



# The Effect of teaching a Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism Theory to Enhance Mathematics Logical Reasoning Ability for First Year Students of Xi'an University

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## Abstract

**Background and Aims:** With the continuous advancement of new education curriculum reform, especially in China, the classroom roles of teachers and students are evolving. Logical reasoning is an important part of the core literacy of mathematics. The purposes of this research were: (1) Compare Mathematics Logical Reasoning Ability before and after the implementation of a Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism theory. (2) Assess the student's satisfaction with the Small Private Online Course (SPOC) on the Elementary Number Theory course.

**Methodology:** The sample of this study was 40 first-year students in Xi'an University, Xi'an City, Shaanxi Province. They were selected by cluster random sampling. The research instruments were: 1) Seven lesson plans of a Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism theory. 2) Mathematics Logical Reasoning Ability test paper. 3) Questionnaire for students' satisfaction. The researcher used the Mathematics Logical Reasoning Ability test paper to conduct pre-tests and post-tests on the sample. Then the pre-test data and post-test data are analyzed. The content of data analysis includes: score mean, standard deviation, the correlation between pre-test data and post test data, t-test of paired dependent sample.

**Results:** From the study, it was found that: (1) The mathematics Logical Reasoning Ability test paper data showed the mean score of post-test data were higher than pre-test scores at the .05 level of statistical significance (The mean of pretest was 19.48, the mean of post-test was 22.55,  $p < .05$ ). (2) The mean scores of students' satisfaction with the Small Private Online Course (SPOC) on the Elementary Number Theory course based on Constructivism theory were very high level.

**Conclusion:** The students who learn through the Elementary Number Theory course will have a post-test score higher than the pretest score. The students' satisfaction with a Small Private Online Course on Elementary Number Theory course based on Constructivism theory will be at a very high level.

**Keywords:** Small Private Online Course (SPOC); Elementary Number Theory Course; Constructivism Theory; Mathematics Logical Reasoning Ability

## Introduction

With the continuous promotion of the new round of curriculum reform, as the leader in classroom teaching activities, teachers' role in classroom teaching has attracted more and more attention. The effectiveness of teachers' classroom evaluation also determines the quality of a class to a great extent. The outline of basic education curriculum reform (Trial Implementation) issued by the Ministry of Education (2020) puts forward: "Change the excessive emphasis on the function of screening and selection in curriculum evaluation, and give full play to the function of evaluation to promote students' development and teachers' improvement and improvement of teaching practice." (Mathematics Curriculum Standards for General High Schools, 2017 Edition), it is further clarified that teachers' classroom evaluation should be "diversified evaluation objectives" and "diversified evaluation methods". The publication of these policies and standards makes teachers' classroom evaluation increasingly pursue the diversity of evaluation contents and the incentive of evaluation methods in real life.

In 1997, the Organization for Economic Cooperation and Development (OECD) launched the Definition and Selection of Competencies Theoretical and Conceptual Foundations (DeSeCo) project





to put forward the concept of "core literacy" for the first time, and education in various countries has embarked on the development trend of core literacy. (Zhang, 2021) In 2014, China proposed to take core literacy as the starting point in the opinions on comprehensively deepening curriculum reform and implementing the fundamental task of Building Morality and cultivating people issued by the Ministry of Education, providing a direction for deepening curriculum reform. In the general high school mathematics curriculum standard "2017 Edition" issued in 2018, it is highlighted that the education goal is to cultivate students' "mathematics core literacy", and logical reasoning, mathematical abstraction, mathematical operation, mathematical modeling, visual imagination, and data analysis are called six core literacy. (Li & Hu, 2020)

Logical reasoning refers to finding out the internal logical relationship according to the surrounding activities and environment, and finally inferring the conclusion that conforms to the logical relationship. People with logical reasoning ability can quickly make correct judgments on things that conform to the logical relationship, so logical reasoning ability has become one of the six core qualities of mathematics. In recent years, there have been numerous studies on cultivating students' logical reasoning literacy, with various starting points and emphases. (Yan & Liu, 2014), (Li, B.2004)

It has always been a compulsory course for mathematics teachers' majors in colleges and universities. It emphasizes serving middle school mathematics teaching and then provides operation space for adding the content of elementary number theory to middle school mathematics teaching. The basis of elementary number theory is clear. Hardy, a famous British mathematician, once said that "elementary number theory hardly needs preparatory knowledge. "Its problems are often clear and easy to understand and can be easily understood by people. However, it is also a difficult subject that requires creative thinking. Therefore, it can often attract students' curiosity and greatly stimulate students' interest in learning. (Li, S. 2019)

Zeng & Lin (2022) The characteristics of elementary number theory determine the feasibility of its entry into the middle school classroom. It is not only extremely practical in theory, but many ways of thinking can play a positive role in the thinking ability of high school students.

People also recognize that mathematical reasoning is logical. What level has the logical reasoning literacy of college students reached? What are the key elements of mathematical logic reasoning? What kind of instructional design can teachers implement in practical teaching to effectively cultivate students' logical reasoning literacy? To answer these questions, first of all, we need to understand what is logical reasoning in theory. Then, the paper is designed to understand the current situation of College Students' mathematical logical reasoning literacy, and put forward the problem-driven mode through the teaching practice class, to provide borrowing and reference for cultivating students' logical reasoning literacy in classroom teaching.

Small Private Online Course (SPOC), as a teaching method that emphasizes a student-centered combination of online and offline teaching, lacks mature teaching mode guidance and still needs to be combined with other teaching modes. How to combine the characteristics of Mathematical statistics with Small Private Online Course teaching mode to cultivate students' learning habits of self-directed exploration, enhance their self-directed learning ability and classroom participation, and stimulate their learning enthusiasm is a breakthrough point in the reform of Mathematical statistics. Small Private Online Course has surpassed massive open online courses in operating mechanism, teaching form, and teaching process. Small Private Online Course advocates blended learning, organically combining "massive open online courses" content with technology and diverse face-to-face activities, and effectively flipping the existing classroom ——Change or reorganize the teaching process, change the teaching structure, and improve the teaching quality. (Zeng, et al, 2015)

Through the teaching of elementary number theory courses, college students can master the basic theory of integers and the basic research methods of number theory, understand the application of number theory in cryptography and Olympic mathematics competitions, cultivate students' mathematics logical reasoning ability, and solve mathematical problems, and help students in the teaching process. A better understanding of elementary number theory. According to the "Basic Education Curriculum Reform Outline (Trial)" mentioned: Change the practice of over-emphasizing the screening and selection functions in curriculum evaluation, and give full play to the function of evaluation to promote student development.

For these reasons mentioned above the researcher is interested development of a Small Private Online Course on Elementary Number Theory course based on Constructivism theory to enhance Mathematics Logical Reasoning Ability for First Year Students of Xi'an University, according to the thesis title and benefit of this research.





## Research objectives

1. To compare Mathematics Logical reasoning ability before and after learning through a Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism theory;
2. To assess the students' satisfaction with the Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism theory.

## Literature Review

The literature review in this study is related to this study comprised of elementary number theory with Small Private Online Course (SPOC) based on Constructivism theory, Mathematics Logical Reasoning Ability, and students' satisfaction research related to this study.

### 1. Small Private Online Course (SPOC) on Elementary number theory course content based on Constructivism theory teaching approach

We explore the elements of an effective learning environment. Then we deconstruct traditional classrooms by integrating online courses, mobile learning, and social interaction, and reconstruct classroom teaching. We establish a SPOC flipped classroom, aiming to explore an effective learning model and provide courses with resources, environment, time, and space for effective learning to occur. (Shi, 2016) As one of the main methods of future course teaching, the SPOC teaching model can effectively promote students' independent learning and thinking inside and outside the classroom, placing more emphasis on students' complete and in-depth learning experience, and at the same time prompting teachers to have a more in-depth understanding of course teaching before teaching. Comprehensive and personalized curriculum understanding and teaching arrangements (Fu & Yang, 2017)

Constructivism emphasizes students' active exploration of knowledge and active construction of learned knowledge, which is consistent with SPOC's emphasis on student-centered learning (Wang, 2013). In the course design based on the SPOC teaching model, teachers integrate. The basic ideas of constructivism theory can better guide students' online learning activities. Class discussions are no longer limited to theoretical knowledge, but also include the application and practice of knowledge (Wei, 2017).

In the article "Several Issues That Should Be Attention in the Reform of Elementary Number Theory Teaching", it was proposed in terms of teaching methods that when teaching elementary number theory courses, special topics can be appropriately carried out to cultivate students' awareness of participation and ability to summarize. It can also be expanded by combining the history of mathematics to consciously cultivate students' good moral character; in the article "Cultivation of Creative Thinking Awareness in Elementary Number Theory Teaching" all believe that elementary number theory courses can cultivate students' creative thinking Awareness, and put forward corresponding suggestions; (Lazhen, 2016) took the elementary number theory course as an example to conduct classroom teaching based on mathematical literacy. These studies can provide a reference for college mathematics teachers in the teaching and reform of elementary number theory.

### 2. Synthesize the teaching process of Small Private Online Course (SPOC) on Elementary number theory courses based on Constructivism theory to enhance the ability of logical reasoning 5 Step.

Step 1: Task design is to design practical tasks and integrate multiple content or skills. It includes determining the goals and requirements of practical tasks, clarifying the knowledge and skills that students need to master, and designing specific content and steps for practical tasks.

Step 2: Complex environment design is to design a complex environment that reflects effective actions taken by students after learning. It includes providing students with a realistic and challenging environment where they can apply their knowledge and skills to solve practical problems.

Step 3: Autonomous problem solving is to give students autonomy in problem-solving and inspire them to solve problems themselves. It includes guiding students to think and explore independently, encouraging them to ask questions, find answers, and continuously try and improve in practice.

Step 4: Thinking stimulation is to support and stimulate students' thinking in a learning environment. It includes providing students with diversified learning resources and tools, encouraging them to carry out cooperative learning and exchanges, and stimulating their innovative thinking and exploration spirit.

Step 5: Social testing and reflection are to encourage students to test their perspectives in a social context and support their reflection. It includes guiding students to apply their knowledge and skills to





social practice, allowing them to continuously reflect and summarize in practice, and improving their abilities and qualities.

### Conceptual Framework

The variables included in this study were: The independent variable is a Small Private Online Course (SPOC) (Armando Fox, 2013) Elementary Number Theory course based on Constructivism theory (Dowden, 2022). The dependent variables are Mathematics Logical Reasoning Ability and Students' Satisfaction.

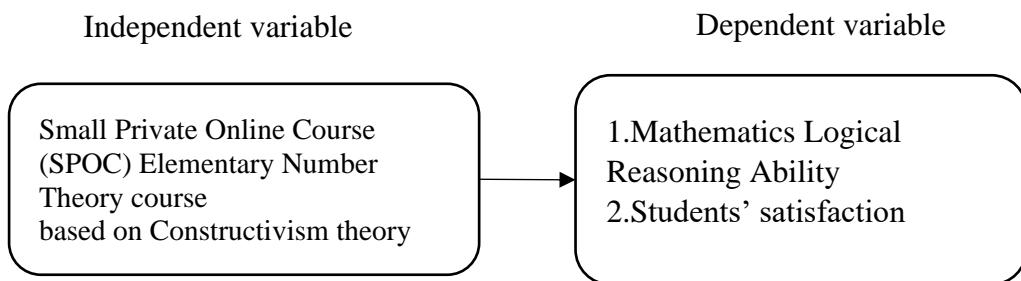


Figure 1 Conceptual Framework

### Methodology

**1. Population and sample:** The population in this study was 80 students majoring in mathematics from First Year Students in Xi'an University. The sample of this study was 40 students majoring in mathematics of First Year Students at Xi'an University, derived from 80 students by cluster simple random sampling method.

**2. Research instruments:** Research instruments were the tools for collecting data. The research instruments which were used in this study were:

#### 2.1 Instruments for measuring Mathematics Logical Reasoning Ability

Evaluate Small Private Online Course (SPOC) Elementary Number Theory course, the researcher created the evaluation form of lesson plans.

1) An expert group composed of five experts evaluates the evaluation form. Five experts consisted of 2 specialists in the curriculum field, 2 specialists in instruction relevant to specific content, and 1 specialist in the measurement and evaluation field. The Index of Item Objective Congruence (IOC) of each item of the evaluation form was between 0.60-1.00, higher than 0.5. The result of analyzing the IOC index showed that the evaluation form about lesson plans of the Elementary Number Theory course was appropriate and could be used in the evaluation Elementary Number Theory course.

2) An expert group composed of five experts used the evaluation form to evaluate the seven lesson plans of the elementary number theory course. The evaluation form of the lesson plan was established using the 5-point Likert scale method. According to the expert evaluation, the scores of the seven lesson plans are all above ( $M=4.40$ ,  $SD=0.62$ ). Therefore, the seven lesson plans of the Elementary Number Theory course are applied to the teaching of the year 1 students of mathematics major at Xi'an University to enhance their Mathematics Logical Reasoning Ability.

#### 2.2 Instruments for collecting data

An instrument for measuring: Test paper of Mathematics Logical Reasoning Ability and satisfaction questionnaire.

##### 1) Test paper of Mathematics Logical Reasoning Ability

The test paper had a total of 30 items (Single choice), The 30 items tested 5 factors of mathematics Logical Reasoning Ability, including Direct reasoning and foundational ability, Analogical reasoning ability, Inductive reasoning ability, Deductive reasoning ability, Logical derivation and proof ability. The Index of Item Objective Congruence (IOC) value of 30 items in the Small Private Online Course (SPOC) on Elementary Number Theory course test paper was 0.60 at the lowest and 1.00 at the highest. The IOC value of each item in the evaluation form of the test paper was between 0.60-1.00, the result of analyzing the IOC value showed that all test items were appropriate and could be used in the test. The test paper difficulty (p) was between 0.55-0.70, and item discriminability (r) should range from 0.27-0.64 and more than 0.20. The reliability of the mathematics Logical Reasoning Ability test is 0.98 and more than 0.7 (Richardson & Kuder, 1939: 681-687).





## 2) Satisfaction questionnaire (5-point Likert scale)

The questionnaire is provided to 5 experts for content validity check and suggestions. The quality of the questionnaire is considered according to the Index of Item Objective Congruence (IOC) obtained from the achievement test evaluation form. The IOC of each item of the satisfaction questionnaire was between 0.60-1.00. The result of analyzing the IOC index showed that 20 items in the satisfaction questionnaire were appropriate and could be used in the satisfaction evaluation of the Small Private Online Course (SPOC) Elementary Number Theory course.

The Cronbach's Alpha coefficient of the reliability of the student satisfaction questionnaire is 0.83, which is greater than 0.70 (Cronbach, L. J., 1951). This showed that the internal consistency of the student satisfaction questionnaire met the requirements.

**Data collection:** The procedures of data collection were as follows: (1) The sample was given the pre-test score of the Mathematics Logical Reasoning Ability test paper by using the constructed instrument. (2) The sample was taught by using the Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism theory. (3) After the sample implemented the Elementary Number Theory course based on Constructivism theory, the sample was given the post-test score by using the same instrument that was used in the pre-test. And (4) Evaluation of students' satisfaction using a satisfaction questionnaire.

**Data analysis:** In this study, data were analyzed by using the statistical method according to the research objectives.

1. Compare the scores of test papers before and after the teaching of the Elementary Number Theory course based on Constructivism theory by using a t-test for a dependent sample.

2. Analyze the student satisfaction data using Cronbach's Alpha method (Lee J. Cronbach, 1951) and determine the level of student satisfaction.

## Results

The results were presented according to the research objectives as follows:

1. Result of comparing Mathematics Logical Reasoning Ability of the students before and after receiving a Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism theory by using a t-test for a dependent sample.

Table 1 Paired sample test about Mathematics Logical Reasoning Ability

Group	N	Pretest scores		Post-test scores		t	p
		M	SD	M	SD		
Experimental group	40	19.48	4.40	22.55	4.92	15.06*	0.000

\* $P < .05$

As presented in Table 1, the mean scores for the pre-test of students' mathematics logical reasoning ability were ( $M=19.48$ ,  $SD = 4.40$ ) and the mean scores for the post-test of students' mathematics logical reasoning ability were ( $M=22.55$ ,  $SD = 4.92$ ). The result of Table 1 showed that after implementing the Small Private Online Course (SPOC) on Elementary Number Theory course based on Constructivism theory in the classroom, the post-test scores of students' mathematics logical reasoning ability were greater than pre-test scores at .05 level of statistical significance ( $t=15.06$ ,  $p<.05$ ). The average scores of the study developed increasingly higher than pre-test.

## 2. Data analysis result of students' satisfaction questionnaire

The researcher used the satisfaction questionnaire to conduct a survey on the year 1 mathematics students of Xi'an University and randomly selected 40 students' data for analysis (The same students to pre-test and post-test).





Table 2 Mean score and satisfaction level of Students satisfaction about Small Private Online Course (SPOC) in the Elementary Number Theory course course

Question number of satisfaction questionnaire		Mean	S.D.	Satisfaction level
Section	Question number			
Part 1: Teaching objective s	1. Satisfaction with whether the teaching objectives of the Elementary Number Theory Small Private Online Course (SPOC) are clear and accurate:	4.40	0.55	High
	2. Satisfaction with the clarity of teaching objectives of the elementary number theory course Small Private Online Course (SPOC):	4.60	0.55	Very high
	3. Satisfaction of the teaching objectives of the Elementary Number Theory Small Private Online Course (SPOC) meet the requirements of enhancing logical reasoning ability:	4.80	0.45	Very high
Part 2: Teaching content	4. The Satisfaction of whether the teaching content of the elementary number theory course Small Private Online Course (SPOC) is easy to understand:	4.60	0.55	Very high
	5. Satisfaction with whether the teaching content of the Elementary Number Theory Small Private Online Course (SPOC) is new and can stimulate learning interest:	4.40	0.55	High
	6. Satisfaction of whether the teaching content of the Elementary Number Theory Small Private Online Course (SPOC) has practical significance:	4.40	0.55	High
	7. Satisfaction with whether the teaching content of the Small Private Online Course (SPOC) in the elementary number theory course can enhance students' logical reasoning ability:	4.60	0.55	Very high
	8. Satisfaction with whether teachers of the elementary number theory course Small Private Online Course (SPOC) explain the teaching content clearly :	4.40	0.55	High
Part 3: Instructional strategy	9. Satisfaction level of effective communication between teachers and students in the Elementary Number Theory Course Small Private Online Course (SPOC):	4.60	0.55	Very high
	10. Satisfaction with the teaching process design steps of the elementary number theory course Small Private Online Course (SPOC):	4.80	0.45	Very high
	11. Satisfaction with the teaching method (constructivism theory) of the small private online course (SPOC) in the elementary number theory course to improve the classroom atmosphere:	4.40	0.55	High
	12. Satisfaction with class hour allocation of small private online courses (SPOC) for elementary number theory courses:	4.60	0.55	Very high
	13. Satisfaction with the teaching approach of the Elementary Number Theory Small Private Online Course (SPOC) to enhance students' logical reasoning ability:	4.60	0.55	Very high





<b>Question number of satisfaction questionnaire</b>		<b>Mean</b>	<b>S.D.</b>	<b>Satisfaction level</b>
<b>Section</b>	<b>Question number</b>			
Part 4: Teaching resources	14. Satisfaction with the combination of teaching resources and media of practical problems:	4.40	0.55	High
	15. Satisfaction with teaching resources and media to enhance logical reasoning ability:	4.80	0.45	Very high
	16. Every student is satisfied with the teaching resources and media used in the introductory number theory course Small Private Online Course (SPOC):	4.80	0.45	Very high
Part 5: Teaching evaluation	17. Satisfaction with the difficulty of the assignment of the Elementary Number Theory Course Small Private Online Course (SPOC):	4.60	0.55	Very high
	18. Satisfaction with the number of assignments for the Elementary Number Theory Small Private Online Course (SPOC):	4.60	0.55	Very high
	19. Satisfaction with the effectiveness of the evaluation system (including test paper and course thesis):	4.80	0.45	Very high
	20. Evaluation system (including test paper and course thesis) can differentiate students' logical reasoning ability in learning the small private online course (SPOC) of the elementary number theory course:	4.40	0.55	High
<b>Total/Overall</b>		4.58	0.52	Very high

As presented in Table 2, in the 20 items of the satisfaction questionnaire, the lowest mean score was ( $M=4.40$ ,  $SD=0.55$ ), and the highest mean score was ( $M=4.80$ ,  $SD=0.45$ ). The result of Table 2 showed that the student's satisfaction with the Small Private Online Course (SPOC) on elementary number theory course based on Constructivism theory was very high level ( $M= 4.58$ ,  $SD=0.52$ ).

## Discussion

1. Constructivism theory provides some useful perspectives and strategies to enhance students' mathematics Logical Reasoning effects and meet individualized needs.

Constructivism and information-based teaching pre-training. Constructivism theory encourages learners to use modern technology and online resources to construct knowledge. However, students may need training in information-based teaching to make better use of these resources. Schools can help students master digital skills, understand how to effectively search and filter online information, and how to participate in online learning communities by providing targeted pre-information teaching training. These trainings can meet students' information needs and help them better adapt to the modern education environment. In terms of individual needs, personalized learning is encouraged. Each student has different learning paths and needs. Schools can use different teaching methods to meet the diverse needs of students. This includes providing resources and guidance for independent learning, supporting group work and project learning, and tailoring courses to students' interests and learning styles. In this way, students can better achieve personalized learning goals, overcome their weaknesses, and realize their potential. At the same time, Zhang, et al (2023) also have the same view, attaching importance to the intelligence of the smart environment, and the teaching programs in the teaching model are more accurate and personalized. The intelligence and ecology of the smart environment allow teaching to be borderless, and students can learn according to their needs. You can be immersed in learning at any time, and the connection and coupling of various teaching elements are more ecological and integrated. For such a fast feedback system, accuracy is inevitable. Educational big data mining technology has penetrated fields such as student learning tracking and performance prediction, auxiliary teaching, examination applications, student behavior, and psychological identification, and has produced many





educational application products. The ultimate goal of data mining is to scientifically determine teaching problems and accurately implement intervention, so that the teaching process and teaching procedures are dynamic and generative, and the resulting learning path is more accurate and personalized. Through this, teachers can "determine teaching based on learning" and "teach students by their aptitude" on a large scale. "Students' demands for 'personalized learning' can be met under big data conditions."

2. Based on constructivism, it is of great help to the development of elementary number theory courses and SPOC to improve the logical Reasoning ability of mathematics students, and student satisfaction has been greatly improved after students adopted this approach.

The first is that timely feedback and assessment are key to ensuring students understand their academic progress and provide opportunities to improve. This includes educators providing feedback, students receiving grades and comments as soon as possible after submitting assignments, and students being able to self-assess their learning progress. Make sure students actively participate in self-assessment and not just be assessed by the teacher. Students may need to develop skills in self-reflection and self-evaluation. Cai, et al (2021) also proposed to further optimize the design of online learner evaluation activities: (1) Evaluation results should be selectively applied according to different student ability levels; (2) Teachers should give more help to students in the early stages of participating in evaluation; (3) It is necessary to continue to pay attention to the development of students' evaluation abilities.

The second is continued improvement involving educators and schools regularly reviewing and updating curriculum and teaching methods to reflect student needs and the latest educational trends. This can include updating teaching materials, improving course design, and adopting new teaching technologies. In practice, educational institutions may be affected by budget constraints, time constraints, and policy constraints that may prevent timely improvements in curriculum and teaching methods. Additionally, educators may need training to adapt to new teaching methods and technologies, which may require additional resources and time. Xu, et al (2022) mentioned a similar view on teaching resources, achieving online and offline integration and complementarity, and being diverse and rich. In addition to course websites and teaching materials as the core, it also includes cloud resources, virtual simulation projects, reference quality courses, and course design tasks. books, computer experiment task books, etc.

The third is student well-being including physical health, mental health, and social support. Schools and educators should provide resources and services to help students maintain healthy lifestyles, provide mental health support, and promote social interaction and support. Student mental health issues may become more prevalent in educational settings, but providing adequate mental health support is a complex task. Yu & Zhang (2023) elaborated on the "efficiency-enhancing" value of digital technology in the prevention and teaching, counseling and intervention, monitoring and evaluation, and practice of school mental health services; it was proposed that digital technology should be used to lead school mental health in the new era. An important tool and practical path to serve high-quality and high-level development. Schools may need to increase resources for mental health services to meet student needs. Additionally, social support may also be affected by the way students interact socially, particularly in digital learning environments. The implementation of these methods can effectively improve student satisfaction.

## Conclusion

Through the comparative analysis of the results of the pretest and post-test of the First-grade students using the teaching method of SPOC blended teaching that combines online and offline, after the intervention of SPOC combined with Constructivism theory. The conclusion was as follows:

1. The mathematics logical reasoning ability data analysis about pre-test and post-test showed the mean score of post-test data was 3.08 higher than that of pre-test data. When the confidence level was .05, the correlation between pre-test data and post-test data was 0.97, and the t-test value  $\text{Sig.} = 0.000 < .05$  (The mean of the pre-test was 19.48, and the mean of the post-test was 22.55).





2. The students' satisfaction was very high level. The lowest mean score was 4.4 and the highest was 4.8, higher than 3.51. The mean scores of students' satisfaction with the Small Private Online Course (SPOC) on the Elementary Number Theory course based on Constructivism theory were high level ( $M = 4.58$ ,  $SD = 0.52$ ).

In this study, SPSS software was used to evaluate the student's satisfaction with the teaching of a Small Private Online Course (SPOC) Elementary Number Theory course based on Constructivism theory. The results show that students have higher satisfaction with the Small Private Online Course (SPOC) Elementary Number Theory course based on Constructivism theory. In the classroom practice of a Small Private Online Course (SPOC) Elementary Number Theory course based on Constructivism theory, Cultivates students' ability and character such as problem-solving, cooperation, and communication with each other. Students will be involved in learning faster, helping to enhance mathematics Logical Reasoning Ability, and winning the popularity of students.

## Recommendation

### Recommendation for implication

Based on the findings from the study, the following recommendations are made:

1) Determination of logical reasoning ability indicators for college students majoring in mathematics. The establishment of indicators involves the subjective understanding of experts, but the expert's grasp of the core meaning is closely related to the personal value orientation, making it more "localized" and more conducive to guiding the teaching practice of front-line teachers.

2) Add educational technology-related content to the classroom and develop integrated technology for mathematics majors. Make mathematics major students familiar with the operation of various commonly used teaching equipment, and the development and utilization of digital resources, so that they can use educational technology to optimize the teaching and learning process and promote education and teaching reform.

3) The representativeness of the research objects is not comprehensive enough. However, the scale is too small and it does not cover all universities in Shaanxi Province. More researchers, teachers, and students need to actively participate in such theoretical research and discover more from it. problems to construct a new teaching theory based on the need for reflective teaching in the classroom teaching process.

### Recommendation for further research

1) In mathematics teaching, adhere to the reflective teaching purpose of "learning mathematics, learning mathematics teaching". Only teachers and students can pursue self-enrichment, self-improvement, and self-transcendence in the teaching process and gradually realize it.

2) Explore the diversification of mathematics classroom teaching methods. Diversified teaching methods should be appropriately selected according to the teaching content and students' learning situation, and reasonable mathematical and logical Reasoning ability teaching should be carried out.

3) The compilation of elementary number theory textbooks should refine the core content of core mathematical abilities and cultivate college students' mathematical logical reasoning ability to "follow the trend".

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