Strategy for Developing Numeracy Skill of Elementary School Students Based on Constructivism Theory

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Abstract. The purpose of this study is to analyze strategies that can be used to develop numeracy skills of elementary school students based on constructivism theory. This research is included in library research. Library research is research with a qualitative approach. The data in this study are qualitative data obtained from various sources such as scientific journal articles, books, and policies related to the development of elementary school students' numeracy skills. The object of this research is the strategies that can be done by elementary school mathematics teachers related to the development of students' numeracy skills that refer to constructivism theory. The data analysis technique was carried out through four stages, namely collecting data, reducing data, displaying data, and drawing conclusions. This library research will discuss (1) constructivism theory in learning mathematics, (2) elementary school students' numeracy skills, and (3) elementary school students' numeracy skills development strategies based on constructivism theory.

Keywords: constructivism, elementary school, numeracy, strategy

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INTRODUCTION

Numeration is one of the kinds of literacy that must be mastered by students in the 21st century. Numeration has become a topic that has recently been continuously studied in mathematics learning, both in elementary school and at a higher level. Numerical ability is considered important because of its role that is not only useful in the field of study, but is more likely to be useful in everyday life.

In the international world, numeracy is an ability that is measured in solving mathematical problems. This measurement is carried out by the OECD (Organization for Economic Cooperation and Development), an organization that conducts the PISA (Program for International Student Assessment) test where this test aims to measure mathematical literacy, scientific literacy, and language literacy in participating countries. PISA is held every three years and the last year it was held was in 2018. Unfortunately, Indonesia in the field of mathematical ability only managed to rank in the bottom seven, namely in 73rd position (Dian, 2022).

To anticipate the next PISA test and improve the quality of learning in the three literacy areas tested, the government through the Ministry of Education and Culture issued a new policy and it must be implemented as soon as possible. The policy is the abolition of the UN (National Examination) and replacing it with a national assessment system called AKM (Minimum Completeness Assessment). With this AKM, it is hoped that students who are subject to this national assessment can answer contextual questions that encourage students not only to memorize concepts but use them to solve problems. Efforts to increase literacy and numeracy as one of the national priority agendas (Lie et al., 2022)

In the aspect of numeracy literacy, AKM is contextual which measures problem solving abilities and stimulates students to think critically (Patriana et al., 2021). Mathematical problem solving ability requires students to have independence. This is because in solving problems, a person needs to have confidence in his ability to deal with problems (Nahdi et al., 2021). Numeration includes the ability to think logically, critically and systematically in solving problems related to everyday life (Pardede et al., 2021).

To develop problem solving and critical thinking skills, the teacher as the spearhead of education must also have these abilities as a condition. Hartatik & Nafiah (2020) argue that teachers are required to act professionally in improving students' numeracy skills with teachers who have good numeracy skills first. If the teacher does not have numeracy literacy skills, it is very

likely that students will not be able to explore concepts more deeply and see concepts only as material that is in school without anything to do with their daily lives.

Learning that focuses on numeracy, especially in mathematics, will provide a contextual learning experience. Numerical ability is the ability to use various kinds of numbers and symbols related to basic mathematics to solve everyday life problems, the ability to analyze information displayed in various forms, either in the form of graphs, tables, charts, and other representations (Mariamah et al., 2021). In students' daily lives, there are many things that can be used as teaching materials and discussion materials for classroom learning. Examples of activities that involve numeracy skills are shopping, starting a business, building a house, and so on (Widodo et al., 2022).

For example, there is a math problem that asks students to decide on an alternative solution that is most effective and efficient. In the matter, it is known that Ali wants to buy a satay cake that is sold. There are traders who sell several satay cakes containing 3 and containing 4 with the price of satay cakes containing 3 being Rp. 2000 and satay cakes containing 4 being Rp. 2500. There are two critical questions, if Ali brings Rp. 8000, how much maximum satay cake can Ali get? Is there any chance of Ali getting change? Of course the expected answer is that Ali buys 3 skewers of satay cakes containing 4, so 3 x 4 = 12 pieces and the money spent is 3 x IDR 2500 = IDR 7500 and gets a change of IDR 500. If the student immediately answers the satay cake containing 3 as many as 4 skewers at a price of 4 x Rp. 2000, then Ali does not get change even though he gets 12 satay cakes too.

To make learning based on numeracy literacy and develop students' numeracy skills, teachers must be able to see the needs of students in the future. Teachers must have the view that learning at this time is no longer relevant if only with methods that do not encourage active students. Therefore, teachers must be guided by the student-centered learning (SCL) approach which is rooted in the constructivism approach.

According to Naufal (2021), constructivism theory is suitable for learning that aims to develop mathematical problem solving skills with real life contexts. The constructivism perspective emphasizes the role of students in learning activities that are responsible for their own learning, where students are active and have a goal to learn, not as passive recipients (Cintang & Nurkhasanah, 2017). Students themselves are actively building their knowledge to gain meaning. The more students who are able to build meaning from what is learned, it is possible that this will be a hope in improving the quality of human resources who are more capable, skilled, and adaptive. Success in the classroom will have an indirect and cumulative impact on success in fulfilling the competence of qualified and reliable human resources.

This paper will discuss (1) constructivism theory in mathematics education, (2) elementary school students' numeracy skills, and (3) elementary school students' numeracy skills development strategies referring to constructivism theory.

METHOD

This research includes qualitative research. The type of research used is literature study. Literature research is research carried out by collecting information from various reading materials such as reference books, relevant research results, articles, and other media related to the topic of discussion in this paper. The data sources for this research are books, scientific journals and internet sites. The data obtained is qualitative data in the form of a description of words. The data analysis technique used is content analysis with the steps of (1) reading content, (2) collecting data, (4) sorting and selecting, and (4) drawing conclusions based on a series of processes to find relevant meanings.

RESULTS & DISCUSSION

1. Constructivism Theory in Mathematics Learning

Constructivism is a learning theory that believes that individuals construct new knowledge based on prior knowledge and experience (Kameda, 2017). This theory shifts the orientation of learning in the classroom from teacher-centered teaching to student-centered learning (Hendrayanto, 2019). The constructivist approach is an approach that directs students to

build their own knowledge through experience so that students' reasoning abilities can develop so that students' mathematical understanding abilities can be improved (Rahmawati & Andrian, 2022).

This theory actually has two 'camps', which look at how a person constructs knowledge and meaning. The two 'camps' are radical constructivism (or psychological constructivism) and social constructivism, where the main character developments are Jean Piaget and Lev Vygotsky, respectively. Psychological constructivism is more concerned with the creation of meaning at the individual level and how meaning develops as formal knowledge within groups, whereas social constructivism focuses on the social, economic, and political environment in which knowledge has been created (Kemp, 2011). However, these two constructivism groups emphasize the importance of the environment in the process of constructing knowledge.

In the class process, the teacher acts as a moderator and facilitator. A constructivist teacher must realize that students will always be wrong and therefore the teacher must understand how student errors occur. Teachers should see errors as a source of information about students' characteristic schemas and thinking (Kusuma et al., 2021; Rangkuti, 2014). According to Bermejo et al. (2021), learning with a constructivist approach is based on the following principles: (a) students become the main agents of their learning by constructing their own knowledge; (b) the teacher must be a guide to facilitate and ensure such constructions by being outstanding experts of the basic aspects of the development of children's mathematical thinking; (c) mathematical content must be ordered in terms of complexity and significance to students and contextualized over time; and (d) classrooms should have a constructivist climate that promotes cooperative work among students.

Learning mathematics which is characterized by constructivism emphasizes the development of one's own understanding actively, creatively, and productively based on previous knowledge and from experience (Rahmawati & Andrian, 2022). In the learning process (acquired knowledge) with constructivism learning begins with cognitive conflict. The cognitive conflict occurs when the interaction between students' initial conceptions and new phenomena cannot be simply integrated, so changes in cognitive structure modifications are needed to achieve balance. Then this cognitive conflict can only be ended with self-knowledge, this knowledge will be built by himself through experience in interaction with his environment (Cahyanto & Prabawati, 2019).

Reys et al. (2014) suggest three basic principles of constructivism that need to be observed in learning mathematics as follows:

a. Knowledge is not passively received; on the contrary, knowledge is actively created or created (built) by students.
b. Students create (construct) new mathematical knowledge by reflecting on their physical and mental actions.
c. Learning reflects a social process in which children engage in dialogue and discussion with themselves as well as with others (including teachers).

Small groups in constructivism theory-based mathematics learning can encourage students to be actively involved. In these small groups students will have discussions that have an impact on their social skills as well, such as cooperation, helping each other, interacting and communicating with other group members, learning to express opinions, learning to accept other people's opinions, and being responsible. It is possible that there are students with low abilities in one group, and therefore, teamwork will help and motivate each other in the group, so that the learning process can run well (Rodiyana & Puspitasari, 2019).

2. Numerical Ability of Elementary School Students

Numerical literacy is a branch of mathematical literacy. This ability guides individuals to recognize the role of numeracy competence in everyday life. Knowledge of numeracy literacy is an urgent need for students (Rakhmawati & Mustadi, 2022). Numerical skills are related to the ability to apply basic knowledge, principles and mathematical processes to problems in everyday life, for example understanding problems presented in tables or diagrams, trading and others (Rohim et al., 2021).

Numerical literacy skills as knowledge and skills that are closely related to understanding numbers, symbols and analysis of quantitative information (graphs, tables, charts, etc.), are very

important for the current generation (Susriyanti et al., 2022). According to Gittens (2015), numeracy is critical thinking in a quantitative context, which emphasizes the use of analysis, inference, interpretation, explanation, evaluation, and reflection on the reasoning process itself (metacognition and self-regulation). Operationally, numeracy refers to the ability to solve numerical and spatial reasoning problems, draw conclusions from information that can be measured in various contexts, and reason probabilistically.

Numerical literacy consists of three aspects, namely counting, numeracy relations, and arithmetic operations (Perdana & Suswandari, 2021). Counting is the ability to verbally count an object and the ability to identify the number of objects. Numerical relations are related to the ability to distinguish the quantity of an object such as more, less, taller, or shorter. Meanwhile, arithmetic operations are the ability to perform basic mathematical operations in the form of addition and subtraction. According to (Fadiana et al., 2022), numeracy literacy indicators are; understand problems, build models, use mathematics, explain solutions. The components of numeracy literacy in the scope of mathematics according to Susriyanti et al. (2022) namely: numbers, operations and calculations, geometry and measurement, data processing, statistical interpretation, spatial reasoning, and patterns.

The numeracy ability of elementary school students is the ability of students to include understanding in the use of mathematical symbols, use various kinds of numbers and be able to operate them, and can use mathematical forms such as graphs, tables, charts in problem solving and students can recognize geometry (Suciyati et al., 2022).). Umar & Widodo (2021) argue that at least students must have basic skills, namely numeracy consisting of addition, subtraction, division, and multiplication, and be able to create and solve mathematical problems.

The importance of numeracy skills can be seen in the following example. A second grade elementary school student learns the concept of multiplying integers – three times two is six. The multiplication result is always the same even though the problem is changed to two times three. However, the meaning will be different if given the context of taking medicine. The rule of taking medicine three times two and two times three can have different meanings. Students who understand concepts and have good numeracy skills will be able to explain the causes of differences in drug absorption effects (Via et al., 2021).

Some research results show that numeracy learning for elementary school students has not run and succeeded optimally. Ashri & Pujiastuti (2021) found that early grade students (grades I, II, and III) were able to work on literacy questions well even though the accuracy in working on the questions was still lacking, while in counting questions which were numeracy literacy errors were still found so that students' numeracy literacy skills were still found. still need to be improved. Febriyanti & Mashar (2022) found that the numeracy skills of first-grade students were able to answer simple addition questions correctly. However, there are also students who work on addition problems and experience errors, especially on story questions related to everyday life.

Research in class II by Maulidina (2019) found that students still have difficulty applying the mathematical knowledge they learn to solve problems that occur, which are related to everyday life. As many as 35% of students with low abilities, 40% of students with moderate abilities, and 25% of students with high abilities. Then in grade IV, Setyawati (2022) found that literacy and numeracy-based learning had not been specifically formulated in grade IV, and was only formulated specifically at the beginning of grade V which was prepared to face AKM. In terms of learning objectives in class IV, the planning of literacy and numeracy-based learning has not been fully reflected.

While in class V, the results of research by (Apipatunnisa et al., 2022) show that the literacy and numeracy abilities of fifth grade students are still quite low. Only one student has high literacy and numeracy abilities. Fadilah et al. (2022) concluded in a different study that the low skills of high-class students in mastering mathematical concepts and the lack of teacher supervision on the application of numeracy literacy in everyday life affect the success of the implementation of the numeracy literacy program.

Learning numeracy literacy in schools can also be done through the school literacy movement (GLS), where students are given the opportunity to read various books in the library for a few minutes before class starts. It should be noted that school literacy activities consist of

three stages, namely the habituation stage, the development stage, and the learning stage (Rakhmawati & Mustadi, 2022). The habituation stage consists of reading books in the school environment. The development stage consists of integrated reading activities, shared reading, discussion, and individual development. The learning stage consists of literacy-based learning activities so that literacy activities blend with learning activities in class. However, Rakhmawati & Mustadi (2022) found that even though the GLS had been implemented, students' numeracy skills were still low and far from standard. Implementation of literacy activities has not run optimally; limited media for literacy activities is the main obstacle. Not only that, numeracy literacy has not been implemented in literacy activities. The impact is that students have not touched basic literacy in literacy activities at school at all.

According to Siregar (2022), the supporting factors for the implementation of numeracy learning are the initial ability of the teacher, the availability of facilities and infrastructure owned by the school and the use of the formal, non-formal and informal environment. Teachers must have higher numeracy skills than their students in order to accommodate all possible answers from students to a problem or question. For this reason, teachers must always improve their competence through professional self-development activities such as training, workshops and the like. Teachers also need to facilitate and familiarize the implementation of numeracy literacy in schools by utilizing various reading sources. Support in the form of providing learning media is also inseparable from the success of learning numeracy in the classroom. The more varied the learning media used, the more students will gain insight about how the material or concept relates to the media and what information can be represented on the media, so that students can find the meaning of the material or concept being studied.

In addition to supporting factors at school, elementary school students who are accustomed to practicing formal arithmetic at home are also predicted to have better numeracy skills. Research conducted by Girard et al. (2021) show that numeracy experiences at home predict arithmetic skills in elementary school children, but only when the activity is formal and challenging enough for children. Children are more likely to benefit from numeracy activities at home that are challenging enough for them (at grade level or higher) than from numeracy activities at home that they may be accustomed to.

Learning numeracy that must involve contextual elements in it can actually make elementary school children understand more about numbers and arithmetic operations. As stated by Widodo et al. (2022), that students have difficulty when asked about number operations, but when it comes to money when shopping, students tend to be able to answer and use operations. For example, Rp. 10,000 is spent Rp. 8,000, so how much change will you get. Students tend to be faster to answer Rp. 2,000.

3. Strategies for Developing Numerical Ability of Elementary School Students Referring to Constructivism Theory

Constructivism theory is suitable for learning that aims to develop mathematical problem solving skills with real life contexts (Naufal, 2021). The challenge in teaching using a constructivist approach is to create a learning environment that engages and supports students in developing their own explanation, evaluation, communication, and application of the mathematical knowledge they have built (Kameda, 2017). In general, constructivism theory becomes the foundation and philosophy of developing a model or learning strategy.

However, what must be underlined is that constructivism is a theory that explains how students learn, so that it becomes an approach in the context of learning. Therefore, the principles of constructivism theory must be held so that it can be appropriate when applied in learning. When the teacher views that learning must be driven by the students themselves, what must be considered is that the teacher does not really release student learning activities into learning without guidance and supervision. The teacher must act as a facilitator, guiding the learning process, going around and providing feedback, not just telling students to study on their own and working on math problems in student books. Moreover, the task was not given feedback by the teacher, so the students did not find the meaning of the given task and in the end also did not find the meaning of the learning process.

As in the Problem-Based Learning (PBL) learning model, being "student centered" in PBL Students explore the problem and schedule their own activities to manage the problem. Through this exploration students can explore their knowledge and skills as well as how to manage time (Ali, 2019). The steps of the PBL model, namely (1) orientation of students to problems, (2) organizing students for learning, (3) guiding individual and group investigations, (4) developing and presenting work, and (5) analyzing and evaluating problem solving process (Ramlawati et al., 2017). However, in the PBL syntax there is no process that will actually gain experience using previously constructed knowledge.

In the PBL syntax there is no opportunity for students to answer practice questions. Maybe the activity of answering practice questions is made into a homework assignment. Likewise other constructivist learning models, such as Discovery Learning. Discovery Learning steps are (1) stimulation (providing stimulation), (2) problem statement (statement / problem identification), (3) data collection (data collection), (4) data processing (data management), (5) verification (proof), and (6) generalization (draw conclusions/generalizations) (Rachmawaty, 2018). There are no stages that accommodate activities using knowledge that has been constructed in the mind.

In the author's opinion, practice questions still need to be given, so that students can develop skills using the concepts that have been learned. In learning mathematics, students need to be accustomed to practice questions to test their understanding of concepts. Through practice, students will get feedback individually which can motivate and develop students' self-efficacy. Reeves et al. (2021) also view that with some practice, learning time can be used productively because students are actively involved in learning, by doing (doing). According to him, in the application of constructivism theory, exercises must: (1) focus on conceptual understanding and how to improve it, (2) be contextually relevant for students, and (3) involve students in active learning.

For writers, math exercises must be applied but not teacher-centered. If the teacher centered uses exercises right after the explanation of the material and examples of questions from the teacher, then in the student centered students use exercises at the end of the learning stage after students carry out active learning activities so that they find the meaning of a concept. If you only give examples and continue with practice questions, then it is not student centered learning. Student centered means students who move more to get the meaning of what is learned.

The use of training methods to encourage students to use the concepts that have been obtained through the process of active learning activities in learning mathematics is in accordance with constructivism theory. Like the constructivist learning model with four steps initiated by alik et al. (2010), contains one last step, namely applying (using). The previous three steps are (1) generating students' pre-existing ideas, (2) focusing on the targeted concept, and (3) challenging students' ideas.

The author finds the similarities of this model with other constructivist models (such as PBL and Discovery Learning), which lies in the similarity of principles that emphasize the construction of students' knowledge during the learning process. However, the difference is in the use of training methods to use students' conceptual understanding. The practice method can be used when entering the applying stage, and here the teacher can provide scaffolding if there are individual students who have not been able to use the concepts that have been taught.

The implications for learning mathematics, especially in developing students' numeracy skills in elementary schools, innovative models such as PBL and Discovery Learning are still well used. However, habituation to practice questions must still be applied. The development of numeracy is also part of the school literacy movement where every day students are invited to read a book for a few minutes before going to class. This means that numeracy development can also be applied every day through numeracy practice questions. Likewise, in intra-curricular activities in the classroom, learning mathematics, especially in the development of numeracy, it is very important to pay attention to the benefits of training methods coupled with innovative learning models. Although it is difficult to apply constructive teaching methods in every classroom because it involves increasing effort, adding material, closed monitoring and accountability; but the benefits will have a positive impact on students as learning centers (Sehar et al., 2021).

For the application of each constructivism-based learning model, teachers also need to prepare learning media that are interesting and relevant to the characteristics of students. During the Covid-19 pandemic, Indonesian teachers competed to find and use interactive media to help students learn mathematics and develop numeracy from home. Such as utilizing the Quizziz application (Saefurohman et al., 2021), creating numeracy learning videos (Apriliawan & Parmiti, 2021; Patriana et al., 2021), interactive puzzles (Ramlah et al., 2022), and so on. In the constructivism approach, students will enjoy the ways or solutions they have found, so that students will experience more enjoyable learning activities (Altaftazani et al., 2020). Small group interactions, non-routine problem solving, and manipulative materials can be valuable tools in the hands of a mathematics teacher, but the simple use of these tools is not always sufficient to enable teachers to design productive learning situations that result in conceptual understanding (Simon, 1995, in Kameda, 2017).

CONCLUSION

Based on the discussion above, three things can be concluded. First, constructivism theory in mathematics education refers to the two theoretical building blocks, namely radical (psychological) constructivism and social constructivism. The two sides of constructivism theory have the same view, namely that students must actively construct their knowledge to gain meaning in learning mathematics. Students are not passive thinkers, physical and mental involvement in learning helps in the process of obtaining meaning, and learning mathematics activities cannot be separated from social relationships with other people. Second, based on research on numeracy at the elementary school level in Indonesia, the numeracy ability of students in Indonesia is still relatively low. Third, the strategy for developing numeracy skills for elementary school students refers to constructivism theory, namely by (1) applying the principles of constructivism theory, (2) implementing innovative learning models, (3) providing exercises on numeracy questions, and (4) using learning media. interactive and interesting. These four points cannot be separated from each other, so that student-centered numeracy learning activities can be carried out more optimally.

REFERENCES

Ali, S. S. (2019). Problem Based Learning: A Student-Centered Approach. *English Language Teaching*, *12*(5), 73. https://doi.org/10.5539/elt.v12n5p73

Altaftazani, D. H., Rahayu, G. D. S., Kelana, J. B., Firdaus, A. R., & Wardani, D. S. (2020). Application of the constructivism approach to improve students' understanding of multiplication material. *Journal of Physics: Conference Series*, *1657*(1). https://doi.org/10.1088/1742-6596/1657/1/012007

Apipatunnisa, I., Hamdu, G., & ... (2022). Eksplorasi Kemampuan Literasi dan Numerasi Siswa Sekolah Dasar dengan Pemodelan Rasch. *COLLASE (Creative of …*, *05*(04), 668–680. https://journal.ikipsiliwangi.ac.id/index.php/collase/article/view/11511

Apriliawan, P. A., & Parmiti, D. P. (2021). Improve Students' Numeracy Skills Using Learning Videos. *International Journal of Elementary Education*, *5*(2), 256. https://doi.org/10.23887/ijee.v5i2.34774

Ashri, D. N., & Pujiastuti, H. (2021). Literasi Numerasi pada Pembelajaran Tematik Terpadu di KelasRendah Sekolah Dasar. *Jurnal Karya Pendidikan Matematika*, *8*(2), 1–7. https://jurnal.unimus.ac.id/index.php/JPMat/article/view/7674

Bermejo, V., Ester, P., & Morales, I. (2021). A Constructivist Intervention Program for the Improvement of Mathematical Performance Based on Empiric Developmental Results (PEIM). *Frontiers in Psychology*, *11*(January), 1–12. https://doi.org/10.3389/fpsyg.2020.582805

Cahyanto, I. D., & Prabawati, M. N. (2019). Kontruktivisme dalam pembelajaran matematika. *Prosiding Seminar Nasional & Call For Papers*, 274–280.

Çalik, M., Ayas, A., & Coll, R. K. (2010). Investigating the effectiveness of teaching methods based on a four-step constructivist strategy. *Journal of Science Education and Technology*, *19*(1), 32–48. https://doi.org/10.1007/s10956-009-9176-0

Cintang, N., & Nurkhasanah, A. M. (2017). Peningkatan Pemahaman Konsep Bangun Datar Melalui Pendekatan Konstruktivisme Berbasis Teori Van Hiele. *Premiere Educandum : Jurnal Pendidikan Dasar Dan Pembelajaran*, *7*(01), 1. https://doi.org/10.25273/pe.v7i01.1144

Dian. (2022). *Kemendikbudristek Harap Skor PISA Indonesia Segera Membaik*. Diakses di https://radioedukasi.kemdikbud.go.id/read/3341/kemendikbudristek-harap-skor-pisa-indonesia-segera-membaik.html (pada tanggal 18 November 2022)

Fadiana, M., Yulaikah, & Taufikurrizal, Z. (2022). Improving Numeracy Skills of Elementary School Students Through Problem-Based Learning: An Implementation of Lesson Study. *ElementerIs: Jurnal Ilmiah Pendidikan Dasar Islam*, *4*(1), 27–36.

Fadilah, Y., Faliyandra, F., Aprilia, I., & Sofia. (2022). Literasi Numerasi dalam Pembelajaran Matematika Kelas Tinggi di Tingkat Madrasah Ibtidaiyah. *Jurnal Al-Ibtidaiyah*, *3*(1), 18–27.

Febriyanti, K., & Mashar, R. (2022). Identifikasi Kemampuan Numerasi Siswa Kelas 1 SD N Tulasan. *Prosiding Seminar Nasional Hasil Pelaksanaan Program Pengenalan Lapangan Persekolahan*, *2*(1), 754–761. http://seminar.uad.ac.id/index.php/semhasmengajar/article/view/6451

Girard, C., Bastelica, T., Léone, J., Epinat-Duclos, J., Longo, L., & Prado, J. (2021). The relation between home numeracy practices and a variety of math skills in elementary school children. *PLoS ONE*, *16*(9 September), 1–25. https://doi.org/10.1371/journal.pone.0255400

Gittens, C. A. (2015). Assessing Numeracy in the Upper Elementary and Middle School Years. *Numeracy*, *8*(1). https://doi.org/10.5038/1936-4660.8.1.3

Hartatik, S., & Nafiah. (2020). Kemampuan Numerasi Mahasiswa Pendidikan Profesi Guru Sekolah Dasar dalam Menyelesaikan Masalah Matematika. *Education and Human Development Journal*, *5*(1), 32–42. https://doi.org/10.33086/ehdj.v5i1.1456

Hendrayanto, D. N. (2019). Implications of the Constructivism Philosophy Perspective in Mathematics Learning. *Journal of Mathematics and Mathematics Education*, *9*(1), 15. https://doi.org/10.20961/jmme.v9i1.48285

Kameda, Q. (2017). a Case Study on Effective Approaches for Implementing Constructivist Teaching Strategies Into a Mathematics Classroom. *International Journal of Education Learning and Development*, *5*(11), 23–33. www.eajournals.org

Kemp, S. (2011). Constructivism and problem-based Learning. *Learning Academy*, 45–51. https://doi.org/10.1080/0309877990230306

Kusuma, J. W., Rochmad, R., Isnarto, I., & ... (2021). Constructivism From Philosophy To Mathematics Learning. *International Journal of Economy, Education and Entrepreneuship*, *1*(2), 104–111.

Lie, D., Nainggolan, L. E., & Nainggolan, N. T. (2022). Improving Literacy And Numeracy Of Students In Elementary And Junior High School Through Merdeka Belajar Kampus Merdeka (MBKM). *International Journal Of Community Service*, 325–329. http://ijcsnet.id/index.php/go/article/download/117/111

Mariamah, Suciyati, & Hendrawan. (2021). Kemampuan Numerasi Siswa Sekolah Dasar Ditinjau dari Jenis Kelamin. *Tunas: Jurnal Penelitian Pendidikan Dasar*, *1*(2), 17–19. https://doi.org/10.30651/else.v3i1.2541

Maulidina, A. P. (2019). Profil Kemampuan Numerasi Siswa Sekolah Dasar Berkemampuan Tinggi Dalam Memecahkan Masalah Matematika. *Jurnal Bidang Pendidikan Dasar*, *3*(2), 61–66. https://doi.org/10.21067/jbpd.v3i2.3408

Nahdi, D. S., Jatisunda, M. G., & Suciawati, V. (2021). Pre-service teacher's ability in solving mathematics problems viewed from Self-Resilience. *Malikussaleh Journal of Mathematics Learning (MJML)*, *4*(2), 117. https://doi.org/10.29103/mjml.v4i2.2916

Naufal, H. (2021). Model Pembelajaran Konstruktivisme pada Matematika untuk Meningkatkan Kemampuan Kognitif Siswa di Era Merdeka Belajar. *Seminar Nasional Pendidikan Matematika*, *2*(1), 143–152.

Pardede, Y. K., Yuhana, Y., & Pamungkas, A. S. (2021). Pengembangan Video Pembelajaran Berbasis Numerasi Untuk Siswa Sekolah Dasar. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, *10*(6), 1664. https://doi.org/10.33578/jpfkip.v10i6.8353

Patriana, W. D., Sutama, S., & Wulandari, M. D. (2021). Pembudayaan Literasi Numerasi untuk Asesmen Kompetensi Minimum dalam Kegiatan Kurikuler pada Sekolah Dasar

Muhammadiyah. *Jurnal Basicedu*, *5*(5), 3413–3430.
Perdana, R., & Suswandari, M. (2021). Literasi Numerasi Dalam Pembelajaran Tematik Siswa Kelas Atas Sekolah Dasar. *Absis: Mathematics Education Journal*, *3*(1), 9. https://doi.org/10.32585/absis.v3i1.1385
Rachmawaty, M. N. B. (2018). Kajian Deskriptif Model Discovery Learning Dalam Meningkatkan Motivasi Belajar , Aktivitas Belajar dan Hasil Belajar Peserta Didik. *Prosiding Seminar Nasional Biologi Dan Pembelajarannya*, 551–556. https://ojs.unm.ac.id/semnasbio/article/view/7061
Rahmawati, R., & Andrian, F. (2022). Penerapan Pendekatan Konstruktivistik untuk Meningkatkan Kemampuan Pemahaman Matematika Siswa. *BULLET : Jurnal Multidisiplin Ilmu*, *1*(03), 236–241.
Rakhmawati, Y., & Mustadi, A. (2022). The circumstances of literacy numeracy skill: Between notion and fact from elementary school students. *Jurnal Prima Edukasia*, *10*(1), 9–18. https://doi.org/10.21831/jpe.v10i1.36427
Ramlah, R., Riana, N., & Abadi, A. P. (2022). Fun Math Learning For Elementary School Students Through Interactive Puzzle Media. *SJME (Supremum Journal of Mathematics Education)*, *6*(1), 25–34. https://doi.org/10.35706/sjme.v6i1.5775
Ramlawati, Yunus, S. R., & Insani, A. (2017). Pengaruh Model PBL (Problem Based Learning) terhadap Motivasi dan Hasil Belajar IPA Peserta Didik. *Jurnal Sainsmat*, *6*(1), 1–14. http://ojs.unm.ac.id/sainsmat/article/download/6451/3684
Rangkuti, A. N. (2014). KONSTRUKTIVISME DAN PEMBELAJARAN MATEMATIKA. *Jurnal Darul Ilmi*, *02*(02), 61–76.
Reeves, K. A., Hernandez-Gantes, V., Centeno, G., & Nurnberg, C. G. (2021). Constructivist exercises to enhance teaching of probability and statistics for engineers. *INFORMS Transactions on Education*, *22*(1), 55–64. https://doi.org/10.1287/ITED.2021.0246
Reys, R., Lindquist, M. M., Lambdin, D. V., & Smith, N. L. (2014). *Helping children learn mathematics. (9 ed.)*. United States of America: John Wiley & Sons, Inc.
Rodiyana, R., & Puspitasari, W. D. (2019). Model Pembelajaran Konstruktivisme untuk Meningkatkan Kemampuan Pemahaman dan Komunikasi Matematika Siswa Sekolah Dasar. *Proceedings of The ICECRS*, *2*(1), 147–157. https://doi.org/10.21070/picecrs.v2i1.2409
Rohim, D. C., Rahmawati, S., & Ganestri, I. D. (2021). Konsep Asesmen Kompetensi Minimum Meningkatkan Kemampuan Literasi Numerasi Sekolah Dasar untuk Siswa. *Jurnal Varidika*, *33*(1), 54–62. https://doi.org/10.23917/varidika.v33i1.14993
Saefurohman, S., Maryanti, R., Azizah, N. N., Fitria, D., Husaeni, A., Wulandary, V., & Irawan, A. R. (2021). Efforts to increasing numeracy literacy of Elementary School Students through Quiziz learning media. *ASEAN Journal of Science and Engineering Education*, *1*(3), 167–174.
Sehar, S., Khan, S. K., & Zaman, Z. (2021). Constructivism in Numeracy : Impact Of Inventive Measures on Grade I Students. *International Journal of Innovation, Creativity and Change.*, *15*(5), 263–281.
Setyawati, E. (2022). *Pengembangan Bahan Ajar Modul Berbasis Literasi dan Numerasi Di Kelas IV SD*. 248–257. https://doi.org/10.47709/educendikia.v2i2.1606
Siregar, P. (2022). Pelaksanaan Pembelajaran Literasi Numerasi Pada Siswa Kelas 5b SD Negeri 101880 Aek Godang Padang Lawas Utara. *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah*, *6*(2), 366. https://doi.org/10.35931/am.v6i2.944
Suciyati, S., Rosadi, D., & Mariamah, M. (2022). Elementary School Students Numeration Ability. *AlphaMath : Journal of Mathematics Education*, *8*(1), 1. https://doi.org/10.30595/alphamath.v8i1.12218
Susriyanti, S., Yeni, F., & Yulasmi, Y. (2022). Implementasi dan Aplikasi Literasi Numerasi Di SDN 20 Labuhan Tarok, Bungus Teluk Kabung, Padang. *Jurnal Pengabdian Masyarakat …*, *1*(3), 1–7. https://journal.adpebi.com/index.php/JPMA/article/view/141
Umar, & Widodo, A. (2021). Analysis of the Numerical Ability of Elementary School Students in Terms of the Introduction to Place Values of Numbers. *Journal of Innovative Mathematics Learning*, *4*(4), 161–166.
Via, Y., Tatag, Y. E. S., & Abadi, A. (2021). The effect of mathematics self-efficacy on numeracy skills

of prospective elementary school teachers. *Cypriot Journal of Education Sciences*, *16*(6), 3394–3406.

Widodo, A., Haryati, L. feni, Syazali, M., Indraswati, D., & Anar, A. P. (2022). Analisis Proses Pembelajaran Literasi Dan Numerasi Dasar Inklusif Selama Pandemi Covid-19. *JIPD (Jurnal Inovasi Pendidikan Dasar)*, *6*(1), 53–60. https://doi.org/10.36928/jipd.v6i1.928