

## Research on the Improvement of Information Literacy of Universities by Micro-Courses under the Background of New Engineering

Jing LI<sup>1,a,\*</sup>, Zuwen Weng<sup>1,b</sup>, Manya Li<sup>1,c</sup>

<sup>1</sup>Information Center, Xiamen Institute of Technology, Xiamen, China

<sup>a</sup>lijing@xmut.edu.cn, <sup>b</sup>2010997501@xmut.edu.cn, <sup>c</sup>lmy@xmut.edu.cn

\*corresponding author

**Keywords:** Information literacy, Micro-courses, New engineering

**Abstract:** New engineering emphasizes the deep integration of Internet technology and traditional engineering, and information literacy has become the core element to be improved to adapt to the development requirements of new engineering talents. With the rise of mobile learning and ubiquitous learning, information literacy course based on micro course has become an effective way to improve the information literacy of teachers and students in Universities under the background of new engineering. In order to make better use of micro courses to carry out information literacy education, we can improve the strategies such as collecting appeals, establishing a question and answer knowledge base, establishing a micro course framework of information literacy suitable for new engineering, organically integrating resources, platforms and education, and establishing a high-quality information service team.

### 1. Introduction

Premier Li Keqiang proposed the implementation of “Made in China 2025” in his 2015 government work report. In this process, intelligent manufacturing is the main direction of attack, and it is also the fundamental path for my country to transform from a manufacturing power to a manufacturing power. “New engineering” is the key to the realization of intelligent manufacturing. It is a new concept of education reform of our national project implemented by major strategies such as “One Belt One Road”, “Made in China 2025”, “Internet +” and other major strategies in response to the new round of technological revolution and industrial transformation, and actively serving the country's innovation-driven development<sup>[1]</sup>. It focuses on the practicability, intersectionality and comprehensiveness of disciplines, emphasizes the deep integration of new technologies and traditional engineering in the internet era, and cultivates talents with strong engineering practice capabilities.

Both national and local governments have taken the improvement of information literacy as a major task or even an important strategic goal. The Ministry of Education will implement comprehensive information literacy improvement actions in the key points of education informatization and network security for three consecutive years from 2018 to 2020, and improve the information literacy of teachers and students as an annual priority. At the same time, in the “Education Informatization 2.0 Action Plan” issued by the Ministry of Education in 2018, it is proposed that “to comprehensively improve the abilities of people” as the core foundation of the Education Informatization 2.0 Action Plan, which would transform from improving students' information technology application ability to improving information technology literacy, from application integration development to innovation integration development<sup>[2]</sup>. In order to adapt to the development of the new situation and the requirements of talent training, Beijing and Tianjin have proposed educational informatization action plans to improve the informatization application capabilities, innovation capabilities and information literacy of teachers and students<sup>[3-4]</sup>. These enhancements in informatization capabilities and information literacy all coincide with the requirements of new engineering. It can be seen that it is very meaningful and necessary to study the improvement of university information literacy under the background of new engineering.

## **2. The Concept and Dimensions of Information Literacy in the Context of New Engineering**

### **2.1. Conceptual Development of Information Literacy**

Information literacy was first proposed in 1974 by Paul Zurkowski, chairman of the American Information Industry Association, and it is defined as a problem-solving skill <sup>[5]</sup>. American Association of Libraries (ALA), American School Book Association (AASL), American Association for Educational Communication and Technology (AECT), American Association for International Educational Technology (ISTE), American Association for Higher Education Library Research (ACRL), British countries and universities The Association of Libraries (SCONUL), the Association of Australian University Librarians (CAUL), UNESCO, the Ministry of Education of China, the Beijing Library Association, the Japanese Ministry of Education, etc. are all conducting continuous research on information literacy <sup>[6-7]</sup>. Through combing the concept of information literacy, it is found that it is widely defined and changes with social development and technological progress. In addition to its distinctive brand of the times, its concept is also closely related to the country's strategic positioning, from emphasizing information processing and application capabilities, and constantly adding information awareness, evaluation and judgment, and fusion innovation capabilities.

In the context of new engineering, information literacy and “Internet +” technology are increasingly closely linked, and their meanings are becoming broader and evolving, and gradually derived concepts such as computer literacy, network literacy, media literacy, digital literacy, and data literacy. Broadly speaking, these derived concepts have the basic characteristics of information literacy, which are the extension and deepening of the connotation of information literacy, but their focus is different. In a narrow sense, these literacy are included in the concept of information literacy and are an important part of it.

### **2.2 Dimensions of Information Literacy**

Both domestic and foreign information literacy concepts overlap at different levels, and there is no unified definition. So many scholars focus on the dimension of information literacy in order to have a more in-depth study of its connotation, including the New Media Alliance (NMC)<sup>[8]</sup>, Chinese scholars Sang Xinmin<sup>[9]</sup> and Zeng Xiaomu<sup>[10]</sup> and so on. As a new stage of development, educational informationization 2.0 will surely bring about innovations in educational concepts and profound changes in teaching models. Li Feng of East China Normal University put forward in the pedagogy of anti-epidemic, “A person with information literacy, in addition to mastering commonly used information technology tools, has basic information technology application capabilities, but also has the superposition of the field and information technology that has changed. The original state of existence produces new benefits of information technology + capabilities and a sense of responsibility for the development of the information society” <sup>[11]</sup>.

We found that the dimensions of information literacy can more fully reflect its connotation. Based on the views of many scholars, we believe that information literacy in the context of new engineering is the attitude, method and ability for lifelong learning or personalized learning, including the identification and application of information, learning and communication, problem solving, reflective development, interdisciplinary integration, and decision-making The ability to innovate in six dimensions.

## **3. The Current Situation of University Information Literacy in the Background of New Engineering**

Under the background of new engineering disciplines, informatization is used to lead education and teaching. The improvement of school informatization level has brought about the improvement of education and teaching efficiency and the improvement of management service level, and its educational effectiveness is immeasurable. But what is the actual situation?

First of all, many teachers and students are either immigrants or aborigines in the information age. They are accustomed to obtaining information through mobile terminals, and their demand for campus informatization is very strong. However, many business applications of the school were not

deeply integrated into the terminal screen during the system construction, and were scattered in various departments and systems. Teachers and students spend a lot of time and energy when looking for business and service portals, and often find no suitable way to solve the problems they encounter, and the user experience is not good.

Secondly, many universities do not have a complete information literacy training system, and the information literacy training environment, informatization assessment and incentive mechanisms are relatively lacking. Most of the time, the improvement of information literacy depends on the training of the information department. The training content is generally conventional and simple information application. As far as the frequency of training is concerned, it is often to train specific personnel such as system administrators and security officers at specific times when the new system is online. With the size of universities, such training content, scale and frequency can hardly meet the increasing demand for information applications of teachers and students.

In addition, no matter what method is used to push informatization information in the school, the desire of teachers and students to actively learn informatization knowledge in the school is not strong enough. When facing informatization problems, teachers and students are still accustomed to finding the information department to solve these problems. These problems are universal and repetitive. Service personnel have to spend a lot of time and energy on repetitive labor and cannot do other things.

To sum up, it is not difficult to find that teachers and students have a weak desire to learn actively, the service of the information department is not targeted enough, there is a contradiction between services and needs, and it is difficult to match the manpower, material resources, resources and benefits invested in informatization.

#### **4. The Significance of Micro-Courses to the Improvement of Information Literacy in Universities under the Background of New Engineering**

A learning society of “everyone can learn whenever and wherever they want” is being established. The importance of information literacy as the basis for lifelong learning and personalized learning is self-evident. Using new learning methods such as mobile learning and ubiquitous learning, people can quickly grasp knowledge with the help of mobile terminals in the scattered and limited time. Knowledge that is small but precise and easy to be quickly disseminated and shared is more favored, and then “micro” education follows the trend. The introduction of information literacy education in micro-classes is of great significance to the promotion of information literacy. (1) U-learning enables learning anytime, anywhere. (2) Portable learning tools break through the limitations of the learning environment. (3) The autonomy of knowledge entering is conducive to narrowing the information gap<sup>[12]</sup>.

In addition, problem-oriented learning and online learning can be implemented through micro-classes to avoid duplication of work by service personnel, and change information literacy education from passive to active. This kind of open curriculum learning and guidance based on individualization can achieve the sharing of information-based education resources and promote educational equity.

#### **5. Strategies for Improving Information Literacy of Universities Based on Micro-Courses in the Background of New Engineering**

The ultimate goal of new engineering construction is to cultivate new engineering talents needed by society, emphasizing multidisciplinary integration and practical ability. In intelligence campus environment, the informatization department of a university should think about how to guide teachers and students to effectively use the fragmented time to quickly understand and willing to apply campus informatization, and adaptively solve the problems they encounter, so that learning will be growing everywhere and can better fit new engineering talent training requirements. This is the biggest change that the informatization has brought to universities.

### **5.1. Collect Appeals in Multiple Dimensions and Establish a Q&a Knowledge Base**

Construct a stereoscopic and active information service system oriented to multiple roles, multiple terminals, and multiple channels. The information department confronts with the main body of the intelligence campus and establishes a standard service process for demand recording, task distribution, problem tracking, and result confirmation, provides problem reporting and service acceptance through various channels, and responds to different problems in a graded manner and follows up in time. Information service personnel can actively collect feedback from key users such as school leaders, and provide one-to-one application guidance services. Based on the collected knowledge related to the information services and services of teachers and students, the school's business system and information services are deeply integrated to accelerate the expansion of a intelligent robot Q&A knowledge based on AI natural language interaction.

### **5.2 Establish an Information Literacy Micro-Course Framework Compatible with New Engineering**

The information literacy micro-video education framework is based on the construction of university information literacy courses under the background of new engineering. It sets three levels of understanding, familiarity and mastery. Focusing on the training goals of the course and the information skills required by the intelligence campus, based on the collected service requests and the organized background data of the intelligent robot Q & A knowledge base, it can be selected a large number of high-frequency application questions to condense the knowledge points of the course. The specific content of each section of knowledge points is presented through micro-videos, and the theoretical knowledge of information literacy under the background of new engineering and each informatization business application are connected, so that the training of teachers and students' informatization skills can be make from rough to fine, knowledge content can be make from shallow to deep. It is conducive to the formation of an open curriculum framework for information literacy and the introduction of a new teaching model such as micro-courses, so as to realize the sharing of information education resources. Finally, teachers and students build their own information literacy ability system by learning this knowledge on demand.

### **5.3 Organic Integration of Resources, Platforms and Education**

Set up the concept of “resources as a service”<sup>[13]</sup>, change the service model to “resources + platform + education”, screen, design, process, produce and apply the results of school informatization construction. Then establish a mobile side and a PC side micro-course learning platform for the improvement of information literacy of the whole school, realize the actual operation scenario of what you see is what you get, and finally let the results of the school's information construction benefit to all the teachers and students. The content of the course based on the background learning data can be iteratively updated, an effective training mechanism of “offline collection requirements + production resources + platform + teacher and student users” can be formed. Resources, platforms, and information literacy education are organically integrated, so as to realize the general improvement of school information application level and teacher and student information literacy.

### **5.4 Change Roles and Establish a High-Quality Information Service Team**

In the past, teachers and technicians were often separated in the construction of online courses. The information department of the university has a great advantage in the reserve of educational technology. When using information literacy courses developed by micro-courses, the staff of the information department are both course developers and front-line users of user service. They are able to move information literacy education into curriculum learning, and have greater advantages in pre-planning and design, content demand analysis, material collection, courseware production, video shooting, post-processing, course release, and guiding promotion and application, making the

curriculum more in line with the actual needs of information construction. It not only helps personnel to liberate from a large amount of repetitive work, enhances the main service consciousness, but also helps the transformation, promotion and development of the school information department.

## **6. The Effect Achieved**

When teachers and students encounter informatization problems, we guide them to find solutions of problems according to the catalog through the micro courses published on websites, Short video, WeChat official account, etc. Teachers and students reported that they can clearly understand “what is the problem and how to solve it” than before. After several times of guidance, They can actively solve their own problems when they encounter problems again, the learning method has changed from passive to active, and the internal drive to improve information literacy has been strengthened. At the same time, as the duplication of work has been greatly reduced for the information sector, they have more energy to solve other complex problems. The school's information literacy ecosystem is gradually being established.

## **7. Conclusions**

High-quality development and transcendence of universities cannot be separated from informatization. The development of informatization inevitably requires the improvement of information literacy. In the final analysis, it is the main body of the intelligence campus, which is the improvement of the information literacy of “people”. This improvement cannot be achieved overnight. Universities are gradually promoting decentralized businesses to converge towards the overall construction goal of intelligence campuses, and the importance of new engineering to the cultivation of university talents has become increasingly prominent. Information literacy micro-courses under the background of new engineering disciplines have become a new perspective of research and practice to change the “last mile” phenomenon of information construction. Informationization departments of universities should innovate service methods, broaden service areas, strengthen service functions, build a comprehensive application framework for teacher and student informatization, fully mobilize the enthusiasm of information promotion service personnel. Ensure that there is a place where teachers and students can say what they want to say, where they can do what they want to do, where someone can help to solve difficulties. Only in this way can the reform and development of school informatization education and teaching promote the improvement of teachers and students' information literacy ability and provide technical support for the cultivation of new engineering talents in universities under the new situation.

## **Acknowledgment**

This article is supported by Xiamen University of technology's education and teaching reform research project - “Research on University Information Literacy Curriculum Construction under the background of new engineering” in 2018.

## **References**

- [1] Notice from the General Office of the Ministry of Education on the Recommendation of New Engineering Research and Practice Projects,[online] Available:[http://www.moe.gov.cn/srcsite/A08/s7056/201707/t20170703\\_308464.html](http://www.moe.gov.cn/srcsite/A08/s7056/201707/t20170703_308464.html).
- [2] Notice of the Ministry of Education on Issuing the “Education Informatization 2.0 Action Plan”, [online] Available:[http://www.moe.gov.cn/srcsite/A16/s3342/201804/t20180425\\_334188.html](http://www.moe.gov.cn/srcsite/A16/s3342/201804/t20180425_334188.html).
- [3] Beijing's Three-year Action Plan for Education Informatization (2018-2020) Released,[online] Available:[http://edu.china.com.cn/2018-07/17/content\\_57566263.htm](http://edu.china.com.cn/2018-07/17/content_57566263.htm).

- [4] Jingwen Zhang, Education Informatization 2.0 Action Plan Released: Create an Online Learning Space for School-age Students, Tianjin Daily, Ninth Edition, February 28, 2019.
- [5] Youqun Ren, Xiaoxiao Sui, Xinyang Liu, Research on EU Digital Literacy Framework, Research on Modern Distance Education, no. 5, pp. 3-12, 2014.
- [6] Zhenhua Chu, A Comparative Study between China and the United States in the Evaluation of Student Information Literacy, Central China Normal University, 2018.
- [7] Zhixian Zhong, Facing Lifelong Learning: the Connotation, Evolution and Standard of Information Literacy, China Distance Education, no. 8, pp.21-29, 2013.
- [8] Qing Zhang, Research on “Digital Plain Face: New Media Alliance Horizon Project Strategic Briefing”, Library Work and Research, no. 5, pp.110-114, 2017.
- [9] Xinmin Sang, Theoretical and Experimental Research on the Cultivation of College Students' Learning Ability in Multimedia and Network Environments, China Distance Education, no.11, pp.22-26, 2000.
- [10] Xiaomu Zeng, Ping Sun, Mengli Wang, et al. Research on the Information Literacy Capability Index System of Universities in Beijing, Journal of Academic Libraries, no.3, pp. 64-67, 2006.
- [11] Li Feng, Information Literacy in the Epidemic, [online] Available: <https://mp.weixin.qq.com/s/whUfx499SwA7lfMzUM8ZFfA>.
- [12] Luo Lin, Strategies for the cultivation of college students' digital literacy based on the perspective of micro-courses, Contemporary Education Forum, no.4, pp. 115-120, 2019.
- [13] Chen Xiaoming, Information literacy is the basic literacy necessary for every member of modern society-Re-understanding of information literacy in the era of educational information 2.0, Tianjin Education (1st issue), no.6, pp. 4-8, 2019.