Asian Journal of Education and Social Studies

Volume 38, Issue 4, Page 33-39, 2023; Article no.AJESS.95978
ISSN: 2581-6268

Research on the Cultivation Strategy of Junior Middle School Students' Mathematics Application Consciousness

Xiaofan Ma [a] and Zezhong Yang [a*]

[a] School of Mathematics and Statistics, Shandong Normal University, Jinan, China.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJESS/2023/v38i4833

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/95978

Review Article

Received: 26/11/2022
Accepted: 27/01/2023
Published: 02/02/2023

ABSTRACT

With the implementation of mathematics curriculum reform in primary and secondary schools, the importance of mathematics application consciousness has become increasingly prominent. Many scholars have conducted relevant research on the cultivation of junior high school students' awareness of mathematics application, however, few relevant findings have been summarized. Through the method of literature analysis, we reviewed and sorted out the research on the cultivation of junior middle school students' mathematics application consciousness, and draws the following conclusions: (1) The cultivation strategy of junior middle school students' mathematics application consciousness is mainly studied from two aspects: class and extracurricular; (2) Previous studies have put forward more strategies on the cultivation of junior middle school students ' mathematics application consciousness from the perspective of class, there are few studies on extracurricular aspects; (3) Researchers mainly use literature research method and case analysis method to study; (4) The previous research methods are relatively simple, and the

**Corresponding author: Email: zhongzee@163.com;*

suggestions and strategies given by scholars are relatively broad and general. Therefore, in the future, it is necessary to improve the research methods and conduct research from a more targeted perspective in order to find more reasonable and specific suggestions and strategies. These new findings have clarified the characteristics of the current research and laid the foundation and pointed out the direction for further relevant research.

Keywords: Junior high school; mathematics; application consciousness.

1. INTRODUCTION

Compulsory education mathematics curriculum standards (2022 edition) points out that mathematics curriculum should cultivate students ' core literacy so that students can express the real world in mathematical language, and one of the manifestations of mathematical language is application consciousness. Application consciousness helps students use their knowledge to solve practical problems and develop practical ability [1]. Therefore, it is necessary to study the cultivation strategy of junior high school students' mathematics application consciousness. At present, there are many studies on the cultivation strategy of junior middle school students ' mathematics application consciousness, but there are few overview studies on this topic [2-4]. Therefore, this paper intends to review and sort out the current research, systematically analyze the research status of this topic, and provide corresponding strategic references for how to cultivate junior high school students ' awareness of mathematics application. More importantly, by finding out its blank points in the paper, scholars are encouraged to further study.

The question studied in this paper is: What is the research status of the "cultivation strategy of junior high school students mathematics application consciousness"? Specifically, it includes the following two aspects:

(1) What aspects have scholars studied on the cultivation strategy of junior high school students ' mathematics application consciousness? What are the main results? What are the main methods used?
(2) Which areas are currently being studied more? Which aspects are less researched? What are the deficiencies? Are there any blank points?

2. METHODS

2.1 Data Source

This paper selects the literature in the CNKI (China National Knowledge Infrastructure) database as the sources of data. CNKI is the most authoritative document retrieval tool in Chinese academic journals, which approximately contains all the contents of Chinese journals. This database can ensure persuasion and reliability.

2.2 Data Collection

Through the advanced search of CNKI, a total of 15 articles were retrieved by searching the three keywords of "application consciousness " " junior high school mathematics " and " cultivation". Through reading each article, it was found that 15 articles were closely related to the topic, so all 15 articles were retained. In addition, two keywords of ' application consciousness ' and ' junior high school mathematics ' were searched at the same time, and 6 articles were selected according to their relevance and publication time. Therefore, these 21 articles are analyzed in depth.

2.3 Data Collation

Through the intensive reading of the literature, the author uses the method of taking notes to summarize the research contents, research methods, and research results in previous studies.

3. RESULTS

3.1 Research Aspects and Categories

Reading 21 articles, it is found that the research on the cultivation strategy of junior high school students' mathematics application consciousness mainly involves two aspects: how to cultivate application consciousness in class and after class. All strategies are roughly divided into 17 categories, namely: (1) Strengthen the application consciousness and establish the correct concept of mathematics application; (2) Understand the psychology of junior high school students, contact the actual teaching of life, stimulate students' interest in learning, enhance

students ' understanding of mathematics and confidence in learning mathematics; (3) Carry out comprehensive practical activities to cultivate students ' practical ability; (4) Create problem situations and cultivate students ' awareness of mathematical application; (5) Make full use of textbook resources to cultivate application awareness; (6) Expand extracurricular knowledge and enrich knowledge horizons; (7) Improve students ' problem-solving ability; (8) Scientific arrangement of homework; (9) Using historical materials to guide students to understand that mathematics comes from life; (10) Carry out modeling training; (11) Carry out the second classroom, expand students ' mathematics application space; (12) Improve mathematics teaching methods to make teaching methods close to life; (13) Reasonable classroom introduction; (14) Focus on the connection and integration of knowledge; (15) Fully tap the realistic background of mathematical knowledge, so that students experience the process of applying mathematics; (16) Guide students to think and ask questions from the perspective of mathematics; (17) Strengthen communication between teachers and students, teachers guide students to find and solve problems by themselves. The details of the number of occurrences of each type of strategy in all articles are shown in Table 1.

As can be seen from Table 1, "Understand the psychology of junior high school students, contact the actual teaching of life, stimulate students ' interest in learning, enhance students ' understanding of mathematics and confidence in learning mathematics" and "Carry out comprehensive practical activities to cultivate students ' practical ability", these two strategies are the most mentioned by people.

Table 1. Aspects and Categories

Research aspects / Research categories	In class	Extra -curricular
Strengthen the application consciousness, establish the correct concept of mathematics application		5
Understand the psychology of junior high school students, contact the actual teaching of life, stimulate students ' interest in learning, enhance students ' understanding of mathematics and confidence in learning mathematics	19	
Carry out comprehensive practical activities to cultivate students ' practical ability		13
Create problem situations and cultivate students ' awareness of mathematical application	5	
Make full use of textbook resources to cultivate application awareness	3	
Expand extracurricular knowledge and enrich knowledge horizons		1
Improve students ' problem-solving ability	2	
Scientific arrangement of homework		2
Using historical materials to guide students to understand that mathematics comes from life	3	
Carry out modeling training		6
Carry out the second classroom, expand students ' mathematics application space		1
Improve mathematics teaching methods to make teaching methods close to life	1	
Reasonable classroom introduction	2	
Focus on the connection and integration of knowledge	2	
Fully tap the realistic background of mathematical knowledge, so that students experience the process of applying mathematics	4	
Guide students to think and ask questions from the perspective of mathematics	2	
Strengthen communication between teachers and students, teachers guide students to find and solve problems by themselves	1	

Note: Numbers indicate the number of times the corresponding strategy appears in the article

3.2 The Method Adopted

Table 2. Research Methods

Research method	Literature research	Case analysis
Frequency	14	20

Note: Numbers indicate the number of times the corresponding method appears in the article

By summarizing the research methods involved in 21 articles, it is found that most of the articles adopt the literature research method and case analysis method. The number of times that various methods appear in the article is summarized. The details are shown in Table 2.

3.3 Main Viewpoints of Predecessors

3.3.1 How to cultivate the consciousness of mathematics application in class

How to cultivate junior high school students ' awareness of mathematics application in class, there are mainly 11 strategies, which are: (1) Understand the psychology of junior high school students, contact the actual teaching of life, stimulate students ' interest in learning, enhance students' understanding of mathematics and confidence in learning mathematic ; (2) Create problem situations and cultivate students' awareness of mathematical application; (3) Make full use of textbook resources to cultivate application awareness ; (4) Improve students ' problem-solving ability; (5) Using historical materials to guide students to understand that mathematics comes from life; (6) Improve mathematics teaching methods to make teaching methods close to life; (7) Reasonable classroom introduction; (8) Focus on the connection and integration of knowledge; (9) Fully tap the realistic background of mathematical knowledge, so that students experience the process of applying mathematics; (10) Guide students to think and ask questions from the perspective of mathematics; (11) Strengthen communication between teachers and students, teachers guide students to find and solve problems by themselves.

Mao, Qi, Lu, and others pointed out that mathematical knowledge is widely used in real life, but some students think that some mathematical knowledge can not be applied to real life, and they are tired of mathematics. Therefore, teachers should contact life examples in teaching, stimulate students' interest, and enhance students' understanding of mathematical knowledge [5-7]. Qi, Zhu, and others pointed out that teachers can set some situations for students in mathematics teaching so that students can solve the problems in a certain situation, and guide students to think more actively [6,8]. Li pointed out that the current junior high school mathematics textbooks attach great importance to the use of knowledge. Teachers should make full use of textbook resources and cultivate students' awareness of application [9].

Lai pointed out that as a highly logical and highly structural subject, mathematics can improve students ' thinking ability and computing ability. students ' problem-solving ability is one of the manifestations of thinking ability and computing ability [10]. Wang, Yin, and others pointed out that in the teaching process, teachers can make full use of historical materials to introduce students to the source of relevant mathematical theory knowledge [11,12]. Liang pointed out that teachers should abandon traditional teaching methods, improve mathematics teaching methods, and guide students to connect mathematics knowledge with real life [13]. Yin pointed out that teachers should introduce classroom introductions toward the applied aspects of mathematics [12].

Li pointed out that teachers should choose teaching forms flexibly and pay attention to the effective integration of different subject knowledge and related knowledge [14]. Cheng, Li, and others pointed out that teachers should consciously explore the realistic background of mathematical knowledge and guide students to use the knowledge to explore more practical problems [9,15]. Li pointed out that teachers should guide students to think from the perspective of mathematics, ask questions, and use mathematical knowledge to solve problems [9]. Mao pointed out that in the actual teaching process, communication between teachers and students is very important. Teachers should give students a certain amount of space and time, encourage students to explore boldly, and guide students to find and solve problems by themselves. After that, teachers adjust teaching strategies through communication with students to help students [16].

3.3.2 How to cultivate the consciousness of mathematics application in extracurricular activities

How to cultivate junior high school students ' awareness of mathematics application in extracurricular activities, there are mainly 6 strategies, namely: (1) Strengthen the application consciousness, establish the correct concept of mathematics application; (2) Carry out comprehensive practical activities to cultivate students ' practical ability; (3) Expand extracurricular knowledge and enrich knowledge horizons ; (4) Scientific arrangement of homework; (5) Carry out modeling training ; (6) Carry out the second classroom, expand students ' mathematics application space.

Yang, Li, and others pointed out that teachers should change their teaching concepts. Before cultivating students ' application consciousness, they should first enhance their application consciousness, follow the students ' cognitive rules, pay attention to the infiltration of thinking methods, and let students gradually form the consciousness of applying mathematics [17,18]. Mao, Liu, Lu, and others pointed out that comprehensive practical activities are a good way to train students to use mathematical knowledge flexibly. Students can gain more mathematical knowledge in the process of activities, enhance their thinking and practical ability, and learn to look at practical problems with a mathematical perspective [5,7,19]. Cheng pointed out that teachers should combine in-class and after-class, expand the knowledge learned in class to after-class, and provide students with a broad application space [15].

Liang and Lai pointed out that teachers can not only set up after-school exercises with a strong flavor of life according to the actual teaching arrangement but also adopt the forms of papers, weekly journals, etc. so that students can summarize the social problems involving mathematics around them and try to solve them. After the completion of the students, teachers should provide guidance to help students better grasp the knowledge they have learned [10,13]. Wang, Wang, and others pointed out that it is necessary to strengthen modeling training to help students master how to convert text into mathematical language, how to convert general problems into mathematical problems, and be familiar with the modeling process [11,20]. Zhu pointed out that teachers should actively carry out the second classroom, use the Internet and multimedia technology, effectively expand the space of mathematics application, and ensure the effectiveness of junior high school mathematics teaching [8].

4. DISCUSSION

4.1 Discussion on Relevant Aspects and Categories

Through the collation of statistics, it can be seen that the previous research on the cultivation strategies of junior high school students ' mathematics application consciousness mainly focuses on the two aspects of class and extracurricular, and a total of 17 strategies are proposed. The research mainly focuses on how to cultivate students ' awareness of mathematics application in class. It can be seen that the research on class strategies is relatively concentrated and is the focus of current research. There are 11 kinds of training strategies for application consciousness in class, and the research is more comprehensive; however, there are few studies on how to cultivate students ' application consciousness after class. Only 6 strategies are put forward, such as strengthening application consciousness, establishing the correct concept of mathematics application, carrying out comprehensive practical activities, cultivating students' practical ability, expanding extracurricular knowledge, and enriching knowledge horizon. It can be seen that there is a lack of research on how to cultivate students ' application consciousness after class, which needs further research.

4.2 Discussion on Research Methods

For research methods, most of the 21 articles use the literature research method and case analysis method. The research methods are relatively simple, mostly based on speculation and drawing on previous experience, and lack certain persuasiveness. Later research can use questionnaire survey and interview method, through real data collection and analysis, objectively put forward strategies to ensure the reliability and persuasiveness of the results. The experimental method can also be used to verify the effectiveness of the relevant strategies proposed by the predecessors in cultivating students ' application consciousness through the comparison between the experimental group and the control group.

4.3 Discussion on the Main Strategies

In view of how to cultivate junior high school students' awareness of mathematics application, the researchers mainly mentioned 17 strategies. In class, the commonly mentioned strategies are to understand the psychology of junior high school students, contact the actual teaching of life, stimulate students ' interest in learning, enhance students' understanding of mathematics and confidence in learning mathematics, to create problem situations, and cultivate students' awareness of mathematical application. It can be seen that these two strategies are generally recognized by current scholars. In terms of extracurricular activities, the strategies commonly mentioned are to carry out comprehensive practical activities to cultivate students' practical ability, and carry out modeling training. It can be seen that these two strategies are generally recognized by current scholars [21,22]. There are relatively few previous studies on the other 13 strategies, and further research is needed to verify the effectiveness of the strategies. In addition, the previous research on comprehensive practical activities is relatively general. As an important field of developing application consciousness, the research on synthesis and practice needs to be further strengthened, especially the research on thematic activities and project learning mentioned in the new curriculum standard.

5. CONCLUSION

In this paper, through the analysis of the results of previous studies, the following conclusions are obtained:

(1) In this paper, by sorting out 21 articles, it is found that the previous research on the cultivation strategy of junior high school students ' mathematics application consciousness mainly focuses on the two aspects of class and extracurricular, and there is more research on class.

(2) Through the analysis of previous views, it is concluded that the current common views are mainly to understand the psychology of junior high school students, contact the actual teaching of life, stimulate students ' interest in learning, enhance students ' understanding of mathematics and confidence in learning mathematics, to create problem situations and cultivate students ' awareness of mathematical application, to carry out comprehensive practical activities to cultivate students ' practical ability, to carry out modeling training.

(3) Most of the previous studies used the literature research method and case analysis method. The application of the questionnaire survey method, interview method, and experimental method is blank. It can be seen that the research methods used in previous studies are relatively single, so more research methods can be used in future research to ensure the reliability of the results.

(4) All kinds of strategies are studied by researchers from the reference of other people's literature or their own experience, lacking certain persuasiveness. Therefore, in the future, it is necessary to further study the cultivation strategy of junior high school mathematics application consciousness from multiple perspectives, put forward more effective strategies, and further verify its effectiveness for other strategies proposed by predecessors.

(5) At present, most of the research on ' application consciousness ' is before the promulgation of the new curriculum standard, and there are few studies under the background of the new curriculum standard. Previous studies on the cultivation strategy of applied consciousness are relatively general. The research of specific modules such as comprehensive practical activities needs to be further strengthened.

FOUNDING

This research was supported by Shandong Provincial Education Department (Grant number: SDYJG21023).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ministry of Education of the People's Republic of China. Compulsory education mathematics curriculum standards (2022 edition). Beijing: Beijing Normal University Press; 2022.
2. Wei Q. Research on the cultivation of students' application consciousness in

junior middle school mathematics teaching. New Curriculum. 2020;(37):203.
3. Hu CH. Analysis of the strategy of cultivating students' application consciousness in junior middle school mathematics teaching. Everyday Love Science (Education Frontier). 2020;(03): 102.
4. Wang JX. On cultivating students' application consciousness in junior middle school mathematics teaching. China 's off-campus education, 2019;(31):112.
5. Mao M. The cultivation of students' application consciousness in junior middle school mathematics teaching. Test Questions and Research. 2020;(17):66.
6. Qi HY. On the cultivation of students' application consciousness in junior middle school mathematics teaching. New Curriculum (Middle). 2019;(08):224-225.
7. Lu JQ. On the importance of cultivating the application consciousness of junior middle school mathematics teaching. Youth diary (Education and Teaching Research). 2019;(02):177.
8. Zhu L. How to cultivate students' application consciousness in junior high school mathematics. Mathematics World (Late). 2017;(09):32-33.
9. Li W. Strengthening the cultivation of application consciousness in junior middle school mathematics teaching. China Science and Education Innovation Guide. 2008;(12):79.
10. Lai CR. Methods of cultivating students' application consciousness in junior high school mathematics. Mathematics World (Early ten days). 2017;(11):47.
11. Wang N. On the cultivation of application consciousness in junior middle school mathematics teaching. New curriculum (I). 2014;(03):10-11.
12. Yin HQ. The strategy of cultivating students' application consciousness in junior middle school mathematics teaching. Middle School Teaching Reference. 2016;(14):55-56.
13. Liang BS. Close to real life, pay attention to application awareness. Literature navigation (Mid-Term). 2017;(03): 23.
14. Li WD. On the cultivation of students' awareness of knowledge application in junior high school mathematics teaching. Secondary school curriculum counseling (Teacher Communication). 2015;(12): 22.
15. Cheng YW. Cultivating application awareness and improving mathematical literacy. The Big World of Mathematics (Mid-term). 2018;(08):52.
16. Mao YF. Improve students ' awareness of application and promote students' all-around development-How to cultivate students ' awareness of application in junior high school mathematics. Mathematical World (Junior high School Edition). 2022;(03):87-89.
17. Yang PP. Cultivate application ability and improve mathematical literacy. Xueyuan Education, 2019, (24) : 42.
18. Li Y. The significance and ways of cultivating students ' application consciousness in junior middle school mathematics teaching. China's Off-campus Education. 2015;(22):118.
19. Liu SH. On the cultivation of students ' application consciousness in junior middle school mathematics teaching. Reading, Writing and Calculating. 2020; (06):79.
20. Wang XR. The cultivation of junior high school students ' awareness of mathematics application. Xueyuan Education. 2016;(11):96.
21. Zhang SJ. The penetration strategy of junior high school mathematics application consciousness under core literacy. Reading, writing and calculating, 2021;(06): 191-192.
22. Shen LP. How to cultivate students' application consciousness in junior middle school mathematics teaching. Science and Education Journal (First issue). 2019;388 (28):164-165.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/95978