A STUDY ON STUDENTS' SATISFACTION WITH ADVANCED MATHEMATICS COURSE AT UNIVERSITY S OF JINAN, SHANDONG PROVINCE, CHINA

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Abstract: This study aimed to investigate the students' satisfaction with the advanced mathematics course program at University S of Jinan and compare students' satisfaction across different demographic factors. The study was conducted through a questionnaire survey with 357 students in the academic year of 2024 at University S of Jinan in Shandong Province, China. The current level and differences in students' satisfaction with Advanced Mathematics Course at University S of Jinan compared by students' gender, grade, subject, whether they are class officers, and place of origin were analyzed. The results showed students' satisfaction with advanced mathematics course was regarded as "high" at University S of Jinan. Significant differences were found under all variables except gender and whether they were class leaders or not. Students' satisfaction with the advanced mathematics course was lower for all first-year students compared with the other grades. Students in arts major were more satisfied with their advanced mathematics course than students in science majors. Students' satisfaction from rural areas was significantly higher than those from urban areas. Finally, conclusions, discussion and recommendations were provided, including a hierarchical teaching system established at each grade level to emphasize teaching and learning, the integration of theory and practice of related subjects should be added in disciplines, and targeted assistance and academic support should be provided to students in less developed areas to narrow the basic gap between students.

Keywords: College Students, Advanced Mathematics Course, Students' Satisfaction

Introduction

Advanced Mathematics Course are not only an important part of the discipline of mathematics, but also the foundation of many disciplines. Globally, there are some differences in the content and teaching methods of advanced mathematics course, but in general, the core concepts and theories are

common. Advanced mathematics courses usually include calculus, linear algebra, differential equations, and real number theory (Shi, 2010). These courses provide students with the necessary mathematical tools and foundations for further study and research. Advanced Mathematics Course in many countries and regions are constantly reforming and innovating to meet the needs of the times (Zheng, 2017).

As an important course in university public courses, advance mathematics plays a crucial role in cultivating students' logical thinking, analyzing and problem-solving abilities (Song, 2021). Since the 1980s, with the development of China's economy and the advancement of science and technology, Advanced Mathematics Course have undergone many reforms and innovations. These reforms and innovations are mainly centered on teaching content, teaching methods and assessment methods, aiming to improve the quality of advance mathematics and better serve the economic and social development (Li, 2005).

There are some significant problems with the students' satisfaction with the advanced mathematics course. With the popularization of online teaching, students' learning attitudes have changed greatly, which can easily affect the progress and purpose of course learning. Therefore, it was necessary to explore and understand the students' satisfaction of the advanced mathematics course that has been pending in educational research.

Research Objectives

1. To identify the demographic factors of the students at the University S of Jinan, Shandong Province, China, including their gender, grade, academic discipline, whether they are class officers, and their place of origin.

2. To assess the current level of students' advance mathematics course satisfaction at University S of Jinan Shandong Province, China.

3. To analyze the differences in students' satisfaction with Advanced Mathematics Course among students at University S of Jinan, Shandong Province, China, based on their demographic factors.

Literature Review

The Advanced Mathematics Course

It was generally recognized that advanced mathematics is a discipline formed by post-calculus in the seventeenth century, deeper algebra, geometry, and the cross-cutting elements between them. Advanced mathematics is more difficult than elementary and secondary mathematics and belongs to the university curriculum. The study of variables is the study of advanced mathematics, but it is not the study of variables alone. As for the courses that usually accompany "advanced mathematics", they are linear algebra, probability theory and mathematical statistics.

The advanced mathematics course is one of the important public courses at the university level in China (Xiu et al., 2011). It focused on the study of variables and functions, and covers the core content of limits, differentiation, integration, and so on. (Li, 2002).

Advanced Mathematics Course help students understand the quantitative relationships and patterns of change in nature and social phenomena through rigorous logical reasoning and mathematical methods. Calculus is the main tool, and differentiation studies the local properties of functions, such as the rate of change (Su, & Zhang, 2020). Integration is used to solve the total problem of area and volume under the curve.

Advanced Mathematics Course develop students' ability to think logically, abstractly and solve practical problems. It lays a solid mathematical foundation for the study of subsequent specialized courses and for the development of scientific research, engineering technology and other fields, and plays an irreplaceable role in many professional fields.

Expectation Confirmation Theory

This theory originated in the field of consumer behavior research and has since been widely applied across various domains.

Before using a product or service, users form expectations about its performance based on their past experiences. After use, they compare their perceived actual performance with their expectations. If the actual performance meets or exceeds the expectations, the expectations are confirmed, and users feel satisfied, potentially leading to repeat use or continued engagement. Conversely, if the actual performance falls short of expectations, users may feel dissatisfied and discontinue use. Satisfaction is influenced by both the degree of expectation confirmation and perceived performance—higher confirmation and better performance lead to greater satisfaction.

Students similarly develop expectations for a course before enrollment. After taking the course, they assess their satisfaction by comparing the actual experience with their initial expectations. If the course meets or exceeds their expectations, students feel satisfied and may be more likely to continue studying it; otherwise, dissatisfaction may arise. Research has shown a significant positive correlation between the degree of expectation confirmation and course satisfaction. Students with higher confirmation tend to express greater willingness to persist with the course. For instance, if a programming course fulfills students' expectation of in-depth algorithm explanations, satisfaction increases; however, if the explanations fall short, dissatisfaction grows.

Course satisfaction research focuses on students' perceptions and evaluations of course quality (Yin & Hu, 2023). In related studies, satisfaction is often defined as a psychological state in which students rationally assess the balance between the costs they incur and the benefits they derive (Cheng, 2018). The aim of satisfaction research is to enhance service quality and student satisfaction, thereby strengthening institutional competitiveness.

In terms of theoretical frameworks, satisfaction theory serves as the foundational basis for

studying course satisfaction (Li, 2010). Models like the ACSI (American Customer Satisfaction Index) provide practical frameworks for measuring course satisfaction by evaluating product/service attributes and quality, offering valuable insights for improving course quality.

Empirically, researchers typically collect data through questionnaires, interviews, and observations. Often, a combination of qualitative and quantitative research methods is employed (Jiang, 2009) to comprehensively understand students' needs, expectations, and satisfaction levels.

Practically, course satisfaction studies offer schools valuable feedback to identify strengths and weaknesses in their curricula, guiding improvements. Additionally, the findings can facilitate comparative analyses of teaching quality across different courses or institutions, providing a basis for educational policy decisions.

In summary, course satisfaction theory and related research play a crucial role in improving educational service quality and enhancing student satisfaction (Li, 2009). By addressing student needs and refining mechanisms for assessing teaching quality, this research contributes to the continuous advancement of education.

Attribution Theory

Kelly (1967) proposed the three-dimensional attribution theory, which classifies attribution phenomena into multi-cue and single-cue attributions. It points out that people's behavior attribution involves three factors: the objective stimulus object, the actor, and the relationship or situation. The attribution requires considering the specificity, commonality, and consistency of the information to make a judgment.

Root (1960) proposed the control source theory, suggesting that individuals have different attributional tendencies for life event outcomes, categorized as internal and external control types. Internal controls believe event outcomes mainly depend on internal factors like their own ability and effort, while external controls attribute outcomes to external factors like luck, fate, and the environment.

Weiner (1974) proposed that people's analysis of behavioral success or failure can be summarized as six reasons: ability, effort, task difficulty, luck, physical and mental conditions, etc. Subsequent research refined the theory of motivation and attribution, categorizing the six factors into three dimensions: factor origin, stability, and controllability.

Attribution theory, focusing on causal inferences for event outcomes, shares common dimensions of control point (internal/external), stability, and controllability. For example, attributing success to one's own effort is internal attribution, while attributing it to good luck is external attribution. Ability is generally seen as a stable factor, while effort is relatively unstable. Effort is usually controllable, whereas luck is not. People's attribution styles affect their emotions, expectations, and subsequent behavior.

If students attribute good learning results to external factors like good course design and teachers, they will be more satisfied with the course. Conversely, if they attribute poor results to course

or teacher issues, satisfaction decreases. For instance, good test scores increase satisfaction because students believe the course content is systematic and teacher guidance is appropriate; poor scores decrease satisfaction due to perceived unreasonable course arrangements.

Teachers can use attribution theory to understand students through their course learning outcome attributions. If students attribute poor performance to lack of ability, frustration may arise, affecting course satisfaction. If they attribute it to insufficient effort, they may be more motivated to improve, allowing teachers to provide targeted encouragement and guidance.

Using attribution theory, teachers can guide students toward positive attributions. For example, attributing success to ability and effort enhances self-confidence and achievement sense, increasing course satisfaction. Attributing failure to controllable factors like insufficient effort helps students understand that improvement through self-effort is possible, rather than giving up due to uncontrollable factors, thus fostering positive attitudes toward the course.

Based on students' attributions, teachers can identify teaching problems. If students attribute learning difficulties to challenging content or inappropriate teaching methods, adjustments can be made to improve course satisfaction.

Methodology

This study was conducted to investigate the satisfaction of students at University S of Jinan with the advance mathematics course. The total number of students in this study was 5019, the sample size was determined to be 357 based on the sample size requirement of Krejci & Morgan (1970), a total of 357 questionnaires were distributed. During December 2024, the link of questionnaires was distributed to the students through the school's WeChat group, 357 questionnaires were distributed. Finally, 357 questionnaires were collected, and all collected questionnaires provided the valid data, the retuned valid questionnaire rate reached 100% in this study.

The questionnaire part of this study consists of two parts: the first part is the basic information of individuals, which mainly includes five background factors: students' gender, grade, subject, whether they are class cadres, and place of origin. The second part of the questionnaire investigates students' satisfaction with the advanced mathematics course, including six dimensions: teaching environment, teaching management, teaching methods, teaching content, teaching communication and teaching assessment.

The questionnaire of this study was adopted from Zuo (2019) in "Survey and Research on Satisfaction with Advance mathematics in Applied Undergraduate Colleges and Universities", to which questions in the section of demographic background information were added, thus constituting the research questionnaire of this study. Because the questionnaire in Zuo's (2019) "Survey and Research on Satisfaction with Advance mathematics in Applied Undergraduate Colleges and Universities" has already been tested for reliability and validity, and it was often used repeatedly in China, the

questionnaire was used in this study instead of conducting a pilot test.

Results

Demographic Analysis of Questionnaire Participants

According to the data from the questionnaire, among the students at the University S of Jinan who responded to the questionnaire, 186 of them, or 52.1%, were male and 171, or 47.9%, were female. The number of men and women in this study is not very different, and the gender ratio was relatively even. The grade level of college students participating in the study was mainly concentrated in the freshman year, accounting for 32.5%, followed by the sophomore year accounting for 27.2%, and the junior and senior year accounting for 20.4% and 19.9% respectively. In the survey on majors, the proportion of liberal arts and science is relatively concentrated, accounting for 38.7% and 40.1% respectively, followed by art, accounting for 21.3%. In the survey on whether the students are class cadres or not, 48.7% of the students are class cadres and 51.3% of the students are not class cadres, which was relatively even. In the survey about the place of origin, the proportion of urban students was 76.2%, and the proportion of rural students is 23.8%, and the students from rural areas were a relatively small group in the survey of this study.

Descriptive Statistics on Students' Satisfaction in Advanced Mathematics Courses in University S of Jinan, Shandong Province

Using descriptive statistical analysis, the teaching and learning environment was examined. According to the results in Table 1, the overall mean score for this dimension was M=3.79, indicating a high level of quality. Specifically, "there is full and complete multimedia equipment" (M=3.83), "class size matches the size of the classroom" (M=3.78), and "the allocation of class time is appropriate to the program requirements" (M=3.77) all demonstrated high levels of satisfaction. Therefore, the teaching and learning environment in private colleges was at a consistently high level across all measured aspects.

Table 1: Descriptive Statistical of Teaching and Learning Environment

Dimension	N	M	SD	Interpretation
There is full and complete multimedia equipment.	357	3.83	1.021	High
Class size matches the size of the classroom.	357	3.78	1.065	High
The allocation of class time is appropriate to the requirements of the program.	357	3.77	1.063	High

Descriptive statistical analysis was carried out to examine the teaching and learning management at S University. According to the results in Table 2, the overall mean score for this dimension was M=3.81, clearly indicating a high level of effectiveness. Specifically, for "teachers take

daily attendance, such as roll call before and during class," the mean score was M=3.77, reflecting a high level of performance. Regarding "teachers in the classroom are able to effectively utilize instructional time," the mean score reached M=3.83, further emphasizing the strong execution in this aspect. Similarly, for "the atmosphere in the classroom is lively and stimulates students' interest," the mean score was M=3.82, also showcasing an excellent outcome. Collectively, these findings affirm that the teaching and learning management at S University maintained a consistently high standard across all measured elements.

Table 2: Descriptive Statistical of Teaching and Learning Management

Dimension	N	M	SD	Interpretation
Teachers take daily attendance, such as roll call before and during class.	357	3.77	0.972	High
Teachers in the classroom are able to effectively utilize instructional time.	357	3.83	1.030	High
The atmosphere in the classroom is lively and stimulates students' interest.	357	3.82	0.991	High

Using Descriptive statistical analysis was conducted to assess the utilization of pedagogical tools. As shown in Table 3, for the dimension "Teachers in the classroom are able to actively and effectively utilize multimedia in their lessons," the mean score was M = 3.84, indicating a high level of implementation. For "Teachers in the classroom use math software appropriately in the instructional process," the mean score was M = 3.69, also reflecting a high degree of satisfaction. Overall, these results suggest that teachers exhibit a commendable performance in leveraging various pedagogical tools within the classroom environment.

Table 3: Descriptive Statistical of Pedagogical Tools

Dimension	N	M	SD	Interpretation
Teachers in the classroom are able to actively and effectively utilize multimedia in their lessons	357	3.84	0.998	High
Teachers in the classroom use math software appropriately in the instructional process.	357	3.69	0.987	High

Descriptive statistical analysis was conducted to examine the dimension of pedagogical content. According to the results in Table 4, the overall performance of this dimension was excellent, with all evaluated indicators remaining at a high level. "The teaching content is rich, highlights key points and difficulties, and facilitates students' acquisition of structured knowledge," scored 3.74, demonstrating

the effectiveness of teaching content in knowledge construction. "The teaching content covers intellectual elements, mathematical modeling cases, the history of mathematics, and mathematical culture, which can stimulate students' interest," received a score of 3.68, indicating that diversified content has successfully enhanced students' learning motivation. "Teachers actively update the teaching content, connect theory with professional practice, and focus on practical problem-solving," scored 3.71, highlighting the practicality and timeliness of the teaching content. "The cultivation of students' mathematical competence in teaching practice sessions meets professional requirements," with a score of 3.72, shows that practical teaching has achieved remarkable results in shaping professional abilities. In conclusion, in terms of pedagogical content, whether in knowledge construction, interest stimulation, or practical application, a high standard has been reached.

Table 4: Descriptive Statistical of Pedagogical Content

Dimension	N	M	SD	Interpretation
The teaching content is rich, highlights the key points and difficulties, and facilitates the acquisition of structured knowledge by students.	357	3.74	1.091	High
Teaching content is intellectual, mathematical modeling cases, history of mathematics and mathematical culture, which can stimulate students' interest.	357	3.68	1.122	High
Teachers are actively updating their teaching content, linking theory to professional practice and focusing on practical problem solving.	357	3.71	1.091	High
The development of students' mathematical competence in teaching practice sessions meets the requirements of the profession.	357	3.72	1.075	High

Using descriptive statistical analysis, instructional communication was examined. According to the results in Table 5, the overall performance in this dimension showed positive trends. Specifically, "Teachers often listen to students' problems and opinions, and guide students to think and learn independently" (M=3.84) indicated a high level. "The instructor is proactive in asking students questions about the course" (M=3.71) also demonstrated a high level. Additionally, "Students who do not understand the content of the course can receive timely answers to questions and assistance from the instructor" (M=3.73) was rated as high. Therefore, instructional communication in the observed context achieved consistently high levels across all evaluated aspects.

Table 5: Descriptive Statistical of Instructional Communication

Dimension	N	M	SD	Interpretation
Teachers often listen to students' problems and opinions, and guide students to think and learn independently.	357	3.84	1.054	High
The instructor is proactive in asking students questions about the course.	357	3.71	1.119	High
Students who do not understand the content of the course can receive timely answers to questions and assistance from the instructor.	357	3.73	1.053	High

Using descriptive statistical analysis, the teaching and learning assessment was examined. According to the results in Table 6, the overall performance in this dimension reflected a high-quality level. Specifically, "Teachers assign a variety of extracurricular assignments to promote students' mastery of knowledge in a comprehensive manner" (M=3.72) indicated a high degree of effectiveness. "The instructor is able to correct assignments and provide feedback on assignment grades in a timely manner" (M=3.81) demonstrated the highest mean score among the evaluated items, highlighting strong performance in feedback efficiency. Additionally, "The examination covers the core content of the course, and the assessment methods and grades are scientifically sound" (M=3.74) showed a solid level of scientificity and comprehensiveness. Collectively, these findings suggest that teaching and learning assessment in this context achieved consistent high standards across all measured aspects.

Table 6: Descriptive Statistical of Teaching and Learning Assessment

Dimension	N	M	SD	Interpretation
Teachers assign a variety of extracurricular assignments to promote students' mastery of knowledge in a comprehensive manner.	357	3.72	1.095	High
The instructor is able to correct assignments and provide feedback on assignment grades in a timely manner.	357	3.81	1.048	High
The examination covers the core content of the course, and the assessment methods and grades are scientifically sound.	357	3.74	1.032	High

Satisfaction of Students in Advanced Mathematics Courses in University S of Jinan

From the items of each sub-dimension, the mean value is higher than 3.68, and the overall

satisfaction level reached 3.76, so the satisfaction level of the students at University S with the advanced mathematics course was regarded as high.

According to the analysis of the mean value, one of the highest scores is found in the item "Teachers often listen to students' problems and opinions, and guide students to think and learn independently", and one of the lowest scores is found in the item "Teaching content is highly intellectual, cases of mathematical modeling, the history of mathematics, and the culture of mathematics, and it can stimulate the students' interest". The lowest score was found in "The teaching content is intellectual, examples of mathematical modeling, history of mathematics and mathematical culture, and can stimulate students' interest.

Discussion

There is no significant difference in the satisfaction level of the advanced mathematics course among different genders of U of S students.

The main reason may be that the knowledge system and teaching requirements of advanced mathematics are uniform and do not change according to the gender of students. Both male and female students have to study the same calculus, vector algebra, etc., and face the same difficulties and key points in the process of learning, such as the calculation of limits, the application of derivatives, etc., and the objectivity of these contents makes the gender factor have little influence on the degree of satisfaction.

Secondly, teachers usually adopt a common teaching model and treat male and female students equally. In the classroom, they receive the same lectures, demonstrations and assignments, and learn in the same teaching environment. For example, when teaching the concept of definite integral, teachers have the same teaching schedule and requirements for both sexes, and both sexes are mostly interested in fulfilling their academic requirements and acquiring knowledge to support their own professional studies. This did not lead to a significant difference in satisfaction due to gender differences.

There is a significant difference in the satisfaction level of advanced mathematics course among different grades of students at University S of Jinan.

The satisfaction level of senior students is higher than that of freshmen, sophomores and juniors. Satisfaction of senior students is higher than that of freshmen, sophomores and juniors, while satisfaction of juniors is higher than that of freshmen and sophomores, and satisfaction of sophomores is higher than that of freshmen. Satisfaction was higher in all dimensions for juniors than for other grades, and lower in all dimensions for freshmen than for other grades.

The high satisfaction of senior students may be due to the fact that they have completed most of the courses, have a complete knowledge of the knowledge system, and can see the practical use of the subject in their further education or work. For example, science and engineering students may apply their knowledge of advanced mathematics to solve real-world problems at the final design stage, thus

gaining a deeper appreciation of its value (Wu & Lin, 2023).

Junior students are studying their major courses in depth, many of which are closely related to advanced mathematics, and they begin to understand the importance of advanced mathematics as a tool subject, so their satisfaction is higher than that of freshmen and sophomores. Sophomores are just beginning to encounter some more in-depth advanced mathematics content and may find it more difficult but compared with the ignorance of freshmen when they first encountered advanced mathematics, they have already had a certain degree of adaptation, so their satisfaction level is slightly higher. Freshmen students, who have just been exposed to advanced mathematics, are disturbed by its abstract concepts and high level of difficulty and have not yet realized the importance of advanced mathematics in their majors, so their satisfaction level is the lowest.

There is a significant difference in the satisfaction of advanced mathematics course among students at University S in different disciplines.

The overall satisfaction with the advanced mathematics course and the satisfaction with the teaching environment, teaching management, teaching methods, teaching content, teaching communication, and teaching assessment dimensions are higher for students at the University S of Jinan whose majors were arts than for students of arts and sciences. The satisfaction of the Advanced Mathematics Course of the students at University S in the science category is in between that of the students of the liberal arts category and that of the students at University S of Jian in the arts major, and the satisfaction of the advanced mathematics course of the students at University S in the humanism major is the lowest.

This result may be due to the fact that, in the eyes of art students, advanced mathematics is a relatively new subject, which contrasts with their daily art studies, and the novelty of this subject increases favorability. Moreover, they are less pressured to apply the complex theories of advanced mathematics to their professional practice and are able to view the subject with a relatively relaxed mindset.

The fact that the satisfaction of science students is higher than that of arts students and lower than that of arts students may be due to their deeper understanding of advanced mathematics. On the one hand, the knowledge system of science and advance mathematics is closely connected, and they can see the practical value of advance mathematics in their majors, but at the same time, because the science majors have higher requirements for advance mathematics, they will face more challenges and pressure during the learning process, for example, physics majors have to use advance mathematics knowledge in calculating complex physical models and chemistry majors have to use advance mathematics knowledge in carrying out quantitative analyses, and the difficulty of learning may lead to a lower level of satisfaction than that of art majors. The difficulty of learning may cause the satisfaction level to be not as high as that of the art program.

The lowest satisfaction rate in the liberal arts may be due to the relatively weak connection

between the content of liberal arts majors and advanced mathematics. For liberal arts students, learning advanced mathematics may feel abstract and difficult to understand, and they seldom apply advanced mathematics knowledge directly in their own majors and future career development, resulting in their low motivation and satisfaction with the subject.

There is no significant difference in satisfaction with the advanced mathematics program among U of S students who are class officers or not.

The reason for this result may be that advance mathematics is a theoretical and logical subject, and its teaching content, teaching methods and assessment standards are relatively fixed for all students and will not change depending on whether they are class cadres or not. Whether they are class officers or ordinary students, they all have to learn the same mathematical theorems and formulas and complete the same level of difficulty in homework and examinations.

Most of the students study advanced mathematics mainly to fulfill their academic requirements, to get credits or to lay the foundation for their professional studies, and class cadres and non-class cadres are the same in this respect. Their expectations for this course are mainly centered on mastering knowledge and passing the examination successfully, and there is no big difference because of the status of their positions.

In terms of learning experience, although class cadres may spend their efforts on organizing class activities and other matters, in the advanced mathematics classroom learning, they are in the same environment and receive the same teaching resources. For example, they listened to the teacher explaining the integral knowledge and took the test together in the classroom, etc. These common learning experiences made no significant difference in their satisfaction with the advanced mathematics course.

There is a significant difference in the satisfaction of Advanced Mathematics Course among students at the University S of Jinan with different places of origin.

The overall satisfaction with the advanced mathematics program, as well as the six dimensions of teaching environment, teaching management, teaching methods, teaching content, teaching communication, and teaching assessment, were higher for students from rural than from urban areas.

On the one hand, in terms of learning mentality, students from rural areas may value the opportunity of university education more. They are aware that learning opportunities are hard to come by, so they have an active learning mindset for every course, including advanced mathematics. They put more effort into challenging courses such as advanced mathematics, and when they are able to master certain knowledge and skills, they will have a higher sense of satisfaction.

On the other hand, from the perspective of basic improvement, some students from rural areas may have a relatively weak foundation in mathematics in high school, but the university advanced mathematics course provides a platform for them to improve again. If they make progress in the university advanced mathematics course, for example, from being confused about complex concepts at

the beginning to gradually understanding and being able to apply the knowledge to solve problems, the sense of achievement brought by such progress will enhance their satisfaction with the course (Zhang, 2024). The urban students, on the other hand, may not have the same sense of progress in advanced mathematics as the rural students because they may have already had relatively better educational resources in high school.

Table 7: Hypotheses Test Results

Research Hypothesis	Results
H1: There is a significant difference in the satisfaction of advanced mathematics course among students at University S of Jinan, Shandong Province, China, based on different factors of demographic background variables.	Partially valid
H1-1: There is a significant difference in the satisfaction of the advanced mathematics course among the students at University S with different genders.	Invalid
H1-2: There is a significant difference in the satisfaction of the advanced mathematics course among the students at University S with different grades.	Valid
H1-3: There is a significant difference in the satisfaction of advanced mathematics course among the students at University S with different majors.	Valid
H1-4: There is a significant difference in advance mathematics course satisfaction among students at University S with whether they are class leaders or not.	Invalid
H1-5: There is a significant difference in the satisfaction of Advanced Mathematics Course among students at University S with different places of origin.	Valid

As a result of the study, significant differences in the satisfaction of advanced mathematics course among the students at University S with different students' grades, majors and places of origin.

However, there is no significant difference in the satisfaction of the advanced mathematics course among the students at University S with different genders and with whether they are class leaders or not.

Conclusions

This study examined the current status of students' satisfaction with the advanced mathematics program at Shandong University S in China, focusing on the following key aspects:

1. Demographics: The study population was slightly male-skewed, with the highest number of respondents being first-year students (nearly 33% of the total), though differences between other grades were minimal.

2. Overall Satisfaction: Students' overall satisfaction with the advanced mathematics program at Shandong University S was generally high.

3. Comparison of Satisfaction Levels: Significant differences were found in satisfaction across several demographic factors:

Grade Level: Senior students showed higher satisfaction across all dimensions compared to other grades, while freshmen showed lower satisfaction.

Discipline: Students in arts disciplines reported the highest satisfaction, followed by science, with liberal arts students showing the lowest satisfaction.

Place of Origin: Rural-origin students reported significantly higher overall satisfaction and higher satisfaction across all six dimensions compared to urban-origin students.

4. Other Factors: No significant differences were found in overall satisfaction or the six dimensions between different genders, class officer status, or, interestingly, the specific breakdown of satisfaction by the six teaching dimensions was not found to vary significantly between genders.

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