

Systematic Literature Review on Learning Obstacles of Junior High School Students in Understanding Algebra Concepts

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Abstract

Learning obstacles faced when solving math problems have become an exciting topic to research. This is due to the importance of developing mathematical concepts and understanding skills, especially algebraic concepts. This study aims to describe the research results related to junior high school students learning obstacles in understanding algebraic concepts. This research uses the Systematic Literature Review (SLR) method, comprising 22 studies. This study concludes that research related to junior high school students learning obstacles in understanding algebra concepts is found most in Sinta publications, then continued with Scopus, EBSCO, Proceeding, and DOAJ. These studies include a variety of methods used, with the Didactical Design Research approach dominating. Epistemological, didactical, and ontogenic barriers were the main concerns, with didactical obstacles being the most common in this study. These obstacles include the lack of direct interaction and active learning between teachers and students and the lack of optimal use of varied learning methods and teaching aids, causing students to have difficulty in planning problem-solving strategies, solving story problems, and understanding mathematical concepts thoroughly. Concrete efforts that can be made to overcome the identified obstacles include utilizing active, collaborative, and exploratory learning approaches.

Keywords: *Learning Obstacles, Algebra, Systematic Literature Review*

INTRODUCTION

Mathematics is generally known as an abstract subject, but mathematics also departs from the reality of human life. Therefore, mathematics is introduced to everyone at all levels of education (Urmi Babys et al., 2023). Mathematics is one of the fields of science that is very broad and deep, discussing basic concepts that cover a wide variety of topics, ranging from arithmetic to geometry (Neri, 2016). Among these topics, algebra plays a vital role as one of the main branches of mathematics that provides a conceptual framework for solving various problems using symbols and variables (Kerna et al., 2020). Algebraic concepts are related to almost all problems that arise in everyday life. Students need to understand and learn algebraic concepts because this is the basis for building their ability to think abstractly and master the material (Bora & Ahmed, 2019). If students do not understand algebraic concepts well, they will face difficulties or obstacles in understanding other mathematical materials at the next level (Rayhan & Juandi, 2023).

To prevent students from facing difficulties in understanding the material, teachers need to know the obstacles that students face during the learning process (Purnama et al., 2023). Learning obstacles are obstacles faced by students during the learning process, namely when they face difficulties in understanding concepts and finding solutions to the questions given, which results in unfulfilled learning objectives and decreased learning outcomes (Hermanto & Santika, 2017). According to Cornu, the types of obstacles that students often experience are cognitive obstacles, genetic and psychological obstacles, didactic obstacles, and epistemological obstacles (Wanasimaa & Utami, 2019). According to Brousseau, there are three types of obstacles in the learning process, namely ontogenic, didactical, and epistemological. Ontogenic obstacles are obstacles that arise due to individual restrictions in developing themselves or in

mental readiness to learn. Didactical obstacles are obstacles that arise from the way the teacher delivers the material or the approach used. Epistemological obstacles are obstacles that occur due to the limited knowledge of students in a particular context (Evayanti, 2017).

Some research on learning obstacles faced when solving math problems has become an exciting topic. This is due to the importance of developing students' abilities for mathematical concepts, especially algebraic concepts, to improve logical, critical, and creative thinking skills that are important for everyday life (Abdulhafiz et al., 2023). By understanding the learning obstacles faced by students, teachers can design learning designs that take this into account to improve students' algebra concept understanding skills. In addition to making appropriate learning designs, teachers also need to introduce students to learning obstacles related to understanding algebraic concepts to improve learning outcomes (Elfira Yuliani, 2016).

Although in recent years, research on learning obstacles related to algebraic concepts has been conducted in various schools, with various subject matter, various learning media, and in various locations, these studies may produce different results. To get complete information about student learning obstacles related to algebra concept problems, a literature review is needed. Therefore, this study uses the Systematic Literature Review (SLR) method to analyze the literature related to student learning obstacles related to algebraic concepts, with the most important stage being data collection in the form of research results on the ability to understand mathematical concepts on the supporting aspects (Khairunnisa et al., 2022). The purpose of this study is to describe the results of research related to junior high school students learning obstacles in understanding algebraic concepts. Through the data obtained, the researcher asked the following questions: (1) What is the distribution of journals that discuss learning obstacles of junior high school students in understanding algebra concepts? (2) What are the types of research, data collection techniques and research tools, and research subjects used to examine learning obstacles for junior high school students in understanding algebra concepts? moreover, (3) What are the results of research related to learning obstacles of junior high school students in understanding algebra concepts?

RESEARCH METHODS

This research uses the Systematic Literature Review (SLR) method. SLR is a research method for identifying, evaluating, and interpreting overall research results that are relevant to research questions, specific topics, or phenomena of concern (Verbruggen et al., 2021). The data used in this study are secondary in the form of primary data from the results of research on junior high school students learning obstacles in understanding algebraic concepts. This research was conducted on junior high school students because junior high school is the right time to build a strong foundation in mathematical algebra, develop students' skills gradually, and prepare students for higher levels in the future.

After determining the sample of this study, the next step is to describe the flow of the literature search and selection process in the form of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) is a robust framework designed to guide researchers in conducting systematic reviews (Page et al., 2021). The following is a flowchart of the literature search and selection process in this study.

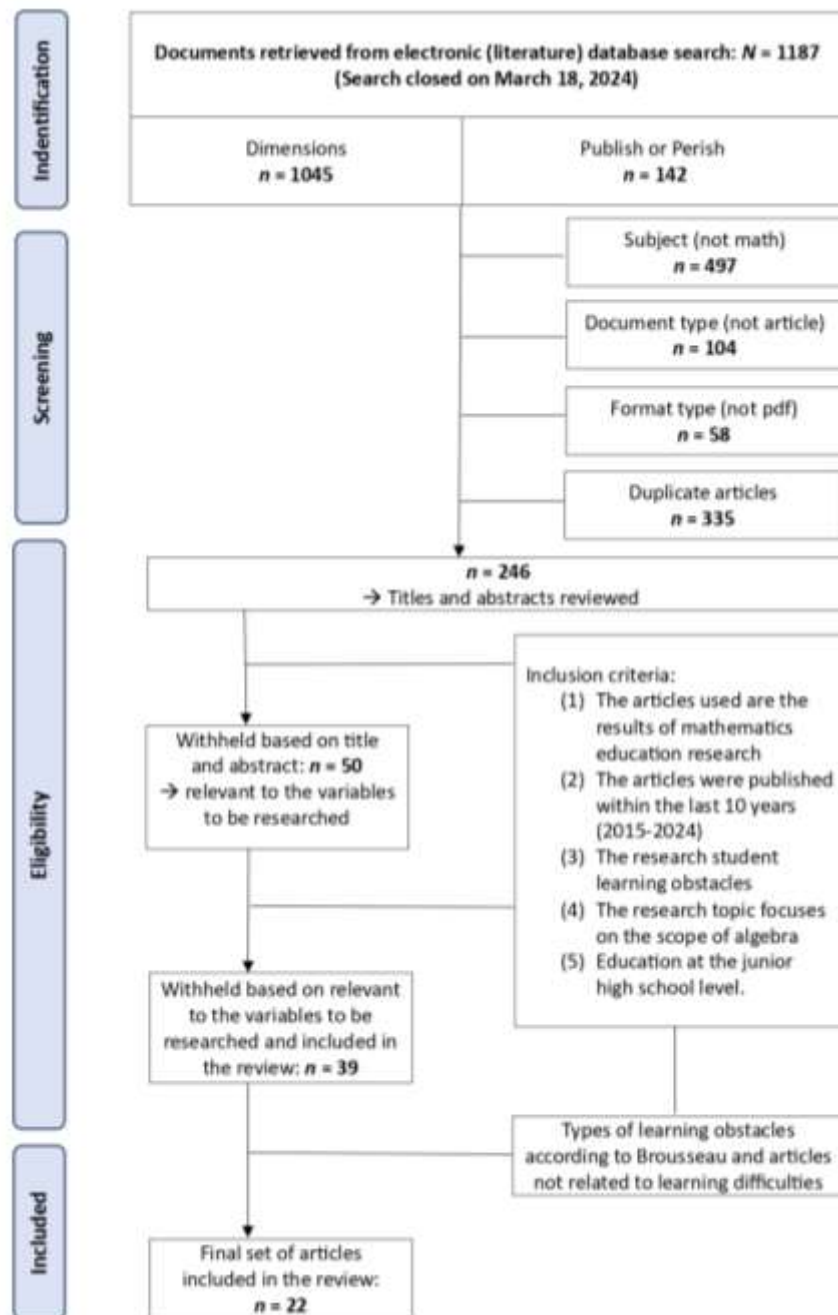


Figure 1. Flowchart of literature search and selection process

Figure 1 shows that during the literature search and selection process, two databases were searched, Dimensions and Publish or Perish, with the search keywords 'Learning Obstacles' and 'Understanding of Algebra Concept.' The search yielded a total of 1,187 hits. Next, the search was narrowed down using the filters: (1) subject: mathematics, (2) document type: journal article (published or printed) or proceedings, (3) format type: pdf, and (4) exclude duplicates, resulting in 246 articles. The data set was further reduced using five inclusion and exclusion criteria, namely: (1) the articles used were the results of mathematics education research, (2) the articles were published within the last 10 years, namely 2015-2024, (3) the research contained learning obstacles, (4) the research topic focused. On the scope of algebra, and (5) the research was conducted at the junior high school level. After applying inclusion and exclusion to 246 articles, 50 articles were retained. Next, a further screening process was carried out, which resulted in 39

articles that were relevant to the variables to be studied. Then, the search was narrowed again by using the filter of types of learning obstacles (according to Brousseau) and articles not related to learning difficulties. The final result was 22 articles.

Relevant study results will be selected at the stage of analyzing and integrating the study results. From the 22 articles obtained, we will generalize and specify the learning obstacles found. In the last stage, the researcher conducts a further analysis process of the results that have been presented, summarizes the results of the analysis, and relates them to previous research.

RESULT AND DISCUSSION

Distribution of Journals that Discuss Learning Obstacles of Junior High School Students in Understanding Algebraic Concepts

In this study, data collection was obtained from articles published in Dimensions and Publish or Perish. The number of studies that analyze junior high school students' Learning Obstacles in Understanding Algebra Concepts can be seen in **Figure 2** below:

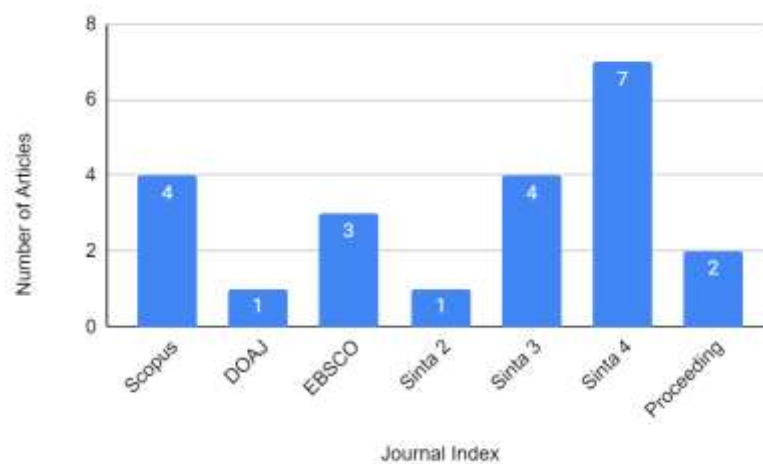


Figure 2. Review based on journal distribution

Figure 2 above shows the results of the study based on the distribution of journals that discuss learning obstacles related to junior high school students' research on understanding algebraic concepts consisting of 7 indexes, where the most published distribution is in Sinta indexed journals, with 7 studies indexed Sinta 4, 6 studies indexed Sinta 3, and 1 study Sinta 2. Then, in DOAJ (Directory of Open Access Journals) indexed journals, there were 1 study, EBSCO indexed 3 studies, Scopus indexed 4 studies, and there was also 2 study in the form of proceedings. These results show the diversity of academic efforts to overcome obstacles to learning algebraic concepts at the junior high school level. This gives a clear picture of the seriousness and relevance of this topic in the context of mathematics education.

The number of articles indexed in the journals Sinta, Scopus, Ebsco, and DOAJ is an indicator of the importance of a research issue. Research has shown that different databases, such as Scopus and Web of Science, have different coverage, thus affecting the number of quotes (Pech, et. al., 2020). Furthermore, the use of multi-word series in research articles from several indexed journals can reveal common themes and help determine the significance of a particular research problem (Heryono, et. al., 2023). By considering the number of articles indexed in different databases and analyzing quotation patterns, the relevance and impact of a research problem in the scientific community can be measured.

The Types of Research, Data Collection Techniques and Research Tools, and The Research Subjects Used to Examine Learning Obstacles for Junior High School Students in Understanding Algebra Concepts

After analyzing the distribution of journals that discuss the learning obstacles of junior high school students in understanding algebraic concepts, the researchers then analyzed the variations in the types of research, data collection techniques, research tools, and subjects used in the observed studies. By understanding the variety of research types, data collection techniques, research tools, and subjects used in the studies, the research can help identify weaknesses or gaps in the existing literature, as well as guide researchers to choose the most appropriate methodological approach in their studies. The following table shows the results of the analysis related to the variety of research types, data collection techniques, research tools, and subjects used in the observed studies.

Table 1. Analysis results related to variations in research type, data collection techniques, research tools, and subjects

| No | Author, Year | Type of Research | Data Collection Techniques and Research Tools | Research Subject |
|----|---------------------------|--|--|---|
| 1 | (Rohimah, 2017) | Qualitative research methods | Test and interview | Thirty-seven students from SMPN 1 Ciwidey Class VIII- A and 40 students from SMAN 1 Ciwidey Class X-MIA-2 |
| 2 | (Lestari et al., 2020) | Single subject design research, using the A- B-A' design. | Grids, pre-test questions, posttest questions, answer keys, scoring guidelines, interview guidelines, and observation sheets | Students of class VII A SMPN 4 Sungai Pinyuh |
| 3 | (Sumbandari et al., 2022) | Didactical Design Research (DDR) | Diagnostic test and interview with one grade 8 math teacher | 55 students of SMPN 1 Mendo, 30 of SMAN 1 West Mendo, and 1 mathematics teacher of grade 8 |
| 4 | (Nurhasanah et al., 2019) | Qualitative research with Didactical Design Research (DDR) | Triangulation techniques such as documentation, interviews, and participatory observation | 39 Bandung junior high school students |
| 5 | (Pramuditya et al., 2021) | Descriptive qualitative research with Didactical Design Research (DDR) | Data was collected through triangulation: observation tests and interviews. | 15 junior high school students in Cirebon Regency |

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| 6 | (Ardiansari et al., 2023) | Didactical Design Research (DDR) | Implementation of hypothetical didactic design, conducting posttest, observation, and interviews | 198 junior high school students in Bandung |
| 7 | (Lisaiha Rodiyya Basori, 2017) | Research and Development (R&D) research with the 3-D model (Define, Design, Development) | Analysis of validity, practicality, and effectiveness. Questionnaires from experts/validators, subject teachers, and students | X MIPA 1 class with a total of 32 students |
| 8 | (Lisa Astriani et al., 2022) | Didactical Design Research (DDR) | Observation, test, and interview | 35 class VIII students at MTsN Al Wasliyah Tanjung Morawa |
| 9 | (Ruli et al., 2019) | Didactical Design Research (DDR) | Researcher as the main instrument, tests, and non-tests | IX grade junior high school students and X grade high school students |
| 10 | (Sumarni et al., 2023) | Didactic design method (DDR) | Test of Respondent Ability (TKR), interview, and documentation | 31 seventh-grade students at a junior high school in Bengkulu City |
| 11 | (Solihah et al., 2022) | Didactical Design Research (DDR) | Questions, interviews, and documentation | 3 junior high school students and three high school students |
| 12 | (Firda & Juandi, 2023) | Systematic Literature Review (SLR) Research | Analyze each review material obtained after going through 4 stages of screening | 7,060 articles, which after screening became 13 articles |
| 13 | (Rahmi & Yulianti, 2022) | Case study | Used source books, exams, and interviews. Data analysis by reducing, displaying, and drawing conclusions | 25 grade VIII students in a junior high school in Padang |
| 14 | (Istiqomah, 2015) | Descriptive Research | Five questions covering the concept part of the function | One hundred twenty-one junior high school students from Bandung and 76 grade X and XI students from one of the high schools in Bandung |

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| 15 | (Bakar et al., 2019) | Qualitative analysis approach | Two problems and an interview | 2 grade VIII students from a junior high school in Ternate |
| 16 | (Fuadiah, 2015) | Qualitative Research | Tests and interviews with math teachers | 20 junior high school students in Indralaya District and 20 junior high school students in Palembang City, South Sumatra |
| 17 | (Putra et al., 2017) | Research and Development (R&D) | Interview and Questionnaire | Students of class VIII Semester 1 at SMPN 1 Pakuan Ratu |
| 18 | (Putra & Setiawati, 2018) | Research and Development (R&D) research with 4D stages (Define, Design, Develop, Disseminate) | Qualitative and quantitative analysis, as well as validation by material experts and media experts | Students of SMPN Mesuji class VIII |
| 19 | (Palpialy & Nurlaelah, 2015) | Didactical Design Research | Analysis of elementary and junior high school mathematics curriculum, as well as analysis of teaching materials (books and LKS) used by teachers. Another research tool is a validated test. | Sixty students in grades VII and VIII and 35 students in grade VII in the following academic year at one of the junior high schools in North Halmahera Regency. |
| 20 | (Utami, 2023) | Qualitative Research | Interviews, Document Analysis, and written tests | 39 ninth-grade students and a math teacher from a junior high school in Bandung |
| 21 | (Sugiman & Murdiyani, 2019) | An ex post facto approach | Diagnostic tests take the form of visual, narrative, and symbolic questions | 151 seventh-grade junior high school students from four schools in Yogyakarta |
| 22 | (Jannah et al., 2023) | Didactical Design Research (DDR) | Tests and interviews, with the Miles and Huberman model (data reduction, data presentation, and conclusion drawing) as the | Three 8th grade students from a junior high school in Cirebon Regency |

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| | | | data analysis technique. | |
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Table 1 above shows that out of 22 articles, there are 7 types of research using different data collection techniques, research tools, and research subjects. This SLR research covers a wide variety of research methodologies used in the related literature. Of the 7 types of research identified, Didactical Design Research (DDR) was the most common approach, with 10 articles included in the analysis. Qualitative research was also highlighted with 5 relevant articles. Three articles used the Research and Development (R&D) approach, as well as 1 other article that applied the Single Subject Design, Systematic Literature Review (SLR), Case Study, and Ex-post Facto approaches. This variation in research type indicates the existence of different approaches in investigating phenomena related to the observed topic, providing great insight into the methodologies used in this research domain.

Based on the variation seen in the types of research conducted in the context of learning algebraic concepts, it can be concluded that diverse approaches are used to understand the obstacles and find solutions in the learning process. The Didactical Design Research (DDR) method dominates in the number of articles; this method focuses on developing and evaluating learning designs to improve students' understanding of algebraic concepts (Danuri, Waluya et al., 2023). Meanwhile, qualitative research focuses on exploring students' experiences and teachers' practices in learning algebra (Simbolon et al., 2023). In addition, research and development (R&D), single-subject design, systematic literature review (SLR), case study, and ex-post facto approaches offer perspectives on strategies for overcoming learning obstacles in mathematics. By considering these diverse research approaches, we can develop a comprehensive framework to help all students learn mathematics better.

The Results of Research Related to Learning Obstacles of Junior High School Students in Understanding Algebra Concepts and Efforts that Can Help Overcome these Obstacles

After analyzing the variations in research types, data collection techniques, research tools, and subjects, the researchers then analyzed the types of learning obstacles according to Brousseau, which consist of three types of learning obstacles, namely ontogenic obstacles, didactical obstacles, and epistemological obstacles. In this study, researchers analyzed the results of 22 articles related to learning obstacles faced by junior high school students when gaining concept understanding in algebraic material. In addition to discussing student learning obstacles, the researcher will also conclude the learning obstacles that arise most from the 22 articles found; then, in the end, the researcher will list the efforts that can be made so that these learning obstacles can be reduced or even no longer occur.

Table 2: Results of Analysis of Types of Learning Obstacles

| No | Author, Year | Types of Learning Obstacles | Learning Obstacles found |
|----|------------------------|-----------------------------|---|
| 1 | (Rohimah, 2017) | Ontogenic Obstacle | There is a leap in student thinking from an arithmetic mindset to an algebraic mindset. |
| | | Didactical Obstacle | Teachers use a procedural approach when teaching. |
| | | Epistemological Obstacle | Students' limited context causes errors when working on problems. |
| 2 | (Lestari et al., 2020) | Epistemological Obstacle | Students have not understood the errors related to understanding the concept of |

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| | | | negative numbers and the misconceptions associated with it. |
| 3 | (Sumbandari et al., 2022) | Didactical Obstacle | Teachers do not emphasize essential prerequisites when teaching, making it difficult for students to understand concepts. |
| 4 | (Nurhasanah et al., 2019) | Didactical Obstacle | Some students still have difficulty in making mathematical models. |
| 5 | (Pramuditya et al., 2021) | Epistemological Obstacle | Students cannot interpret algebraic elements and cannot operate algebraic forms correctly. |
| 6 | (Ardiansari et al., 2023) | Epistemological Obstacle | Students experience limitations in understanding the symbols of algebraic forms. |
| 7 | (Lisaiha Rodiyya Basori, 2017) | Didactical Obstacle | Students have difficulty understanding the meaning of the questions given. They also do not have adequate study aids. |
| 8 | (Lisa Astriani et al., 2022) | Didactical Obstacle | Errors in working concepts make students make mistakes in the processing of problems. |
| 9 | (Ruli et al., 2019) | Didactical Obstacle | The students faced challenges in understanding and illustrating the given problem. |
| | | Epistemological Obstacle | Students have difficulty representing problems both through equations and graphs. |
| 10 | (Sumarni et al., 2023) | Epistemological Obstacle | Students have not been able to define factors, find factors, determine common factors, and determine the most significant common factor. |
| 11 | (Solihah et al., 2022) | Didactical Obstacle | Students are less able to connect the concept of whole number division operations with daily life, the concept of distance, not knowing what to do and the social context of profit/loss on exchange rates. |
| 12 | (Firda & Juandi, 2023) | Ontogenic Obstacle | Students who have found math difficult do not have the interest and desire to learn. They are also less thorough and do not understand the problems well. |
| | | Didactical Obstacle | Students only know procedures; they are not used to working on different problems, and teachers can not adapt learning to students' intellectual needs. |
| | | Epistemological Obstacle | Students' insufficient knowledge, poor mastery of concepts, and their inability to create mathematical models. |

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| 13 | (Rahmi & Yulianti, 2022) | Ontogenic Obstacle | Students still lack understanding of prerequisite materials and are interested in learning the concept of function. |
| | | Didactical Obstacle | There is a misrepresentation of non-function examples and a misrepresentation of function graphs in the textbook. |
| | | Epistemological Obstacle | Students assume that all linear functions have straight-line graphs regardless of the domain because the definition of the function they understand is not complete. As a result, students cannot identify the domain, codomain, and range only of the function in the arrow diagram. |
| 14 | (Istiqomah, 2015) | Didactical Obstacle | Learning the concept of function is still not applicable and varied, and the exercises given are still the same. |
| | | Epistemological Obstacle | Students have not been able to convert images into symbols and function notation. Students cannot also understand the meaning of a problem and convert it into a simpler notation to be communicated. Students do not understand how to select existing information and the definition of a function. |
| 15 | (Bakar et al., 2019) | Ontogenic Obstacle | The ontogenic obstacle is that students do not have basic mathematical knowledge. |
| | | Didactical Obstacle | Didactic obstacle occur when teachers are unable to create learning that accommodates students' intellectual needs. |
| | | Epistemological Obstacle | Epistemological obstacle are that students can not translate problems into mathematical models, calculate incorrectly, and also cannot provide explanations for the answers obtained. |
| 16 | (Fuadiah, 2015) | Epistemological Obstacle | Students are constrained in understanding the concept of the sum of whole numbers with different signs. Students are constrained in understanding the abstract meaning of negative numbers. Students are limited to applying the concept of whole number addition operations involving negative whole numbers. |
| 17 | (Putra et al., 2017) | Epistemological Obstacle | Not only do students have difficulty factoring algebraic forms with constant |

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| | | | values of more than ten and squared variables, but they also have |
| 18 | (Putra & Setiawati, 2018) | Ontogenic Obstacle | Students still have poor mental readiness, which can be seen when the lesson starts because they cannot receive the material appropriately presented. |
| | | Didactical Obstacle | Because the teaching materials used are only ordinary printed books distributed by the government and are general, there are many students who are passive. Based on this, teachers really need to prepare teaching material designs that show student responses. |
| | | Epistemological Obstacle | Students fail to find the equation of a line parallel to another line and through a point, the equation of a line perpendicular to another line and through a point, and the concept of straight-line equations used in everyday life. |
| 19 | (Palpialy & Nurlaelah, 2015) | Didactical Obstacles | Students experience didactic difficulties in learning fractions, which are identified through mistakes made by teachers when working on problems and the design of teaching materials used by teachers. |
| | | Epistemological Obstacles | Students face an epistemological challenge when they try to generalize the concept of counting numbers and whole numbers to the concept of fractions. The understanding they have of integers and whole numbers affects their understanding of fractions. |
| 20 | (Utami, 2023) | Ontogenic Obstacles | The tasks given are not in accordance with the development of students' thought processes (potentially, they can, but actually, they cannot). Students do not have sufficient prerequisite knowledge (notion of variables) to complete the task. |
| | | Didactical Obstacles | The teacher's teaching materials do not facilitate students' remembering of previous topics, especially about variables, and do not give assignments in the form of story problems. Function learning focuses on operational rather than structural concepts. |
| | | Epistemological Obstacle | The set of tasks given in the textbook does not consider students' thought processes and does not facilitate the transition from |

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| | | | operational to structural conceptions of a function. |
| 21 | (Sugiman & Murdiyani, 2019) | Didactical Obstacles | Students have didactic constraints in learning fractions in visual form and narrative form. |
| 22 | (Jannah et al., 2023) | Didactical Obstacles | Students could not give examples of SPLDV because of their difficulty in reformulating the Concept of system of linear equations of two variables. |

Table 2 above shows that Didactical Obstacles were found in 73% of all studies, namely 16 studies, while Epistemological Obstacles were found in 68% or 15 studies, and Ontogenic Obstacles were found in 27% or 6 studies. The average Didactical Obstacle experienced by students understanding algebraic material is the lack of direct interaction and active learning between teachers and students, as well as the lack of use of varied learning methods and optimal teaching aids, which causes students to have difficulty in planning problem-solving strategies, solving story problems, and understanding mathematical concepts thoroughly. This statement is in line with research conducted by (Dogani, 2023), who explained that the lack of active learning can hinder problem-solving and also understanding of the material. This is also in line with research conducted by (YuliaSari et al., 2019), which explains that lack of interaction and lack of diversity in teaching methods can hinder students in solving problems and difficulty in understanding material concepts.

Then, the average epistemological obstacle experienced by students when understanding algebraic hampered the linking of basic algebraic concepts with real contexts. This is due to the lack of depth of understanding of the basic concepts of algebra, which makes it difficult for students to understand more complex concepts and apply them in the context of various mathematical problems. This is in line with research conducted by (Saaroh et al., 2021), which explains that a lack of in-depth understanding of basic algebraic concepts can make it difficult for students to apply complex concepts in solving math problems. Research from (Prediger et al., 2023) is also in line with this, where a lack of in-depth understanding of basic algebraic concepts can hinder students from understanding more complex concepts and difficulty in applying them to problems.

Furthermore, the average Ontogenic Obstacle experienced by students when understanding algebra is that most students still lack an understanding of prerequisite material and lack interest in learning algebra because they think math is complicated. This is in line with research conducted by (Noto et al., 2020), who explained that a lack of understanding of prerequisite material causes difficulties in learning algebra; students also consider math difficult, thus affecting interest in learning. Research from (Azmidar et al., 2017) is also in line with this statement, where students are less interested in algebra material because it is considered too complicated and the abstract nature of algebra.

To overcome the barriers to learning effectively in understanding algebra concepts, educators can use a variety of innovative strategies. One promising approach is the use of problem-solving tasks (Sirait, et. al., 2020). Problem-solving tasks can involve students in actively working through algebraic problems, which allows them to work, represent, and solve problems in a variety of ways. This method not only helps students to represent and solve problems in various ways but also cultivates deeper algebraical thinking processes. In connection with problem-solving tasks, the use of concrete models such as algebra tile has proven useful (Rini, 2022). Algebra tile is a concrete model used to introduce algebra concepts, helping students to understand and maintain concepts better, thus overcoming learning barriers. The real

tools help students understand abstract algebra concepts, thereby enhancing retention and understanding. In addition, other efforts in overcoming epistemological, ontogenic, and didactical obstacles are through learning designs that are tailored to the needs of students (Sidik et al., 2021). By utilizing active, collaborative, and exploratory learning approaches, providing diverse learning methods, and incorporating appropriate teaching aids, educators can effectively engage students, improve their understanding of prerequisites, and enhance their problem-solving abilities in mathematics, ultimately fostering a deeper understanding of algebraic concepts.

It can be concluded that students' learning obstacles in overcoming problems in understanding algebraic concepts still require attention to be studied or researched further, in line with research conducted by (Nurlaili et al., 2023) who said that further research on learning obstacles in understanding algebraic concepts is needed to improve teaching strategies and overcome challenges effectively. The purpose of this study is to conduct research and development related to the ability to understand algebraic concepts, given the importance of this ability for students. This research is expected to provide information to education stakeholders regarding learning obstacles. To the problem of understanding algebraic concepts. Thus, in the implementation of mathematics learning in schools, more attention can be paid, and the causes of student learning obstacles can be corrected, in line with research conducted by (Marfuah et al., 2023) which says that mathematics teachers can improve student learning by using social-emotional and didactic-pedagogical strategies to diagnose and overcome learning obstacles. Then this research is also expected to provide information for further research so that students' understanding of algebraic concepts can be developed and improve student learning obstacles related to understanding algebraic concepts so that students can quickly solve math problems, especially in algebraic material.

CONCLUSION

Based on the results and discussion above, research related to junior high school students' learning obstacles in understanding algebraic concepts is found most in Sinta publications, then continued with Scopus, EBSCO, Proceeding, and DOAJ. These studies include a variety of methods used, with the Didactical Design Research approach dominating. Epistemological, didactical, and ontogenic obstacles were the main concerns, with didactical obstacles being the most prevalent in these studies. These obstacles include the lack of direct interaction and active learning between teachers and students, as well as the lack of optimal use of varied learning methods and teaching aids, causing students to have difficulty in planning problem-solving strategies, solving story problems, and understanding mathematical concepts thoroughly. Concrete efforts can be made to overcome the identified obstacles, including utilizing active, collaborative, and exploratory learning approaches. This systematic review recommends that future researchers identify and thoroughly describe learning obstacles related to problems of understanding mathematical concepts from elementary schools, high schools, universities, and regions of various islands in Indonesia and on materials other than algebra. This research can also help teachers find appropriate methods, models, or tasks for students to develop and improve their understanding of mathematical concepts.

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