College Students' Learning under the Environment of Internet Technology: Strategies and Suggestions

Ling Wang[1,2]
[1]School of Marxism, Hohai University
[2]Dean's office, Hohai University
Nanjing, China
Lingwang@hhu.edu.cn

2021 10th International Conference on Educational and Information Technology (ICEIT) | 978-1-6654-2295-6/20/$31.00 ©2021 IEEE | DOI: 10.1109/ICEIT51700.2021.9375608

***Abstract*—With the rapid development of information technology, Internet, big data, artificial intelligence, and higher education have been integrated with great speed, shaping a new form of education in the Internet era and changing the way of College Students' learning. This study explores the learning situation of college students, including the learning behavior, existing problems, influencing factors and improvement strategies in the Internet technology environment, in order to enhance the learning adaptability of college students in the Internet technology environment, and improve the learning ability and academic level of college students in the Internet era.**

Keywords—internet technology, college students, learning, improvement strategies, information literacy

I. INTRODUCTION

With the continuous development of information technology, the way of knowledge acquisition and teaching has undergone a revolutionary change. College students are the main force of the Internet. It is an unavoidable task to study and improve the learning behavior of college students in the Internet technology environment, enhance the adaptability of College Students' learning, and ensure the quality of personnel training in the Internet era. Thus, this study analyzes the learning behavior of college students in the Internet technology environment, summarizes the new characteristics of College Students' learning, the existing problems and the methods to enhance the learning adaptability of college students in the Internet technology environment. Through this research, we hope to improve the learning ability and academic level of college students in the Internet era.

II. NEW CHARACTERISTICS OF COLLEGE STUDENTS' LEARNING IN THE INTERNET ERA

With the development of Internet technology, the transmission and acquisition of information is very convenient, which also changes all the aspects of College Students' learning mode. In this study, we compiled a questionnaire on College Students' learning under the environment of Internet technology, and investigated the learning characteristics of college students from the aspects of time for Internet use, activities on the Internet, Internet tools, sources of learning resources in the information era, and information literacy of college students. 1200 college students were randomly selected from a college in Nanjing, and 1156 valid questionnaires were collected. Through statistical analysis, the learning characteristics of college students in the Internet era are as follows:

A. Long Time for Internet Use

Time for Internet use, referring to the length of time that an individual uses the network in the unit time, is the objective embodiment of individual network use intensity [1]. The time for Internet use reflets the Internet involvement of college students. Our study statistically analyzes the time for Internet use, and the results show that, on average, 22.29% of college students surf the Internet for 1-2 hours a day, 41.1% for 3-4 hours, 24.5% for 5-6 hours, and 12.11% for more than 6 hours (Figure 1a).

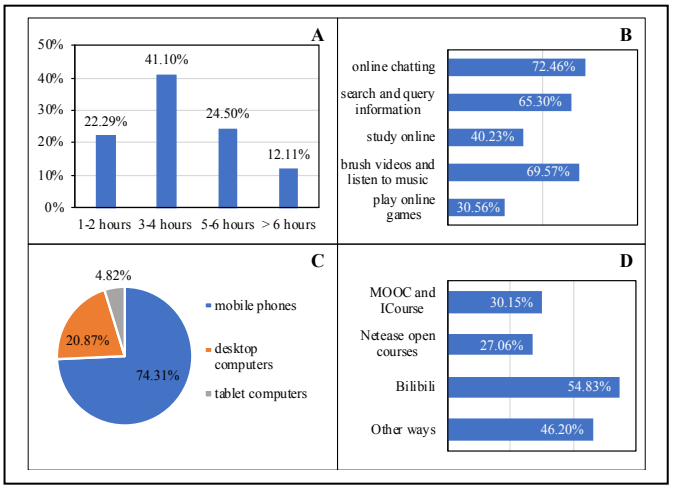

Fig. 1. College students' online learning characteristics, a: the percentages of time for Internet use; b: the percentages of different Internet activities; c: the percentages of different tools for online learning; d: the percentages of online learning resources

B. Diversified Internet Activities

In the Internet era, college students' Internet behavior has certain sociality and universality, as well as the uniqueness of college students. To some extent, college students' Internet behavior can reflect their purpose and preference. This study investigates the diversity of college students' Internet activities. According to the analysis, online chatting accounts for 72.46% of college students' online activities, 65.3% of them search and query information, 40.23% of them study online, 69.57% of

This work is supported by the scientific research project for higher education in Hohai University (2018B51614).

them brush videos and listen to music, and 30.56% of them play online games (Figure 1b).

C. Mobile Phone Has Become the Main Tool

Internet tools reflect not only the means college students rely on, but also the configuration of college students' information equipment to a certain extent, which is related to the performance of the tools themselves and economic situation of students. According to the survey, there are three kinds of tools for college students to access the Internet. Because of its convenience and relatively cheap price, mobile phone has become the preferred tool for college students to access the Internet. According to the statistical analysis, 74.31% of them use mobile phones for online learning, 20.87% use desktop computers for learning, which are the main learning tools for college students (Figure 1c). Besides, 4.82% use tablet computers for learning, suggesting that mobile phones are easy to carry, but the function and performance of mobile phones are not as good as computers and tablets, which limits college students' online learning to a certain extent.

D. Abundant Online Learning Resources

The abundance and quality of online learning resources represent the investment of country and education departments in online education. With the development of Internet technology, the popularization of information technology and the reform and development of higher education, college students can obtain online learning resources through multiple ways. The present survey shows that 30.15% of college students use MOOC (massive open online courses) and ICourse in Chinese universities to obtain learning resources, 27.06% of college students use Netease open courses, 54.83% use Bilibili, and 46.2% obtain learning resources through other ways (Figure 1d), which is closely related to the national strategy of strengthening the construction of online course resources in China.

E. Information Literacy Needs to Be Improved

The information literacy of college students represents the technology and skills they possess in using information tools and resources to solve problems [2]. The present survey shows that 72.35% of college students hope to obtain useful resources from the Internet for promoting personal development. However, only 36.79% of college students have the ability to quickly screen information, and 85.47% of college students think that online resources are too mixed, which affects the effectiveness of online learning. In addition, 62.32% of college students hope that the school will set up special information literacy courses to guide individuals for improving their online learning skills.

III. Influencing Factors of College Students' Learning in the Information Technology Environment

The integration of information technology and higher education leads to the possibility for college students to learn anytime, anywhere. Their learning efficiencies and qualities in the information technology environment can be affected by views of learning of students, teaching competences of lectures, academic evaluation, etc., and can be greatly promoted with the influencing factors determined.

A. College Students' Views of Learning

The learning of college students is based on individual characteristics, and personal metacognition, motivation, learning interest, learning strategies and self-monitoring can affect the effectiveness of learning to a certain extent. Previous studies have reported the potential impact of students' views of learning on their cognitive processes, strategies, motivations, learning behaviors, affective experiences, and academic performances [3-5]. The view of learning is an implicit metacognitive knowledge, involving recognitions of various concepts such as knowledge experience and its nature, form, procedure, condition, and result [6], which is considered as the learner's understanding and perception of the entire learning process. Through empirical research, some scholars have proved that college students' views of learning are significantly positively correlated with endogenous motivation, general self-efficacy and learning efficacy, and are significantly negatively related to exogenous motivation; the academic self-experience and views of the learning process are valid predictors of college students' endogenous motivation, and academic self-experience is a valid predictor of their general self-efficacy and learning efficacy [7]. The relationship between these variables is illustrated with Figure 2.

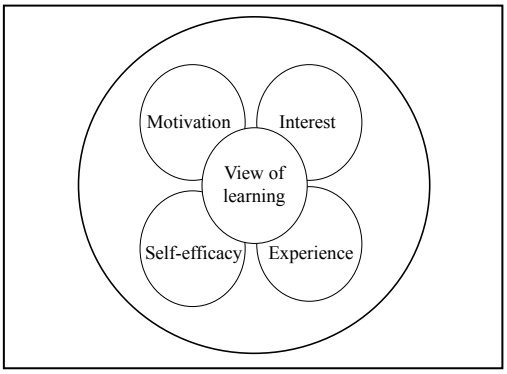

Fig. 2. Individual elements of learners

B. Lectures' Teaching Competences

Teaching competences are regarded as the abilities of lectures to conduct teaching processes, including specialist knowledge, teaching methods, teaching skills and teaching commitments. Specialist knowledge refer to the necessity of lectures to accumulate not only general knowledge such as higher education and psychology, but also particular academic knowledge in their area of expertise. Teaching methods refer to the different means of the curriculum reforms and teaching processes by lectures according to specific course contents. Teaching skills refer to the techniques and capabilities available to lectures on the teaching processes, or mainly the information literacies of lectures in the information technology environment, which are their abilities to effectively employ information technologies in courses and instruct students to use information technologies.

C. Academic Evaluation

Academic evaluation is the 'baton' of teaching and learning, and a considerable factor of teaching qualities. Academic evaluation involves the assessments on the students' knowledge and abilities through effective tools and approaches based on

the national education and teaching objectives [8]. For the current academic evaluations in universities, a tendency can be observed to the randomness of formative evaluations and emphasis on learning processes rather than outcomes, reform circumstances rather than process monitoring and learning attitudes rather than abilities, causing certain effects on the creativities and learning initiatives of students [9]. The development of information technology and the widespread application of Internet big data have made the data collection, monitoring and early warning processes of academic evaluation possible, and information technology has been an important support for the promotion of academic evaluation.

IV. The Strategies and Suggestions for College Students' Learning in the Internet Era

Under the environment of Internet technology, information technology has become an indispensable part for the development of college students, and also gives college students a new era of learning connotation. This is very necessary to give full play to the advantages of the Internet, promote the learning and development of college students, and provide a new practice path for higher education researchers.

A. Setting up Information Technology Course to Guide College Students to Use Network Scientifically

At present, C language, Python and other language information technology courses are generally set up in colleges and universities, which pay attention to information technology ability and have certain professionalism. Colleges and universities need to set up more general courses on the use of information and network time management, so as to improve the ability of college students for selecting, screening or using the information. Colleges and universities also need to strengthen the guidance of college students' network use, guide college students to increase the investment in network learning activities, reasonably allocate the time of network use, strengthen the monitoring and self-management of college students' network use, and avoid college students' addiction to online games and other entertainment activities, which will affect their studies. At the same time, colleges and universities need to strengthen the construction of network resources, provide better network learning resources, and increase the positive experience of college students' network learning.

B. Strengthening the Information Literacy of College Students and Improving the Application Ability of Information Technology

In the Internet plus era, learning resources are more open and diversified, and the way of acquiring knowledge has been revolutionized. Online courses, flipped classroom, wisdom teaching, ubiquitous learning, and other teaching modes also raise higher requirements for college students. Therefore, we need to constantly improve the information literacy of college students, so that college students can learn more effectively in the Internet era. At present, there is no unified statement about the connotation of information literacy. Based on the existing research at home and abroad [10, 11], this study believes that the information literacy of college students includes three aspects: information ethics and security, information knowledge and skills, information application and innovation, as shown in Figure 3. Information ethics and security include positive information awareness and attitude, abiding by students' integrity and maintaining information security. Information knowledge and skills include theoretical knowledge and technical knowledge of mastering information, methods and principles of learning information. Information application and innovation include information retrieval, information management, information processing, information presentation, information internalization, and information output.

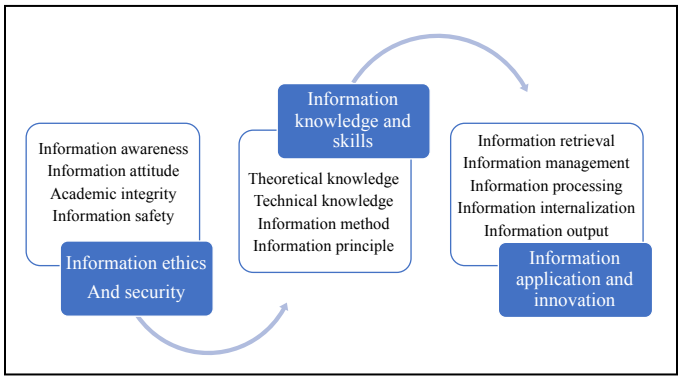

Fig. 3. Information literacy model of college students

C. Establishing Multi-dimensional Teaching Behavior Model

Under the environment of Internet technology, multi-dimensional teaching has become a trend, which also brings many challenges to teachers and teaching work [12]. Some researchers believe that teachers' teaching behavior affects students' input, as shown in Figure 4 [13]. In the Internet era, the role of teachers is no longer limited to the imparter of learning. Teachers' teaching behaviors and roles are more diverse. Teachers are the organizers, guides, promoters, feedbacks, supporters, and information providers of students' learning. Teachers' positive and multi-dimensional teaching behavior is helpful to improve the learning mechanism of college students, promote college students' active learning, positive interaction, increase group cooperation, self-management and emotional input.

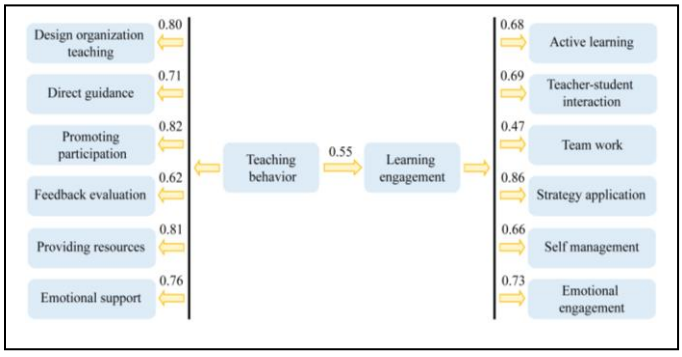

Fig. 4. Relationship model between teaching behavior and learning engagement

D. Improving the Mechanism of College Students' Academic Evaluation and Promoting the Management of Academic Process

College students' academic evaluation is affected by many factors, such as the nature of the curriculum, teachers' teaching,

process monitoring, evaluation system and so on. Under the Internet technology environment, we need to expand the connotation of curriculum evaluation, realize the multi-directional and whole process of evaluation, and build a multi-dimensional developmental student academic evaluation system. In the traditional teaching environment, resource platforms are independent of each other, data cannot be shared, and teaching and learning behaviors cannot be collected in the whole process. Under the information technology environment, we should establish a smart campus public data platform, realize data sharing, collect students' learning behavior and learning investment, establish academic feedback between teachers and students, establish big data of teaching evaluation, refine process evaluation and management, and improve students' academic performance and level (Figure 5).

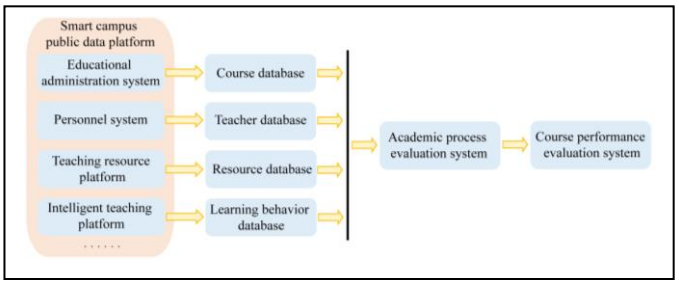

Fig. 5. Structure diagram of academic evaluation based on smart campus

E. Promote the Construction of Learning Resources and Strengthen the Guidance of College Students' Academic Planning

Information technology has not only shaped a new form of learning, but also changed the online learning habits of college students. In addition to the collection, retrieval and processing of learning resources, college students prefer professional video resources, and hope to improve themselves through thematic learning. Therefore, the construction of learning resources needs to be strengthened, the construction of quality curriculum resources needs to be advanced. At the same time, teachers should be guided to give students learning guidance and learning expansion through online and offline mixed teaching through the flipped classroom, and increase students' sense of learning acquisition [14, 15]. On the other hand, it is needed to strengthen the guidance of college students' academic planning, set up courses and introduce tutors of college students' academic planning, establish center of college students' academic development, according to the personalized development characteristics of students in different grades. From the first grade, the system of academic planning should be established according to the curriculum and talent training objectives. In the first grade, students should establish the goal of college, so as to lay a solid foundation, to adapt to the seminar learning mode. In the second grade, students should understand basic courses of specialty, improve learning efficiency, and establish better time management. In the third grade, the learning of major courses should be strengthened and the width and thickness of learning should be improved. In the fourth grade, the scientific research training should be tempered, the continuity of learning should be emphasized, and the management of four-year continuous learning should be carried out. It also needs to carry out one-to-one academic consultation and guidance combined with students' interests, specialties and personalized needs, in order to formulate personalized academic growth plan, improve the help and guidance for students with learning difficulties, enhance the learning adaptability of college students under the Internet technology environment, and help college students realize themselves and achieve themselves.

V. CONCLUSION

With the continuous integration deepening of Internet technology and higher education, the innovative application of information technology brings new opportunities for the leapfrog development of colleges and universities. It changes the higher education and the form of college students' learning. In the future, it is necessary to strengthen the top-level design of college students' learning, and carry out systematic and in-depth research on the college students' learning training, self-monitoring, learning resources and evaluation of online learning under the environment of Internet technology, so as to further improve the learning adaptability of college students in the Internet technology environment. We hope that college students can truly become the participants, practitioners, promoters, and creators of informatization for their individual learning abilities and future development.

ACKNOWLEDGMENT

This work is supported by the scientific research project of higher education in Hohai University (2018B51614).

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