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Research on PowerPoint Teaching Favored by Chinese Mathematics Graduate Students

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Abstract

With the development of information technology, multimedia technology has long been integrated into college teaching activities. Among them, PPT (PowerPoint) technology should be the most representative teaching method. Regardless of basic education, higher education, or vocational training, PPT has become a commonly used teaching tool. As the direct experiencer of various teaching methods, students are the objects with the most discourse power. Exploring how to use PPT from the perspective of students can better understand the needs of students for PPT and have a certain positive significance for students' learning. This research takes 13 graduate students from the School of Mathematics and Statistics of Shandong Normal University as the survey subjects and uses interview methods and quantitative analysis methods to study the use of PPT at the graduate level. The conclusions obtained are as follows: (1) The content of the PPT should have a knowledge frame structure, diagrams, or video and audio; it should be accompanied by pictures and texts; it should have class exercises corresponding to knowledge points; it should have some practical examples, application problems, and classroom knowledge variant training; it should appear the emergence of more practical topics; it should have some more computationally strong exercises. (2) The frequency and proportion of use of PPT should be determined according to the content of the course; PPT should be combined with teacher's explanation or blackboard writing, not just reading PPT; PPT switching speed should be moderate; PPT should have clear key points and keywords.

Keywords

Postgraduate, PPT, Teaching, Interview Method

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1. Introduction

Since the 1990s, with the rapid development and popularization of computer technology and information technology, multimedia computers have gradually replaced the integrated use of multiple teaching media in the past. The modern education media represented by PPT (PowerPoint) has been widely used in college classroom teaching [1]. PPT integrates text, graphics, images, sound, animation, and video, which is conducive to improving teaching efficiency and mobilizing students' enthusiasm. It has the advantage of convenient operation and is widely used in university classroom teaching [2]. With the popularity of PPT in universities, people began to rationally examine its effects. From the perspective of related reports and scholars, PPT is a controversial teaching method. However, neither the public nor scholars are the most direct subject of PPT teaching. Although their views have reference value, only teachers and students, especially students, are the direct experiences of this teaching method [3]. Therefore, all teaching methods and methods must start from the students and focus on facilitating students to master the learning content [4]. Only by fully understanding the inner world of students can teachers be able to be targeted in the teaching process and have the foundation to find the basic laws of education [5]. Therefore,

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this article intends to take 13 graduate students from the School of Mathematics and Statistics of Shandong Normal University as the research object. Through interviews and quantitative analysis methods, the use of PPT at the postgraduate level will be studied, which will have a certain significance for students' learning.

The question studied in this article is: What kind of PPT teaching is the favorite of Chinese mathematics graduate students?

2. Theoretical Basis

2.1. Understanding of Learning Outcomes

Learning outcomes are developed from educational goals and are important indicators to measure the magnitude of learning benefits and educational output [6]. The Council for Higher Education Accreditation (CHEA) believes that student learning gains should be strictly defined as learners' gains in knowledge, skills, and abilities after completing a certain period of higher education [7]. Wang believes that what college students can bring to them during their studies at school is not only their test scores and various awards and certificates. University study has brought them more personal development and growth in knowledge, skills, abilities, and self-awareness [8]. Zhang believes that learning gain refers to the improvement of the knowledge, abilities, and values acquired by students through learning [9]. Peter T. Ewell believes that the learning gains of college students refer to the gains in knowledge, skills, and abilities of students after participating in a series of learning experiences. According to different standards, it is divided into cognitive and non-cognitive, or psychological and behavioral [10]. Therefore, this article defines learning gains as learners' gains in knowledge, skills, and abilities after a period of study.

2.2. Understanding of Investigation

The author wants to explore how graduate students think teachers should use PPT, which will make their own learning more rewarding. According to the above definition, the author believes that the students' gain is reflected in the following six aspects: (1) Knowledge acquisition; (2) Understanding of knowledge; (3) Mastery of knowledge; (4) Application of knowledge; (5) Ability improvement; (6) Mastery of skills. These six aspects are research and investigation from the content of PPT. Zhou and Xu believe that a good PPT presentation design is the basis for a successful PPT classroom, and a reasonable PPT-assisted classroom teaching design is the key [11]. In the actual PPT teaching process, if only excellent courseware is prepared, the improvement of the teaching effect cannot be guaranteed. It depends on the teacher's application level of PPT courseware in actual teaching [12]. Therefore, in addition to the exploration of PPT content in the above six aspects, it is also necessary to understand the use of PPT from the perspective of students, such as the usage frequency of PPT, the proportion of use, and other use precautions.

So the interview outline includes the following questions: (1) What should appear in the PPT to help you gain better knowledge? (2) What should appear in the PPT to help you better understand the knowledge? (3) What content should appear in the PPT to help you better grasp the knowledge? (4) What should appear in the PPT to help you better apply knowledge? (5) What should appear in the PPT to help you improve your ability? What abilities have been improved? (6) What should appear in the PPT to help you master your skills? What skills have been mastered? (7) How can the teacher control the frequency of using PPT to help you learn knowledge? (8) How can the teacher control the ratio of PPT to blackboard writing can help you learn knowledge? (9) What should teachers pay attention to when using PPT to help you learn knowledge?

3. Method

3.1. Sample

This survey selected 13 first-year graduate students from the School of Mathematics and Statistics of Shandong Normal University as interview subjects.

3.2. Instrument

This article uses the interview method. After the interviewee agrees, the interviewer chooses an appropriate interview time and location. During the interview, the interviewer should make full use of communication skills to encourage the interviewee to fully express their ideas. During the interview, the interviewer should listen carefully to the interviewee and truthfully record the content of the interview.

3.3. Data Processing

The answers of the 13 interviewees were extracted and coded in the language of the researcher, and the fragments with similar meanings were collected and sorted out. Count the number of people mentioned in various responses, and find the percentage of people mentioned in various responses to the total number of people.

4. Results

4.1. PPT Content

4.1.1. Knowledge Acquisition

In terms of knowledge acquisition, about 85% of the students

believe that the frame structure, diagrams, or video and audio of the knowledge appearing in the PPT are conducive to the acquisition of knowledge. Approximately 40% of the students think that the emergence of marked difficulties is beneficial to the acquisition of knowledge. Approximately 15% of the students think that the appearance of summative knowledge or the appearance of content related to the learned knowledge is helpful to the acquisition of knowledge. The details are shown in Table 1.

Table 1. Knowledge Acquisition.

Knowledge Acquisition	the Number of People Mentioned	Percentage (%)
Knowledge structure, diagrams or video and audio	11	84.62
Highlighted difficulties	5	38.46
Summary knowledge	2	15.38
Content related to the learned knowledge	2	15.38

4.1.2. Understanding of Knowledge

In terms of knowledge understanding, about 70% of the students think that the content in the PPT should be accompanied by pictures and texts to help the understanding of knowledge. Approximately 40% of the students think that the introduction of steps or detailed instructions is helpful to the understanding of knowledge. Approximately 15% of the students thought that the identification of similar knowledge and the keywords of knowledge points were helpful to the understanding of knowledge. Approximately 8% of the students think that the problems that need to be paid attention to in the application summary are helpful to the understanding of knowledge. The details are shown in Table 2.

Table 2. Understanding of Knowledge.

Understanding of Knowledge	the Number of People Mentioned	Percentage (%)
Colorful pictures and text	9	69.23
Derivation steps or detailed instructions	5	38.46
Discrimination between similar knowledge	2	15.38
Keywords of knowledge points	2	15.38
What to pay attention to in the application summary	1	7.69

4.1.3. Mastery of Knowledge

In terms of knowledge mastery, about 54% of the students think that class exercises corresponding to knowledge points in the PPT help to master the knowledge. Approximately 30% of the students think that the emergence of a framework summary of what they have learned helps to master the knowledge. Approximately 15% of students think that the introduction of methods and skills helps to master knowledge. Approximately 8% of the students think that the detailed explanation of pictures and videos is helpful to the mastery of knowledge. The details are shown in Table 3.

Table 3. Mastery of Knowledge.

Mastery of Knowledge	the Number of People Mentioned	Percentage (%)
Class exercises corresponding to knowledge points	7	53.85
Summary of the framework of learned knowledge	4	30.77
Explanation of methods and techniques	2	15.38
Pictures and videos explaining the content in detail	1	7.69

4.1.4. Application of Knowledge

In terms of the application of knowledge, about 92% of the students think that giving some practical examples is helpful to the application of knowledge. Approximately 77% of the classmates think that the emergence of application problem examples and classroom knowledge variant training is helpful to the application of knowledge. The details are shown in Table 4.

Table 4. Application of Knowledge.

Application of Knowledge	the Number of People Mentioned	Percentage (%)
Some practical examples	12	92.31
Application problem examples or variant training	10	76.92

4.1.5. Ability Improvement

In terms of ability improvement, about 50% of the students think that more practical questions should be appeared in the PPT to improve their ability to think and solve problems. Approximately 40% of the students think that the presentation of textual topics in the PPT can improve the ability of language expression, and the appearance of graphic

problems can improve the ability of spatial imagination. About 8% of students think that the content in the PPT has no obvious effect on the improvement of our ability. The details are shown in Table 5.

Table 5. Ability Improvement.

Ability Improvement	the Number of People Mentioned	Percentage (%)
Strongly applicable questions	7	53.85
Descriptive topics	5	38.46
Graphical topics	5	38.46
No effect	1	7.69

4.1.6. Mastery of Skills

In terms of skills mastery, about 50% of the students think that there should be more computational exercises in the PPT, which is conducive to the mastery of computational skills. Approximately 20% of the students think that the emergence of proof-type questions is helpful to the mastery of reasoning skills, and the appearance of drawing exercises is helpful to the mastery of drawing skills. About 15% of the students think that the content in the PPT has no obvious effect on the mastery of our skills. The details are shown in Table 6.

Table 6. Mastery of Skills.

Mastery of Skills	the Number of People Mentioned	Percentage (%)
Computational exercises	6	46.15
Proof questions	3	23.08
Drawing exercises	3	23.08
No effect	2	15.38

4.2. PPT usage

4.2.1. Usage Frequency

In terms of frequency of use, about 62% of students believe that the frequency of PPT use should be determined according to the content of the course. About 23% of students think that PPT can be used in every class. About 15% of students think that the frequency of using PPT should be reduced, and the classroom should not be completely dependent on PPT. The details are shown in Table 7.

Table 7. Usage Frequency.

Usage Frequency	the Number of People Mentioned	Percentage (%)
PPT can be used in every lesson	3	23.08
Reducing the frequency of use	2	15.38
According to the content of the course	8	61.54

4.2.2. Use Proportion

In terms of the usage ratio, about 70% of the students think that the ratio of PPT and blackboard writing depends on the content of the course. About 20% of students think that writing on the blackboard should be less and more PPT. About 10% of the students think that there should be less PPT and more blackboard writing. The details are shown in Table 8.

Table 8. Use Proportion.

Use Proportion	the Number of People Mentioned	Percentage (%)
According to the content of the course	9	69.23
Less writing on the blackboard, more PPT	3	23.08
More writing on the blackboard, less PPT	1	7.69

4.2.3. Other Use Precautions

In terms of other precautions, about 70% of students think that PPT should be combined with the teacher's explanation or blackboard writing, not just reading PPT. About 40% of the students think that the PPT layout should be beautiful and the font should be clear. About 50% of the students think that the PPT switching speed should be moderate. Approximately 20% of the students think that too many texts should not be listed in the PPT, and the form should be rich and varied. Approximately 50% of the students thought that there should be clear key and difficult points and keywords in the PPT. The details are shown in Table 9.

Table 9. Other Use Precautions.

Other Use Precautions	the Number of People Mentioned	Percentage (%)
Combine with explanation and blackboard writing	9	69.23
Nice typography, clear font	5	38.46
Moderate switching speed	6	46.15
The amount of text listed	3	23.08
Clear focus and keyword tags	6	46.15

5. Discussion

5.1. PPT Content

Based on the above statistics of interview results on PPT content, the following conclusions can be drawn:

In terms of knowledge acquisition, most students believe that the framework of knowledge, diagrams, or video and audio should appear in the PPT to help students better acquire knowledge.

In terms of knowledge understanding, most students think that the content in PPT should be accompanied by pictures and texts to help students better understand knowledge.

In terms of knowledge mastery, most students think that the exercises of the knowledge that should appear in the PPT will help students better master the knowledge.

In terms of the application of knowledge, most students believe that some practical examples, application questions, and classroom knowledge variant training should appear in the PPT to help students better apply knowledge.

In terms of ability improvement, most students think that more practical topics should appear in the PPT, which will help improve the ability of thinking and solving problems.

In terms of skills mastery, most students think that there are some more computational exercises in the PPT, which is helpful to master arithmetic skills.

5.2. PPT Usage

Based on the above statistics of the interview results used on PPT, the following conclusions can be drawn:

In terms of frequency of use, most students think that the frequency of use of PPT should be determined according to the content of the course.

In terms of the proportion of use, most students think that PPT and blackboard writing should be divided into half, but the proportion of use should be determined according to the content of the course.

In terms of other precautions, most students think that PPT should be combined with the teacher's explanation or writing on the blackboard, not just reading PPT. Most students think that the PPT switching speed should be moderate, with clear key and difficult points and keywords.

5.3. Previous Views

Wang believes that pictures, charts, animations, videos, and other visual materials that can characterize the situation should be used as much as possible in the PPT [13]. Peng believes that the PPT screen should be concise, beautiful, and focused, and the content of the PPT should effectively reflect the teaching goals, teaching priorities, and difficulties of a unit. She believes that teachers should scientifically select and set courseware content according to the teaching time, and organically combine the key points and difficulties in the text with relevant exercises after class [14]. Xu believes that when teachers use PPT to teach, they should pay attention to the combined use of teaching aids (board writing, physical booth, interactive tablet, etc.). Teachers must be confident about the teaching content to be solved and must be clear about the presentation order, presentation method, and questioning method of the knowledge being taught. Teachers should switch slides at the right time, reasonably control the teaching rhythm, and give students sufficient time to think and take notes. Besides, teachers can also step off the stage and come to the students for on-site tutoring. They only need to use the PPT page-turning pen to switch slides, thereby enhancing the interaction between teachers and students [15]. Xiong believes that the effect of writing on the blackboard cannot be replaced by PPT. PPT, blackboard writing, and teacher's oral narration are complementary and mutually reinforcing [16]. Yang and Zhao believe that using PPT and blackboard writing in combination to teach and concentrate their advantages is the best way of education and learning [17].

6. Conclusion

Through the above statistics and analysis of the data, it is concluded that most graduate students hope that when teachers use PPT to give lectures, they should take the following measures in terms of content and use: (1) The content of the PPT should have a knowledge frame structure, diagrams, or video and audio; it should be accompanied by pictures and texts; it should have class exercises corresponding to knowledge points; it should have some

practical examples, application problems, and classroom knowledge variant training; it should appear the emergence of more practical topics; it should have some more computationally strong exercises. (2) The frequency and proportion of use of PPT should be determined according to the content of the course; PPT should be combined with teacher's explanation or blackboard writing, not just reading PPT; PPT switching speed should be moderate; PPT should have clear key points and keywords.

In the context of the information society, PPT has become an indispensable method for classroom teaching. Teachers must not only improve the quality of PPT courseware but also use PPT rationally [18]. Although the application of PPT in education is very common, PPT is actually not the point. PPT is only a kind of auxiliary teaching, the teaching content is the main body of the classroom, and the teacher is the leader of the classroom. Reasonable use of PPT courseware is of great significance to the progress of students' learning and teaching and can cultivate students' ability to analyze and solve problems. Therefore, in teaching practice, only serious thinking and continuous exploration can make excellent PPT courseware serve to teach better [19].

This survey only selected 13 students with a master's degree in education from the School of Mathematics and Statistics of Shandong Normal University as the interview subjects. The sample size is small. In the subsequent research, the research sample will be expanded to make the research conclusions more widely popularized.

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