

Research on the Current Status of Digital Teaching Competency Training for Teacher Trainees in the Context of Artificial Intelligence

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Abstract: With the rapid development of artificial intelligence technology, the deep integration of artificial intelligence and education will become more and more important, which also puts forward higher requirements for digital teaching ability of normal students. Digital teaching ability is particularly important for teacher trainees who are about to embark on the teaching post. After visual analysis of the existing digital teaching ability literature, this paper first investigates the current situation of digital teaching ability training of teacher trainees in Z University through the questionnaire method, and statistically analyzes the survey data to obtain the influencing factors affecting the digital teaching ability of teacher trainees, and puts forward a strategy for cultivating the digital teaching ability of teacher trainees under the background of artificial intelligence, in order to provide reference significance for the digital teaching ability training of teacher trainees in Z University and promote the improvement of digital teaching level.

Keywords: Artificial Intelligence; Normal University Student; Digital Teaching Competencies; Digital Teaching Concept

1. Introduction

The integration of artificial intelligence technology and education is changing the education ecology and posing new challenges to the talent training objectives and digital education of teacher educators. The "Education Industry Standard of the People's Republic of China: Teachers' Digital Literacy"(2022) stipulates the knowledge of digital technology that teachers should know and the digital technology skills they need to

master in their daily education and teaching activities, including the knowledge of digital technology as well as the digital technology skills. The document "The Ministry of Education of the People's Republic of China Accelerating the Digitization of Education and Building a Strong Country in Education" (2022) points out that efforts should be made to improve teachers' digital literacy and their ability to teach multimedia interactive teaching and learning; it is necessary to strengthen the construction of the teacher team in the digital era, and to carry out the training of teachers' digital competence in multiple levels, so as to empower teachers' professional development and upgrade their teaching and learning reforms. However, after visualizing and analyzing the existing literature, the author found that the current research object of digital teaching ability is mainly post-service teachers, and a total of 253 articles have been found according to the qualifier search of "teachers' digital teaching ability"; only 16 articles have been found according to the qualifier search of "teachers' digital teaching ability"; and only 16 articles have been found according to the qualifier search of "teacher students' digital teaching ability". Only 16 articles were found according to the qualifier "teacher's digital teaching ability". In summary, it can be seen that the investigation of the current situation of the cultivation of digital teaching ability of teacher trainees pays less attention to the fact that in the modern society, artificial intelligence technology has been introduced into thousands of households and the use of digital devices has become a commonplace. As the reserve force of teachers, normal students have both the roles of "taught" and "taught" and as the successors of future education, (Zhao and Qu, 2022) normal

students with innovative spirit will cultivate innovative students, and their digital teaching ability will not only affect their own competence in teaching, but also affect the cultivation of future talents [1]. Therefore, digital teaching ability is particularly important for teacher trainees who are about to embark on the teaching post. In today's context, the overall enhancement of digital teaching ability of teacher trainees has become a realistic problem that must be paid attention to and confronted in the training of teacher trainees.

2. Survey on the Current Status of Digital Teaching Competence of Teacher Trainees at University Z

At present, domestic education is in the era of profound changes and development of educational informatization 2.0. With the blessing of artificial intelligence technology, educational informatization has changed to educational digitalization, which also requires closer and deeper integration of information technology and education and teaching [2], then normal university student as the reserve army of the teaching force, improving their digital teaching ability is an indispensable part in education teaching. In order to understand the current situation of teacher students' digital teaching ability, the author took teacher students of University Z as the survey objects and did the questionnaire survey of "Survey on the Current Situation of Teacher Students' Digital Teaching Ability in University Z".

2.1 Survey Design

2.1.1 Survey background and respondents

(1) Background of the survey. University of Z is a public full-time comprehensive undergraduate university with the right to confer master's degrees, sponsored by the People's Government of Guangdong Province and under the supervision of the Provincial Department of Education. It was founded in 1970, and is located in Duanzhou District, Zhaoqing City, the node city of Guangdong, Hong Kong and Macao Greater Bay Area. As of September 2022, the university has a total of 70 undergraduate majors and 18 teacher training majors. The university adheres to the idea of "making new teacher training better" in the construction of majors, and takes the cultivation of teacher training students as the

focus of teaching, (Zeng,2019)cultivating various types of teacher training students at all levels and conveying a large number of excellent talents for the construction of the teaching force [3].Therefore, it is representative for this study to choose teacher trainees of University Z as the survey object.

(2) Survey Objects. In order to ensure the authenticity and accuracy of the sample, this paper takes the enrolled teacher training students of University Z as the overall research population and randomly samples the sample. In terms of specialty selection, 18 teacher trainees majoring in Educational Technology, Elementary Education, and Physical Education were surveyed as the target of this questionnaire; in terms of the scope of the survey, the questionnaire is universally representative by taking into account the freshmen to the seniors and the four grades.(Shown as Figure 1 , Figure 2)

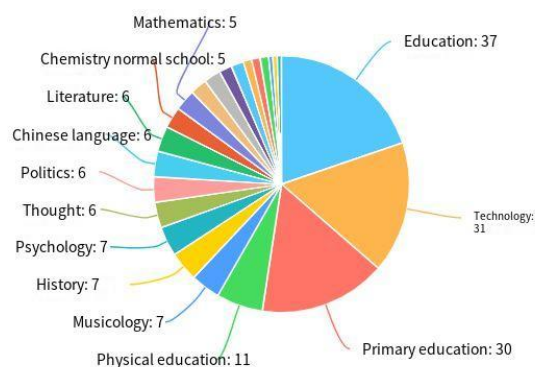


Figure 1. Diagram of Specialized Word Analysis of Survey Respondents

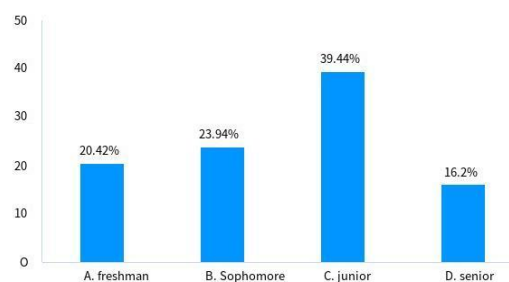


Figure 2. Distribution of Survey Respondents by Grade Level

2.1.2 Questionnaire development and research tools

(1) Questionnaire preparation. In order to accurately grasp the current status of teacher students' digital teaching ability, based on the Standard for Teacher Students' Informatization Teaching Ability,

(Sha,2019) this study has adapted Sha Tong's Study on the Cultivation of Teacher Students' Digital Education Teaching Ability in Higher Teacher Colleges and Universities Majoring in History^[4] after the questionnaire used in the master's thesis was adapted accordingly and a survey of digital teaching ability of normal students in Z University was compiled and designed. This questionnaire consists of three parts, the first part is mainly about the statistics of the basic personal information of the survey respondents, the second part is about the survey on the digital teaching competence training courses offered on the campus of the University of Z and the cognitive survey on the digital teaching competence of the teacher students, and the third part is about the survey on the use of the skills of the digital teaching competence of the teacher students and the survey on their digital education and teaching competence.

(2) Research tools. This study used the questionnaire star system to distribute questionnaires in the form of online surveys, and used questionnaire star and SPSS to count and analyze the collected data.

2.1.3 Questionnaire survey process

In the process of investigating the current situation of normal students' digital education and teaching ability, the author distributed 142 questionnaires online with the help of the questionnaire system on the digital network platform. At the same time, based on the principle of convenient sampling, all normal majors were randomly sampled, and 142 copies were recovered, with an effective rate of 100%.

2.2 Survey Results and Statistical Analysis

2.2.1 Basic situation analysis

(1) Gender. According to the statistics of the questionnaire results, among all the respondents, there are 53 male students and 89 female students, the ratio is close to 4:6, which is consistent with the overall male to female ratio in University Z. This also shows that the questionnaire has a certain degree of scientific validity. (Shown as Figure 3)

(2) Grade and specialty composition. The questionnaire survey selected freshmen to senior teacher training students of University of Z. According to the statistics, it was concluded that the teacher training students of arts and sciences totaled 62, accounting for

about 43%; the teacher training students of science majors totaled 55, accounting for 39% and the teacher training students of arts and sports majors totaled 25, accounting for about 18%, which indicates that the number of teacher training students surveyed is relatively even in arts and sciences, and the number of teacher training students of arts and sports majors is relatively small, which is due to the fact that before distributing the questionnaires, the author selected the This is because before distributing the questionnaire, the author selected three junior teacher training students in music, dance and physical education to do interviews, in which it was found that the teacher training majors in the arts and sports category would have relatively fewer digital teaching ability training courses than those in the arts and sciences, but in order to better take into account the current situation of digital teaching ability training of the teacher training students in the three major categories of arts, sciences and arts and sports, the author still distributed the questionnaires among the teacher training majors in the arts and sports category, but the number of the questionnaires distributed was relatively fewer compared to that of the arts and sciences teacher training majors. The number of questionnaires distributed is relatively small compared with that of the arts and science teacher training majors, so, on the whole, such a survey better takes into account the three major categories of arts and science and arts and sports, and to a large extent, more accurately reflects the current status of the cultivation of digital teaching ability of teacher training students.

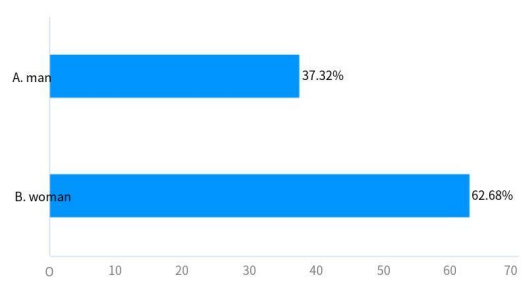


Figure 3. Sex ratio Distribution

(3) Educational internship experience. In the basic information, the author also set the question of "whether you have had educational internship experience" to support the subsequent "to understand whether the educational internship has certain relevance to the development of teacher trainees' digital

teaching ability". From the statistics, it can be seen that among the 142 respondents, a total of 88 people, or 61.97%, did not have any educational internship experience, while 54 people, or 38.03%, had educational internship experience, a ratio of 6:4, which is consistent with the ratio of those who did not have any internship experience in their freshman and sophomore years, and those who went to internships in their junior and senior years at the University of Z. This demonstrates that the setting of this questionnaire has a certain degree of reasonableness and scientific validity in the attributional analysis of the subsequent survey. (Shown as Figure 4).

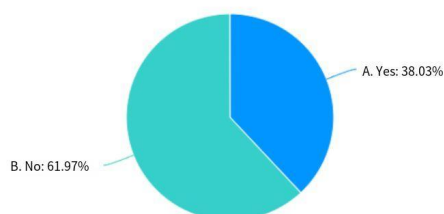


Figure 4. Availability of Educational Internships

2.2.2 Analysis of digital teaching competency development courses offered on campus

Curriculum is the most basic and important factor in the process of talent cultivation in higher education institutions(Wu,2021) [5] , and in the context of the development of artificial intelligence, it is also crucial for institutions of higher education to cultivate the digital teaching ability of teacher trainees. Only if the school pays attention to the development of information technology in the curriculum system, offers relevant courses, and puts the practice opportunities in place will it better enhance the digital teaching ability of teacher trainees. Courses for the development of digital teaching ability offered in schools can be centered on both theoretical

courses and practical courses. According to Figure 5 shows, in terms of theoretical courses, 88.03% of the teacher trainees have been exposed to the digital teaching competence development courses combined with subject teaching offered by the school at present, and only 11.97% of the students have not yet been exposed to the digital teaching competence development courses; whereas in terms of practical courses, only 8.45% of the students think that the school provides teacher trainees with a great deal of practical opportunities for digital teaching competence, and 32.39% of the students thought that the school provided more practical opportunities for teacher trainees to develop digital teaching competence, 41.55% of the students thought that the school provided average practical opportunities for teacher trainees to develop digital teaching competence, 14.79% of the students thought that the school provided fewer practical opportunities for teacher trainees to develop digital teaching competence, and 2.82% of the students thought that the school had no practical opportunities at all to provide teacher trainees with digital practice opportunities for teaching competence. In view of this, the author also organized the basic information of the teacher trainees who participated in the survey and obtained the following Table 1.

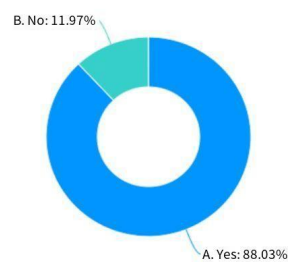


Figure 5. Whether the School Offers Courses Related to the Development of Digital Teaching Skills

Table 1 Statistics on the Grade of Normal University Students and whether there are Courses to Cultivate the Teaching Ability of Digital Education.

X/Y	A. be	B. no
freshman	21(72.41%)	8(27.59%)
B.Sophomore	30(88.24%)	4(11.76%)
C.Junior	52(92.86%)	4(7.14%)
D.Senior	22(95.65%)	1(4.35%)

It can be found through the above data that

72.41% of the majors will start to train teacher

trainees in digital teaching competence, while 27.59% of the majors will train teacher trainees in digital teaching competence in their sophomore or junior year according to the teaching requirements and training programs of their corresponding disciplines. Therefore, from the results of the data statistics, University Z has spent more efforts on the theoretical course system in the cultivation of teacher students' digital teaching competence, while in the practical courses (such as micrographic practical training and multimedia courseware production), most of the teacher students think that the opportunities for practical work are at an average level, in addition, the cultivation of teacher students' digital teaching competence in University Z basically starts in the first year, which shows that Z University attaches importance to the cultivation of digital teaching ability in the first year and focuses on the cultivation of theoretical courses for teacher trainees' digital teaching ability. However, there are still some shortcomings in the practical curriculum, and it is necessary to strengthen the practical curriculum. This kind of practical participatory activities can create a good environment for creative development and provide more practical opportunities for normal students, [6] so as to improve the digital teaching ability.

2.2.3 Analysis of Teacher Trainees' Perceptions of Digital Teaching Competencies
 As the saying goes: "Depth of thought determines the height of action" teacher trainees' cognitive awareness of digital teaching competence is the basis of teacher trainees' motivation to master the knowledge and skills of digital teaching competence. In terms of cognition, the author set up the

questionnaire to investigate five questions, namely, "recognizing the importance of digital information technology to teachers and education", "using digital information technology to solve difficulties", "enjoying new applications of IT", "concerned about the application and development of digital IT in teaching", and "believing that the use of digital IT in the classroom can improve the quality of teaching". From the results of the survey, it can be seen that among these five questions, the proportion of those who chose to be more in line is the largest, which indicates that the majority of teacher education students at University Z have the cognitive awareness of adopting information technology in teaching, but the number of those who chose to be more in line with "I am concerned about the application and development of digital information technology in teaching and learning" did not exceed 40%, which suggests that compared with those who are more interested in information technology, the number of those who are more in line with it does not exceed 40%. However, in the question of "I am concerned about the application and development of digital information technology in teaching and learning", not more than 40% of the teacher trainees were in line with the statement "I am concerned about the application and development of digital information technology in teaching and learning", which indicates that most of the teacher trainees are less concerned about the application and development of digital information technology in teaching and learning than they are about the recognition of information technology. (Shown as Figure 6)

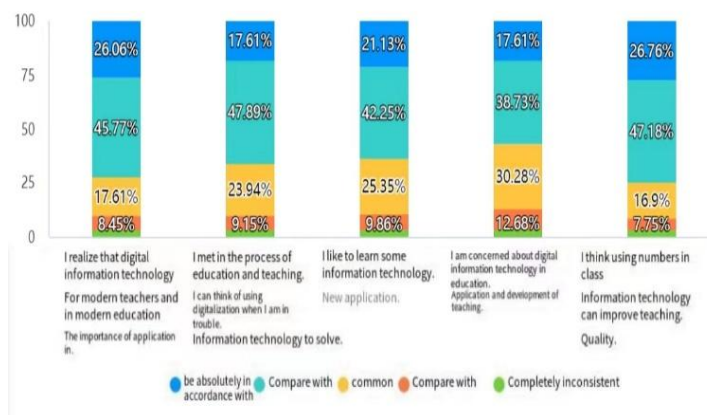


Figure 6. Analysis Chart of Teacher Trainees' perception of Digital Teaching Competence

2.2.4 Analysis of Teacher Trainees' Skill Use of Digital Teaching Competencies

Skill application is an important part of digital teaching ability. Skillfully using information technology to integrate teaching resources, making interactive multimedia courseware and applying it in class can not only improve the efficiency of lesson preparation, but also stimulate students' interest in learning and enrich classroom teaching forms. According to the statistical data, it can be seen that most normal students can skillfully operate the multimedia equipment configured in the classroom and master the use of basic information technology, and the percentage of

those who are more in line with this is more than 40%. However, in terms of solving the common problems in multimedia equipment, keeping abreast with the new technology in the field of information technology, and learning the new technology, the percentage of those who are more in line with this is no more than 40%, which reflects that the teacher trainees have not yet better master the methods of solving common problems in multimedia and there is still room for improvement in keeping abreast of new technologies and learning. (Shown as Figure 7)

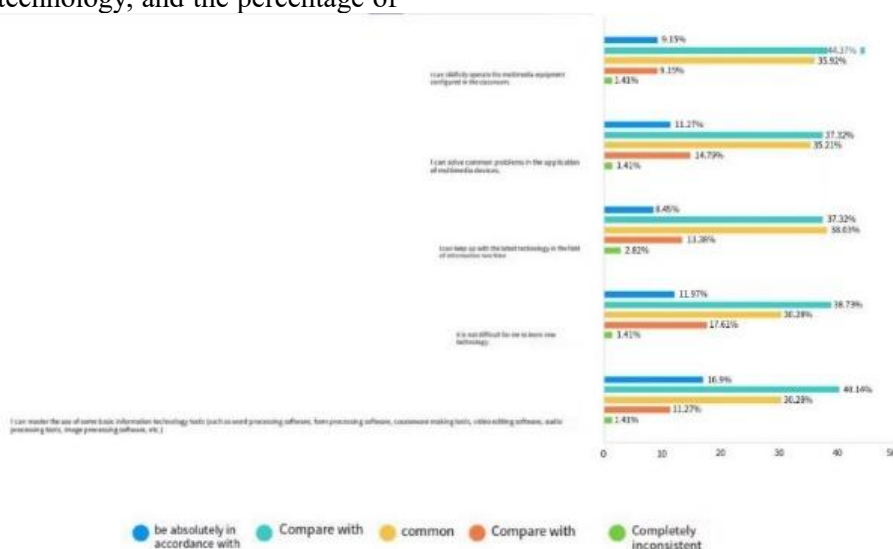


Figure 7. Analysis Chart of Teacher Trainees' skill use of Digital Teaching Competencies

2.2.5 An analysis of teacher educators' digital teaching competencies.

Mastering skills is to better use in teaching, and to enable normal students to optimize teaching design and improve classroom teaching quality with the skills they have learned, so as to optimize digital teaching. As can be seen from the results of the data analysis (Figure 8), most of the teacher trainees have a relatively good mastery of the selection of teaching media, screening and organizing of teaching resources, with the number of those who are fully compliant approaching 10%, and the number of those who are more compliant approaching 50%. However, in the combination of the teaching objectives and the teaching content of the teaching resources for the originality of the teaching resources and the use of digital information technology tools to produce high-quality teaching works, the number of those

who are more compliant is less than 50%. The number of people is less than 50%, which reflects that there is still much room for improvement in the teaching of teacher trainees in terms of originality. Meanwhile, from the perspective of ways to improve their digital teaching ability, most of the teacher trainees think that "educational internship" is the most effective way to improve their digital teaching ability, followed by "microform teaching" practical training, and after statistical analysis of the data of the teacher trainees who have already had internships, there is a significant difference between the number of teacher trainees who have already had internships and the number of teacher trainees who have already had internships. After the statistical analysis of the data of teacher trainees who have already had internships, 85.19% of teacher trainees think that their digital teaching ability has been

improved accordingly after the internships, while only 14.81% of teacher trainees think that their digital teaching ability has not been improved, which indicates that practical channels can better improve the digital

teaching ability of teacher trainees and promote the cultivation of teacher trainees' teaching ability. (Shown as Figure 8 , Figure 9)

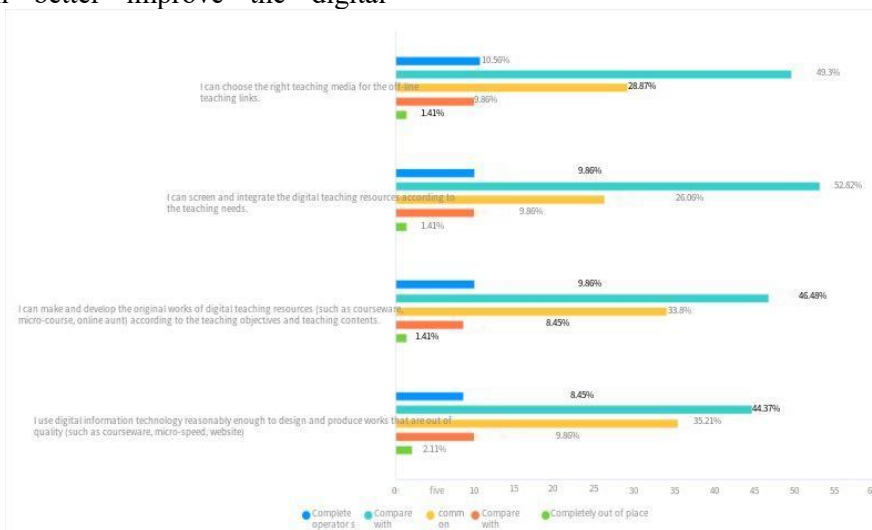


Figure 8. Diagram of the Analysis of Digital Teaching Competence of Teacher Trainees

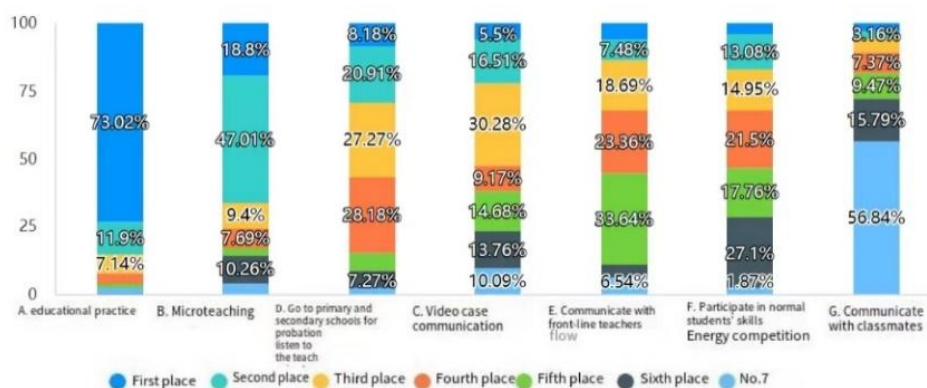


Figure 9. Sorting Diagram of Ways to Effectively Improve Digital Teaching Ability

3. Strategies for Cultivating Teacher Trainees' Digital Teaching Competence in the Context of AI

In the era of artificial intelligence, the application of generative artificial intelligence in the field of education has received more widespread attention. In the theme lecture of "Information Technology Integration and Innovative Classroom Teaching Practical Activities", Prof. Jiao Jianli talked about the close connection between AIGC and primary and secondary education. Generative AI tools can help teachers generate content such as text, code, images, voice, video, poetry, etc., reducing the burden and increasing the efficiency of teachers. As a teacher trainee facing the fast-developing AI era, she should

also adapt to the changes and development of the times, master the basic multimedia skills as well as the higher-level generative AI tools, and improve her own digital teaching ability. Aiming at the status quo of digital teaching ability of teacher trainees in University Z, the author will give corresponding strategies for the cultivation of digital teaching ability of teacher trainees from three aspects.

(1) The school strengthens the construction of facilities and creates more opportunities for practice. From the statistical results of the questionnaire, it can be seen that there is a certain relationship between the cultivation of teacher students' digital teaching ability and the category of specialties, for this reason, when schools cultivate the specialties of arts, sciences and arts and sports, they can offer

relevant courses according to the teaching progress and teaching needs of different specialties; and from the Figure 10, it can be seen that most of the teacher trainees think that the school's software and hardware facilities are the most important factors affecting their digital teaching ability, followed by the participation in teaching practice. Secondly, the participation of teaching practice. Therefore, normal universities should pay attention to the cultivation of normal students' professional categories and skills and knowledge and strengthen the construction of basic software and hardware facilities in schools. In addition, most of them think that the educational internship has a great influence on the improvement of their digital teaching ability. In addition, most of the teacher trainees believe that educational internships have a great role to play in improving their digital teaching ability, and that schools can provide more opportunities for practice. For teacher

trainees, theoretical knowledge of education and skills cannot be well grasped by the actual knowledge without applying them in practice, and they can only hold the attitude of "getting knowledge from the paper is not as easy as it seems, and one must do it oneself" to adapt to information technology. Only by adapting to the development of information technology with the attitude of "the knowledge gained on paper is not as good as the knowledge gained on paper, and the knowledge gained has to be put into practice", can we better improve our digital teaching ability, therefore, in a way, the educational internship is an effective practical path for teacher trainees to test their own learning achievements. In the process of educational internship, teacher trainees can better discover and know their problems and deficiencies in digital teaching, and can make targeted improvements under the guidance of the corresponding practicing teachers, so as to master digital teaching ability more effectively.

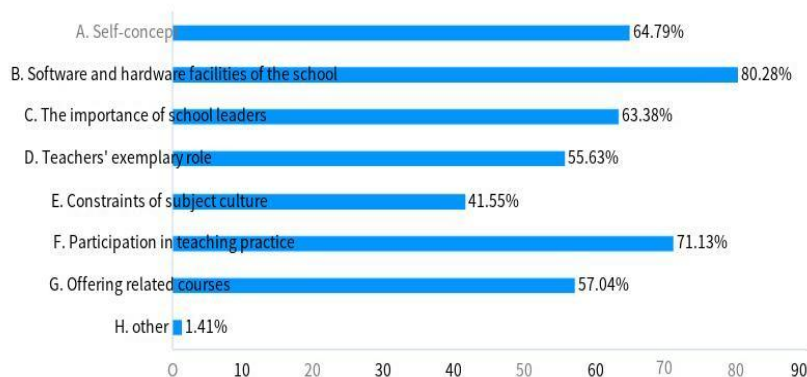


Figure 10. Factors Affecting the Improvement of digital teaching ability of Normal Students

(2) Teachers teach students according to their aptitude and innovate teaching methods. At present, it is understood that most of the higher teacher training colleges and universities in the teaching of information technology and digital theory courses, the teaching method is still "filler", not better for the individual differences of students to teach the relevant knowledge content, which is not conducive to improve the teacher training students' interest in information technology. Therefore, when teaching teacher training students, teachers can use network resources and interesting interactive platforms to stimulate students' enthusiasm, (Wang, 2020) realize the integration co-construction, sharing and intercommunication of digital teaching

resources [7]. For example, by means of catechism, classroom is a bit cool, rain classroom and other forms to let students carry out independent cooperative inquiry learning.

(3) Teacher trainees adapt to the changing times and take the initiative to learn digital teaching skills. The society is constantly changing and developing, and the technology is constantly being iteratively updated. Only by keeping pace with the development of the science and technology era can normal students actively learn new teaching equipment and master information technology skills to gain a foothold in the future teaching industry. What's more, teacher trainees can read more books related to cutting-edge

technology to expand their technological horizons, and participate in the relevant teacher trainee skills competitions, accumulate teaching experience, which will help them to better shift from "the recipient" to "the teacher", and also help them to improve their awareness of digital teaching. This is conducive to the teacher trainees to better change from the "taught" to "teaching", but also conducive to the improvement of their own digital teaching awareness, so as to enhance their own digital teaching ability.

To summarize, in the era of artificial intelligence background, schools should pay attention to the cultivation of digital teaching ability of teacher students, but at the same time of paying attention to it, schools need to find out a more mature training system and cultivation path in the practical path cultivation. Teachers should change the traditional teaching concepts and innovate the teaching methods. Normal university student should adapt to the changes and development of the times and consciously and actively pay attention to and learn the new technology. With the efforts of many parties, the improvement of digital teaching ability of teacher trainees will be more rapid and effective.

4. Conclusion

In the era of artificial intelligence background, the application of digital technology skills in the field of education is also becoming more and more common, and it is particularly important for teacher trainees to have better digital teaching ability if they want to gain a foothold in the future teaching profession. In this paper, under the background of national policy changes and the rapid development of artificial intelligence, the literature on digital teaching ability is analyzed, and it is found that the existing literature in China does not pay enough attention to the digital teaching ability of teacher trainees and less literature can be collected, for this reason, this paper takes University Z as an example, and carries out a status quo research survey on the cultivation of teacher trainee's digital teaching ability in order to make it a useful reference for the cultivation of teacher trainee's digital teaching ability in University Z. Cultivation has certain reference significance, but due to the author's current time constraints, the

implementation strategy given for the specific cultivation path is not comprehensive enough, which is the deficiency of this paper. The enhancement of digital teaching ability of teacher trainees is not an overnight solution, but a long process. Moreover, the construction of digital resource platform for normal students is also a long-term and meaningful thing.^[8] Therefore, the author will continue to follow up the relevant investigations and give more specific and comprehensive strategies for the cultivation of digital teaching ability of teacher trainees.

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