MaPan : Jurnal Matematika dan Pembelajaran
p-ISSN: 2354-6883; e-ISSN: 2581-172X
Volume 11, No 1, June 2023 (38-52)
DOI: https://doi.org/10.24252/mapan.2023v11n1a3

IMPLEMENTATION OF DIRECT INSTRUCTION IN MATHEMATICS CLASSROOMS DURING THE NEW NORMAL

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Received November 22, 2022; Revised January 27, 2023; Accepted April 10, 2023

Abstract:
The development of the covid-19 vaccine and the impact of online learning enable the government in Indonesia to remove some restrictions caused by the pandemic and our situation now is called the new normal. In the sector of education, some schools already implemented PTMT (Pembelajaran Tatap Muka Terbatas) by fully implementing face-to-face learning with some restrictions recommended by the government. One of the learnings that most teachers used was direct instruction. This study employed a sequential explanatory design to investigate the implementation of direct instruction in mathematics classrooms during the new normal. Firstly, we measured the effectiveness of direct instruction. Secondly, we investigated the factors affecting the results of our measurement of learning effectiveness. Two classes of the eleventh grade in one of the high schools in Makassar were chosen as the sample of our study. The findings of our study imply that the implementation of direct instruction in the mathematics classroom is not effective during the new normal based on the mathematics test results of the students. However, students and teachers respond positively to the implementation of direct instruction in mathematics lessons during the new normal. Our interview results reveal several factors causing the ineffectiveness, which were lesson duration, the number of tasks, and the short deadline of tasks from other subjects. Thus, the students cannot focus and overlook mathematics because they shift their focus to other subjects.

Keywords: Direct Instruction, Mathematic Learning, New Normal

IMPLEMENTASI PEMBELAJARAN LANGSUNG DALAM PEMBELAJARAN MATEMATIKA SELAMA ERA NEW NORMAL

Abstrak:
Pengembangan vaksin covid-19 dan dampak pembelajaran online memungkinkan pemerintah di Indonesia untuk menghapus beberapa batasan yang disebabkan oleh pandemi dan situasi kita sekarang disebut New Normal. Di bidang pendidikan, beberapa sekolah sudah menerapkan PTMT (Pembelajaran Tatap Muka Terbatas) dengan menerapkan pembelajaran tatap muka sepenuhnya, namun dengan beberapa batasan yang telah direkomendasikan oleh pemerintah. Salah satu pembelajaran yang

paling banyak digunakan guru adalah pengajaran langsung. Penelitian ini menggunakan desain sequential explanatory untuk menyelidiki implementasi pembelajaran langsung di kelas matematika selama New Normal. Pertama, kami mengukur efektivitas dari pembelajaran langsung. Kedua, kami mengeksplorasi penyebab dari hasil investigasi terkait keefektifan pembelajaran langsung. Dua kelas tingkat sebelas di salah satu sekolah menengah atas di Makassar dipilih sebagai sampel penelitian kami. Temuan penelitian kami menunjukkan bahwa pengajaran langsung tidak efektif untuk diterapkan di kelas matematika selama New Normal berdasarkan hasil tes matematika siswa. Namun, siswa dan guru merespon positif implementasi pengajaran langsung dalam pelajaran matematika selama new normal. Hasil wawancara kami mengungkapkan beberapa faktor yang menyebabkan ketidakefektifan, yaitu durasi pelajaran, jumlah tugas, dan tenggat waktu tugas yang singkat dari mata pelajaran lain. Dengan demikian, siswa tidak dapat fokus dan mengabaikan matematika karena mereka mengalihkan fokus mereka pada mata pelajaran lain.

Kata Kunci: Pembelajaran Langsung, Pembelajaran Matematika, New Normal

How to Cite: Ikram, F. Z., & Rosidah. (2023). Implementation of Direct Instruction in Mathematics Classrooms During the New Normal. *MaPan : Jurnal Matematika dan Pembelajaran*, *11*(1), 38-52. https://doi.org/10.24252/mapan.2023v11n1a3.

INTRODUCTION

The Pandemic covid-19 overwhelmingly impacted various sectors around the world. Numerous people must change their habits by adapting to the new situation. Education is one of the sectors affected by covid-19 (Cahapay, 2021). Teachers must adapt to the new situation by designing learning that prevents virus transmission. The type of lesson that all teachers used was online learning. Teachers use various strategies in delivering their teaching material. Some of them used messaging and video call applications such as WhatsApp or Telegram while others utilized video conference software, namely zoom or google meet. Many teachers also used a platform that enables the instructors to administer online evaluations such as quizziz or google forms.

Numerous researchers have already investigated the topic of online learning or blended learning during the new normal. For example, Capacio (2021) discussed the use of Genyo e-learning during the new normal education to improve mathematics achievement. There was a study by Berbesada and Rondina (2022) investigated the impact of blended instruction on mathematics

learning outcomes during the new normal. Efriyadi and Nurhanurawati (2021) conducted a study about learning motivation and mathematical communication skills during the covid-19 pandemic.

Many teachers and students disliked online learning. Masdafni (2021) stated that students were not excited or enthusiastic to study. Some of them even told their parents to complete their assignments. During the implementation of online learning, including in mathematics classrooms, numerous problems such as flexibility, learning access, adaptation to technology, and internet connectivity (Agayon, Agayon, & Pentang, 2022; Andarwulan, Al Fajri, & Damayanti, 2021; Kundu & Bej, 2021; Kusumaningrum & Wijayanto, 2020; Mamolo, 2022; Masyithoh & Arfinanti, 2021; Nsengimana, Bazimaziki, Nyirahabimana, Mushimiyimana, Mutarutinya, Mugabo, & Nsengimana, 2021; Putrawan, Ayuni, & Apsari, 2021) arose. The significant decline in self-efficacy and motivation, lack of self-discipline, and social interaction were some of the issues of distance learning (Mamolo, 2022; Thongbunma, Nuangchalerm, & Supakam, 2021). Mamolo added that students' anxiety remained high. Additionally, a study by Inan (2020) explained that all the educators (226) who participated in his study said that face-to-face education was effective during the pandemic. Therefore, a new type of learning is necessary to replace or complement the current type of learning used by most teachers.

As time goes by, the development of the covid-19 vaccine removes some restrictions caused by the pandemic. People are starting to go back to their daily routines but with a new habit, which was following the health protocols such as wearing masks, using hand sanitizer, and keeping their distance from other people. This situation is the new normal (Aly, Nur, Rosyida, Hamidah, Ahmad, Suryani, & Ilmi, 2020).

Several schools started to combine online learning and offline learning. Some even already implement offline learning fully but with various restrictions. The learning is called "Pembelajaran Tatap Muka Terbatas" (PTMT). Students are advised to receive the covid vaccine and are required to wear masks and use hand sanitizer. They also had to keep their distance from other people.

In several high schools in Makassar, Indonesia, the mathematics teachers used a curriculum called Kurikulum Darurat, which reduces the number of topics that must be taught. Some schools also reduce the time spent

in school. Mathematics teachers not only implement face-to-face learning but also used online learning as a complement to maximize the learning results.

We conducted a preliminary study by observing and interviewing the mathematics teachers in Makassar regarding the learning models used by most teachers during the new normal. Our preliminary study showed that 90% of the teachers employed direct instruction. This model is a teacher-centered approach that could become the solution to the current New Normal. In this model, there is no direct collaboration or cooperation that could cause virus transmission. There are five stages or phases of direct instructions described by Arends (2014), which are presented in table 1.

Table 1. Syntax of Direct Instruction

Phase	**Teacher Behavior**
Phase 1: Explain goals and establish a set	The teacher gets students' attention and makes sure that students are ready to learn. The teacher also describes the learning objectives and the importance of the current topic
Phase 2: Exemplify knowledge or skill	The teacher shows the skills correctly and provides the appropriate procedures
Phase 3: Facilitate Guided Practice	The teacher provides guided practice
Phase 4: Assess understanding and gives feedback	The teacher assesses students' comprehension and provides feedback
Phase 5: Gives Additional or Extended Practice	The teacher gives additional or extended practices with more complex situations

Most of the studies conducted in the field of education during the pandemic in Indonesia address the implementation of online learning. Although several studies also examined the effectiveness of direct instruction, they did not investigate the cause affecting the effectiveness or ineffectiveness. Based on the information explained, the research questions are: (1) is direct instruction effective to be implemented in mathematics classrooms during the new normal?; (2) How is the implementation of direct instruction in mathematics classrooms during the new normal based on the perspective of the mathematics teachers and students?

METHODS

This study employed the sequential explanatory design to answer the research questions. Firstly, the researcher used descriptive and inferential statistics to answer the first question regarding the effectiveness of direct instruction in mathematics classrooms during the new normal. Secondly, the researcher interviewed the mathematics teachers and the students about the implementation of direct instruction in mathematics lessons.

Our study took place in one of the high schools in Makassar, South Sulawesi, Indonesia. The school fully implemented offline learning which was supported by online learning in google classroom and whatsapp. We conduct our research during the even semester.

The classes selected as the samples of our study were two classes in the eleventh grade, namely XI IPA 2 and XI IPA 3. We collected the quantitative data by collecting their mathematics test results from the teachers. The teachers utilized Google Forms to administer their tests. The concepts assessed were sequence and series. The instructor used a test consisting of 15 multiple-choice questions. The students' scores must be higher than 76 to pass the test. As for the qualitative data, we interviewed the mathematics teachers regarding the results of the implementation of direct instruction in their mathematics classroom.

Regarding the first research question, we employed SPSS which stands for Statistical Product and Service Solutions to analyze the quantitative data. There were two criteria for effectiveness. Firstly, the mean score of each class has to be higher than 76. Secondly, the percentage of students who passed the minimum criteria must be more than 85%. We used to mean to determine the average mathematics score of each classroom. We also calculated the number and the percentage of students who passed and did not pass the minimum criteria of 76 (KKM or Kriteria Ketuntasan Minimum). Before conducting the t-test, we had to check whether the data obtained followed the normal distribution or not. In this case, we used Shapiro's Wilk test. The criteria of the test were et were if $p > 0.05$ then the data follows the normal distribution. However, if $p \leq 0.05$ then the data is not normally distributed.

If the data is normally distributed, then one sample t-test was employed to determine whether the average score of each class was significantly higher than 76 or not. The hypothesis was:

$$H_0 = \mu_p \leq 76 \text{ vs } H_1 = \mu_p > 76$$

μ_p stands for the average score parameter of the mathematics test results. The null hypothesis (H_0) means that the score is lower than or equal to 76 while the alternative hypothesis (H_1) indicated that the mathematics test results are higher than 76. However, if the data does not follow the normal distribution, then we employed a one-sample Wilcoxon signed rank test.

The next research question addresses the implementation of direct instruction based on the perspective of mathematics teachers and students. The researcher acted as the main instrument to collect the qualitative data. We used an interview protocol consisting of two main questions which were: (1) What is your opinion about the implementation of direct instruction in mathematics classrooms during the new normal?; and (2) Why is direct instruction not effective/effective to be used in mathematics classrooms during the new normal?

The data analysis technique used consisted of three main steps, which were data condensation, data display, and conclusion (Miles et al., 2018). In data condensation, we were condensing the data by selecting which of them that should be the focus. However, we did not just discard the one that was not selected. We saved it for comparison purposes. We might use it later providing that the tentative conclusion obtained is not enough. In this step, the researcher organized the data and made categories based on the responses of students and mathematics teachers regarding the implementation of direct instruction and its effectiveness. In data display, we presented the data in Figures and Tables to compare the responses of teachers and students about the model implemented. Based on the data displayed, we concluded the implementation of direct instruction in mathematics classrooms during the new normal. The conclusion obtained might not be fixed. In this case, the researcher might have to collect data or consider the data that was not selected at first.

RESULTS AND DISCUSSION

1. Results

There were two classrooms chosen as the sample of our study. The results of the implementation of direct instruction are presented by the following table 2.

Table 2. Results of The Implementation of Direct Instruction

Class	Below Standard (Number/Percentage)	Above the Standard (Number/Percentage)	Mean	Standard Deviation
XI IPA 2	9/41%	13/59%	65.6	25.6
XI IPA 3	10/45%	12/55%	59.1	27.8

Table 2 shows that direct instruction is not effective to be used in the mathematics classroom during the new normal. The percentages of students who passed the standard of 76 were 59% and 55%, respectively. Both of them are below 85%. Moreover, the mean of their mathematics test results was 65.6 with a standard deviation of 25.6 and 59.1 with a standard deviation of 27.8. The mean of their mathematics score was below 76. In terms of descriptive statistics, the implementation of direct instruction was ineffective.

We also analyzed the data by employing inferential statistics. Before conducting the test, we conducted a normality test to check whether the data obtained followed the normal distribution. Table 3 provides the results.

Table 3. Results of Shapiro Wilk Test

Class	Df	Sig.
XI IPA 2	22	0.000
XI IPA 3	22	0.000

The column of Sig**.** explained the results of the normality test. The values which are less than 0.05 means that the data does not follow the normal distribution. Therefore, we employed a one-sample Wilcoxon signed rank test. The results of the Wilcoxon test are shown in table 4.

Table 4. Results of One-Sample Wilcoxon Signed Rank Test

Class	Sig.	Decision
XI IPA 2	0.328	Retain the null hypothesis
XI IPA 3	0.157	Retain the null hypothesis

Table 4 reveals that the score of 0.328 and 0.157, which are more than 0.05, means that the decision is to retain the null hypothesis. Therefore, based on the criteria determined, the implementation of direct instruction during the new normal was not effective.

Based on the results obtained, no criteria of effectiveness were met. Thus, the implementation of direct instruction is not effective to be implemented in mathematics classrooms during the new normal.

The results of the study show the ineffectiveness of the implementation of direct instruction. Furthermore, we interviewed by asking every student in the classroom regarding their opinion of the use of direct instruction in a mathematics lesson and the cause of the ineffectiveness. The questions asked and students' responses are presented in the table below.

Table 5. Summary of Students' Response

Questions	Responses	Frequency
What is your opinion about the implementation of direct instruction in mathematics classrooms during the new normal?	Enthusiastic	44
	Motivated	40
	The concept was easier to understand compared to online learning	44
Why is direct instruction not effective to be used in mathematics classrooms during the new normal?	Short deadline	43
	Too much homework	43
	Lesson duration	44
	The difficulty of the test	5

Table 5 shows that most of the students were motivated and enthusiastic about the implementation of direct instruction in their mathematics lessons. Moreover, all of them could comprehend the learning material easier compared to online learning.

2. Discussion

Our findings showed that direct instruction is ineffective to be implemented in mathematics classrooms during the new normal. Several studies (Aisyah, Sukmawati, & Amalia, 2021; Dhanieargo, Handayanto, & Aini, 2021; Elisa, Hikmah, Turmuzi, & Arjudin, 2021; Islami, Soeprianto, & Prayitno, 2021; Rachmawati, Baidowi, Hikmah, & Hayati, 2021) also reported similar results regarding the ineffectiveness of the instruction. The mean scores of each class participating in the studies were below 70. It means that the implementation of direct instruction during the new normal is not effective.

A study by Mahyuddin (2022), however, revealed that direct instruction could increase students' mathematics learning outcomes. Their average score improved from 71 to 79. Seran (2021) also reported similar results. The implementation of direct instruction could enhance students' mathematics

learning outcomes. The main differences were that Mahyuddin used the Fast and True technique to support the mathematics lesson and Seran's research investigated elementary school students.

Similar to the findings of Mahyuddin (2022); Tompunu (2021) described that the implementation of direct instruction could enhance students' mathematics learning outcomes. Additionally, a study by Krismolita, Junedi, Tabrani, and Marlina (2022) also reported the same findings but with different levels of education. In Tompunu's findings, more than 90% of the participants have a mathematics score of at least 65 after the lesson. However, the main notable difference was that the minimum passing criteria of Krismolita Junedi, Tabrani, and Marlina; Tompunu's studies were 65 while the passing criteria in the school investigated were 76.

A study with a similar condition but with a different level of education conducted by Septianingsih (2021) also revealed different findings. Septianingsih reported that direct instruction during the PTMT could enhance students' mathematics learning outcomes in junior high school. The school chosen in Septianingsih's investigation also implemented PTMT with the same restrictions that must follow the health protocol. The minimum passing criteria were even higher, which was 78.

Based on the results of our interviews, there were several factors affecting the ineffectiveness of direct instruction. The following interview excerpts show students' and teachers' opinions regarding the implementation of direct instruction.

Table 6. Interview Excerpts

Interviewer:	What is your opinion about the implementation of direct instruction in mathematics classrooms during the new normal?
Student A:	I was enthusiastic and motivated to learn mathematics because there were actual interactions between students and teachers. Teachers also provide feedback directly after I asked them a question.
Interviewer:	Why is direct instruction not effective to be used in the mathematics classroom during the new normal?
Student A:	Even though we were enthusiastic and motivated to learn mathematics, the time spent on every lesson was too short. The maximum was only an hour. Therefore, I think that the duration should be more than that.

Interviewer:	Is that the only reason why the average score of your classroom is below the standard?
Student A:	No, the number of tasks given to us from other subjects was too many. Several of them even have a too-short deadline. Therefore, we cannot focus on studying mathematics in the classroom
Interviewer:	What is your opinion about the implementation of direct instruction in mathematics classrooms during the new normal?
Student B:	I was enthusiastic, I found it easier to learn the concept
Interviewer:	Why is direct instruction not effective to be used in the mathematics classroom during the new normal?
Student B:	Some of us cannot focus on learning mathematics because we always thought about our homework which has a very short deadline.
Interviewer:	Is that the only reason?
Student B:	The number of tasks. I thought that teachers should discuss the number of assignments in the first meeting.
Interviewer:	Why is direct instruction not effective to be used in the mathematics classroom during the new normal?
Teacher A:	The time spent on every meeting was too short. Therefore, many students still have several questions about the concept taught in that meeting. Because of the number of tasks that they have to complete from the other subjects, they forgot to ask the questions that they want to ask.

Based on the excerpt and table 5, the main factors affecting the ineffectiveness of direct instruction were the number of tasks, lesson duration, and the short deadline. Even though there were other reasons for the ineffectiveness of the mathematics lesson, the three factors were the most frequently mentioned responses.

Many students commented that some subjects had too many assignments. This numerous homework forced them to neglect other subjects' tasks such as mathematics. Therefore, the objective of the exercise to improve students' mathematics understanding was not achieved due to their lack of practice.

The time spent on mathematics lessons was very limited. Students only learn mathematics for approximately one hour. Students argued that there were still many things that they did not understand about the mathematics

topic learned and they wanted to ask questions about the topic in the classroom. However, many of their questions remained unanswered. Teachers could not completely solve the issue because of the lesson duration. The problem of lesson duration indicated that teachers need to make extra efforts to help students learn mathematics. One of the possible ways is teacher-created videos which are helpful for students (Nabayra, 2022). In the video, self-assessment was included to facilitate students' reflection. Another way is to create a Q&A (Questions and Answers) session on social media or Google Classroom regarding the previous topic learned in the classroom.

Another problem found was the short deadline. Many of the tasks given had to be submitted on the same day, one day, or two days after the lesson. Students shift their focus on that subject and overlook or even forgot their obligation in the other subjects, including mathematics. Thus, they could not focus on mathematics learning.

Mahyuddin's (2022) supports our findings about students' responses to the implementation of direct instruction. The students gave positive reactions by saying that they were motivated and enthusiastic about the lesson given. They found it easier to comprehend the mathematics concept compared to online learning. their mathematics teachers also described that students were more active.

CONCLUSION

The findings of our study imply that direct instruction is ineffective to be applied in mathematics classrooms during the new normal based on the mathematics test results of the students. However, students and teachers respond positively to the implementation of direct instruction in mathematics lessons during the new normal. Our interview results reveal several factors causing the ineffectiveness. Firstly, the lesson duration of mathematics in the classroom is very short. Therefore, the mathematics learning outcome is not optimized. Secondly, many subjects have too many tasks or homework. Some of them even have very short deadlines such as only one or two days. A few of them even have to submit the task on the same day. The number of tasks and the deadline for some tasks forced the students to focus and prioritize the subject. Thus, the students cannot focus and overlook mathematics.

Our findings reveal some factors affecting the effectiveness of direct instruction implementation in a mathematics lesson. Teachers or schools could use our findings as a consideration to design a learning program that

maximizes students' learning outcomes, including mathematics. The program includes many aspects such as the time spent on every subject, the number of tasks, the deadline for homework, and the discussion of learning contracts in the first meeting. Schools may also consider the standard score that students have to achieve to be considered a success. Lastly, a workshop discussing learning design during the new normal is also necessary for the teachers. The school might invite educational experts as a speaker.

Regarding the topic of our study, other researchers could develop learning media such as games or modules that facilitate and help students to learn mathematics topics. Investigating other types of learning is also necessary to add references regarding the learning that could be used during the new normal. Other educational experts may consider studying the quality of mathematics teachers' preparation or teachers' strategies in a semester.

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