information awareness in two classesare relatively strong. However, information acquisition, information application and creation are at the weak level, total score of NILCS and the other four dimensions are at the medium level, which is consistent with the results of previous studies (Gross & Latham, 2012; Hou, 2021; Liu, 2020; Wu et al., 2009) suggesting that the low level of information literacy is common among college students.

Before the course, there is no significant difference between two classes in the total average of NILCS and percentage of students in each grade of the total score. After one semester of course, total score of NILCS and scores of 7 dimensions in the experimental class are significantly higher than those in the control class; There is significant difference between two classes in the percentage of students in each grade of NILCS total score . The percentage of students in relatively strong grade in experimental class is higher than that in control class, and lower than those in the control class in the grades of moderate and relatively weak. It is suggested that blending learning can improve the information literacy of college students. The reason lies in hybrid teaching mode of cooperation and competition (Feng et al., 2018; Gong et al., 2017; Hou, 2021; Shan et al., 2016). As we regularly present various kinds of disputes about the same topic, students must fully search, compare and identify relevant information, in order to determine which view they are most inclined to, and through sufficient argument, refute other view and establish their own opinions. This kind of work of searching and sorting data is actually the work of obtaining, processing and utilizing information, which helps to improve the ability of using information. During this period, students can also realize that the quality and quantity of information can affect problem solving, so as to improve the information awareness; Due to the realization that it is hard to obtain and process information, students will enhance the intention of maintaining information ethics. Due to the improvement of information ability, students can obtain information by their own efforts, which can also reduce the illegal behavior of stealing information to a certain extent, and objectively improve their information ethics.

After one semester of course, the total score of NILCS in control class is also significantly higher than that of itself before course. Excluding the interference factors such as natural maturity of students' thinking ability and practice effect of scale, conventional teaching method may also improve information literacy of college students to a certain extent, which needs further follow-up research to confirm.

After the research of one semester, although the scores of NILCS and the percentage of students in high-grade of NILCS total score in experimental class are significantly improved, the total score of NILCS in experimental class is still at the moderate level, and the percentage of students in the high-grade of NILCS total score is still not high, which is consistent with the previous research results, suggesting that the blending learning of one semester has limited effect on improving students' information literacy. Information literacy is a complex system with multiple components (such as information awareness, information needs, information acquisition, information evaluation, information organization and communication, information application and creation, information security and morality)(Wu et al., 2009). Its development needs a good social atmosphere, abundant family living conditions,

highly developed intelligence, perfect personality, systematic education, rich experience, and so on (Liu & Chen, 2018; Lu, 2020; Sang, 2000; Zhang, Tan, & Yang, 2020). We need to create a good social, family and school education atmosphere, carry out long-term systematic information skills training (Cha, Zhang, & Yan, 2015; Jia & Zhang, 2019; Pan & Liao, 2014; Zhang, 2016; Zhang, 2015) in order to improve the information literacy of college students in essence.

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