Development of Learning Scenarios as Implementation of 21st Century Mathematic Skills in Madrasah Ibtidaiyah

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Abstrak

Penelitian ini bertujuan untuk mendeskripsikan implementasi keterampilan matematis abad ke-21 pada Madrasah Ibtidaiyah. Penelitian yang dilakukan berupa penelitian kualitatif untuk mendeskripsikan implementasi keterampilan matematis abad ke-21 menggunakan sebuah skenario pembelajaran. Penelitian dilaksanakan pada salah satu sekolah MI Kota Jambi yang dilakukan pada guru dan siswa yang berjumlah 102 siswa. Pengumpulan data dilakukan melalui angket, observasi serta wawancara. Sampel yang digunakan adalah non probality sampel dengan teknik purposive sampling yang merupakan teknik penentuan sampel dengan pertimbangan-pertimbangan tertentu. Sampel penelitian berupa guru kelas I-VI berjumlah 6 orang serta siswa kelas I-VI yang berjumlah 12 orang. Wawancara dilakukan kepada guru dan siswa MI terkait pengimplementasian keterampilan matematis abad ke-21, selanjutnya observasi dilaksanakan pada saat proses pembelajaran berlangsung dan angket disebarkan kepada guru untuk mengetahui pengimplementasian keterampilan matematis abad ke-21. Selanjutnya data dianalisis dengan teknik deskriptif kualitatif melalui desain penelitian Miless yang terdiri dari pengumpulan, penyajian, reduksi data serta melakukan penarikan kesimpulan. Hasil dari penelitian implementasi keterampilan matematis sudah berjalan dengan baik di MI Kota Jambi yang dijabarkan dalam 3 tahap (1) Guru merancang sebuah skenario pembelajaran yang berisi 5 jenis keterampilan matematis yang nanti dituangkkan secara rinci pada RPP sebelum pembelajaran dilakukan (2) Pelaksanaan pembelajaran disesuaikan dengan rancangan skenario dan RPP yang telah dibuat oleh guru yang mana setiap pelaksanaan pembelajaran memunculkan 5 jenis keterampilan matematis. (3) Pelaksanaan implementasi 5 jenis keterampilan matematis tersebut di temukan bahwa siswa dapat menalar dengan baik, berkomunikasi dengan baik, merepresentasikan pelajaran dengan baik, dan memiliki koneksi matematis yang baik serta memiliki problem solving yang baik.

Kata Kunci: Skenario Pembelajaran, Keterampilan Matematis, Madrasah Ibtidaiyah

Abstract

This study aims to describe the implementation of 21st century mathematical skills in Madrasah Ibtidaiyah. The research was conducted in the form of qualitative research to describe the implementation of 21st century mathematical skills using a learning scenario. The research was carried out at one of the MI schools in Jambi City which was conducted on teachers and students with a total of 102 students. Data collection was carried out through questionnaires, observation and interviews. The sample used is a non-probability sample with a purposive sampling technique which is a sampling technique with certain considerations. The research sample consisted of 6 teachers in class I-VI and 12 students in class I-VI. Interviews were conducted with MI teachers and students regarding the implementation of 21st century mathematical skills, then observations were carried out during the learning process and questionnaires were distributed to teachers to find out the implementation of 21st century mathematical skills. Furthermore, the data were analyzed using qualitative descriptive techniques through the Miless research design which consisted of collecting, presenting, reducing data and drawing conclusions. The results of the implementation of mathematical skills have gone well in MI Jambi City which are described in 3 stages (1) The teacher designs a learning scenario which contains 5 types of mathematical skills which will be laid out in detail in the lesson plan before learning is carried out (2) The learning implementation is adjusted to the scenario design and lesson plan that has been made by the teacher where each learning implementation raises 5 types of mathematical skills. (3) The implementation of the 5 types of mathematical skills found that students can reason well, communicate well, represent lessons well, and have good mathematical connections and have good problem solving.

Keywords: Learning Scenario, Mathematical Skills, Madrasah Ibtidaiyah

Introduction

Skills in the 21st century have various meanings, but in essence skills in the 21st century include skills to be able to think at a high level and critically, to be able to find solutions to a problem, to collaborate, to have creativity and to be able to communicate. Suherman (2001) learning that teachers do related to 21st century skills can be achieved with the implementation of different education systems that adapt to the demands of technological developments and digitalization. Hidayati (2017) states that a teacher must have innovation in order to be able to train students' higher-order thinking skills, but not only for middle and upper level students but must be trained from elementary school age . But in reality instilling and making students able to think at a higher level is not that easy, especially for elementary level students. Various efforts must be made by a teacher during the learning process.

A teacher can improve students' high-level thinking skills through learning mathematics. According to Mehrjoo et al. (2022) , learning mathematics creates opportunities for students to be able to think at a higher level and as one of the demands of learning in the 21st century. As it is known that learning mathematics is often frightening for some students because there is an assumption that mathematics is something that is difficult to learn and sometimes becomes boring because the concepts that must be understood are explained through methods or models that are less attractive (Rosita, 2014) . Therefore, innovation is needed in learning mathematics which besides being able to hone 21st century skills is certainly not monotonous (Romli, 2016) .

In line with what was conveyed by carrying out the learning process, teacher innovation is needed to make learning meaningful and interactive (Bjuland, 2007) . In this case learning mathematics for students is not in the form of mere calculations but also requires skills in thinking, expressing mathematical reasons and being able to solve problems and express ideas so that students will be able and accustomed to dealing with various problems in the future (Hartati et al.: 2021) . Principles (2000) divides 4 standards for learning mathematics including reasoning abilities, problem solving, communication, and mathematical connections. However, in reality the ability to represent mathematically is also an important ability in learning mathematics because it is directly related to communication and problem solving abilities (Suningsih & Istiani, 2021) . Indicators of mathematical problem solving include: understanding the problem and planning problem solving, making a problem solving process, making a problem solving process, explaining or interpreting the results (Sumartini, 2016) .

Students' mathematical skills can be improved through an innovation from the teacher in the mathematics learning process. Mathematical skills are students' skills in using mathematical concepts based on understanding the concepts that have been learned (Hartati & Suhendri, 2021) . The first mathematical skill is reasoning, namely the ability to think that tries to relate known facts or mathematical evidence to a conclusion (Abidin, 2022) . Furthermore, mathematical representations are expressing answers or mathematical ideas with tables, graphs, photos, or mathematical notation using their own language (Suningsih & Istiani, 2021) . Mathematical communication includes connecting real objects, pictures and diagrams into mathematical ideas; explaining ideas orally or in writing in

mathematics, stating daily events in language or mathematical symbols, listening, discussing and writing about mathematics, reading comprehension of mathematics, explaining and making questions about the mathematics that has been learned (Rizqi, 2016) . A person's ability to make connections between topics in mathematics, linking mathematics with other sciences, and with life is called the ability of mathematical connections. The last ability is problem solving, Sumartini (Sumartini, 2016) says that problem solving skills are very important in mathematics, not only for those who will later study or study mathematics, but also for those who will apply them in other fields of study and in everyday life. -day.

The way that teachers can do in creating a meaningful learning process that develops 21st century skills, especially in learning mathematics is to design learning scenarios in such a way that includes various components of mathematical skills (Suherman, 2001) . This is in line with the opinion of Suningsih & Istiani (2021) which states that teachers are the main factor in developing students' mathematical skills, because teachers will design the learning process in such a way that students can understand learning. Apart from being an educator, the teacher is also a figure and role model for students at school. Particularly at the elementary education level, students' curiosity which is still high requires the teacher's efforts to understand the various characteristics of students, which incidentally students still really need instructions and directions.

Method

The research was conducted in the form of qualitative research to describe the implementation of 21st century mathematical skills using a learning scenario. The research was carried out at one of the MI schools in Jambi City which was conducted on teachers and students totaling 102 students. Data collection was carried out through questionnaires, observation and interviews. The sample used is a non-probability sample with purposive sampling technique which is a sampling technique with certain considerations. Research sample in the form of 6 class I-VI teachers and 12 class I-VI students . Interviews were conducted with MI teachers and students regarding the implementation of 21st century mathematical skills, then observations were carried out during the learning process and questionnaires were distributed to teachers to find out the implementation of 21st century mathematical skills. Furthermore, the data were analyzed using qualitative descriptive techniques through the Miless research design which consisted of collecting, presenting, reducing data and drawing conclusions.

Results and Discussion

The implementation of mathematical skills by teachers at MI Al-Munawwarah begins with creating learning scenarios as a planning stage. Based on the observation results, the learning scenario owned by the teacher is in the form of a table consisting of 2 or 3 columns. The first column contains a description of the activities to be carried out by the teacher and students during learning, the second column is in the form of mathematical skills that appear in the activities carried out and the third column is a description of the activities to be carried out whether it involves all students, groups, individual students or the teacher and student. In making learning scenarios consisting of 3 columns, of course, they are adjusted to the KI and KD as well as the material to be taught. Based on the results of an interview on October 24, 2022 with

teachers who teach in lower grades, it is stated that:

"I am already familiar with the mathematical skills introduced by the Tanoto Foundation and since then I have always applied mathematics learning using mathematical skills. In my opinion, mathematical skills are appropriate for 21st century learning because they hone students' critical and creative thinking abilities. Unknowingly the teacher is also required to be creative in making a learning scenario that is adapted to mathematical material. The mathematical skills that I know consist of reasoning, problem solving, communication, connection and representation. I always design these five skills in learning scenarios (SS, October 24, 2022)"

Furthermore, teachers who teach in high grades also state that:

"Mathematics learning is indeed a scary lesson for most students, especially high-grade students because the higher the grade, the more difficult the material being taught. It takes a method, model or approach that is taught to students in order to create a meaningful learning. I have known mathematical skills since I attended training with the Tanoto Foundation. Even though previously in my studies I had taught skills such as problem solving, reasoning, communication to students. But I don't know that these skills are called mathematical skills. In my opinion, the 5 mathematical skills in the form of reasoning, problem solving, communication, connection and representation are interrelated and continuous with one another that must be taught to high grade students. And these five skills must be described in every learning scenario that has been prepared in the lesson plan (FJ, 24 October 2022)"

Based on the results of observations carried out on 26 and 27

October 2022, it was found that teachers who are familiar with mathematical skills create a learning scenario that contains several mathematical skills. This scenario makes it easier for teachers to design a lesson plan in which various mathematical skills are implemented. As in the high class, the teacher designs several mathematical skills that appear in the learning process, namely communication, representation and problem solving. Meanwhile, in the low class the teacher designs the five mathematical skills in the learning process. The following is an example of a learning scenario prepared by the teacher before implementing mathematics learning in MI:

Figure 1. Higher Class Learning Scenario

Figure 2. High Class and Low Class Learning Scenarios

Based on the results of interviews with teachers in both low and high classes stated:

" Since we teachers at MI Al-Munawwarah received training from the Tanoto Foundation, we were taught to make a scenario of mathematical skills according to the basic competencies that will be taught. Even though sometimes they have difficulty because they are confused in developing activities that are adapted to their mathematical skills, we teachers share and exchange thoughts with each other to be able to design the best possible scenarios for learning mathematics (LN&FJ, 24 October 2022) ".

The results of the interviews were strengthened through observations on October 24 2022 - November 3 2022 which were carried out in low and high classes, the learning process carried out by the teacher used mathematical skills. Each teacher creates learning scenarios that contain mathematical skills as outlined in lesson plans. Teachers use various learning methods such as the THINKING method, Project Based Learning or Discovery Learning . The results of observations of the implementation of mathematical skills carried out by teachers showed that on average teachers were in very good criteria for each observation instrument such as preparing lesson plans according to mathematical skills, provoking students' reasoning abilities, inviting students to convey ideas related to mathematics, associating learning mathematics with the context of everyday life can be seen from the questions and projects that are carried out during the mathematics learning process and even guiding students to solve problems in learning mathematics. In more detail, the percentage of observations of the implementation of mathematical skills carried out by teachers can be seen in the following table:

Table 1 . Results of observations of MI Al-Munawwarah teacher's mathematical skills

No	Class	Total	Percentage	Criteria
1	I	34	85%	Very good
2	II	33	82.5%	Very good
3	III	32	80%	Very good
4	IV	32	80%	Very good
5	V	34	85%	Very good
6	VI	32	80%	Very good

Each teacher obtained very good criteria, in which the percentage of observations on the implementation of mathematical skills was above 80%. This proves that the results of the questionnaire filled out by the teacher can be declared valid because they are in accordance with the observations and interview results. The following are the results of the questionnaire on the implementation of mathematical skills by teachers:

Table 2 . Teacher questionnaire results : implementation of mathematical skills

No	Statement	Percentage
1	The teacher prepares lesson plans according to the 21st century	100%
2	Teachers carry out mathematics learning according to the 21st century	100%
3	Mathematics learning carried out by the teacher uses mathematical skills	100%
4	The teacher provokes students' reasoning abilities	100%

5	The teacher invites students to convey ideas related to mathematics	100%
6	The teacher relates mathematics learning to the context of students' daily lives	100%
7	The teacher involves students to convey the results of learning mathematics	100%
8	The teacher guides students to solve a problem in learning mathematics	100%

Mathematics learning for MI Al-Munawwarah students, both in high and low classes, has been adapted to 21st century learning. Students who are actively involved, able to reason, are able to solve math problems given by the teacher and are able to link mathematics learning with the context of everyday life are proof that learning has led to the skills needed in the 21st century. This is of course inseparable from the role of the teacher who prepares scenarios for learning mathematical skills well before the learning process is carried out.

Figure 3 . Implementation of Low Grade Mathematical Skills

Figure 4 . Implementation of High Grade Mathematical Skills

So it can be concluded that the teacher is the key holder in implementing mathematical skills in MI. The success or failure of the implementation of mathematical skills depends on the scenarios that have been designed in the RPP. Scenarios designed in lesson plans must describe all types of mathematical skills in the form of reasoning, communication, connections, representation and problem solving in the learning process carried out by the teacher in the classroom. Mathematical skills depicted in learning scenarios are of course combined with appropriate models, approaches or learning methods. And in essence, the mathematical skills are interrelated with each other . It's just that these skills are not always sequential to each other in their implementation.

Conclusion

The implementation of mathematical skills has been going well in MI Jambi City which is described in 3 stages (1) The teacher designs a learning scenario that contains 5 types of mathematical skills which will be detailed later in the lesson plan before learning is carried out (2) The learning implementation is adjusted to the scenario design and RPP that has been made by the teacher where each implementation of learning raises 5 types of mathematical skills. (3) The implementation of the 5 types of mathematical skills found that students can reason well, communicate well, represent

lessons well, and have good mathematical connections and have good problem solving which can also be seen from the results of observations, interviews and questionnaires.

Teachers as key holders in implementing mathematical skills in MI. The success or failure of the implementation of mathematical skills depends on the scenarios that have been designed in the RPP. Learning scenarios designed in RPP must describe all types of mathematical skills in the form of reasoning, communication, connections, representation and problem solving in the learning process carried out by the teacher in the classroom. Mathematical skills depicted in learning scenarios are of course combined with appropriate models, approaches or learning methods. And in essence, the mathematical skills are interrelated with each other . It's just that these skills are not always sequential to each other in their implementation.

The era of digitalization is filled with the development of learning in schools which requires teachers to be individuals who are full of innovation in terms of learning, this will be something important. Because it is related to increasing the competence of students in school. Based on the results of research on the implementation of 21st century mathematical skills in Madrasah Ibtidaiyah students in Jambi City , it was found that teachers must be even more innovative in implementing a lesson and collaborating with other teachers and implementing the 5 types of mathematical skills. It is possible that these 5 types of mathematical skills can be applied in other MI schools

REFERENCES

[1] Abidin, Z. (2022). Efektivitas Pembelajaran Berbasis Masalah, Pembelajaran Berbasis Proyek Literasi, dan Pembelajaran Inkuiri dalam Meningkatkan Kemampuan Koneksi Matematis. Profesi Pendidikan Dasar, 7(1), 37–52.

[2] Bjuland, R. (2007). Adult students' reasoning in geometry: Teaching mathematics through collaborative problem solving in teacher education. The Mathematics Enthusiast, 4(1), 1–30.

[3] Hartati, L., & Suhendri, H. (2021). Jurnal Berdaya Mandiri (IMPROVEMENT OF STUDENT ' S MATHEMATICS SKILL THROUGH INNOVATION OF MATHEMATICS Jurnal Berdaya Mandiri. 3(2), 698–707.

[4] Hartati, L., Suhendri, H., & Nurhayati, N. (2021). PENINGKATAN KETERAMPILAN MATEMATIS SISWA MELALUI INOVASI MEDIA PEMBELAJARAN MATEMATIKA. Jurnal Berdaya Mandiri, 3(2), 698–707.

[5] Hidayati, A. U. (2017). Melatih keterampilan berpikir tingkat tinggi dalam pembelajaran matematika pada siswa sekolah dasar. Terampil: Jurnal Pendidikan Dan Pembelajaran Dasar, 4(2), 143–156.

[6] Mehrjoo, N., Nourian, M., & Abai Kopai, M. (2022). A Comparative Study of Mathematics Curriculum in Primary Schools of Iran and Singapore. Iranian Journal of Comparative Education, 5(2), 1871–1897.

[7] Principles, N. (2000). Standards for school mathematics Reston, VA Natl. Counc. Teach. Math.

[8] Rizqi, A. A. (2016). Kemampuan Komunikasi Matematis Siswa melalui Blended Learning Berbasis Pemecahan Masalah. PRISMA, Prosiding Seminar Nasional Matematika, 1(1), 191–202. https://journal.unnes.ac.id/sju/index.php/prisma/article/view/21457

[9] Romli, M. (2016). Profil koneksi matematis siswa perempuan sma dengan kemampuan matematika tinggi dalam menyelesaikan masalah matematika. JIPMat, 1(2).

[10] Rosita, C. D. (2014). Kemampuan penalaran dan komunikasi matematis: Apa, mengapa, dan bagaimana ditingkatkan pada mahasiswa. Euclid, 1(1).

[11] Suherman, E. (2001). Common Text Book STRATEGI PEMBELAJARAN MATEMATIKA. Bandung: JICA.

[12] Sumartini, T. S. (2016). Kemampuan Pemecahan Masalah Matematika dalam Menyelesaikan Soal Cerita Berdasarkan Langkah Polya. Jurnal Pendidikan Matematika STKIP Garut, 5(2), 1–7. https://scholar.googleusercontent.com/scholar?q=cache:jfDgJQUQWmcJ:scholar.google.com/+Peningkatan+Kemampuan+Pemecahan+Masalah+Matematis+Siswa+melalui+Pembelajaran+Berbasis+Masalah&hl=id&as_sdt=0,5

[13] Suningsih, A., & Istiani, A. (2021). Analisis Kemampuan Representasi Matematis Siswa. Mosharafa: Jurnal Pendidikan Matematika, 10(2), 225–234.