

Description of Mathematical Representation Ability Through HOTS-Oriented Learning Model: a Systematic Literature Review

Agna Ilma Taofik* and Dadang Juandi
Pendidikan Matematika, Universitas Pendidikan Indonesia
Jl. Setiabudi No.229, Sukasari, Bandung, Indonesia
*agnailma@upi.edu

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Abstrak

Penelitian ini bertujuan untuk mendeskripsikan hasil deskripsi kemampuan representasi matematis melalui model pembelajaran berorientasi HOTS dari tahun publikasi, level indeks jurnal, jenjang pendidikan, banyak sampel, demografi, metode dan materi yang dibahas. Melalui metode Systematic Literature Review (SLR), penelitian ini didukung oleh beberapa referensi terdahulu mengenai analisis kemampuan representasi matematis dengan berbagai macam model pembelajaran pada kurun waktu 2016-2022. Artikel yang digunakan sebagai referensi adalah artikel yang telah terpublikasi dengan subjek penelitian jenjang pendidikan SD, SMP, SMA sederajat hingga Perguruan Tinggi. Berdasarkan hasil penelitian, didapatkan artikel relevan yang terpublikasi pada Google Scholar sebanyak 44 artikel kemampuan representasi matematis melalui 3 jenis model pembelajaran berorientasi HOTS. Tercatat bahwa artikel paling banyak adalah terindeks Sinta 4 dengan demografi tertinggi di Pulau Sumatera pada tahun 2019 serta metode kuantitatif adalah metode paling sering dijumpai. Jenjang pendidikan terbanyak adalah tingkat menengah pertama dengan sampel lebih dari sama dengan 30 siswa.

Kata kunci: Kemampuan Representasi Matematika, Model Pembelajaran Berorientasi HOTS, SLR

Abstract

This study aims to describe the results of the description of mathematical representation abilities through the HOTS-oriented learning model from the year of publication, journal index level, education level, many samples, demographics, methods, and materials discussed. Through the Systematic Literature Review (SLR) method, this research is supported by several previous references regarding the analysis of mathematical representation abilities with various learning models in the 2016-2022 period. The articles used as references are articles that have been published with research subjects at elementary school, junior high school, senior high school, and university levels. Based on the results of the research, it was found that 44 relevant articles published on Google Scholar were mathematical representation abilities through 3 types of HOTS-oriented learning models. It was noted that most articles were indexed by Sinta 4 with the highest demographics on Sumatra Island in 2019 and the quantitative method was the most frequently encountered method. The highest education level is junior secondary level with a sample of more than 30 students.

Keywords: Mathematical Representation Abilities, HOTS-oriented Learning Model, SLR

1. INTRODUCTION

Mathematics plays an important role in the world of education so it is hoped that it can be a provision to face the challenges of the current global era (Setyawan & Putra, 2020). Mathematics learning is a compulsory subject taught at every school level in Indonesia (Hapsari & Munandar, 2019). his expected phenomenon is often expressed that is contrary to the situation of students who often find it difficult to capture and express mathematical ideas (Nopiyani, Turmudi, & Prabawanto, 2016). Usually, the subject considers mathematics a subject that is considered difficult, but important to learn (Siregar, 2017). So that efforts are needed to minimize the difficulty of learning mathematics, including improving teacher performance even starting from the university education level, prospective teachers need to know their most dominant intelligence so that they can create better learning. (Ariany, Widiastuti A., Syaf, Sobarningsih, & Kariadinata, 2017)

In addition to teacher performance, students must also have the ability to support a better learning process. According to NCTM (in Teacher Professional Development and Classroom Research Across the Curriculum) five mathematical abilities must be mastered by students in learning mathematics, namely: 1) The ability to solve problem-solving); 2) The ability of reasoning and proof (reasoning and proof); 3) Mathematical communication skills (communication); 4) The ability of mathematical connections (connections); and 5) The ability of mathematical representation (representation). Among these five abilities, NCTM said that mathematical representation ability is a special ability to be developed because it is the basis for learning mathematics (Mulyati, 2016; Wijaya, 2018). This is supported by the statement that the ability of representation can help understand mathematical concepts and to communicate mathematical ideas. Kartini stated that representation plays an important role in increasing the understanding of mathematical concepts. There are various forms of mathematical representation including verbal skills, pictures, numeric, algebraic symbols, tables, diagrams, and graphs. Everything is an inseparable part of learning mathematics (Surel, 2019).

Representation is a form of interpretation of students' thoughts on the problem, which is used as an instrument to find a solution (Sabirin, 2014). More specifically, Pape and Tchoshanov (in Komala, 2017) say that there are four ideas for understanding representation, namely: 1) Representation can be viewed as an internal abstraction of mathematical ideas that students build through experience; 2) As a mental reproduction of a previous mental state; 3) As a structured presentation through symbols, images or symbols; and 4) As knowledge of things that represent something else. The indicators of mathematical representation ability according to Mudzakir are as follows.

Table 1. Indicators of Mathematical Representation Ability

No	Representation	Operational Forms
1	Visual Representation	1. Able to present data or information from a representation to a diagram, graph, or table
	a. Table diagrams or graphs	2. Using visual representations to solve problems
	b. Figure	1. Drawing geometric patterns
		2. Drawing pictures to clarify problems and facilitating their solution
2	Mathematical equations or expressions	1. Making mathematical equations or models from other representations given
		2. Being able to make conjectures from a number pattern and solving problems by involving mathematical expression

3	Words or written text	<ol style="list-style-type: none">1. Create a problem situation based on the data or representation given2. Write an interpretation of a representation3. Write down the steps for solving a mathematical problem with words4. Compose a story that fits a representation that presented and answered questions using words or written text
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(Mudzakir, 2006)

In addition to looking at cognitive abilities, learning mathematics is very important so that it becomes the right collaboration in learning. By the current support, namely the scientific approach, learning can be directed by the student center method. This can be interpreted that in communicating the subject matter it is necessary to practice High Order Thinking Skills (HOTS). In general, the implementation of High Order Thinking Skills (HOTS) measures abilities in the realm of analyzing (C4), evaluating (C5), and creating (C6) (Siregar & Nasution, 2019). Based on this, a learning model that is oriented to the application of HOTS is needed. Implementation of the 2013 Curriculum according to Permendikbud No. 22 of 2016 concerning Process Standards using 3 (three) learning models including:

1. Discovery / Inquiry Learning (DL/ IL)
2. Problem-based Learning (PBL)
3. Project-based Learning (PJBL)

Several statements support that the PBL learning model includes learning that implements HOTS including the PBL model is a presentation of learning that starts with problems for students to solve so that it is not the teacher who is the center of attention, but the students (Fauziah dkk., 2018) that the Inquiry-Based Learning or Inquiry Learning is problem-based learning so that they both deliver students to real problem situations. (Farhan & Retnawati, 2014) and as a complement, Kokotsaki also said that Project Based Learning also includes project-based learning that is centered on student activity which is characterized by student autonomy, constructive inquiry, goal setting, collaboration, communication, and reflection in world practice. real (Kokotsaki dkk., 2016)

This study aims to describe the results of research related to the analysis of mathematical representation abilities of learning models in terms of various aspects, namely: 1) Year of publication; 2) Journal index level; 3) Category of research subject education level; 4) Number of samples; 5) The location of the research; 6) The research method used; and 7) The materials used in the research. Through several research results that have been extracted, some formulations of the problems that arise in this study include the following.

1. How is the description of students' mathematical representation abilities through the application of the HOTS-oriented learning model in terms of the year of publication?
2. How is the description of students' mathematical representation abilities through the application of the HOTS-oriented learning model in terms of the journal index level?
3. How is the description of students' mathematical representation abilities through the application of the HOTS-oriented learning model in terms of the education level category?
4. How is the description of students' mathematical representation abilities through the application of the HOTS-oriented learning model in terms of the number of samples?
5. How is the description of students' mathematical representation abilities through the application of the HOTS-oriented learning model in terms of demographics?
6. How is the description of students' mathematical representation abilities through the application of the HOTS-oriented learning model in terms of the research method used?

There have been many articles published in national journals as well as international proceedings regarding the ability of mathematical representation. However, it is still rare to find research in the form of a *System Literature Review* on the topic of using the HOTS learning model on mathematical representation abilities. Based on this, it can be shown that this research is needed to obtain information about the description of various previous research results that meet the inclusion criteria, by looking at the year of publication, journal index level, education level, size or number of samples, demographics and research methods used.

2. METHODS

This study aims to determine the diversity of students' mathematical representation abilities in Indonesia. This research was conducted by identifying, reviewing, evaluating, and interpreting published articles. The research instrument used was an observation sheet related to the inclusion criteria based on the year of research, level of research, and sample size using the Systematic Literature Review (SLR) method.

The Systematic Literature Review (SLR) method is a research method that synthesizes various research results to be presented into more comprehensive and balanced facts (Rahmawati & Juandi, t.t.). Systematically, this method is carried out by identifying through a predetermined (Thovawira dkk., 2021). The purpose of using the SLR method is to find and synthesize research comprehensively by referring to specific questions, and procedures that are well managed, transparent, and can be replicated at every step in the process (Juandi, 2021).

This research begins with collecting all articles on learning models for mathematical representation skills provided that they have been published and indexed by Garuda, Sinta, or published in the proceedings. After that, some of these articles were re-synthesized according to the specified and required inclusion criteria. The following are some of the inclusion criteria set to suit the research objectives, namely:

1. Articles of research results in mathematics education
2. Articles published in 2016-2022
3. Research that includes cognitive abilities of mathematical representation through HOTS-oriented learning models

Some of the provisions of the articles contained in this study are articles on mathematics education research results, articles with the year 2016-2022 published, detected in the Google Scholar database, with the quantitative, qualitative, mixed-method, research and development, Classroom Action Research (CAR) and Systematic Literature Review (SLR). Articles with the object of research are elementary school, junior high school, senior high school, and university level students with a sample size of fewer than 30 subjects or more than equal to 30 subjects. These articles were obtained with the keyword mathematical representation ability available in the Google Scholar database for the last five years or from 2016 to March 2022, so a total of 144 articles were collected.

3. RESULTS AND DISCUSSION

Based on the inclusion criteria that have been set, the results are categorized then based on four moderating variables, namely the year of study, the level of study, the number of samples, and the research method used. This is described in the following table presentation.

Table 2. Categories Based on Inclusion Criteria

Classification	Category	DL/IL	PBL	PJBL
Years	2016	1	4	0
	2017	5	4	1

Classification	Category	DL/IL	PBL	PJBL
	2018	1	3	1
	2019	0	11	0
	2020	0	4	1
	2021	1	5	1
	2022	1	0	0
Journal Index	Sinta 1	0	0	0
	Sinta 2	2	5	1
	Sinta 3	1	1	0
	Sinta 4	2	8	0
	Sinta 5	0	1	2
	Sinta 6	0	1	0
	Garuda	0	4	1
	Conference	0	4	0
	Not Listed	4	7	0
Educational Level	SD	0	1	1
	SMP	9	21	1
	SMA	0	8	2
	PT	0	1	0
Total Sample	<30	2	10	0
	>=30	7	21	4
Demographics	Jawa	4	13	1
	Sumatera	5	12	2
	Kalimantan	0	1	0
	Nusa Tenggara	0	0	0
	Sulawesi	0	1	0
	Maluku	0	1	0
	Papua	0	0	0
	Kepulauan Timur	0	0	0
Not listed	0	3	1	
Methods	Quantitative	6	18	4
	Qualitative	0	5	0
	Mix Method	2	3	0
	RnD	1	1	0
	CAR	0	4	0
	SLR	0	0	0

Based on Table 1., information is obtained that published research on mathematical representation skills through the HOTS-oriented learning model over seven years is dominated by the PBL (Problem Based Learning) learning model. This shows that the statement put forward by NCTM for the 2013 curriculum with a scientific approach has been given better attention. Because the implementation of HOTS in PBL can already include analyzing, evaluating, and creating (Anggraeni & Erviana, t.t.), this learning model provides changes or influences on students' mathematical cognitive abilities, one of which is the ability of mathematical representation. (Bani, 2021)

Apart from the number of studies according to inclusion provisions. In detail, the following are the results and discussion of the seven problems that have been formulated.

A. Description of mathematical representation abilities with learning models based on the year of publication

Research on mathematical representation abilities through HOTS-oriented models was obtained over 7 years, from 2016 to 2022. The visualization according to the line diagram is as follows.

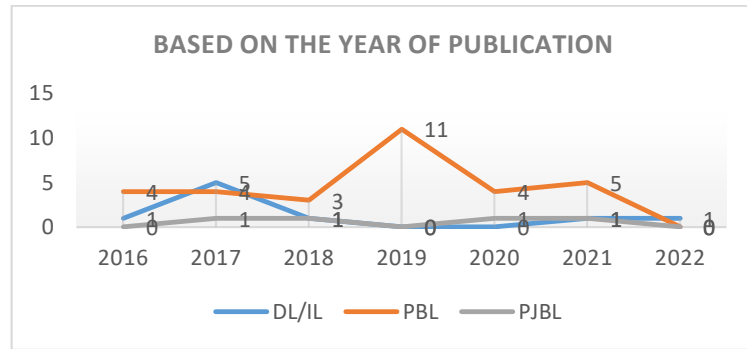


Figure 1. RMA HOTS Model Article by Year of Publication

In Figure 1. it can be seen that published articles that can be accessed through Google Scholar regarding mathematical representation skills through HOTS-oriented learning models (namely PBL, PjBL, and DL/IL models) are dominated by research using the Problem model Based Learning (PBL) and the most in 2019 with 11 articles from the number of articles using the PBL model, namely 31 articles. In contrast to other HOTS articles, namely articles on mathematical representation skills through PjBL and DL/IL models, the total is 4 and 9 articles, respectively, out of a total of 44 articles. This can happen with the possibility of a lot of research on the ability of mathematical representation that is applied other than through the HOTS learning model. Most of the research results through all models state that this HOTS-oriented model provides significance to students' mathematical representation abilities. (Muhamad, t.t.; Susanti dkk., 2019; Turmudi & Zakiya Aulia Ilma, 2021)

B. Description of mathematical representation abilities with learning models based on journal index levels

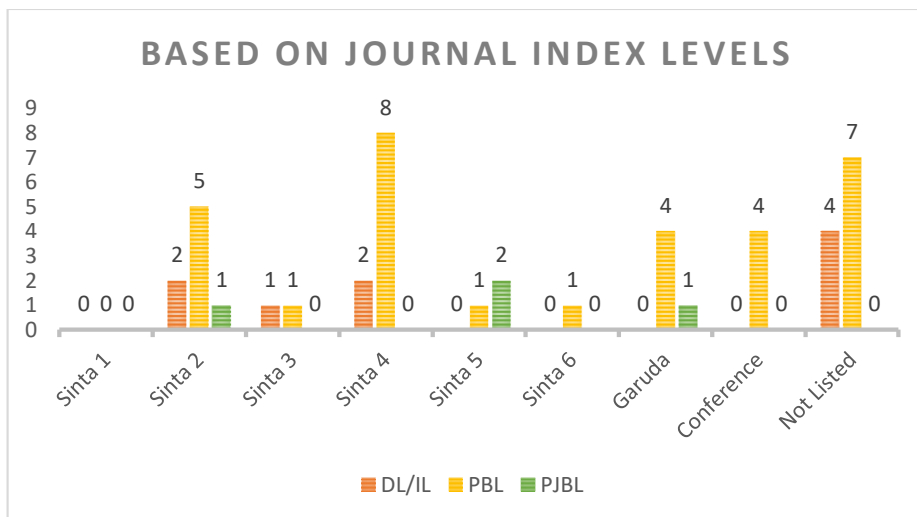


Figure 2. RM HOTS Model Articles Based on Journal Index

One of the functions of the Science and Technology Index (SINTA) is to assess the performance of journals based on accreditation and citation standards, by indexing all national-level journals that have been accredited by the National Journal Accreditation (ARJUNA) (Saputra, 2020). So, if this research is reviewed based on the index of journals, the most total of all types of HOTS-oriented learning models are journals with an index that is not clear (it is not clear that the index of the journal is) so that a detailed retrieval is needed. This case is often found if when the name of the relevant

journal is searched on the SINTA website, there are no results, and it does not include the index logo on the journal's website.

Other information in Figure 2. is obtained from most articles, namely the Sinta 4 indexed journal with the PBL model. Furthermore, as shown in Figure 2, there are still articles regarding the DL/IL model and/or PjBL model that has not been published on the Sinta 3 index, up to Sinta 6, Garuda, and conferences. The three learning models have not been published in the Sinta 1 indexed journal. According to the search, this may be because the learning model used in the mathematical representation article is still limited or uses learning models other than HOTS. This is a hope that research on mathematical representation abilities through the HOTS-oriented learning model can be further improved so that it is published in Sinta 1 or internationally.

C. Description of mathematical representation abilities with learning models based on education level categories

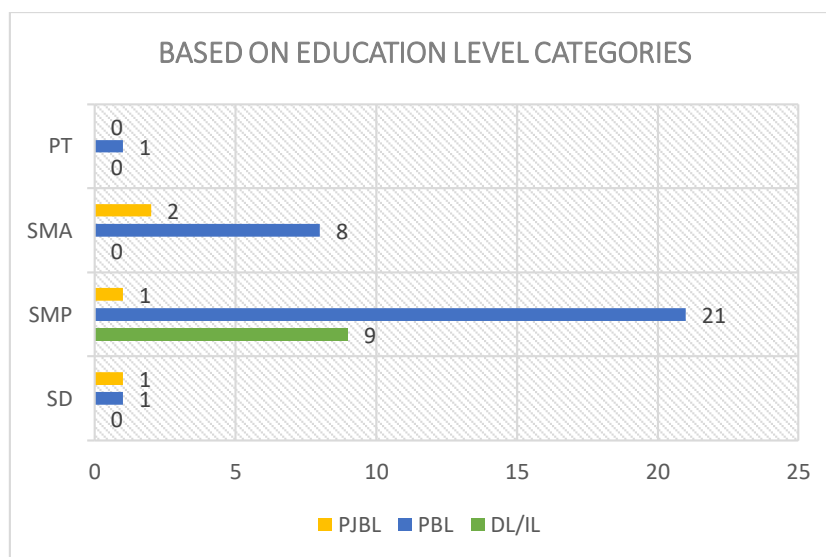


Figure 3. HOTS Model RMA Articles Based on the Educational Level of the Sample

It is clear in Figure 3. that the ability of mathematical representation through the HOTS-oriented learning model is dominated by research at the junior high school education level with a total of 31 of 44 articles or 70%. This is because psychology and character education for junior high school students enter the phase of experimentation, optimism, and the phase of finding problem-solving (K.Y & S.Th., 2020). In line with many research results which show that junior high school students need to improve their mathematical representation skills through the HOTS-oriented learning model, namely PBL, PjBL, and DL or IL, it has a significant influence on problem-solving for junior high school students (Jana & Fahmawati, 2020; Nurfitriyanti, 2016; Putri dkk., 2019). The minimum number of published articles is one article at the Higher Education level. The differences in the character needs of students' education may be more complex than other level students who still need explanations through verbal, written, pictures, tables, graphs, mathematical symbols, and other concrete objects. (Sabirin, 2014).

D. Description of the ability of mathematical representation with learning models based on the number of samples

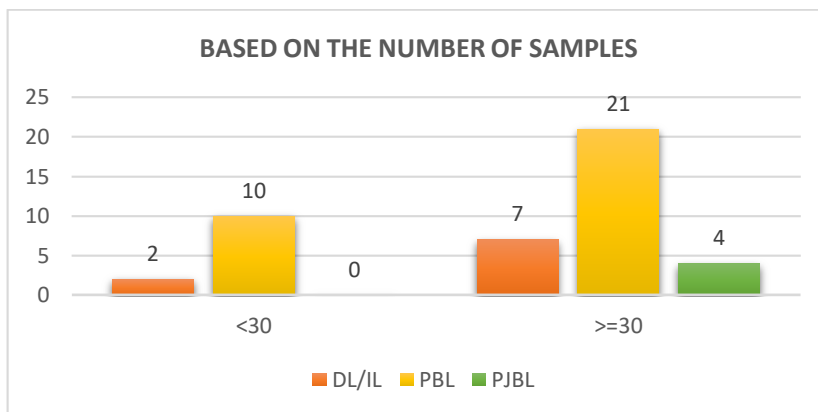


Figure 4. RMA with Learning Model Based on Number of Samples

Research conducted by Naiman, Rosenfeld, and Zirkel states that a large sample with a sample size of more than 30 will statistically produce an average distribution that is quite close to the normal distribution, so calculations based on the normal curve make sense. (in Rijanto, 2013). Furthermore, in Figure 4. it is shown that the most research was conducted on research samples conducted on more than or equal to 30 people with the highest PBL model, then DL/IL, and the last one was PjBL. This is possible because it is clear that the quantity of research on the PBL model is the model that has the highest number of articles on representational abilities through the HOTS-oriented learning model. The conclusion that can be drawn from this phenomenon is that more studies with sample sizes larger than 30 indicate that the closer the population is to the several studies that have been carried out is increasingly supporting the use of this HOTS learning model can improve students' mathematical representation abilities.

E. Description of mathematical representation abilities with learning models based on demographics

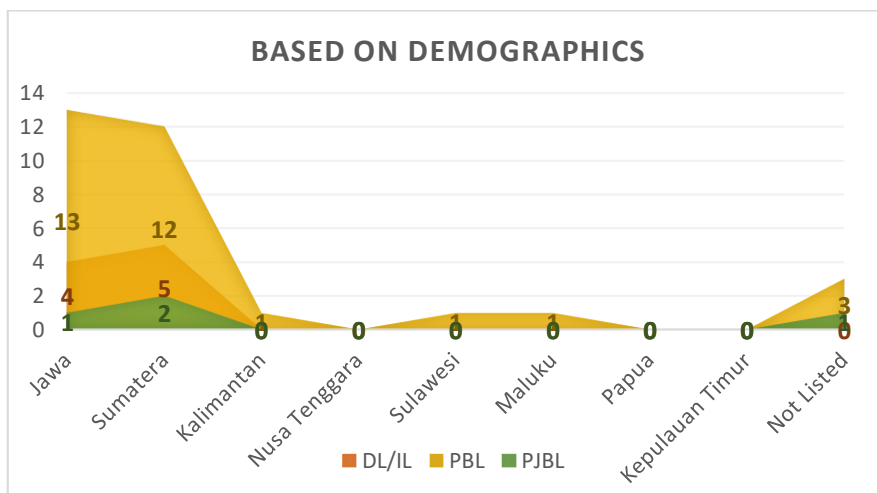


Figure 5 RMA with Learning Models Based on Demographics

Based on the demographics of the Indonesian region, there are 3 out of 9 islands, namely the islands of Nusa Tenggara, Papua, and the East Islands for which there is no research result on the topic of representational abilities through the HOTS-oriented learning model. Figure 5. also provides information that based on demographics, the highest publication occurred in Java with the highest number of 13 articles from 2016 to 2022 using the PBL learning model. This is likely to happen

because the island of Java is the most densely populated in Indonesia (Widiastuti & Silfiana, 2021). This is a hope that other demographics who are still doing little research on the topic of using the HOTS learning model on mathematical representation abilities will be further improved and can be published in indexed journals.

F. Description of mathematical representation abilities with learning models based on the research methods used

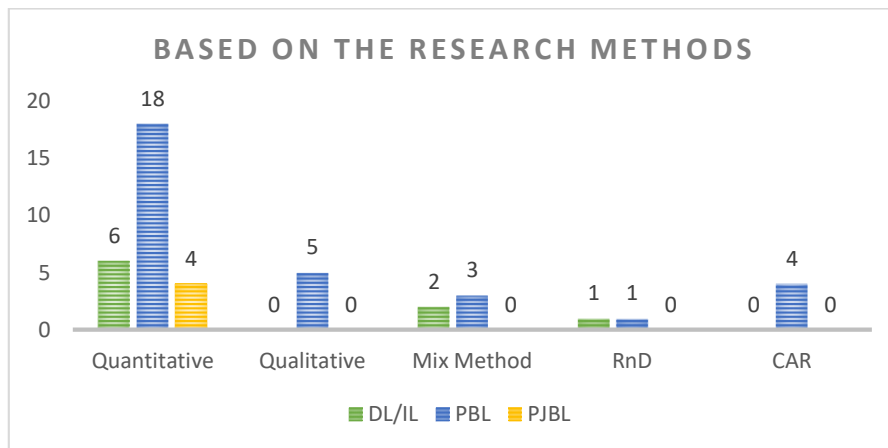


Figure 6. RMA Articles with Learning Models Based on Research Methods

The method in each research used will be different according to the needs of the research (Arifin, t.t.). Figure 6. provides information that the research method that is often used in articles on the topic of representational abilities with the HOTS-oriented learning model is a quantitative research type, which is a total of 28 articles from all HOTS-oriented learning models. This quantitative research is dominated by research conducted on classroom learning by looking at the difference between the improvement in the control class and the experimental class. Meanwhile, judging from one of the learning models, there is the highest PBL model with 18 articles, while PjBL articles only have one type of research, namely quantitative with a total of 4 articles. Other types of research, including qualitative research, are dominated by descriptive methods. This is expected to be the attention of academics or researchers, especially in the field of applying the HOTS-oriented learning model so that the writing of articles with other types of research other than quantitative dominates at this time.

4. CONCLUSION

Research on the description of mathematical representational abilities through the HOTS-oriented learning model has received good attention from what has been described in the literature of several previous relevant articles. It is known that the *Problem Based Learning* (PBL) model is the most dominant HOTS-oriented model used in published articles on mathematical representation abilities. In contrast to the PjBL and/or DL/IL models, their use still needs to be improved for their use of mathematical representation abilities. Given the many types of learning models, it is hoped that there will be many more articles that need to be analyzed to collaborate on mathematical representation abilities, especially in demography or areas that do not yet have published articles. The results of this study are recommended to be reviewed in more detail by processing in the form of a meta-analysis by taking into account several other moderating variables.

References

- Anggraeni, D., & Erviana, V. Y. (n.d.). Implementasi Hots Dalam Model Pembelajaran Problem Based Learning (PBL) Tema 2 Subtema 2 Kelas V SD Muhammadiyah Bantul Kota Yogyakarta. 1(1), 7.
- Arifin, Z. (n.d.). Metodologi Penelitian Pendidikan. 5.
- Bani, A. (2021). Peningkatan Kemampuan Representasi Matematis Siswa SMP 7 Kota Ternate Melalui Model Pembelajaran Problem Based Learning Pada Materi Teorema Pythagoras. 19, 10.
- Farhan, M., & Retnawati, H. (2014). Keefektifan PBL Dan IBL Ditinjau dari Prestasi Belajar, Kemampuan Representasi Matematis, dan Motivasi Belajar. *Jurnal Riset Pendidikan Matematika*, 1(2), 227. <https://doi.org/10.21831/jrpm.v1i2.2678>
- Fauziah, I., Maarif, S., & Pradipta, T. R. (2018). Peningkatan Kemampuan Komunikasi Matematis dan Self Regulated Learning Siswa Melalui Model Problem Based Learning (PBL). *Jurnal Analisa*, 4(2), 90–98. <https://doi.org/10.15575/ja.v4i2.3916>
- Hapsari, B. P., & Munandar, D. R. (2019). Pengaruh Model Pembelajaran Discovery Learning Terhadap Kemampuan Representasi Matematis Peserta Didik. 11.
- Jana, P., & Fahmawati, A. A. N. (2020). Model discovery learning untuk meningkatkan kemampuan pemecahan masalah. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 9(1), 213–220.
- Juandi, D. (2021). Heterogeneity of problem-based learning outcomes for improving mathematical competence: A systematic literature review. *Journal of Physics: Conference Series*, 1722(1), 012108. <https://doi.org/10.1088/1742-6596/1722/1/012108>
- Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, 19(3), 267–277.
- Komala, E. (2017). Pembelajaran dengan Pendekatan Explicit Intruction dengan Teknik Scaffolding untuk Meningkatkan Kemampuan Representasi Matematis dan Self-Concept Siswa. *Jurnal Analisa*, 3(1), 85. <https://doi.org/10.15575/ja.v3i1.1500>
- K.Y, K. B. & S.Th. (2020, July 11). Ini Perbedaan SD, SMP & SMA dari Karakter & Cara Mendidik. *Perencana Keuangan Pertama Yang Tercatat OJK*. <https://www.finansialku.com/perbedaan-sd-smp-sma/>
- Mudzakir, H. S. (2006). Strategi pembelajaran Think-Talk-Write untuk meningkatkan kemampuan representasi Matematik Beragam siswa SMP. Disertasi UPI [Online].
- Muhamad, N. (n.d.). Pengaruh Metode Discovery Learning untuk Meningkatkan Representasi Matematis dan Percaya Diri Siswa. 09(01), 14.
- Mulyati, M. (2016). Peningkatan Kemampuan Pemahaman dan Representasi Matematis Siswa SMA Melalui Strategi Preview-Question-Read-Reflect-Recite-Review. *Jurnal Analisa*, 2(3), 36. <https://doi.org/10.15575/ja.v2i3.1223>

- Nurfitriyanti, M. (2016). Model Pembelajaran Project Based Learning Terhadap Kemampuan Pemecahan Masalah Matematika. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 6(2). <https://doi.org/10.30998/formatif.v6i2.950>
- Putri, R. S., Suryani, M., & Jufri, L. H. (2019). Pengaruh Penerapan Model Problem Based Learning terhadap Kemampuan Pemecahan Masalah Matematika Siswa. *Mosharafa: Jurnal Pendidikan Matematika*, 8(2), 331–340. <https://doi.org/10.31980/mosharafa.v8i2.471>
- Rahmawati, L., & Juandi, D. (n.d.). Pembelajaran Matematika dengan Pendekatan Stem: Systematic Literature Review. 12.
- Rijanto, T. (2013). Pengaruh Metode dan Ukuran Sampel Terhadap Variansi Skor Hasil Penyetaraan. *Jurnal Penelitian dan Evaluasi Pendidikan*, 16(1), 365–383. <https://doi.org/10.21831/pep.v16i1.1122>
- Sabirin, M. (2014). Representasi dalam pembelajaran matematika. *Jurnal Pendidikan Matematika*, 1(2), 33–44.
- Saputra, A. (2020). Pemanfaatan Science and Technology Index (SINTA) untuk Publikasi Karya Ilmiah dan Pencarian Jurnal Nasional Terakreditasi. *Media Pustakawan*, 27(1), 56–68.
- Setyawan, D., & Putra, C. A. (2020). Pengaruh Logic-Mathematic Intelligence dan Cognitive Load Theory Terhadap Hasil Belajar Matematika. *Jurnal Holistika*, 4(2), 96–100.
- Siregar, N. F., & Nasution, E. Y. P. (2019). Pembelajaran matematika berbasis higher order thinking skills. *Curup Annual Conference on Math (CACM)*, 1(1), 21–26.
- Surel, A. (2019). Novira Rahmadian Ma*, Mulyonob, Isnartoc. 2, 6.
- Susanti, S., Duskri, M., & Rahmi, M. (2019). Peningkatan Kemampuan Representasi Matematis melalui Model Problem-Based Learning pada Siswa SMP/MTs. *Suska Journal of Mathematics Education*, 5(2), 77. <https://doi.org/10.24014/sjme.v5i2.7357>
- Thovawira, F. A., Safitri, I., Supartik, S., Sitompul, N. N. S., & Anggriyani, I. (2021). Systematic Literature Review: Implementasi Pendekatan STEM (Manfaat dan Tantangan) di Indonesia. *HISTOGRAM: Jurnal Pendidikan Matematika*, 4(2). <https://doi.org/10.31100/histogram.v4i2.682>
- Turmudi & Zakiya Aulia Ilma. (2021). Optimalisasi Kemampuan Representasi Matematis Siswa Melalui Project-Based Learning Berbantuan Software Geogebra. 9, 18.
- Widiastuti, A., & Silfiana, S. (2021). Dampak Pandemi Covid-19 Terhadap Pertumbuhan Ekonomi di Pulau Jawa. *Jurnal Ekonomi-Qu*, 11(1), 97. <https://doi.org/10.35448/jequ.v11i1.11278>
- Wijaya, C. (2018). Kemampuan Representasi Matematis Siswa dalam Menyelesaikan Soal Lingkaran pada Kelas VII-B Mts Assyafi'iyah Gondang. *Jurnal of Mathematics Education*, 1, 15–124.