

The status and challenges of digital literacy cultivation for students majoring in Chinese language education

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Abstract. With the further development of modern education, the level of teachers' digital literacy has received extensive attention. But there are still some deficiencies in the investigation of the status of the cultivation of preparatory teachers' digital literacy. This research analyzes the current situation of the cultivation of digital literacy of preparatory Chinese language teachers, finding that there is a problem of emphasizing theory but neglecting practice in the cultivation of digital literacy. This research offers the following suggestions: optimize the existing curriculum arrangement of digital education in schools and increase practical courses; optimize the time arrangement and improve the uniformity of digital education; maintain existing theoretical knowledge courses and strengthen digital responsibility education.

1 Introduction

1.1 Background

1.1.1 Social background

With the rapid development of information science and the deepening of digitalized transformation in education, digital literacy has become an important component of modern teachers' professional competence. The need for digital transformation of education, the weakness of digital education exposed by the COVID-19, the problem of educational fairness caused by the inequality of digital education, and the pressure of international competition all reflect the urgency of improving the digital literacy of teachers of Chinese language [1-4]. In November 2022, the Ministry of Education of the People's Republic of China issued the "Teacher Digital Literacy" industry standard (hereinafter referred to as the "industry standard"), which sets specific requirements for teachers' digital awareness, digital technology

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knowledge and skills, digital ability, digital social responsibility, and professional development. This standard not only provides clear direction and standards for the self-improvement of all in-service teachers, but also presents new requirements for the education of preparatory Chinese language teachers. Chinese language teachers are a part of the teaching staff and closely related to global Chinese language teaching [5]. The lack of digital ability will have a negative impact, especially during the special periods, for example, the global epidemic of COVID-19. If Chinese language teachers lack digital literacy, they will be unable to carry out teaching, can not effectively maintain the teacher-student relationship and face other serious problems. Therefore, Chinese language teachers urgently need digital literacy skills [6]. As preparatory Chinese language teachers, examining the status of digital literacy cultivation for students majoring in Chinese Language Education can help predict the digital literacy level of future Chinese language teachers and improve digital literacy education in existing courses.

1.1.2 Research background

The industry standard proposes a framework for teachers' digital literacy, which explains teachers' digital literacy in levels of 5 primary dimensions, 13 secondary dimensions, and 33 tertiary dimensions [7].

Chinese researchers mainly focus on the different dimensions of the Standard for research, proposing paths for cultivating, improving, and evaluating teachers' digital literacy. They have concluded that multi subject co-education and digital means can be used to promote teachers' literacy [8-10].

Researchers from other countries have conducted research around similar standards, such as studying the digital literacy of Tanzanian undergraduate students based on the UNESCO ICT Competency Framework for Teachers, and have identified the problem of students having strong digital awareness but insufficient digital technology knowledge [11].

In terms of research conclusions, most researchers agree that developing digital literacy among college students is an inevitable choice to improve the quality of talent cultivation, and there are deficiencies in the digital application and learning abilities of normal university students, which require further optimization of curriculum design and practical aspects. Measures such as establishing a comprehensive and complete legal system and creating an environment conducive to the development of digital literacy can be taken to promote the improvement of students' digital literacy [3,12].

1.2 Research significance

This research aims to explore the status of digital literacy among undergraduate students majoring in Chinese Language Education, analyze the existing problems and shortcomings, and propose corresponding improvement suggestions. This research aims to provide a status analysis and theoretical guidance for the improvement of digital education for pre service teachers, as well as a reference for the cultivation and enhancement of teachers' digital literacy. The preparatory training stage for Chinese language teachers, which is the undergraduate stage of Chinese Teaching and the undergraduate stage of Teaching Chinese to Speakers of Other Languages, is a critical period for the development of digital literacy. The digital ability at this stage directly affects their adaptability and competitiveness in the teaching profession. Therefore, researching the cultivation of digital literacy among undergraduate Chinese Language Education students on industry standards has important practical significance and guiding value, which can point out the challenges faced by preparatory teachers in digital

literacy training at the current stage.

1.3 Research topic

This research focuses on the blank area in the investigation of the current status of digital literacy cultivation in undergraduate Chinese language education students. Through empirical research, this research investigates the status of digital literacy cultivation in Chinese language education majors at the undergraduate level, and analyzes the potential challenges they may face.

2 Method & result

2.1 Method

This research focuses on undergraduate students majoring in Chinese Language Education. Electronic questionnaires are distributed through online groups, and physical questionnaires are distributed offline.

The method includes six steps: designing questionnaires, evaluating questionnaire validity, distributing questionnaires, collecting questionnaires, screening valid questionnaires, and analyzing data.

2.1.1 Dimensions

This research takes the five digital competencies in the "Teacher Digital Literacy" industry standard as the analytical dimensions, namely digital awareness, digital technology knowledge and skills, digital application, digital social responsibility, and professional development as the analytical dimensions of this research. After completing the questionnaire collection, this research used SPSS software to investigate the differences in digital literacy cultivation among different groups of students majoring in Chinese Language Education. The questionnaire collected four types of basic information: major, grade, gender, and place of origin. The processing steps are data cleaning, descriptive statistical analysis, group difference analysis and independent sample t-test. Based on this, this research analyzed the current situation and challenges of cultivating digital literacy among Chinese Language Education majors.

2.1.2 Survey sample

This research used undergraduate students majoring in Chinese Language Education from three different universities in China as the survey sample, and conducted a stratified sampling survey of 220 people. After excluding 7 invalid questionnaires, a total of 213 valid questionnaires were obtained. Among them, there are 134 students majoring in Chinese Teaching and 79 students majoring in Teaching Chinese to Speakers of Other Languages, with a major ratio of 2:1. There are 30 freshmen, 119 sophomores, and 64 juniors, with a grade ratio of approximately 1:4:2.1. There are 99 male students and 114 female students, with a male to female ratio of approximately 1:1.15. 138 people come from urban areas and 75 people come from rural areas, with an urban-rural ratio of approximately 1.84:1. The data samples come from Chinese education majors in different regions of China, covering different ages, majors, and source areas, with a wide range of data and representativeness.

2.1.3 Analysis of questionnaire reliability and validity

After the questionnaire collection was completed, this research conducted reliability and validity analysis on the 213 collected questionnaires using SPSS software. After excluding screening questions, the Cronbach's α coefficient was 0.957, indicating that this questionnaire has good reliability. The Bart sphericity value is 5716.682, with a p-value less than 0.001 and a KMO value of 0.928, indicating that the data collected in this research is suitable for factor analysis and has applicability.

2.2 Results

Based on the data collected in this research, the following conclusions can be drawn: overall, under the cultivation of school curriculum, undergraduate students majoring in Chinese education have a clear digital awareness and a strong willingness to apply digital resources and tools; However, there is still room for improvement in terms of digital knowledge, digital skills, and ability to cope with challenges.

2.2.1 Status of cultivating digital awareness dimensions

According to the questionnaire data, under the influence of the school curriculum, the current situation of cultivating digital awareness among students majoring in Chinese language education is relatively good. The average score of the module is 4.21 out of 5, ranking second in the five dimensions. The respondents highly recognize the social value of digital technology and hold a positive attitude towards the relationship between digital technology and social development ($M=4.33$). The respondents also have a strong willingness to actively use digital resources, recognizing the value of digital resources ($M=4.32$).

However, the respondents had a weak awareness of the potential risks associated with digital technology ($M=4.13$), with only a few agreeing that digital technology may hurt education in areas such as privacy protection and the digital divide.

In addition, after analyzing respondents from different origins, this research found that students from urban areas had significantly higher levels of value recognition of digital technology than those from rural areas ($M_1=4.4$, $M_2=4.17$), with an effect value Cohen's d of 0.28-0.35 ($p<0.01$), indicating that urban students had significantly higher levels of recognition of the value of digital technology education than rural students.

2.2.2 Status of cultivation of digital technology knowledge and skills dimensions

According to the questionnaire data, under the influence of the school curriculum, students majoring in Chinese language education have weaker digital technology knowledge and skills cultivation. The module has an average score of 4.02, ranking last in the five dimensions. The respondents have a good understanding of the operational principles of modern digital technologies such as artificial intelligence and big data ($M=4.11$), and have rich knowledge of digital technology.

However, the respondents have weak abilities in practical and skill development, and cannot select and operate digital devices and software ($M=4$), as well as the ability to solve problems in digital teaching ($M=3.9$).

In addition, there are differences in the abilities of respondents from different grades in this dimension. Second year students have shown outstanding performance in "mastery of digital technology principles" ($M_2=4.27$) and "digital tool operation ability" ($M_2=4.24$), but

third year students have shown a decline in their ability to "solve digital teaching problems" ($M_3=3.75$), indicating that junior students have not been able to improve their digital application ability after receiving this stage of education.

2.2.3 Status of cultivation of digital application dimensions

According to the questionnaire data, under the influence of the school curriculum, the digital application ability of Chinese language education majors is relatively weak. The module has an average score of 4.07, ranking fourth in the five dimensions. The respondents have strong digital teaching abilities such as learning situation analysis and targeted guidance ($M=4.15$; $M=4.13$), and possess basic digital analysis skills.

However, the respondents have weak abilities in advanced data analysis such as model analysis and visualization analysis ($M=3.97$), and insufficient abilities in cross-domain integration such as assisting in mental health education ($M=3.99$).

In addition, the dimension of digital applications also shows grade differentiation. Second-year students have advantages in "digital teaching design" ($M_2=4.34$) and "academic data analysis" ($M_2=4.27$), while third-year students show relatively weak performance in comprehensive application scenarios such as "digital moral education implementation" ($M_3=4.02$) and "home school collaborative education" ($M_3=3.83$). This proves that respondents have not improved their ability to analyze teaching effectiveness and interdisciplinary education after receiving school education in their sophomore and junior years.

2.2.4 Status of cultivating digital social responsibility dimensions

According to the questionnaire data, under the influence of the school curriculum, students majoring in Chinese language education have a better awareness of digital social responsibility. The average score of the module is 4.26, ranking first in the five dimensions. The legal awareness and network environment maintenance awareness of the respondents are well cultivated ($M=4.36$; $M=4.33$), which indicates that school education can enable most respondents to consciously abide by Internet laws and regulations, actively maintain a healthy Internet environment, and has achieved good results.

However, respondents' awareness of personal information protection is relatively weak ($M=4.18$), and their awareness and practical ability of Internet privacy protection need to be improved.

In addition, among respondents from different majors, respondents of the Chinese Teaching major showed a more systematic ethical awareness, especially in terms of data security protection ($M_1=4.35$, $M_2=4.18$) and Internet risk prevention ($M_1=4.19$, $M_2=3.86$), with significant differences ($p<0.05$). Respondents of the Chinese Teaching major have stronger digital ethical security awareness than students majoring in Teaching Chinese to Speakers of Other Languages.

2.2.5 Status of cultivation of professional development dimensions

According to the questionnaire data, under the influence of the school curriculum, students majoring in Chinese language education have good professional development abilities and awareness. The module has an average score of 4.14, ranking third in the five dimensions. The respondents hold a positive attitude towards technology-driven teaching reform under the promotion of school education ($M=4.21$), and also have a strong willingness to use technology to improve future teaching work ($M=4.3$).

However, the respondents' participation in online training programs is relatively low, and their motivation to improve their abilities through online means is insufficient ($M=4.01$).

In summary, at present, there is a problem of emphasizing theory but neglecting practice in the digital literacy cultivation of students majoring in Chinese Language Education. The interviewed students have good digital awareness and knowledge of digital technology. But the ability is relatively weak in practice and cannot be effectively utilized to utilize digital devices and resources in teaching work. The motivation for professional development through digital platforms is also relatively insufficient.

3 Problem analysis

3.1 Uneven development of application capabilities

Students majoring in Chinese Language Education have already acquired a certain foundation in applying digital technologies across multiple domains. However, their development in different digital technology application capabilities is unbalanced. For example, in the application of digital technologies in mental health education, female students demonstrate stronger capabilities and are more confident in addressing future challenges. Male students, on the other hand, have relatively weaker digital technology application capabilities in this area but possess more advantages in skills like digital tool operation. This may result in distinct issues for students of different genders in the teaching process, with their respective advantages also varying. This is consistent with the conclusion drawn by Chinese researchers in 2023 that girls have higher digital cognition and self-efficacy than boys [10]. Students majoring in Chinese Language Education are divided into those majoring in Teaching Chinese to Speakers of Other Languages and those majoring in Chinese Teaching. Among them, students majoring in Chinese Teaching have strong data analysis and data visualization skills, which are comparable to those of students majoring in Teaching Chinese to Speakers of Other Languages. Nevertheless, in the aspect of using digital tools to collect students' grades, the gap between the two has diminished. Therefore, it is necessary to pay attention to these weak links during curriculum design and the teaching process to promote the all-around development of students.

3.2 Digital social responsibility and digital ethics still need to be improved

Overall, students majoring in Chinese Language Education exhibit a relatively strong sense of digital social responsibility [13]. The school curriculum has achieved notable results in cultivating students' relevant awareness. The interviewed students majoring in Teaching Chinese to Speakers of Other Languages have a strong ability to recognize potential technological risks. Meanwhile, the interviewed students majoring in Chinese Teaching have stronger teaching integration capabilities and a more systematic ethical awareness of digital social responsibility, especially in aspects such as data security protection and network risk prevention. However, due to the complexity of social information and the weak adaptability of education to social development, students' digital literacy is somewhat inadequate. There are certain digital risks from an ethical perspective. The respondents' awareness of personal information protection is relatively weak, and their awareness and practical ability in Internet privacy protection need to be improved. Thus, in the fields of personal information and privacy protection, as well as data security protection and network risk prevention, there is still room for improvement. These are weak links that need to be emphasized and strengthened in

subsequent education and teaching. The conclusions are consistent with the conclusion drawn by Chinese researchers after conducting a questionnaire survey in 2024, that there are still deficiencies in students' digital general skills and digital vocational abilities [13].

4 Suggestions

4.1 Optimizing the curriculum system setting

Optimize the curriculum arrangements for different grades to prevent the over-concentration of professional courses at a certain stage. This over-concentration may lead to students' unfamiliarity with fundamental knowledge and insufficient adaptability to complex educational scenarios in subsequent application phases. Optimize the curriculum system by introducing cutting-edge digital education technology cases to address students' weak points, enrich teaching content, and enhance students' understanding and practical abilities in digital technology applications. Digital literacy courses can also be added to help students enhance their basic understanding of digital technology, cultivate application skills, and improve their digital literacy [13]. Additionally, efforts should be made to bridge the digital divide between urban and rural students by providing more digital educational resources and training opportunities for students from different regions.

4.2 Strengthening practical ability in teaching

Schools should optimize the curriculum content and offer in-depth explanations of cutting-edge technologies, such as big data, virtual reality, and artificial intelligence, in combination with educational application scenarios. Simultaneously, strengthen the practical teaching segment. Increase the number of digital education practical courses or incorporate more practical cases and exercises into existing courses. This is to cultivate students' ability to apply digital skills to solve practical problems in real-world teaching scenarios and boost their confidence in facing the challenges of educational digitalization. Targeted tutoring can also be provided to fill students' knowledge and skill gaps, improve their overall digital literacy, and further stimulate their learning interest and application motivation. Education providers should also consider the characteristics of students in different grades, majors, and regions, design digital literacy courses in a layered manner, and scientifically arrange teaching plans [13].

4.3 Strengthen the construction of digital awareness

Schools should focus on the weak links in cultivating students' awareness, such as personal information and privacy protection, and network risk prevention. Conduct data ethics education to enhance students' data ethics awareness through forms like special lectures and case discussions. Establish a continuous education mechanism, regularly carry out training and educational activities related to digital social responsibility, and consolidate and improve students' awareness and abilities. Moreover, strengthen the tracking and feedback on students. Regularly use evaluation questionnaires and surveys to promptly understand the changes in students' awareness and behavior, and adjust educational and teaching strategies accordingly. Schools should also strengthen digital ethics education for students majoring in Chinese Language Education, guide students to establish correct values, enhance their ability to identify digital information, consciously maintain network security, and strictly abide by academic integrity [13].

5 Conclusion

This research investigates the current situation of cultivating digital literacy among undergraduate students of Chinese Language Education and reveals the main challenges faced in the current cultivation process. Firstly, there is an imbalance in the development of students' digital technology application abilities. Although students have some understanding of the principles of digital technology, their abilities in practical operation and problem-solving in teaching are relatively weak. And there are significant differences in the performance of students from different grades, majors, and hometowns in various dimensions of digital literacy. This reflects the insufficient cultivation of practical abilities and the uneven distribution of resources in the educational process. Secondly, students' awareness of digital social responsibility and digital ethics is generally good. However, the awareness of personal information protection and network risk prevention is relatively weak, exposing the lack of digital ethics education. These challenges indicate that the cultivation of digital literacy among students majoring in Chinese Language Education needs to be improved in practical teaching, curriculum design, and balanced allocation of educational resources to meet the needs of digital transformation in education.

These findings provide important references and directions for the future development of digital literacy cultivation for students majoring in Chinese Language Education. In the future, the cultivation of students' digital literacy in Chinese Language Education should focus on enhancing their practical application abilities. At the same time, attention should also be paid to their digital ethics education, strengthening students' awareness and skills in personal information protection and network risk prevention. In addition, it is necessary to accurately allocate educational resources, especially to provide more learning opportunities for students in rural areas, to narrow the digital divide between urban and rural areas. Through these measures, it is expected to assist in the digital transformation and innovation of education.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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