Investigation and Research on Informatization Teaching Ability of Mathematics Normal Students Based on SPSS Statistical Analysis

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Abstract

Background: With the continuous advancement of education informatization, informatization teaching ability has become an important indicator for the evaluation of contemporary teachers' professional ability. As the reserve force of future mathematics teachers, mathematics normal students should have excellent informatization teaching ability to continuously promote the development of information technology and mathematics teaching from integrated application to innovation. Therefore, informatization teaching ability of mathematics normal students is the key content discussed by scholars. Objective: To obtain the status of informatization teaching ability of mathematics normal students and provide reference for the following research in the field of informatization teaching ability of mathematics normal students. Methods: A questionnaire survey was conducted on 97 mathematics normal students by using the self-measurement tools for pre-service teachers' ICT competency. SPSS is a series of software products developed by IBM for statistical analysis, data mining, prediction analysis and decision support tasks. After the invalid questionnaires were removed, the valid questionnaires were collected and entered into the data, and SPSS 25 version was used for statistical analysis. Results: Firstly, the average score of informatization teaching ability of mathematics normal students is 3.57. Among the specific dimensions, the average score is the highest in the dimension of basic technical literacy, reaching 3.75. The second is technical support learning 3.58 and the third is technical support teaching 3.44, respectively. Secondly, there is no significant difference in gender, major and grade of informatization teaching ability of mathematics normal students. But there is significant difference in grade of technical support teaching dimension. Thirdly, the informatization teaching ability of mathematics normal students is significantly positively correlated with its various dimensions. The correlation coefficient between technical support teaching dimension and informatization teaching ability is the highest, reaching 0.935. Conclusions: Firstly, the current mathematics normal students' informatization teaching ability is at a medium level. Secondly, there is significant difference in grade of technical support teaching dimension. Mathematics normal students in grade three and grade four are higher than those in grade one. Thirdly, informatization teaching ability of mathematics normal students is positively correlated with its various dimensions, and the correlation coefficient between technical support teaching dimension and informatization teaching ability is the highest.

Keywords: *Informatization Teaching Ability; Mathematics Normal Students; Questionnaire Survey; SPSS; Data Analysis*

1 INTRODUCTION

With the continuous advancement of education informatization, informatization teaching ability has become an important indicator for the evaluation of contemporary teachers' professional ability. As the reserve force of future mathematics teachers, mathematics normal students should have excellent informatization teaching ability to continuously promote the development of information technology and mathematics teaching from integrated application to innovation. Facing the future, cultivating and improving

the informatization teaching ability of mathematics normal students is not only the requirement of the times, but also the realistic demand and the pursuit of teachers. Therefore, it's important to research informatization teaching ability of mathematics normal students.

2 RESEARCH STATUS

In order to understand the related research status of informatization teaching ability, this paper read, classified and sorted out the relevant literature.

2.1 Research on the Connotation of Informatization Teaching Ability

Dineke et al. showed that teachers' basic knowledge, means and attitudes towards efficient teaching were achieved through teachers' informatization teaching, and a higher education teaching capacity framework for teachers, content subject experts, organizers and lifelong learners was created [1]. From the perspective of connotation of informatization teaching ability, Markauskaite et al. described the conceptual norms, arrangements and implementation of the ITE course, indicating that teachers should have the ability to use information technology to implement teaching activities, analyze students' actual needs, manage information-based classrooms and conduct self-reflection and evaluation [6]. Gili et al. showed that teachers should judge teachers' informatization teaching ability from three aspects: teaching knowledge, coordinating interpersonal relationship and organizing classroom management, which is to further understand teachers' leading role in teaching [3].

2.2 Research on the Structure of Informatization Teaching Ability

Mishra&Koehler are the most influential researchers on the structure of normal students' informatization teaching ability. Mishra & Koehler, of Michigan State University, added technological knowledge to Shulman's Pedagogical Content Knowledge (PCK) and expanded it to Technological Pedagogical Content Knowledge (TPACK) [7]. Since then, scholars have carried out a lot

of theoretical and practical research on TPACK, some scholars based on the theory of TPACK and the characteristics of mathematics put forward the Technological Pedagogical Mathematics Knowledge (TPMK) [8]

2.3 Research on the Development of Informatization Teaching Ability

Ertmer summed up the problems encountered by teachers in informatization teaching as external obstacles and internal obstacles. External obstacles include equipment, time and training; internal obstacles manifest in teachers' basic beliefs about teaching and learning [2]. Jiayu Du divides the influencing factors of primary and secondary school teachers' informatization teaching ability into five levels: social environment, school information environment construction, teacher factors, teacher information training, student factors [5].

Through the research status, it can be found that scholars pay much attention to teachers' informatization teaching ability, but there are few studies on mathematics normal students. Therefore, this research takes mathematics normal students as the research object, and deeply understands their informatization teaching ability level, in order to provide useful reference for the cultivation of mathematics normal students' informatization teaching ability.

3 RESEARCH DESIGN

3.1 Research Object

This research selected normal school students in primary school mathematics education major and mathematics and applied mathematics major as the research object. In order to facilitate the research, primary school mathematics education major and mathematics and applied mathematics major are collectively called mathematics normal students. The sample size was 97. After necessary screening, 92 effective examinees were retained, and the effective rate was 94.8 %. The distribution of valid examinees is shown in table 1.

Table 1: Frequency analysis of demographic variables

V	O	F	P	M	SD
Gender	male	13	14.1%	1.86	0.35
	female	79	85.9%		
Major	primary education (mathematics)	31	33.7%	1.66	0.48
	mathematics and applied mathematics (normal)	61	66.3%		

Grade	grade 1	19	20.7%	2.73	1.14
	grade 2	18	19.6%		
	grade 3	24	26.1%		
	grade 4	31	33.7%		

3.2   Research Tool

After comprehensive analysis of various scales of informatization teaching ability, using the self-measurement tools for pre-service teachers' ICT competency developed by Professor Hanbing Yan of East China Normal University as the tool [4]. Because the test object of the scale is normal students, which is in line with the positioning of normal students in this study, and after rigorous theoretical analysis, expert argumentation and empirical test, it has good reliability and validity. The scale includes basic technical literacy, technical support learning and technical support teaching three subscales, a total of 60 items. The questionnaire adopts the Likert five-point scale method: very inconsistent with 1 point, not very consistent with 2 points, generally 3 points, relatively consistent with 4 points, very consistent with 5 points. The higher the score, the higher the ability level of normal students in the corresponding dimension. The overall standardized Cronbach' s α coefficient was 0.980. The α coefficients of the three subscales of basic technical literacy, technical support learning and technical support teaching were 0.922, 0.958 and 0.977, respectively. The KMO test coefficient was 0.801, indicating that the questionnaire had good reliability and validity.

3.3   Research Process

Firstly, on the basis of the self-measurement tools for pre-service teachers' ICT competency, three common demographic variables are added: gender, major and grade. Then, the Internet was used to publish an electronic questionnaire. In the guidance language, it was emphasized that the questionnaire was anonymous and all the data were confidential. It was only used for academic research to ensure that the participants expressed their most real ideas as much as possible. Then, the collected questionnaires were checked. After the invalid questionnaires were removed, the valid questionnaires were collected and entered into the data, and SPSS 25 version was used for statistical analysis.

4   RESULT

4.1   Descriptive Statistics on Informatization Teaching Ability of Mathematics Normal Students

Descriptive statistical analysis of mathematics normal students' informatization teaching ability, the results are shown in table 2. The data shows that the average score of informatization teaching ability of mathematics normal students is 3.57, which is slightly higher than the middle value of 3, indicating that the information teaching ability of mathematics normal students is at a medium level. Among the specific dimensions, the average score was the highest in the dimension of basic technical literacy, reaching 3.75, indicating that the participants had good basic technical literacy. The second is technical support learning 3.58 and the third is technical support teaching 3.44, respectively. The standard deviation of each dimension is 0.57 – 0.63, and the dimension of technical support teaching is lower than the average score, reflecting the obvious deficiency of mathematics normal students in the use of technical support teaching and learning in China.

Table 2: The descriptive analysis results of informatization teaching ability of mathematics normal students

	informatization teaching ability	basic technical literacy	technical support learning	technical support teaching
M	3.57	3.75	3.58	3.44
SD	0.54	0.57	0.59	0.63

4.2   Analysis on the Differences of Mathematics Normal Students' Informatization Teaching Ability

It can be seen from Table 3 that there is no significant gender difference in the informatization teaching ability of normal mathematics students, and there is no significant gender difference in each dimension of the informatization teaching ability between boys and girls. It can be seen from Table 4 that there is no significant difference in the informatization teaching ability of mathematics normal students in majors, and there is no significant difference in each dimension between primary

education (mathematics) and mathematics and applied mathematics (normal). It can be seen from Table 5 that there is no significant difference in the information teaching ability of mathematics normal students in grades. But there is significant difference in grade of technical support teaching dimension. The mathematics normal students in grades 3 and 4 are higher than those in grade 1.

Table 3: The results of gender difference analysis on the informatization teaching ability of mathematics normal students

V	Gender	N	M	SD	t	Sig.
informatization	male	13	3.52	0.55	-0.35	0.73
teaching ability	female	79	3.58	0.55		
basic technical	male	13	3.78	0.63	0.17	0.87
literacy	female	79	3.75	0.56		
technical support	male	13	3.57	0.63	-0.09	0.93
learning	female	79	3.58	0.59		
technical support	male	13	3.32	0.73	-0.74	0.46
teaching	female	79	3.46	0.62		

Table 4: The results of major difference analysis on the informatization teaching ability of mathematics normal students

V	Major	N	M	SD	t	Sig.
informatization	PE(M)	31	3.62	0.50	0.62	0.54
teaching ability	MAM(N)	61	3.54	0.57		
basic technical	PE(M)	31	3.72	0.48	-0.44	0.66
literacy	MAM(N)	61	3.77	0.61		
technical support	PE(M)	31	3.65	0.51	0.79	0.43
learning	MAM(N)	61	3.54	0.63		
technical support	PE(M)	31	3.53	0.61	1.01	0.31
teaching	MAM(N)	61	3.39	0.64		

Table 5: The results of grade difference analysis on the informatization teaching ability of mathematics normal students

V	Grade	N	M	SD	F	Sig.	LSD
informatization	G1	19	3.33	0.57	2.60	0.06	/
teaching ability	G2	18	3.45	0.57			
	G3	24	3.73	0.49			
	G4	31	3.65	0.51			
basic technical	G1	19	3.68	0.68	1.29	0.28	/
literacy	G2	18	3.56	0.56			
	G3	24	3.83	0.45			
	G4	31	3.85	0.57			
technical support	G1	19	3.42	0.74	1.07	0.37	/
learning	G2	18	3.50	0.59			
	G3	24	3.72	0.52			
	G4	31	3.61	0.55			

technical support	G1	19	3.03	0.64	4.61	0.06	G3>G1,
teaching	G2	18	3.36	0.65			G4>G1
	G3	24	3.67	0.59			
	G4	31	3.55	0.55			

4.3 Correlation Analysis of Mathematics Normal Students' Informatization Teaching Ability

In order to clarify the relationship between mathematics normal students' informatization teaching ability and its dimensions, the correlation analysis of informatization teaching ability and its dimensions is carried out. The statistical results are shown in Table 6. It can be seen from Table 6 that the informatization teaching ability of mathematics normal students is significantly positively correlated with its various dimensions. Analysis of the correlation coefficient of specific dimensions in Table 6 shows that the correlation coefficient between technical support teaching dimension and informatization teaching ability is the highest, reaching 0.935.

Table 6: The results of correlation analysis on the informatization teaching ability of mathematics normal students

V	ITA	BTL	TSL	TST
ITA	1			
BTL	.828**	1		
TSL	.931**	.725**	1	
TST	.935**	.618**	.815**	1

Note: * * $P < 0.01$, significant correlation

5 DISCUSS

It can be seen from the analysis of the survey results that the overall level of informatization teaching ability of mathematics normal students is general, and they have good basic technical literacy. This may be due to the strong information awareness of mathematics normal students in the information society, and they can use their familiar information technology tools to assist teaching. Technical support learning ability is the 21st century talents need to master the skills, including the use of information technology to carry out independent learning, communication and cooperation, research and innovation. Mathematics normal students' technical support learning ability is general. Technical support teaching is the professional skill that mathematics normal students should master as future teachers, including the preparation of digital education resources, the design of information teaching process and the application ability of information technology that needs to be mastered in the teaching implementation process. However, the technical support teaching ability is still insufficient, which may be due to the lack of practical experience, the lack of design theory of technology and discipline integration, and the single evaluation method in the practical training of mathematics normal students. From the perspective of demographic variables, there is no significant difference in the informatization teaching ability of mathematics normal students in gender, major and grade. But there is significant difference in grade of technical support teaching dimension. The third and fourth grades are higher than the first grade, which may be because the third and fourth grades obtain more teaching practice experience and accumulate more teaching experience.

6 SUGGESTIONS

6.1 Perfecting the Curriculum System of Informatization Teaching Ability of Mathematics Normal Students

Schools should improve the curriculum system of informatization teaching ability training for mathematics normal students, balance the proportion of theory and practice, add informatization education courses with deep integration of mathematics disciplines, provide more informatization teaching training platforms, and stimulate students' interest in learning, so as to improve the informatization teaching ability of mathematics normal students. Informatization teaching ability pays attention to practice, teaching should pay attention to the "normal students as the main body", in line with the "autonomous learning" and "cooperative learning", "accept learning" and "inquiry learning", "classroom learning" and "network learning" principle of combining a variety of learning methods, from the "learning thinking, application, quality development" three dimensions to encourage mathematics normal students to effectively learn principles and operations of informatization teaching.

6.2 Strengthening the Consciousness of Informatization Teaching of Mathematics Normal Students

With the rapid development of information technology, mathematics normal students' teaching concepts are constantly changing. Teachers are not only the inculcate of traditional teaching, but also the leader of information teaching. At present, mathematics normal

students are no longer simple learners, but also need to be willing to accept the information teaching method. Informatization teaching behavior is affected by consciousness. Therefore, teacher educators should imperceptibly guide mathematics normal students to understand and recognize the role of information technology in their professional development and modern mathematics teaching, form the consciousness of using technology to promote self-development and reflection, master the technical tools and methods required for professional development, so as to strengthen consciousness of informatization teaching, so as to improve informatization teaching ability.

7 CONCLUSIONS

Through the investigation of mathematics normal students' informatization teaching ability, the conclusions are as follows: Firstly, the current mathematics normal students' informatization teaching ability is at a medium level. Secondly, there is significant difference in grade of technical support teaching dimension. Mathematics normal students in grade three and grade four are higher than those in grade one. Thirdly, informatization teaching ability of mathematics normal students is positively correlated with its various dimensions, and the correlation coefficient between technical support teaching dimension and informatization teaching ability is the highest.

ACKNOWLEDGEMENTS

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