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ANALYSIS OF MATHEMATICS LEARNING STYLES AND PRACTICES AMONG MATHEMATICAL NORMAL STUDENTS

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Abstract

Learning style is the student's behavior and cognitive approach during learning and encompasses aspects such as autonomy, exploratory, and cooperative. The current educational reform in China aims to change students' learning styles towards self-directed and exploratory methods. This paper explores the transformation of mathematical normal students' learning styles and provides insights into future efforts to improve mathematics education.

Keywords: *Learning style; Educational reform; Mathematical normal students;*

Introduction

Learning style is an important concept in contemporary educational theory research. Currently, academics mostly believe that learning style refers to the basic behaviors and cognitive orientations of students in the process of completing learning tasks. Learning style does not refer to specific learning strategies and methods, but to the basic characteristics of students in terms of autonomy, exploratory, and cooperative aspects. Learning style not only includes the relative learning methods and their relationships, but also involves psychological factors and spiritual forces such as learning habits, learning awareness, learning attitudes, and learning quality. In the face of the new round of curriculum reform, the current goal of the state's reform of the mathematics teacher training curriculum in local universities is not just to replace the original teaching outline with the curriculum standards, change the teaching materials, but to fundamentally change students' learning styles. Changing students' learning styles is one of the important goals of China's educational reform. In the past, researchers paid more attention to the results of students' learning and neglected how students learned through what kind of learning styles and strategies. Memorization and problem-solving methods can get high scores, but hide the problems in students' mathematics learning style, especially the current status of the mathematics learning style of mathematics teacher training students. Are there any differences in overall between different grades? Are there any differences in mathematics learning style between different genders? This paper investigates the transformation of mathematical normal students' self-directed learning, ,exploratory learning styles and their learning motivation and mathematics learning habits, and puts forward the direction of future efforts.

Research Methodology

Survey Participants

The participants of this survey are students majoring in mathematics education at Hunan University of Technology. There were 45 first-year male students, 58 female students, 37 second-year male students, 45 female students, 16 third-year male students, and 22 female students. A total of 223 questionnaires were distributed and 216 valid questionnaires were collected, with the validity rates for each grade and gender shown in Table 1.

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Table 1 *Distribution of students*

	Freshman	Sophomore	Junior	Total
Number of Questionnaires	103	82	38	223
Valid Questionnaires (Pct)	102 (99%)	80 (97%)	34(89%)	216(97%)
Male Students (Pct)	44 (43%)	35(44%)	15(44%)	94(44%)
Female Students (Pct)	58 (57%)	45(56%)	19(56%)	122(56%)

Research Tools

By collecting surveys about mathematics learning methods both domestically and internationally and combining the characteristics of mathematics as a subject and the requirements for teacher professionalization, a questionnaire was compiled. This questionnaire consists of five parts: learning motivation, self-directed learning, cooperative learning, investigative learning, and mathematics study habits.

Results Analysis Based on Questionnaires

Motivation of Mathematics Study

There were 5 questions on learning motivation, where question 1 was "When you encounter something you don't understand in your studies, would you be so dedicated that you would stay up all night researching until you understand it?" 70.5% of students responded that they would. However, when studying intently, 80.1% of students are easily distracted by things happening around them, indicating that good study habits have not been established.

Question 3 of the questionnaire was "Learning math is: A often enjoyable and successful for me; B sometimes enjoyable but sometimes annoying; C not enjoyable but I have to do it; D a painful experience." As the grade level increased, the proportion of female students choosing A increased from 25% to 70%, higher than the 16% to 55% of male students and showed a positive growth trend. This result may be due to the fact that more female students take the postgraduate exams each year, and the students who take the exams are basically female. The proportion of male students choosing B increased with grade level, while the proportion of female students decreased; the proportion of male and female students choosing C and D increased with grade level, so some students view math as a necessary and painful experience. Therefore, teachers need to actively cultivate students' interest in math during their high school years, making math a source of enjoyment rather than a painful experience.

Question 5 in the survey is "The main purpose of learning is: A. Desire and aspiration for knowledge; B. To find a good job; C. Family expectations; D. Do not want to learn at all." It can be found from the survey that there is no grade difference, and as the grade increases, students attach more and more importance to their grades. 45% of students learn mathematics in order to lay a good foundation for future learning. Students have a certain understanding of the basic position of mathematics learning. 75% of students still have the main motivation for learning to find a good job. 9% of students do not attach much importance to the praise from the outside world, and 6% of students simply do not want to learn. It can be seen that students who view learning mathematics as a need are few in number, and students mainly learn mathematics for external reasons. Therefore, further internal motivation needs to be stimulated in teaching.

Self-directed Learning

Self-directed learning refers to innovative learning carried out by students who fully utilize their individual subjective initiative. That is, the learning process continually presents three interdependent levels of self-initiative, proactive, and innovation (???).

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In the investigation of self-directed learning, there are 6 questions. Question 1 regards learning as a self-initiative act and 48% of students think that utilizing free time to study is necessary, 23% of students think they should spend more leisure time during their free time, 12% of students think they just need to attend class, and a small number of students think self-study is not necessary. This shows that students are not very positive about self-study, and in subsequent communication and discussions, they indicated that their free time is mainly used for participating in social practices or club activities, nearly one fifth of students use it for sports exercise, and one third use it for going online.

The results of a survey of college students showed that 95% of students believe that self-study takes place mostly at night and on weekends, mainly in their dorm rooms, with only a small percentage choosing to study in the classroom or library. 78% of students reported not having contacted a teacher for guidance, but having thought about it, while only 14% actually contacted a teacher and 8% never thought about it. 65% of students agreed that hard work and self-study is important during their college years, while 29% thought it was average and 6% disagreed, thinking that college life should be more about socializing. 57% of students felt influenced by their classmates who either love or don't love to study, while 33% felt unaffected and 10% never thought about it. Finally, 62% of students reported not having a specific plan for self-study, with learning being based on need and interest, while 25% had a detailed plan for self-study for their future career goals. A small percentage of students had no plan and didn't like self-study.

According to the survey results, the primary external factor affecting student self-directed learning is professional courses, followed by the school's learning environment and teachers, and thirdly the academic management system and other factors. The main internal factors are the student's own learning attitude, followed by their learning foundation, learning methods, psychological quality and economic situation, and finally physical fitness and interpersonal relationships. Over half of the students consider self-directed learning to be more important than classroom learning and half of the students prefer this type of learning, while the other half prefer passive learning.

Exploratory Learning Activities

According to the communication and investigation, limited by class hours and the impact of COVID-19, there are few exploratory learning activities currently. The investigation was mainly based on communication and the derived results showed that students are willing to engage in exploration of unknown mathematical problems, but only a few students are not willing. Due to constraints, normal students rarely conduct mathematical explorations in class and most students explore during major course design, mathematical modeling, and mathematical competitions. During leisure time, students mainly connect mathematical knowledge and learning through assigned practice problems, innovation and entrepreneurship competitions, etc. The main teaching method used by teachers is to have the teacher talk and the students listen, followed by inspiring students to try. This makes students' preferred teaching method primarily teacher-led explanation, with hands-on exploration second. Therefore, for exploratory learning, students have a desire to engage in exploration, but in practice, they are not used often. Most students are not clear on how to carry out activities. Therefore, teachers need to carry out more relevant learning activities in teaching to enhance students' learning experience in exploratory learning.

Habits of Learning Mathematics

There are 8 questions about the habits of learning mathematics. The obtained results of the survey showed the following:

There are 45% of students make a study plan at the beginning of each semester but don't strictly follow it, 7% of students make a plan and follow it strictly, and 48% of students study based on the course schedule. Only 22% of students do pre-class preparation, the majority of whom just briefly

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look at the textbook. The rest either don't do pre-class preparation or only occasionally do it. 74% of students pay attention during class and occasionally take notes, 6% only listen and don't take notes, 16% take continuous notes and review after class, and some students don't listen to the teacher and study on their own with the book. According to the survey results, 63% of students have the habit of drawing what they consider important while reading, 15% of students continuously read without writing, 10% of students write down their thoughts and perspectives while reading, and 12% summarize the main content after reading. When it comes to summarizing their learning, 27% regularly summarize and identify their future efforts, 47% try to find the cause when there's a problem, 22% believe in taking action instead of summarizing, and 4% don't summarize at all. In terms of mastering learning methods, 23% have their own methods, 32% often borrow from others, 15% rely only on hard work, and nearly 30% don't have or can't find a method. During the math class question survey, only 19% actively ask questions, 54% have the desire but are afraid to ask, 16% say the teacher doesn't require questions, and 11% are not willing to ask. This reflects a passive rather than proactive teaching style among Chinese students and may be related to their personality traits. In response to the question of how they would like to learn, 22% prefer to have independent control over their learning time, 18% prefer to ask teachers or others for explanations, 41% prefer to have the teacher as the main source of learning and self-study as supplementary, and 19% prefer to learn on their own and ask for help when needed. Besides, 8% of students feel that their learning habits are ideal and have resulted in corresponding achievements. 73% of students believe that their habits are not good enough, but they can often identify their shortcomings and make improvements. 9% of students believe that their learning habits are not important and do not have a significant impact on their grades, while nearly 10% of students believe that their learning habits are not good and have no effect on their grades.

To summarize, the mathematical normal students have not developed good mathematical study habits, with unclear learning objectives, lack of autonomy in learning, a large degree of randomness, diverse study methods without systematic approaches, and then resulting in poor outcomes.

Discussion and Suggestions

Based on the above analysis of the survey results, we suggest the following:

(1) Students have a lack of interest in mathematics and their motivation is mainly utilitarian. Teachers need to cultivate students' interest in mathematics and their positive attitude towards mathematical learning, and students' internal requirements for learning should be expressed as interest rather than just a sense of duty. Only when students are interested in taking on the responsibility of mathematical learning, learning becomes truly meaningful.

(2) A change in learning concept is needed - learning should progress step by step. In the secondary school stage, it is emphasized that the earlier foundation must be laid before studying later knowledge. This is a good learning concept in the secondary school stage because the amount of information received is small and the connections between subjects are less. However, this method of learning is no longer applicable in the university stage. Because the amount of information to be received is large and the connections between subjects are close, it is not possible to completely master the earlier content before studying later knowledge. The earlier parts that are not understood can be temporarily skipped, and as learning continues and deepens, knowledge accumulates over time and unconsciously, some of the earlier questions have already been realized. Mathematics and science as a whole are originally an indivisible unity, and partial understanding and mastery should always be linked to some kind of holistic methodology system.

(3) Students need to improve their initiative and curiosity in learning mathematics. They need to focus on thinking about mathematics rather than just memorizing it. However, they lack understanding of the methods of learning mathematics and exploring it. This requires teachers to

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teach students how to learn and think and to guide them in their learning methods. The teacher's role in the learning process is still dominant but it has changed from being explicit to implicit, which requires higher guidance and makes the teacher's role even more important. The teacher needs to have a deep understanding of various learning methods to guide students in their mathematics learning. Various learning methods are interdependent and interpenetrating. The reform of learning methods is closely related to the reform of teachers' teaching methods and concepts. Teachers must choose appropriate teaching methods based on specific teaching goals and students' characteristics, allowing students to learn mathematics using their most suitable learning methods. In particular, mathematical normal students should strive to experience the reform of learning methods and gain prior experience in various learning methods during their studies to prepare for future employment.

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