Volume 3, Nomor 1, March 2025
Pi-Radian: Journal of Mathematics Education
https://journal.pustakailmiah.id/index.php/piradian
DOI: https://doi.org/10.63214/piradian.v3i1.pp1-16

RESEARCH ON MATHEMATICAL ABSTRACTION LITERACY IN CHINA

Shiewei Tang[1], Jerito Pereira[2]
[1] Guangxi Normal University, China
mathtan@foxmail.com
[2] Universidade Nacional Timor Lorosa'e, Timor Leste
jeritopereira@gmail.com

Article Info

Article History
Received: 14-12-2024
Revised: 10-02-2025
Accepted: 20-03-2025

Keywords
High school students;
Mathematical abstraction;
Core literacy

Corresponding Author
Shiewei Tang
mathtan@foxmail.com
Guangxi Normal University

Abstract

Mathematical abstraction is the basic idea of mathematics, which is an important foundation for the formation of rational thinking, reflects the essential characteristics of mathematics, and permeates its generation, development, and application. The latest version of the general high school mathematics curriculum standard lists mathematical abstraction as the primary core literacy of the discipline, and mathematical abstraction literacy has become the focus of educational research. A number of scholars have researched mathematical abstraction literacy in senior high schools in China in recent years, but there is no literature that summarizes and compiles this aspect. This paper employs the literature analysis method to review and sort out the relevant literature on mathematical abstraction literacy and draws the following conclusions: (1) Previous research on mathematical abstraction literacy mainly contains five aspects, which are the connotation of mathematical abstraction, the current status quo of the level, the evaluation method, the influencing factors, and the strategies for the cultivation. (2) There are generally more studies on the connotation of mathematical abstraction, the current status of the level, and the cultivation strategy. However, in terms of influencing factors, the views in the existing literature are scattered, and no major influencing factors have been found. (3) The research methods are relatively single, with literature analysis or discursive methods predominating, especially the analysis of the influencing factors is not systematic and objective enough, lacks quantitative research for empirical evidence, and lacks targeted and practical cultivation strategies.

How to Cite:

Tang, S & Pereira, J. (2025). Research on mathematical abstraction literacy in China. *Pi-Radian Journal*, *3*(1), 1-16.

Print ISSN: 3031-9552, Online ISSN: 3031-9544

INTRODUCTION

Mathematical abstraction is the basic idea of mathematics, which is an important foundation for the formation of rational thinking, reflects the essential characteristics of mathematics, and permeates its generation, development, and application (Ministry of Education of the People's Republic of China, 2020). Among the six core literacies of mathematics, mathematical abstraction holds a fundamental position, and the research on mathematical abstraction is an inevitable requirement for improving the quality of teaching and developing students' core literacy, which has become the focus of educational research (Zhang &Wang & Song, 2017). Up to now, there have been many relevant studies on mathematical abstraction literacy, but there is no complete overview and organized literature in this area. Therefore, this paper intends to review and sort out the existing studies and systematically analyze the current research status of mathematical abstraction literacy, so as to provide a reference for the cultivation strategy to enhance the mathematical abstraction literacy of high school students. More importantly, by identifying the deficiencies and gaps, it will guide future research.

The research questions in this paper are: (1) What are the aspects included in previous research on mathematical abstraction literacy? Which aspects have been received more scholarly attention? (2) What are the predominant research methodologies to study mathematical abstraction literacy? (3) What are the limitations of the current research on mathematical abstraction literacy?.

METHOD

This paper adopts the method of literature analysis and chooses the literature in the database of China Knowledge Network (CNKI) as the source of information. China Knowledge Network (CNKI) is the most authoritative national academic journal literature search tool in China, which basically includes all journals and dissertations in China. Therefore, choosing this database can ensure the persuasiveness and reliability of this study.

During the literature search, 222 documents were retrieved with the theme of "mathematical abstraction literacy" and 58 documents were retrieved with the theme of "mathematical abstraction literacy" and "high school". The focus of this study is the mathematical abstraction literacy of high school students, so considering the research question and the number of citations, 48 documents were selected for in-depth study after eliminating irrelevant documents. Reading the literature carefully and taking notes, we summarized and sorted out the research results, research methods, and information on the samples.

RESULTS AND DISCUSSION

The Comprehensive research results on "high school mathematics abstraction core literacy" in China can be found that its main research content focuses on five levels: connotation research, current level research, evaluation method research, influencing factors research, and countermeasures research.

Print ISSN: 3031-9552, Online ISSN: 3031-9544

Connotation of Mathematical Abstraction Literacy

Zheng pointed out that in mathematics education and mathematics research, people usually used mathematical abstraction and abstract thinking, which represented a generalization of mathematical abstraction from the perspective of thinking form or cognitive mental activity (Zheng & Huang, 2024). The Practical Encyclopedia defined "abstract thinking" as abstract thinking as opposed to figurative thinking, which was the thinking activity of using concepts to make judgments and reasoning (Wang & Qiao, 1991). According to Wang, mathematical abstraction referred to the thinking process of extracting mathematical attributes such as general basic concepts, essential features, and arithmetic laws in mathematical activities (Wang, 2012). Shi pointed out that mathematical abstraction was the thinking process of excluding all physical properties of things to get the object of mathematical study. It included the abstraction of mathematical concepts and interrelationships between concepts from the relationship between numbers and diagrams, the abstraction of general laws and structures from the specific background of things, and the use of mathematical symbols or mathematical terminology to give a representation (Shi, 2017). Tang believed that mathematical abstraction literacy was the level of cultivation formed in routine learning and practice to abstract mathematical research objects in quantitative relations, spatial forms, and concrete things, mainly the level of abstract generalization ability (Tang, 2021). According to Liu, mathematical abstraction was the process of perceiving, internalizing, and practicing the application of mathematical objects, and this process promoted students to clarify the nature of mathematical objects, dig deeper into the connotation of related mathematical concepts, logically correlate with related knowledge, and understand the origin of mathematical knowledge (Liu & Wu, 2024).

In the latest version of the general high school mathematics curriculum standard (2017 Edition Revised in 2020), it is clearly stated that mathematical abstraction refers to the literacy of obtaining mathematical research objects through the abstraction of quantitative relationships and spatial forms. Mathematical abstraction is manifested in obtaining mathematical concepts and rules, formulating mathematical propositions and models, forming mathematical methods and ideas, and recognizing mathematical structures and systems (Ministry of Education of the People's Republic of China, 2020).

Levels of Mathematical Abstraction Literacy in High School Students

Following the promulgation of the 2017 Curriculum Standards, scholars have developed assessment instruments aligned with the new standards to evaluate the mathematical abstraction literacy of high school students. Zheng et al. administered a self-designed test and reported that students' mathematical abstraction literacy was generally moderate, with significant disparities observed between sophomores and juniors, as well as between male and female students. Additionally, regional imbalances in abstraction proficiency levels were observed (Zheng & Chen & Wang, 2017). Liu revealed through standardized testing that students exhibited weaknesses in higher-order thinking and abstraction abilities, particularly in symbolic representation (Liu, 2017). In contrast, Qin and Yan employed an assessment questionnaire and found that students' mathematical abstraction literacy was at an intermediate-to-high level. Their study demonstrated a strong correlation between mathematical performance and abstraction literacy, with high-achieving students outperforming their peers. However, no significant associations were detected with ethnicity or gender (Qin & Yan, 2019). Wang et al. designed original

Print ISSN: 3031-9552, Online ISSN: 3031-9544

test items based on the core literacy framework outlined in the Curriculum Standards. Their results indicated that the overall level of mathematical core literacy among high school students remained relatively low. While knowledge base and problem-solving experience positively correlated with core literacy performance, no gender-based differences reached statistical significance (Wang & Wang & Liu & Zhou, 2021).

Assessment Methods of High School Students' Mathematical Abstraction Literacy

Internationally, the evaluation of mathematical literacy has been predominantly represented by two major assessment programs: the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS) (Wang & Li, 2017). Building upon established evaluation frameworks, Yu integrated Bloom's Taxonomy, the PISA assessment model, and the SOLO taxonomy to develop a theoretical construct for assessing mathematical literacy through three progressive dimensions: knowledge comprehension, knowledge transfer, and knowledge innovation (Yu, 2017). Shi emphasized that effective assessment of core mathematical literacy should specifically examine students' cognitive processes and quality of mathematical thinking (Shi, 2016).

For the core literacy of mathematical abstraction, scholars have proposed different ways and aspects of examination. Hu maintained that assessing mathematical abstraction literacy should focus on students' ability to derive mathematical concepts, propositions, and systems from various contexts, while also evaluating their capacity for generalized thinking in practical situations and their proficiency in applying mathematical reasoning to solve problems (Hu & Bao & Ren & Chen, 2017). In a case study examining the function concept, Chen investigated students' abstraction competence through multiple aspects including concept formation, interpretation of abstract mathematical principles using concrete examples, application of mathematical language, and methodological generalization (Chen, 2018). Jiang conceptualized the assessment of mathematical abstraction literacy as a hierarchical three-level framework progressing from fundamental knowledge comprehension through abstraction, to knowledge transfer, and ultimately to knowledge innovation (Jiang, 2021).

Influencing Factors of Mathematical Abstraction Literacy

Mathematical abstraction ability, as a crucial component of mathematical core literacy, plays a pivotal role in high school students' mathematics learning. Given its significance, enhancing students' mathematical abstraction level has become an important research topic in mathematics education, and investigating its influencing factors holds substantial theoretical value and practical significance. Domestic scholars have primarily focused on the following aspects regarding the factors influencing mathematical abstraction.

On the part of students themselves, scholars suggest that the development of students' mathematical abstraction literacy is influenced by multiple dimensions, encompassing both intrinsic cognitive and psychological characteristics, as well as external learning factors such as behavioral habits. Foremost among these influences are learning motivation and self-belief, which serve as crucial internal drivers. Zhu and Hu developed a questionnaire based on PISA surveys to investigate the current state and influencing factors of high school students' core mathematical literacy. Their findings revealed that mathematics learning opportunities showed the strongest correlation with core mathematical literacy, followed sequentially by mathematical self-belief, learning drive

Print ISSN: 3031-9552, Online ISSN: 3031-9544

and motivation, school factors, and school engagement (Zhu & Hu, 2020). Complementing these findings, Zheng et al. demonstrated a significant correlation between mathematical self-efficacy and abstraction ability (Zheng & Chen & Wang, 2017). Yu further emphasized student initiative as one of the key factors in developing mathematical abstraction literacy among high school students (Yu, 2020).

Learning engagement and habit as influences at the behavioral level, Hu and Huang found that students' engagement in mathematics learning and their study habits positively predict core mathematical literacy (Hu & Huang, 2024). According to Liu, students' ability to generalize and summarize a certain type of problem and their habit of questioning problems and phenomena are the conditions required for the creation of abstract thinking development (Liu, 2019). According to Xing, in terms of students' active learning, poor mathematical learning awareness leads to the face of the exercise not having the ability to actively match the corresponding knowledge points learned, in the learning of high school mathematical knowledge is very susceptible to the interference of some of the mathematical concepts and conclusions learned in junior high school, and thus fall into the stereotypes of the thinking of the misconceptions will be prone to inhibit students from optimizing the thinking of the formation of more scientific and rational thinking, resulting in the students to enhance the mathematical abstract thinking The improvement of students' abstract thinking in mathematics will be hindered by (Xing, 2023).

Regarding knowledge mastery and cognitive structure, Lin highlighted that students' understanding of mathematical abstract symbols and proficiency in mathematical language directly influence abstract thinking development (Lin, 2019). Zhu confirmed a significant correlation between mathematical cognitive structure and abstraction ability, with students at higher cognitive levels demonstrating superior performance (Zhu, 2021). Jiang et al. proposed that the degree of mathematical knowledge mastery, development of mathematical thinking, mathematical competence, and effectiveness of peer-assisted learning are all critical factors affecting abstraction ability (Jiang & Chen & Xie & Gong, 2022). Ge's research further indicated a significant positive correlation between metacognitive ability and mathematical abstraction ability, with metacognitive monitoring showing particularly prominent predictive effects (Ge, 2020).

In addition to teacher- and student-related factors, some scholars suggest that characteristics of high school mathematics knowledge, textbook features, school environment, and teaching resources may also influence students' mathematical abstraction literacy. Among them, Xing argues that the increased density, independence, and abstractness of mathematical knowledge in high school significantly impacts the development and enhancement of students' abstraction abilities (Zhu, 2021). Chen et al. contend that disorganized conceptual presentation and lack of rigorous terminology in textbook compilation constrain teachers' material analysis and instructional design quality, thereby affecting students' abstraction development during conceptual learning (Chen & Yi & Meng, 2020). Chen noted that the overall academic atmosphere of a school substantially influences the cultivation of core mathematical literacy (Chen, 2018). Zhu and Hu identified school-related factors including students' sense of belonging and mathematics learning time as contributors to abstraction literacy development (Zhu & Hu, 2020). Furthermore, Sun demonstrated that disparities in mathematics laboratory resources and equipment lead to differences in students' abstraction ability development (Sun, 2019). Yin and Zhao's comparative study reveals that urban school students

Print ISSN: 3031-9552, Online ISSN: 3031-9544

outperform their rural counterparts in mathematical abstraction ability development (Yin & Zhao, 2017).

Cultivation Strategies for High School Students' Mathematical Abstraction Literacy

Regarding the cultivation strategies of mathematical abstraction literacy for high school students, at the macro level, scholars have elaborated on multiple dimensions such as teaching context design, teaching mode innovation, teachers' professional development, optimization of teaching materials and curricula, and students' cognitive guidance. In terms of instructional context design, multiple researchers emphasize the importance of creating diverse situational contexts to develop abstraction skills. Liu and Wu developed a three-dimensional instructional framework incorporating Geogebra-based problem scenarios, inquiry-based teaching, and worked-example demonstrations to enhance abstract thinking (Liu & Wu, 2024). Ren advocated using real-life contexts to activate students' prior knowledge and experiences, arguing that this approach helps students master mathematical concepts while systematically training their abstraction abilities through relatable situations (Ren, 2019). Jiang proposed a dual approach involving providing rich abstract conceptual backgrounds along with implementing scaffolded "step-by-step" progression combined with hands-on learning-by-doing methodologies to guide students in gradually abstracting mathematical knowledge (Jiang & Li, 2019). Li et al. and Dong further demonstrated that structured problem context analysis and mathematical modeling activities enable students to accumulate valuable abstraction-related cognitive experiences (Li & Zhang, 2022; Dong & Zhu & Jin, 2020).

In the innovation of teaching models, Chang proposed that technology integration and experimental inquiry emerged as significant directions, and he advocated guiding students to actively abstract mathematical patterns through mathematical experiments (Chang, 2017). Kang proposed deep learning approaches including flipped classrooms, project-based learning, and mathematical experiments (Kang & Liu, 2017). Cheng further clarified that mathematical experiment activities served as crucial carriers for developing abstraction competency (Cheng, 2021). Luo maintained that teachers could effectively utilize modern teaching equipment and methodologies to incorporate mathematical thinking and modeling beyond textbook content, thereby facilitating the formation of robust mathematical abstraction literacy (Luo, 2020).

In addition, several scholars emphasized that teacher professional development constituted a vital guarantee for fostering students' mathematical abstraction literacy. Li and Li identified the necessity for teachers to cultivate students' abstract thinking through targeted professional learning and instructional reflection (Li & Li, 2020). Jiang underscored the importance of teachers thoroughly comprehending the characteristics and educational values of mathematical abstraction while implementing cultivation objectives through personalized instructional design (Jiang, 2021). Kong's research revealed that teachers' linguistic guidance significantly catalyzed students' abstract thinking processes (Kong & Guan, 2021).

At the level of cognitive guidance for students, scholars focused on the construction of thinking habits and knowledge systems. Lin proposed employing "number-shape combination" and symbolic language instruction to help students concretize abstract problems (Lin, 2019). Liu emphasized the importance of allowing students to experience complete mathematical abstraction processes while strengthening practical applications

Print ISSN: 3031-9552, Online ISSN: 3031-9544

(Liu, 2019). Teng advocated emphasizing conceptual teaching, paying attention to intrinsic knowledge connections, and cultivating students' mathematical abstract generalization abilities (Teng, 2019). From a deep learning perspective, Wang designed strategies to enhance high school students' abstraction literacy by incorporating visual graphics, practical situations, daily teaching introductions, and group collaboration (Wang, 2023). Jiang suggested guiding students to summarize knowledge and methods systematically, using multiple solutions and variations of problems to help students abstract the same problem into different mathematical models or different problems into the same mathematical model, thereby continuously reinforcing the development of mathematical abstract thinking (Jiang, 2021).

At the micro level, several scholars proposed strategies for cultivating high school students' core mathematical abstraction literacy through specific teaching cases. Ma, using logarithmic function concept teaching as an example, emphasized creating problem situations that help students accumulate concrete-to-abstract experiences, designing guiding questions for difficult points and comparative questions for error-prone areas, while skillfully constructing problem contexts with focused process guidance (Ma, 2020). Li, through the case study of "Several Extremum Problems Related to Lines and Circles," discussed how to guide students in abstracting mathematical knowledge from the perspective of overall classroom teaching design (Li, 2019). Deng et al., taking "Basic Properties of Functions" as an example, specifically explained how to cultivate mathematical abstraction literacy in teaching function monotonicity, proposing to focus on the essence of mathematical content in textbooks, design mathematical exploration activities, comprehend mathematical methods and ideas, and demonstrate the beauty of mathematical abstraction in teaching materials (Deng & Wu & Shen, 2019). Zhou and Xie, using "Area of Triangles" as a case, demonstrated cultivating students' abstraction literacy through abstracting and researching real-life situational problems, noting that multiple solution approaches not only develop divergent and creative thinking but also significantly enhance core abstraction competencies including weak abstraction of forward thinking and strong abstraction of reverse thinking (Zhou & Xie, 2019). Cai, through mathematical concept lessons, deeply analyzed how the exploration process of eccentricity significantly contributes to cultivating core mathematical competencies, including abstraction, visual imagination, and logical reasoning (Xie & Lin, 2019).

Discussion

From the literature review above, it is evident that scholars have conducted diverse and multi-level research on mathematical abstraction literacy. Current studies primarily focus on five key aspects: the conceptual definition of mathematical abstraction, current competency levels, assessment methods, influencing factors, and cultivation strategies. These research dimensions are not strictly separated, as most scholars integrate multiple aspects in their investigations. Among these areas, studies on the conceptual definition of mathematical abstraction, current competency levels, and cultivation strategies have received considerable attention and represent current research hotspots. However, relatively few studies have been dedicated to examining the influencing factors and assessment methods of mathematical abstraction literacy.

In the study of the current situation of the level of mathematical abstraction literacy and influencing factors of high school students, the current scholars' research results are relatively consistent. Scholars generally agree that students demonstrate relatively low

Print ISSN: 3031-9552, Online ISSN: 3031-9544

levels of mathematical abstraction literacy overall. Regarding influencing factors, studies have primarily examined teacher-related and student-related aspects, yielding diverse but fragmented perspectives without identifying core determinants of abstraction competency. In addition, the results obtained from the level status quo study are generally the status quo of the mathematical abstraction literacy level of high school students as a whole, and no scholars have yet conducted a comprehensive analysis of the influencing factors and the results of the status quo survey of each sample, and have not found the relationship between the influencing factors and the level of mathematical abstraction literacy of each sample.

In the research of mathematical abstraction cultivation strategies, scholars mainly elaborate on the dimensions of teaching context design, teaching mode innovation, teachers' professional development, optimization of teaching materials and curricula, and students' cognitive guidance. However, the shortcomings are that most scholars put forward their views through empirical summaries or discursive studies, which are not targeted enough for the enhancement of high school students' mathematical abstraction literacy, and the implementation and effectiveness of the strategies need to be further considered.

Research on the assessment methods of high school students' mathematical abstraction literacy demonstrates relatively homogeneous approaches, with most scholars relying on questionnaires or tests. However, these methods present notable limitations. Some researchers employ self-designed questionnaires whose reliability and validity in content analysis remain unverified, while others propose various assessment frameworks without practical implementation, resulting in a disconnect between theory and practice. Regarding studies on influencing factors, the predominant reliance on literature analysis and speculative methods to directly identify factors has yielded highly subjective conclusions, with a marked scarcity of empirical research analyzing these factors.

Therefore, a single qualitative study can no longer meet the realistic demands of mathematical abstraction research, and the shortage of quantitative research needs to be filled. This is consistent with the conclusion obtained from the study of literature related to mathematical abstraction by Zhang et al. (Zhang & Wang & Song, 2017).

CONCLUSION

By organizing and analyzing the literature related to mathematical abstraction literacy in high school, it can be concluded that existing studies generally focus on five main aspects: the connotation of mathematical abstraction, the current status of its level, evaluation methods, influencing factors, and strategies for cultivation. Most research has concentrated on exploring the connotation, the current status, and cultivation strategies, while studies on influencing factors remain fragmented, with no consensus on the most significant factors. Furthermore, the research methods employed are relatively limited, dominated by literature reviews and discursive approaches. In particular, analyses of influencing factors tend to lack systematic and objective frameworks, empirical evidence through quantitative research, and the development of targeted, practical strategies for enhancing mathematical abstraction literacy.

Therefore, it is necessary to conduct further research on high school mathematical abstraction literacy, analyze the current level of high school students' mathematical

Print ISSN: 3031-9552, Online ISSN: 3031-9544

abstraction literacy, and find out the main influencing factors behind it, so as to encourage experts and scholars to put forward more targeted countermeasures and suggestions. Ultimately, this will effectively improve high school students' mathematical abstraction literacy level.

ACKNOWLEDGMENTS

The researcher would like to express sincere gratitude to the people of Kampung Ciseupan, South Cimahi, for their openness, cooperation, and willingness to share valuable cultural knowledge throughout the research process. Special appreciation is extended to Mrs. LM, who generously provided time, information, and firsthand experiences that became fundamental to this study. The researcher also extends thanks to colleagues and academic mentors who provided constructive feedback, as well as to all parties who directly or indirectly contributed to the completion of this research. May this work bring meaningful benefits to the advancement of ethnomathematics research and the development of contextual mathematics learning rooted in local wisdom.

REFERENCES

An, L. P. (2019). *Research on the influencing factors of high school students' mathematical abstraction literacy* (Master's thesis, Shandong Normal University). *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqoYmIj3O_rPyu-Du7iZFZUwgaI1OD8F2m6WMzYK3J1FRZyZV1_wtOCgBLEioDYvS60wkVkBTU1YEcsocBcplChCcL8iQV4vH4Vws0s196mJpPCq3t7_5t02LdhaRMf4-iDdSAYV-2osrLDkuX7Mui1XJtO2LCyy5M3RBKIrkekr82lUseOWqNeEo2SU1EVOtw0=&uniplatform=NZKPT&language=CHS*

Cai, H. T., & Lin, Y. L. (2019). Teaching strategies for high school mathematics concept courses under core literacy. *Bulletin of Mathematics*, 58(9), 20-25+66. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqoIYj-KmO6ka8T97KRTudsQNnRbqWG08uwsyJnMyubMCZcJjAqM1rSqXoy-1_DGOoe0RisIVHPp4mR1hVOuGDab27TxYz3omWIrn_Hmdr2mpBSuWFNzI0u8nFrkXVVHAjBch6GYF9QWc7bx1J9HY22RvSKZ9z5yUdV2-DgFo1LWog==&uniplatform=NZKPT&language=CHS*

Chang, G. L. (2017). Guiding students to understand mathematical abstraction from an experimental perspective. *Teaching and Management*, (16), 46-48. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrd7fKSC9WkCsl47fho_fYAkbzmSNT2CJKlK6Nc8vn-CPc8pSmz3p0LfwkzsYuQu3Vm6Pym4JD0D9BkEreb71-_hzXHWzAfUfhSAXRPhKPNwO-aCyVOjUIuiSXpGtz1Hgwxmt2g8Tv20r2iQJ3I0KP2hD8L4pEVs4-69wPsIdkLhQ==&uniplatform=NZKPT&language=CHS*

Chen, J. A., Yi, W. H., & Meng, S. Q. (2020). A case study of textbooks focusing on mathematical abstraction literacy: From the perspective of mathematical concept definition. *Journal of Guangdong University of Education*, 40(1), 46-52. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqovy1VhKz6GU7EfwgXcmz-B_k3wu5MxBHXy9SF9X2ZTdcWNcSgtzyfOvvXenbB5bQLpNdgpjINEZ1aqjhpv9lOKP3*

Print ISSN: 3031-9552, Online ISSN: 3031-9544

6vKJxQtWGYpvENyw_TSyMRo420OHCU7WwUbo9M5Hj4gFNhuElQgIYY9N9us7Ggger5Y4HpRdQnvBwRUoC6Eg==&uniplatform=NZKPT&language=CHS

Chen, L. (2018). Thoughts on the penetration of mathematical core literacy in high school mathematics teaching. *Popular Science (Science Education)*, (5), 27. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrKstipqAFnauRtxFK5nNAc-9SuPQM902eWfLQnzvMZEkT963GR3dinizLt_7jxixL9z4Cmrov9k_Om3jicVe_Mtf_zSYpDK8DjR5vSgXvWTkYyMEx8p4kfSdqHzQp7OHNrJauhJL79obVEXE12PfnsX-1PGecHXj7D964CJF1nDQ==&uniplatform=NZKPT&language=CHS*

Cheng, H. (2021). Cultivating students' mathematical abstraction literacy through mathematical experiments: Taking the materials from the "Mathematics Laboratory" column in the Su-Ke edition as an example. *Bulletin of Mathematics*, 60(4), 35-37+66. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqraPsbwN1vD14g9H7KmIak8IjoOib_K5u-PCXUmPaypb-Pnkc8cR969WqeIriO7U3vWkGf6NsHDchaQkxdCG84pPnxwRESiJhmqvrzCyVojpPhUWyx-fcyLPfe-0poqHY12oASnqI1XDFR97xV-G7nEErQ8XcS-0WSLHQeScWVq-A==&uniplatform=NZKPT&language=CHS*

Deng, H. X., Wu, L. B., & Shen, J. (2019). A framework for textbook analysis and case study oriented to mathematical abstraction literacy: Taking the "Monotonicity of Functions" in the People's Education Press A version as an example. *Bulletin of Mathematics*, 58(10), 33-38. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqr4EzTQeeH8y2NQKieV_Xwv2-EPZz5G2WaLvdIH1IzdnCRHdRdTsaQP7EuGt5Ru9crwQNhGa65wq86a1T78T9pXk7cegtferzZp9_9X-J1SvVa4iEOeFIySNM-jWMdOugg7gwR1xoizhBOyVK39mnuzBNfy5SdPpfPhMlBgxo0krQ==&uniplatform=NZKPT&language=CHS*

Dong, W., Zhu, L. M., & Jin, X. L. (2020). Exploration of the generation path of high school students' mathematical abstraction literacy. *Journal of Tangshan Normal University*, 42(6), 144-147. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqqRi5tbuH-IwjWHXUZ5IXP6a-PLtd9uVflax2ofr6ZfIInYlVXUzcM3nBkfPr6b9M8tuRktvL6KAa-y02gmxjzsazMmHBia0QSWwR-nC31UMucOALB91vDCekah-AXSEKWWOieGUOvAUtZiTJHCoCpCQNUFzOL9dAsNtpjoWxAZUA==&uniplatform=NZKPT&language=CHS*

Ge, W. L. (2020). *Research on the relationship between high school students' mathematical metacognition and mathematical abstraction ability* (Master's thesis, Nanjing Normal University) *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqojUFWSvGQm-gEFuTFDQg-vcQeaW2DbG_oRY0Q8F5m8_BcHA8FXIt3cg0RfpCjhslmuGLXMLup1DaTfSx-Nauogec4DsCM2smJuNrQoq7hzVJG5e3_en8JTdSRTcMCUvBBd5MprMOdi10hsabwC6JdDEHSJJkWFy11KNkpP5JM4P7xoZYwmkHYK&uniplatform=NZKPT&language=CHS*

Handayani, S. (2019). Model Pembelajaran Speaking tipe STAD yang Interaktif Fun Game Berbasis Karakter. ponorogo: Uwais inspirasi Indonesia.

Print ISSN: 3031-9552, Online ISSN: 3031-9544

Hu, D. S., & Huang, S. T. (2024). Research on the influencing factors of junior high school students' mathematical core literacy: Based on a multilevel linear model analysis. *Educational Measurement and Evaluation*, (5), 3-14. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqoJ7LDDx8eGxn4US1a4ZBfQKtApH8m7Ov1_gJHgYu_N3swHFQ0uV8Pbramo06dO-osm4hQKQX-ziNAiqeXIIGaNN5HcCFj4d8z1ebEA7Mext7RwfuxO2O0WYBDcsXUELc8a6ATBY4W10i-ExixSwCEFEonOza9VJ1iuPPefWcAdWA==&uniplatform=NZKPT&language=CHS*

Hu, F. J., Bao, J. G., Ren, Z. C., & Chen, A. (2017). Case study on the evaluation of high school mathematics core literacy. *China Examinations*, (11), 10-16. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpt1Y8enbyOM2bxYvMeA4rThh2QirmuaGLEnfHrMt3kz4w2M0TF1V4z_WxjlR0fNJRPtSFGwJx2TPNDf2AFBfnHoipdqLRrRrP21szbBpvJ_D-k3CYJ4YBqpvWrsZRl6NDgmmjuUohLbBtnSjGWFLAsjUwuPe1zg0XORSDlX2lWHg==&uniplatform=NZKPT&language=CHS*

Jiang, H. F., Chen, W. X., Xie, Y. J., & Gong, W. (2022). Analysis of factors influencing the development of students' mathematical abstraction ability. *Teaching and Management*, (27), 93-95. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqouzpo-wVKgw2J3ESoq3_qUhKhEoRjQjYhuz2bZiBknnTIazUbQy8zFYkmONZZcFsprY3RZL1a9zi66Z4PtY2ufpsA3cYuIWs2RRnV3wpiae2r4wUTRzgpa0Xy3ud2f1NGb60l2xHaHlFZAdR2_8t2TvLqAOvpHWXBTqakDWFbfqA==&uniplatform=NZKPT&language=CHS*

Jiang, S. S., & Li, L. (2019). On the cultivation and improvement of mathematical abstraction core literacy. *Economist*, (7), 183-184. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqo1NsMw_TsfAJftrgi2Eie_wqx3EEhzWbn27-akOz7E7cYBkzpR_50_Q5csfATjcaMyZJN7qwIuUN0_4SsuuWApPh3YMigULlsQd_P2sdEmMBCj8TUaLoT1_y8g-pDI7GbwxT_b5MYSXu-TJuPVrlLZJysuuqfjtjsOw-_LlRN9NQ==&uniplatform=NZKPT&language=CHS*

Jiang, Z. D. (2021). Characteristics, evaluation, and cultivation of mathematical abstraction in high school mathematics. *Teaching and Management*, (19), 62-64. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrUZHMDncFwUC8o97AUJ0fXI6F5Li1PMijs_RJ_ccltGs52A_lVReraJLU32y778GOEsZS8BWamTyGEiLLndJeAGaglAJfNqpyKeKGNOfmJ65G0YZmMnh73tbzxz1OUl2GDqBpgNNQ5DXIE79g8eMNnGRiAIYCiDr2azYfMsbDnBg==&uniplatform=NZKPT&language=CHS*

Kang, W. Y., & Liu, H. (2017). Several ways to cultivate students' mathematical abstraction core literacy. *Education Exploration*, (5), 38-41. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpGZ7KNVLFsSePmkHgrV8wXdrvsVUqn2jj5L7UYPRuXcsH7jndHpIocRnJTcElRsX8AavgIzrLoRcO6RvHaUf_JIrKnSIZQtdNey8CRacZEDOSTW2CrqhDHU3m_w0XSC2R1OGkQT1FRgPEra-tRsYAQmMPHm8nAWYa3AzuyP9lQpQ==&uniplatform=NZKPT&language=CHS*

Kong, Y. T., & Guan, C. G. (2021). Exploration of the application strategies of high school mathematics classroom teaching language: From the perspective of improving students' core literacy. *Basic Education Curriculum*, (12), 42-48. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqq4blEV3F4ete66YmirGGg7XZaHcTFIvzA99tJXV4nmharq8sYtSEIS9MkSmRBQ9Ooi0-*

Print ISSN: 3031-9552, Online ISSN: 3031-9544

vbtI9uN_iyGQKsCJ1eXCcy2i3rgpG0og6XkTb5L1Tmi2EYjEQCk3EMolTfcN4Rpt4HLrTUK9WaPXRQdtTY8CSCiQGO66qBRI-bMem5Sw==&uniplatform=NZKPT&language=CHS

Li, F. P., & Zhang, D. (2022). Ways to improve high school students' mathematical abstraction literacy. *Education Science Forum*, (10), 52-55. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrK1iM7KmV_mZLGvwo4WavIi9fUBpUGqLSPQATNiWqzxwz9J8AGOFcp-k5MGAZIRV0ik_7oS7WMV3H6N5YToFKEQ1h3el1e8Wu62N4_7ZsE2972HaFFWTkvraAgj_KoDpPGEtVMY2RkSXZ8q0mdbABtjRiSz9plFCdIxmgf93GL8A==&uniplatform=NZKPT&language=CHS*

Li, H., & Li, L. (2020). *A brief discussion on the cultivation of high school students' mathematical abstraction core literacy. Science Consult* (Technology·Management), (10),186. h*ttps://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpiXkDFndHBjW1GZQmdlewRx2lqzxX5_RmsxPz01hAo_nTKUqFDKAnVRFXjK8m3_BwvX8EWN2pCl11rIBxHNQpgX5K490dxy2sFu5O1baQauoEAs2j-wtOPvT3_7AYfDOXisIYxhfmJmZYZkyydDsN2300O7_MUwNImF6MQZo79wA==&uniplatform=NZKPT&language=CHS*

Li, W. (2019). On the cultivation of students' mathematical abstraction ability in high school mathematics classroom teaching: Taking the teaching of "Several Types of Extremum Problems Related to Straight Lines and Circles" as an example. *Journal of Yanbian Education College*, 33(5), 195-197. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrvt2bjAm92GkD54S2r_eSdQqjiLrDnw_oTdOlqRCawrkV0D_z5Morh8MP01ASadxtZ-hw7YtiSmb8Fs2K5PpQWE-MMWnTUIqUik4FfIWvpLKzJ5fxzjza6Pu11HAC6sIsP0FPn-SLfKu8z_WIrRm_QmpGVK54wbQhn5NTXVf2W3Q==&uniplatform=NZKPT&language=CHS*

Lin, X. T. (2019). Exploration of the new direction of high school mathematics teaching from the perspective of mathematical abstraction literacy. *Asia-Pacific Education*, (11), 110. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqophauQQawbv2V2ij5F3AvNiIwkFl2OH4sGzA_MISG1c_rZTIPzCoworVx3Uv015tow8y4I7Wi6RWzOMk4L4vT0HTPwSjwBNfvM9lW6o8rHs2zSsAblnQZ7ralJ0sNwPUj02M8e9xhXKG33GDOnCDR4tj5GRrY3fgMYppVkZRacUQ==&uniplatform=NZKPT&language=CHS*

Liu, H. Z. (2019). The embodiment of mathematical abstraction literacy cultivation in high school classroom teaching. *Journal of Yanbian Education College*, 33(4), 162-164. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqoyj6wqDr1-HbrXLw_CdPbPH2kcFh1lZwx2aagQY_xaWl57SMc0vh1K0USXZeiox7Cwm0AMwBJP0EcoONb1FpB08OcguJnBneHms0JyCJW3GjpAcCO7U1dQ9LOSxWXyFLgZ_C3HDLnVEi44jmGNH5M3-l5VLmQuNMCG3FrncRr3hA==&uniplatform=NZKPT&language=CHS*

Liu, X. Y. (2017). *Research on cultivating mathematical abstraction literacy in high school mathematics concept teaching* (Master's thesis, Central China Normal University). *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqofQVISDBNlsg4gHIUvYp2TiJDmVVhH0TQEMV_yed9MVXQxGyAvHHTRutxvV_QtBCTvmo3fGCjjNgjTGK9T7bwnttb3cbTh44-2pn55m_GKTdLGoY5yO4eKndBhC9PGtohy-*

Print ISSN: 3031-9552, Online ISSN: 3031-9544

7aBQVpkmgDQihtV2zzuRc9NJQ1SZvMibjthmFMruLFfh2XmmrIV&uniplatform=NZKPT&language=CHS

Liu, Y. Y., & Wu, H. (2024). Research on cultivating high school students' core literacy of mathematical abstraction based on Geogebra. *Neijiang Science and Technology*, 45(3), 75-77+81. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqr29ROkXJgWtIvsV9sif31ZYbvL_u9TiPIttkD4pN_0MSrKxDMpkDX8RzhWYeB-pwY4vJGr2YBhVBRuizwF91BQ4qOXxVImU8zltQltIC0W-5gZhEHSQwGAW0eMoMfcv5zDg1RA3o021BBYQl8LjhNrO7NytTG4x2o-i--cVrJGeQ==&uniplatform=NZKPT&language=CHS*

Luo, Y. P. (2020). Analysis of the new direction of high school mathematics teaching from the perspective of mathematical abstraction literacy. *Science & Technology Information*, 18(17), 161-162. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqqKxi-SpnlIuGP4mPodXPLNW_gGdu8YfPYv49RnsBc-Q971rY3Fi2R8SJQnBJaZ8KFX5Pi37AGSxrI1S_0mXbzU_GJHbIz2G6hclaZmM5u5opkqtKO2N2WYIOm3p2WcD_uOu2ifhhuCL9xpdq54g2ElthFWxI2Nqi8JoZGnckWqpA==&uniplatform=NZKPT&language=CHS*

Ma, B. X. (2020). Skillfully designing problem situations to improve students' mathematical abstraction ability: Taking the teaching design of logarithmic function concepts as an example. *Science Consult (Technology·Management)*, (19), 180-181. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqoERn5S8GwDgLjZdjM6DTM-GTRbv93skPaL9PyDmMYb5FWB83kjj5fuoFbyJJX-qCbL6LfYmcycqxabDdeEt-PsaPSydTaQfKIsm8MsA_5QWCHzyrI843-RwPs8vosiHPt43o_yVt9cTc_vIl_qe37bzDdEXmdQ4HAAoRXyWzsWDg==&uniplatform=NZKPT&language=CHS*

Ministry of Education of the People's Republic of China. (2020). *Mathematics curriculum standards for senior high schools (2017 edition, revised in 2020)* [S]. Beijing: People's Education Press. p. 83.

Ren, X. Y. (2019). Construction of high school mathematics classrooms based on core literacy cultivation. *Huaxia Teacher*, (27), 8-9. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrTss2IjVEG91u5Y1FvcU8YVdRvwIbDKqqbeJJ_dWzQNojjNdKJ4m8_K88sg8Wok86bRBgmFK2Al9Jl1w_dR8vpCFy70BjJFFGSylasb_QzgvkRHqwe-aDDwGR0TQ8XkhJRUJwb3OpxkcT9eFJqrtbXDICO4zNrxlZmtoxPyr0v5w==&uniplatform=NZKPT&language=CHS*

Shi, N. Z. (2017). Cultivation and teaching of subject core literacy: Taking the cultivation of mathematics core literacy as an example. *Primary and Secondary School Management*, (1), 35-37. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpoaFJrLlI_3hb1MlOvaJ8gQrmPBV6zcp6-zvcvZ1wHvXI3mCQKITDjjyitrlTW6Rkqx4x3lvdM_rIczYwZjPXuwldhEqBOgEiBRvGWYliYpNQNUrTBmNw0KqTaYhDyG7DsMqjHHEzqyWGp2CWYK-xdYAP4BiKM0meuTeAewZEOcA==&uniplatform=NZKPT&language=CHS*

Print ISSN: 3031-9552, Online ISSN: 3031-9544

Shi, N. Z. (2016). Promoting teaching reform based on subject core literacy. *Primary and Secondary School Management*, (2), 19-21. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpYAnR-_nhBH2NkCT2S0uZCe5pLN4hAbI_48zAQ6iTCKAvNcjF8CaqcOjSOIVldyFPpQgd4cPoJSVthPeNt3uCTOKVDVmdFXa-e_UxHW52ky4LSUPMTItvkmRxp5bcKGPy0wX6-dc9nsrcSlvsyRFh73Cz3J_cNMaOwp8QOt6sWnw==&uniplatform=NZKPT&language=CHS*

Sun, C. R. (2019). Mathematical experiments: An effective path for the formation of mathematical abstraction literacy. *Bulletin of Mathematics*, 58(2), 21-25. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrUVWDEWDfCLy1dmMkS1ZJCyFpHKL_LLqtIeGLk9YjqSAvOBVRzBuIGNGktmE5I7lEwa6uKXZ-4UlENGIRzasCLqWi-JgnIzI2gTKiLEetxoB95lhMZ0-CU9OcWrRVxeRv40uaend8C6kVNh21upReQmr3NMsO6bZNAv4JjyFT8QA==&uniplatform=NZKPT&language=CHS*

Qin, C., & Yan, Z. Q. (2019). Investigation and research on the current situation of high school students' mathematical abstraction literacy: A case study of high school students in Duyun City, Guizhou Province. *Journal of Qiannan Normal University for Nationalities*, 39(S1), 79-81+90. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqo4bXotPKsIRCULGik8sGa116XnHS4OMEtJz2mJ-xC59qAr9QJOOsGjXftvskNhMhKti7t-MqTNodxm7LvE0z7bbnHG1zjPVQVbouxsa5kg2IIJoQ9Loj6E4pPmheC2va_vPyM4ifxVAnM1j9-vFCv_I_i7UlARhk65gxQaqIgodQ==&uniplatform=NZKPT&language=CHS*

Tang, S. Y. (2021). On the cultivation path of mathematical abstraction literacy. *Bulletin of Mathematics*, 60(10), 33-37. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpc7XKsXecY5Lf39UUQbs378inUT2_3e8qwFRA8xOK268lDOinTE_Mzq-Abzq4NS8cg9urpA7QIudhnS0tK9cNrzaOmF1I4ooSYERWfCObSrhnmEfeb9eTrXkAJeyU5tguzDSVKISyiV4vG7VEMql6iZQUrki9cNTSRlN7-DHYcOQ==&uniplatform=NZKPT&language=CHS*

Teng, F. (2019). A brief discussion on the cultivation of students' mathematical abstraction literacy. *Journal of Yanbian Education College*, 33(2), 147-148. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqoS-SuUn-pf8A6Dp-8BxhjZB4H3JsJTsGFu3g2f-HAtZtj_blX2jBD3jO8AVqu-HO-8nf4Y97wt1eVpbxZWbXGr4nGsvKEkBUlKfItv1ksyhY6mlHcxijElkj9yLhoRYoGFIz51F_-XqWaYdUQ-jbnLGuMZyV-zXxxq7TGMHBiLlA==&uniplatform=NZKPT&language=CHS*

Wang, C. Y. (2012). *Research on the meaning of mathematical symbols and the cultivation of acquisition ability* (Doctoral dissertation, Central China Normal University). *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqqrHyCWqufyXC_kwdiASb_FlTjnEgo271N3coKYGpjdKreAMslAnxkhk0iEFvthBhbk8imnK1MFewPwM1-tMTn9bMGOaAPfM0CPeNjCOY1Y59Bwy-Ihrg2p2UhuFCgY4_oHeoBKMnA-eqM5NU2PBjhhRBUBTjnmtvuD2fIMrmdmIA==&uniplatform=NZKPT&language=CHS*

Wang, D., & Li, B. M. (2017). Comparative analysis of TIMSS and PISA mathematics assessment frameworks. *Global Education*, 46(6), 20-34. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpag7I_Fld4iU_kfTH3l6Bv*

Print ISSN: 3031-9552, Online ISSN: 3031-9544

qpSgXrCy6SyREZtHmwTK7pAu5on_wBB91tYbGCi8UnsZrShjokjpjBbwwYKUmXnbcEHhH9599GR84tuJVxRJm6P3VBDeFVCMXrUOggn_8OOWLPMqnGErQLSCLnjUg3IMz3-I9I0ojXVL-SqMRQ_3iw==&uniplatform=NZKPT&language=CHS

Wang, K. (2023). Strategies for cultivating high school students' mathematical abstraction literacy from the perspective of deep learning. *Asia-Pacific Education*, (16), 61-63. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpnrN75e1ygpcC14UhQiJIQ7qMUb01dju_t3R0wL-f61bI1LgJfhDL0hmGpkjUO-sPInca0TG3Y_GVnNiE2pChLVNzYH7UWKP2UfBpEXnhqolySU8_PlSkjl1i1nCiVUNi8mbx-w22QZz-89fuXyjEslW6PUfqUpvTxQefOhPru5w==&uniplatform=NZKPT&language=CHS*

Wang, K. M., Wang, Y. G., Liu, C. H., & Zhou, H. M. (2021). Investigation on the current situation of high school students' mathematical core literacy. *Journal of Inner Mongolia Normal University (Educational Science Edition)*, 34(2), 126-132. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqowA6IYjS0tEXUAn9yMD28Siztbf_knXJ5puaEibMKioRtecfK237XtEt6NFxpCD46rDd1TNcWrfUBGqmpO3B-Ej77mBMSk6gQP6531gyszlWOz5EqmPs4_FWQQg9yAkkOh3CKyTGJydqsE_oxw_rBLrt9Glr3igNAEUqLDuK7ieA==&uniplatform=NZKPT&language=CHS*

Wang, R. S., & Qiao, J. P. (1991). *Practical encyclopedia* [M]. Beijing: Kaiming Press. pp. 10, 12, 1040.

Xing, G. L. (2023). Influencing factors and improvement strategies of high school students' mathematical abstraction literacy. *Classroom Inside and Outside (High School Teaching and Research*), (9), 52-54. *https://d.wanfangdata.com.cn/periodical/ChtQZXJpb2RpY2FsQ0hJMjAyNTA2MTcxNjU3NTMSEWt0bnctZ3piMjAyMzM1MDE5Gghnd3dlZDRndQ%3D%3D*

Yin, R. Y., & Zhao, W. K. (2017). Investigation and research on the development of junior high school students' mathematical abstraction based on quality monitoring. *Journal of Mathematics Education*, 26(1), 14-15+63.

https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqr7hVNaMpJOP4sOTO5QLl3O-T-nt3tF9aLdOzg1BwDwmJAhdp1yv9v_muWRbC9kNqAo1klvgxwKUjNGWMZESiH4XcudzkLfl33p_WnF73wq2F_AJzAuxru8zGNyxV3vVrHQvmzp66gANcyGArrQc9sOSBtUxKBMY1aArX7tKPwZRA==&uniplatform=NZKPT&language=CHS

Yu, H. (2020). *Research on the influencing factors and cultivation strategies of mathematical abstraction literacy among second-year high school students* (Master's thesis, Shaanxi Normal University). *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpvKOfmGqaU-214eKbHCGSlXoR2JBGswvv0-N_t8eptE0-DXS2kZGtVwjfcAmtgtkM0VFIOpGmPClHDQJ7yfM8d1IoMeASIs1HT7dnLJv20MWHrRt6Z4aHImOFQqKVAFpcPq8rfwIlZEuwOZ7iUYHOVCiGRPdb2fccnCworsN14LqSoDMCsYr2g&uniplatform=NZKPT&language=CHS*

Yu, P. (2017). A framework for the evaluation of mathematical core literacy. *Journal of Mathematics Education*, 26(2), 19-23+59. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqrURlwjYLz9TJ5xubnxVGmtWtcQJvMYyx8GOcc-vR-hDozjbd7sQAD2m_PkTgJZrFwH73zWULdKphZ8ZCBBJSd-*

Print ISSN: 3031-9552, Online ISSN: 3031-9544

uQXeoEn0k_R60kUClDgdzsnnUZAb_Ff3MFVJ8_88jPrw3hlnu-a2oLNHmLPWlHwvsyP0I1IwXr0LM09UVivMmQ==&uniplatform=NZKPT&language=CHS

Zhang, H. R., Wang, X. J., & Song, M. Z. (2017). Research and reflection on mathematical abstraction in China: A bibliometric analysis based on literature from 1958 to 2016. Curriculum, *Teaching Material and Method*, 37(9), 79-84. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpZGLHqeSyeeSPWE4V0ubKWqYDBMXTDXB382jGLnjc4imTwAb9a_MlZPU1cm8bXY5IWsSGrw3T17NxuRVPB59REV9xKbYI-gfHc30hme6ybCCgBxWr2E2KdWzVusJLMlNu8SxZmSR2GqA_9UhK5Pk_hdEOC2irDl6H6eAfgbM31Xw==&uniplatform=NZKPT&language=CHS*

Zheng, X. J., Chen, Q. H., & Wang, C. P. (2017). Research on the current status of high school students' mathematical abstraction literacy level based on testing. *Journal of Mathematics Education*, 26(6), 26-32. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqojFgOFNlU9nifUwGVvBqOv27zc1x_8tED2i_NT_LwOVLL6hmRlWH8oMvQip9UZXW2mDWiwhrrc5CCEOZOrUiOyTVF1PPLjPk2GOLESLGFdM_85rsi40ASeGrnIPJ1gTAL8Azr26cq1OtDbvmzHw2QSHtduFOcQlLT2iaf5RseFDQ==&uniplatform=NZKPT&language=CHS*

Zheng, Y. F., & Huang, F. Q. (2024). The eye of mathematics: Mathematical abstraction thought oriented to the "three competencies" literacy goal. *Journal of Mathematics Education*, 33(1), 59-63. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqpYN77IMFI9hF4kKNhBfk3leOonPjYKQHU-xT5kFWpa7LpT7Wz6f5zg4Kcsv-XZGYt88eiGT4fdAQSrBsyF7LtMGa7J_o0BAdiGMvDFpQ0ASlC6Klz0DMnGjesd0NI0WIsk_jeuyPRMjYru9FeBcJ2bjtL6LD3uE3uj8Ttm-gQnbA==&uniplatform=NZKPT&language=CHS*

Zhou, X. H., & Xie, F. C. (2019). Teaching strategies for the structure and system of high school mathematics under the perspective of thematic teaching. *Education Science Forum*, (35), 76-80. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqp8KQvYV8gNJ8vYghiwAzcfmofItpVBxoUD1e5OO-vlQM4b1SMjtvkw_y_f9HjlxvAiKnwz-qyeE-5QOc_oWaCdYVFzECLgkZ79DHAoSLSPW8DDh7W8yLhfmpawtntIHtbXKdiHZA6y6XGgJFTk6b7rhUHXxMS4l8WIlC-DyJT1Lg==&uniplatform=NZKPT&language=CHS*

Zhu, M. (2021). *Research on the relationship between CPFS structure and mathematical abstraction* (Master's thesis, Nanjing Normal University). *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqoiAwTBwhz_Dft9029KOrhXQkBgzE8zeGfn5OrPZwP1clVHd19wfT8tnzNUsrQTQt3HUH2HfYE560X7mZm7yxbEQL150DzxRgBeypfiQeBtDW0ZGI4ATGVYkyNJLxEVjTmOY3fDUTYSDbpsWSIjXPONPZu8xN2UaqyxbedyCk9unpPGwuVvQkXH&uniplatform=NZKPT&language=CHS*

Zhu, X. Y., & Hu, D. S. (2020). An empirical study on the influencing factors of high school students' mathematical core literacy development level: Based on a survey analysis of 16 cities in Hubei Province. *Educational Measurement and Evaluation*, (2), 50-58. *https://kns.cnki.net/kcms2/article/abstract?v=i7m15r_oBqp_DadUbX1b_2N-_-IlY6lof9Q0eL67lTQKMIsE9k0_gHfg3kbKBrwkEqeqfpCREG4xuKf7Ozs4u6FcGaSY83iPIgCdyDUTBKW2ejvtB2FDUnfOort1kx3gFt5Izx2HaduGYHWvsYzjKNPAeJ7fpgBNdtKxDftZ6E3izEzLCMFa-Q==&uniplatform=NZKPT&language=CHS*

Print ISSN: 3031-9552, Online ISSN: 3031-9544