



A Breakthrough Approach to Digital Literacy for Primary and Secondary School Students Based on Virtual Technology

Yiming Tan, Ling Luo, and Lei Lei^(✉)

Chongqing Normal University, Chongqing, China
20131051@cqnu.edu.cn

Abstract. Digital technology in the 21st century has brought great convenience to the world, but also brought new challenges. As “digital natives”, primary and secondary school students have become the focus of education to adapt to the needs of the digital era and to promote the digital transformation of society through intensive and efficient basic education. This paper compares the current situation of digital literacy in primary and secondary schools at home and abroad, proposes new issues in the cultivation of digital literacy in primary and secondary schools according to the national policy and learning environment of primary and secondary students in China, and constructs a breakthrough path model for the cultivation of digital literacy of students in basic education in China on the basis of virtual technology.

Keywords: digital literacy · digital skills · primary and secondary school students · education informatization

1 Introduction

In October 2021, the central government issued the “Action Plan to Enhance Digital Literacy and Skills for All”, proposing that by 2035, digital literacy and skills for all people should reach a higher level to provide strong support for building a strong network, digital China and smart society. General Secretary Xi proposes to promote the digitization of education and build a learning society and a learning nation with lifelong learning for all. Digital literacy is a key element in promoting holistic human development and enhancing the digital economy. The 11th Internet usage of Chinese minors shows that the scale of Internet users of primary and secondary school students under 18 years old in China reaches 175 million, and the use of Internet by primary and secondary school students is shown in Fig. 1 [1], among them, primary and secondary school students use the Internet to watch short videos, listen to music, play games, etc. all occupy a high position, and in the new round of underage Internet use survey, 43.33% of students have Internet addiction behavior [2], And the correct use of digital technology by primary and secondary school students can effectively improve academic performance [3–6], Otherwise there will be adverse effects, such as excessive web surfing, short video

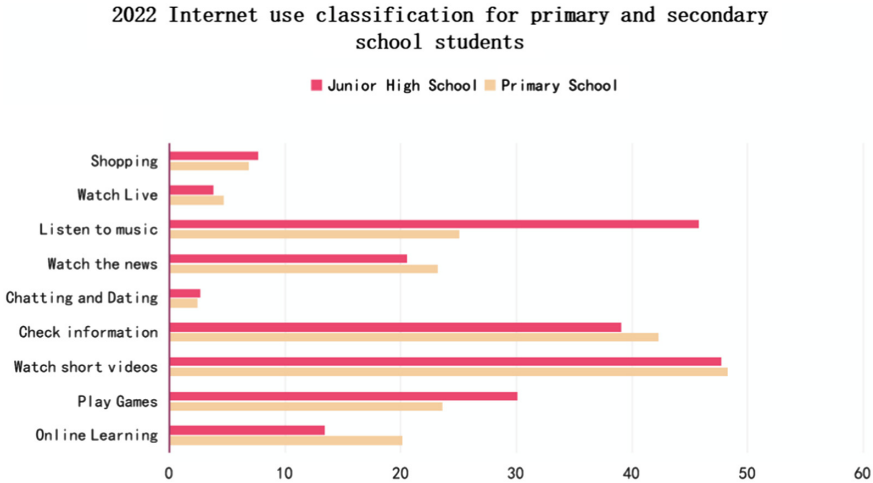


Fig. 1. 2022 Internet use classification for primary and secondary school students

viewing. Primary and secondary school students use digital technology to retrieve and benchmark data and improve their digital literacy, which will have a positive impact on their future income enhancement and skill premiums [7].

In 2016, Chinese scholar Shi Ge proposed a new framework for digital literacy from the cognitive laws of primary and secondary school students and the national situation, adding value judgments of the Internet and incorporating online ethics into the necessary digital literacy [8]. Since then, moral literacy has become an important part of the literacy research for primary and secondary school students in China. In 2020, it was suggested that primary and secondary school students' digital literacy is influenced by their own factors, environmental factors, and service provider factors; Dutch scholars newly identified six themes of digital literacy and proposed integration with the curriculum [9]; New Zealand emphasizes digitally literate reading for students with a variety of online and offline services [10, 11]. In the 21st century, Finland launched the third round of basic education reform, which emphasizes the development of students' digital literacy cross-cutting competencies throughout the learning process in all subjects [12]. As a result, the importance of digital literacy is recognized by all countries, in recent years, both research and policy on digital literacy have become increasingly sophisticated [13], while making up for past cultivation deficiencies, new problems are also exposed, this paper puts forward the current new problems of digital literacy cultivation and proposes new paths of digital literacy cultivation for primary and secondary school students from new technologies and students.

2 New Issues in Digital Literacy Development

2.1 Overly Influenced by Foreign Theories and Little Empirical Research

Analysis of the literature on the Internet shows that more than 50% of the studies on digital literacy are based on foreign theories, among which the UNESCO digital literacy concept and the EU digital literacy theory occupy more than one section. In addition, empirical studies are scarce, and virtual technologies such as electronic school bags, 3D printing technology, and VR are not very useful in aiding classroom teaching. And current domestic digital education research often ignores children's Internet environments and the specific uses of digital technology, and digital safety is not sufficiently monitored. Teachers only teach the use of technology and ignore risk avoidance, resulting in students being unable to escape the "cyber vortex".

2.2 Low Penetration Rate of All Subjects in IT Courses

The new 2022 version of the curriculum separates the IT curriculum from the integrated curriculum, reflecting the right direction of education but also exposing new problems. The IT courses offered in schools have been the main channel for developing students' digital literacy and are less cross-cutting in the learning of various subjects. On the one hand, because each subject has its own teaching system, teachers' use of "new resources" is at a moderate to low level [14], only a few teachers are willing to explore new channels of data interoperability and lack interconnection in the design of teaching activities and school-based resource development [14], so it is also difficult for students to transfer their skills in learning.

2.3 Lack of Continuity in Course Articulation

The Ministry of Education on the comprehensive deepening of curriculum reform to implement the fundamental task of moral education proposed: to strengthen the coordination of school segments, fully reflect the laws of education and talent training in each segment, to avoid curriculum content disjointed, cross and misalignment. Some students have been struggling with digital education in higher education and have difficulty keeping up with the pace of the curriculum because of the poor articulation between the various stages of the curriculum, which makes it difficult to build logical and substantive support for higher education. Students who fail to develop a good digital awareness at the primary and secondary school levels will have difficulty supporting later learning, and the issue of curriculum articulation is a major impediment to digital transformation [15].

3 Breakthrough Path

Virtual technology disrupts the era, and the emergence of metaverse is bound to bring a new future shape. As shown in Fig. 2, this model integrates the digital literacy education process as a whole based on virtual technology, constituting a complete and integral model based on the new technology from the educational substrate to the curriculum innovation, including the evaluation system.

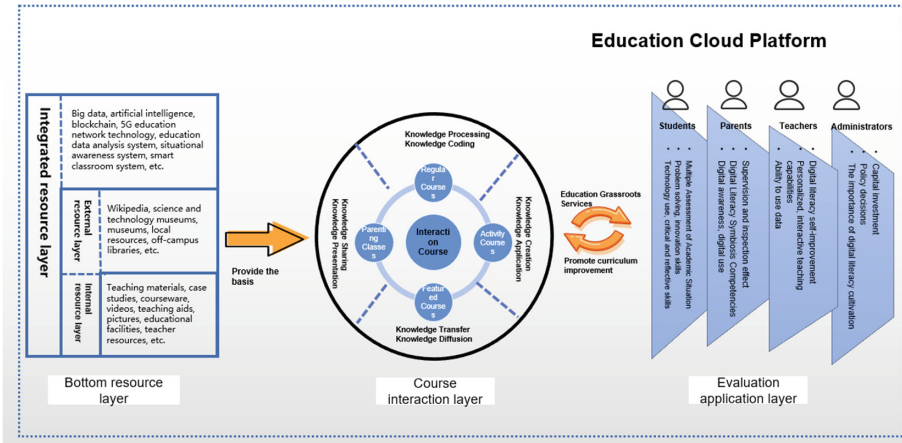


Fig. 2. Breakthrough path model of digital literacy cultivation for primary and secondary school students

3.1 Construction of a Ubiquitous and Integrated Education Cloud Platform

The guiding opinions of the Ministry of Education and six other departments on promoting the construction of new infrastructure for education to build a high-quality education support system, issued in 2021, suggest that technology should be used to promote the gathering of educational platforms and provide a solid digital base for high-quality education. In this model, virtual technology is used to build a digital cloud platform, coordinate internal and external resources in education, constitute a hybrid learning format, and offer multiple courses in cyberspace, with each course assuming a specific role. At the same time, capturing the reality that primary and secondary school students spend more time using digital screens, focusing them on curricular activities, helping them develop digital skills, and shortening the gap in their use of technology can effectively contribute to the digital transformation of education [16].

3.2 Building a Curriculum System of Media Interaction Services and Content Interaction

In this model, the curriculum system is built in the “meta-universe” classroom, as shown in Fig. 3, which forms a resource base of student information through the school platform, models the learner’s experience and learning through data analysis technology, and pushes personalized curriculum through prediction and intervention modules. The “meta-universe” classroom is composed of virtual technology, and the e-book package intelligently recommends books and evaluation information for students, and backfills the information resource base to form a closed-loop system. The model creates realistic scenarios, supports students to use digital skills in a digital environment, improves the aggregation effect of digital technologies, and has a long-term effect on improving the digital literacy of both students and teachers.

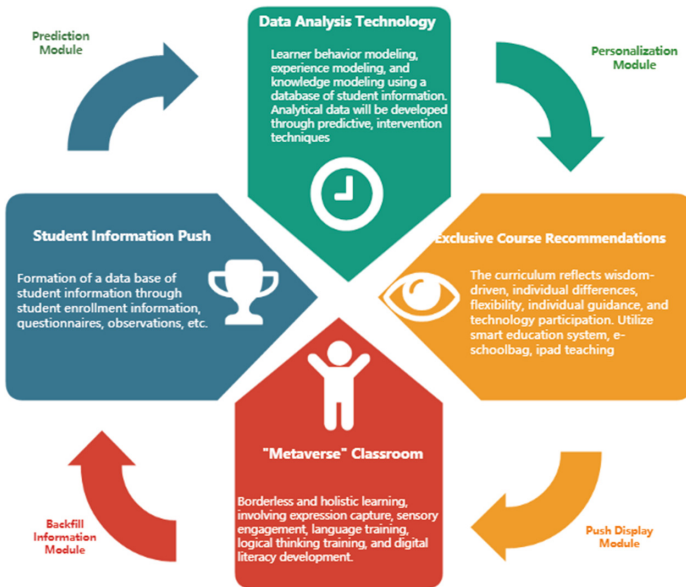


Fig. 3. Virtual technology-based course system diagram

3.3 Exploring a Multi-dimensional Digital Literacy Assessment System

The model builds a multi-effective assessment system for the whole society, fully considers students' own differences, aims to integrate into digital life, assesses participants from students to administrators, assesses the core literacy that new-age personnel should have, refines the assessment direction, diversifies the assessment methods, and masses the participating subjects. The assessment system is based on data analysis, which can provide objective feedback on the quality of digital curriculum, provide a basis for the government to adjust policies and fund investment, and can promote educational equity.

4 Conclusion

By analyzing domestic and foreign research on digital literacy of primary and secondary school students, this paper puts forward the current new issues of digital literacy cultivation in domestic primary and secondary schools and gives a new breakthrough model diagram based on technology. Emphasis is placed on the integration of technology and curriculum, breaking through the gap between rich and poor, making full use of primary and secondary school students' possession of screen time, laying a good digital foundation and cultivating digital literacy.

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