

Covid -19 : The Effects of Distance Learning in Indonesia based on a Commognitive Perspective

Adika Setyo Budi Lestari¹, Toto Nusantara², Susiswo³, Tjang Daniel Chandra⁴, Nonik Indrawatiningsih⁵

¹Doctoral Student, Mathematics Education, Universitas Negeri Malang, East Java, Indonesia, ²Professor, Mathematics Education, Universitas Negeri Malang, East Java, Indonesia, ³Associate Professor, Mathematics Education, Universitas Negeri Malang, East Java, Indonesia, ⁴Assistant Professor, Mathematics, Universitas Negeri Malang, East Java, Indonesia, ⁵Lecturer, Department of Mathematics Education, Universitas PGRI Wiranegara Pasuruan, East Java, Indonesia

Abstract

Distance learning is a learning system that does not take place in one room and there is no face-to-face interaction between the teacher and the learner. This study aims to determine the impact of implementing distance learning in Indonesia from a commognitive point of view. This research is a descriptive type of research with a total of 543 participants who come from high school students in Pasuruan district, Indonesia. Data collection using a questionnaire. After the questionnaire is collected, it is analyzed using the Miles and Huberman method through reduction, display data, and conclusion, then it will be studied based on the commognitive theory. The results show that based on commognitive studies, students are more likely to still need a visual mediator as a visible object to be used as a communication medium, its realization depends on the material context. Students need to communicate to ask questions related to material that has not been understood. So it can be said that visual mediator is important during distance learning.

***Keywords** – Distance Learning, Visual Mediator, Commognitive.*

Introduction

The learning process is a two-way interaction process that involves face-to-face communication between teachers and students in a class. However, with the Covid-19 pandemic since March 2020, the face-to-face learning process in schools has to be temporarily halted. This is due to preventing massive transmission of Covid-19. The Ministry of Education and Culture provides instructions for schools to organize distance learning (online) and advises students to study from their homes. This condition forces educators to innovate and try digital platforms that are widely available to support the learning process as a solution to implementing learning from home policies ⁽¹⁾. Like it or not, ready or not, all elements in the world of education must be able to carry out distance learning.

Distance learning is a learning system that does not take place in one room and there is no face-to-face interaction between teacher and learner⁽²⁾. Various kinds of platforms can be used in distance learning, both in the form of learning management systems and in the form of video conferencing. Learning management systems that are widely used include, google classrooms and E-learning portals owned by schools or colleges⁽¹⁾. Meanwhile, video conferencing applications that are widely used during distance learning include the zoom meeting application, Google Meet and Visco Webex. Apart from these applications, Whatsapp Group is also an alternative in implementing distance learning⁽³⁾⁽⁴⁾. To succeed distance learning requires cooperation from various parties, not only from the educators but also from the students and families. Distance learning is a new challenge for educators because so far learning has been done directly.

Even though educators use digital platforms, communication is the main factor needed during the learning process using online. In solving a problem, communication and cognition skills are needed. Communication skills and cognition are combined with the term commognitive⁽⁵⁾. Commognitive is a method of analyzing how students solve a problem⁽⁶⁾. Solving problems is one of the abilities that must be possessed by students.

Distance learning is one way to continue education during a pandemic⁽⁷⁾. Distance learning is still designed in such a way as to be able to train students in solving problems. Distance learning is a new thing that must be applied in Indonesia during the pandemic period, so it still needs improvement. It can be said that distance learning is a transition period from conventional learning to digital learning⁽⁸⁾⁽⁹⁾. To be able to determine the impact of distance learning can be done by analyzing it in terms of communication and cognitive. Commognitive is a communicative cognitive process related to what is being thought, as a combination of communication and cognitive which consists of four components, including word use, routine, visual mediator, and narrative⁽⁵⁾⁽¹⁰⁾. Routine is the tendency of choosing terms or choosing representations in the process of pouring out ideas to solve the problems or problems faced so that they can support the narrative. Visual Mediators are visible objects that are used as communication media, the manifestation depends on the material context. Word use is the use of words that can reflect or represent the situation at hand. A narrative is a series of sentences that describe objects, relationships, and processes, such as definitions, theorems, and proofs.

Distance learning is closely related to the four commognitive components. The main question in this research is how is the impact of implementing distance learning based on a commognitive point of view?

Research Methodology

This research is qualitative research with a descriptive design conducted to determine the impact of the application of distance learning in Indonesia

according to a commognitive view.

Participant

The population in this study were all junior high school students in Pasuruan Regency. The sample of this study was 543 students who came from junior high schools in Pasuruan district and had an average age of 13-15 years. The sample collection technique used is random sample sampling, which means that each member of the population has the same opportunity and opportunity to become a research sample.

Procedure

The procedure in this study is as follows: 543 junior high school students were given a questionnaire. The questionnaire was used to obtain preliminary data on the assessment of the application of distance learning carried out in Indonesia during the Covid 19 Pandemic, then after knowing the initial data, it will be studied about the impact of distance learning from a commognitive point of view. The questionnaire consisted of two parts, the first part related to the impact when implementing distance learning which consisted of 1 question with 5 answer choices. The second part deals with the impact after implementing distance learning which consists of 1 question with 3 answer choices.

The questionnaire instrument given to students is as follows:

1. What do you find burdensome in online learning? (choose only one answer that you think is the most burdensome).

- a. Duration online
- b. Pulse costs
- c. The subject matter is difficult to learn
- d. Too many tasks
- e. Others

2. After you have participated in online/online distance learning for almost 2 weeks, how do you feel?

- a. Troubled or restless
- b. Happy
- c. Ordinary

questionnaire were then analyzed using the Miles and Huberman concept through reduction, display data, and a conclusion.

Result and Discussion

Data collection technique

Based on initial data obtained from a questionnaire distributed to 543 junior high school students, data is obtained in Table 1 and Table 2 below.

The data collection technique was done by filling out a questionnaire online. The data obtained from the

Table 1. Student Response when Application of Distance Learning

Answer Items	Number of Respondents who answered
It took a long time	10
High pulse costs	109
Students have difficulty learning the material	202
Students refused because of the large number of assignments	193
Etc.	29
Total	543

Table 1 above shows that when implementing distance learning (online), students still find it difficult to learn the subject matter provided by the teacher through online learning with a percentage of 37%. The second place is students objecting because students get more assignments when using online learning with a percentage of 36%. The third-place students objected

because the credit was expensive with a percentage of 20%. The fourth place is that students answer other questions with a percentage of 5%. The fifth place is students objecting because the time is too long when using distance learning (online) with a percentage of 2%. The percentage is presented in Figure 1 below.

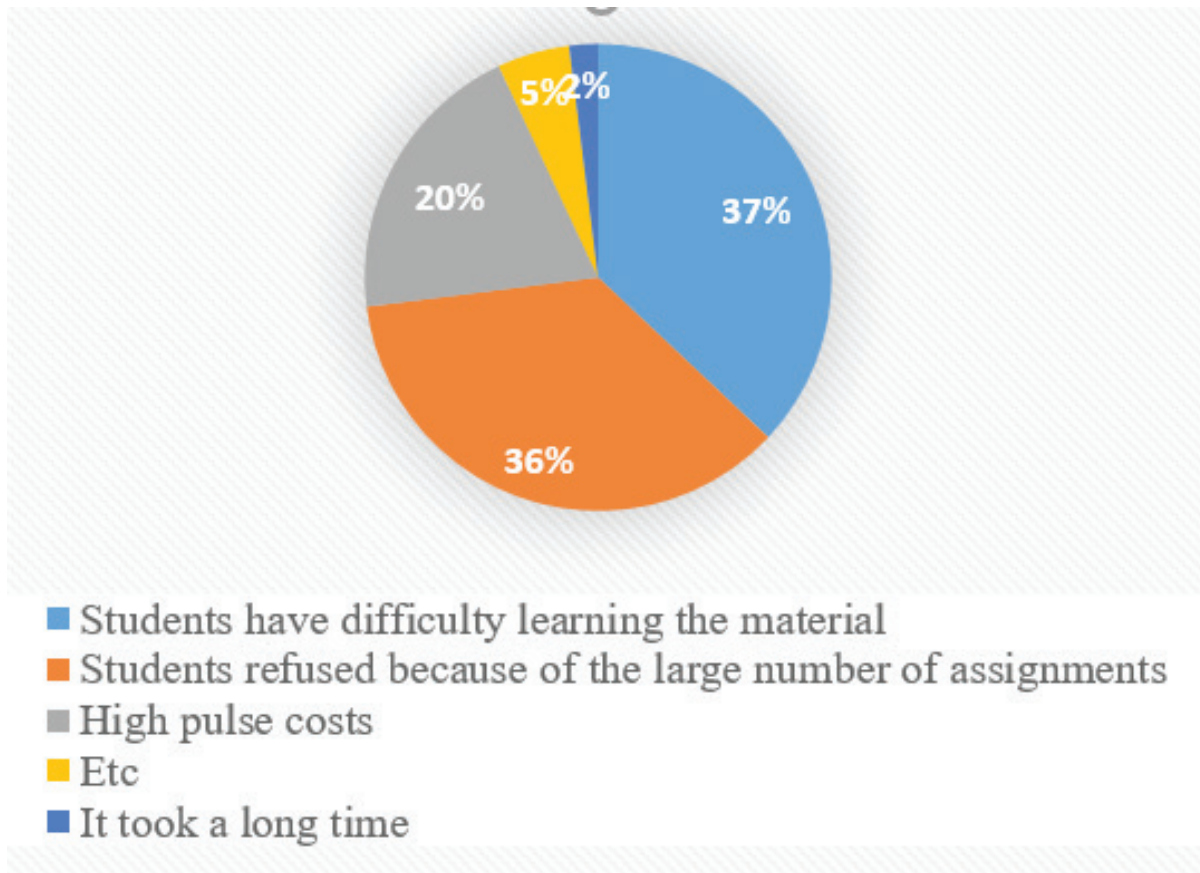


Figure 1. Student Response when Application of Distance Learning

Based on the results in table 1, it shows that students, in terms of material content, still have difficulty understanding the material. This is because it is not common to learn online. Teachers as teachers and educators are also still not used to presenting material

online. As a result, the material presented is not optimal for students because the ability to master technology is still not maximally mastered by the teacher. Learning is felt to be still not effective because of several influencing factors, including a lack of parental supervision⁽¹¹⁾.

Table 2. Student Response after Application of Distance Learning

Answer Items	Number of Respondents who answered
Students enjoy using distance learning	219
Students find it difficult or restless to use distance learning	139
Students are casual towards distance learning	185
Total	543

The percentage can be presented in Figure 2 below.

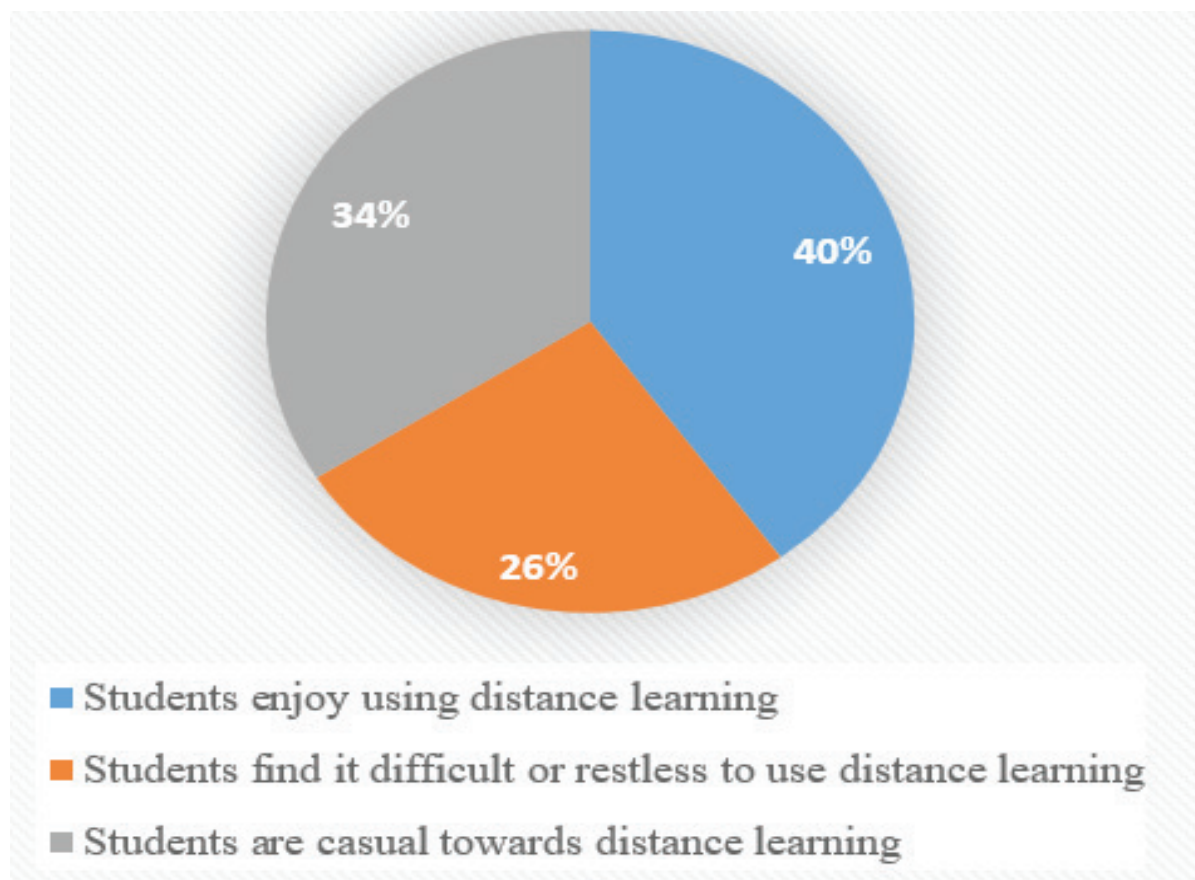


Figure 2. Student Response after Application of Distance Learning

Table 2 above shows that after implementing distance learning (online), students enjoy learning through distance learning with a percentage of 40%. Furthermore, students feel difficulty with distance learning with a percentage of 26%. Then students act normal if distance learning is applied with a percentage of 34%. The impact of distance learning is felt by students in various kinds of responses obtained from students, including boredom, mediocrity, frustration, and anxiety⁽¹²⁾. Based on table 1 distance learning most students feel happy, but also not a few students feel normal. Several factors affect, including because distance learning is a new thing for students, students learning online using cellphones feel freer to use cellphones than usual days.

Based on Table 1 and Table 2 above, if it is associated with the four commognitive components, namely word use, routine, visual mediator, and narrative.

Students are more likely to still need a visual mediator as a visible object to be used as a communication medium, its realization depends on the material context⁽¹⁰⁾⁽¹³⁾. Students need to communicate to ask questions related to material that has not been understood. So it can be said that visual mediators are important during online learning. This is following the opinion of Sfard and Kieran⁽¹⁴⁾ that defines communication as effective when differences in the speech from the interlocutor generate responses that are in line with the speaker's metadiscursive expectations⁽¹⁵⁾. Besides, communication will be more effective if students discuss in small groups to solve problems⁽¹⁶⁾⁽¹⁷⁾⁽¹⁸⁾. So it can be concluded that the use of words and visual mediators is very important in learning mathematics in distance learning.

Visual mediators are objects that are acted upon as part of the communication. Whereas everyday discourse

is mediated mainly by pictures of concrete objects that exist independently of a particular discourse, in mathematics most symbols and other mediators are created primarily for communication purposes. Visual mediators in mathematics learning include algebraic symbols that mediate ideas such as numbers and written graphics, or other symbols such as those representing variables, coefficients, and equations⁽¹⁹⁾. The mediator used in communication often influences what can be said about the ideas being discussed. To illustrate, while solving equations in algebra, students often use graphs as visual mediators. Also, a visual mediator is a means used by the participants as a discourse to identify the object of their conversation and coordinate their communication. Mathematical discourse often involves symbolics that is used as a form of certain communication⁽²⁰⁾⁽²¹⁾. For students to be able to receive and understand the material presented by the teacher in the online learning process, creativity, and special skills from the teacher are needed to present the material.

In the learning process, both direct learning and using online media, communication is needed in providing an understanding of the material to students. Communication takes a broader view and also considers non-verbal aspects such as visual mediators⁽²²⁾⁽²³⁾. Commognitive with visual mediators focuses on cognitive frameworks about making routines explicit, supported narratives, words, and visual mediators such as lectures⁽²⁴⁾. Meanwhile, commognition is a socio-cultural approach that aims to provide an understanding of what is learned during the learning process.

However, the problem with distance learning is that some teachers are still not tech-savvy, making online learning a new thing for most teachers in Indonesia. Resources, and the limitations of educational technology, as well as the skills and quality of the teachers, are not sufficient⁽¹⁾⁽²⁵⁾. Learning in schools is carried out by WA, zoom meeting, and often by giving assignments, learning in the form of videos downloaded on YouTube. Many think that the teaching responsibility in implementing PJJ is much lighter than traditional learning⁽²⁶⁾. Even though the teacher's duties during

PJJ are done online, the tasks that are carried out are still the same. For some teachers who do not understand technology, PJJ is a burden in itself.

Conclusion

The results showed that the effects of distance learning were felt by students and teachers alike. As many as 37% of students objected because the subject matter was difficult to learn when using online learning. However, 40% of students also enjoy using distance learning because it is more effective. From a teacher's perspective, teachers still don't understand technology. Learning in schools is carried out by WA, zooming, and often by giving assignments, learning in the form of videos downloaded on YouTube. Whereas distance-learning studies according to a commognitive view state that students are more likely to still need a visual mediator as a visible object to be used as a communication medium, its realization depends on the material context. Students need to communicate to ask questions related to material that has not been understood. So it can be said that visual mediators are important during online learning.

Some of the recommendations suggested based on the results of this study are to carry out proper schedule control to guide students learning step by step and increase their understanding of the material that has been studied, motivate students to interact via digital platforms so that students can clearly express the problems they have faced, and The use of visual mediators is still applied so that students can improve their understanding.

Acknowledgment: This study supported by Universitas PGRI WIRANEGARA Pasuruan.

Ethical Clearence: Yes.

Conflict of Interest: No

Source of Funding : Authors

References

1. Sousa M., Rocha A. DIGITAL LEARNING IN AN OPEN EDUCATION PLATFORM FOR

- HIGHER DIGITAL LEARNING IN AN OPEN EDUCATION PLATFORM FOR HIGHER EDUCATION STUDENTS. Proc EDULEARN18 Conf 2nd-4th July 2018, Palma, Mallorca, Spain. 2018;(November).
2. Bhebhe S, Maphosa C. Examining the learning habits of distance education learners in one Southern African university Examining the learning habits of distance education learners in one Southern African university. *Am J Distance Educ.* 2020;(June).
 3. Liu H. Effects of Distance Learning on Learning Effectiveness. *EurasiaJournal Math Sci.* 2014;10(6):575–80.
 4. Cavanaugh C, Gillan KJ, Kromrey J, Hess M, Blomeyer R. The Effects of Distance Education on K – 12 Student Outcomes : A Meta-Analysis October 2004 The Effects of Distance Education on K – 12 Student Outcomes : October 2004. *Learn Point Assoc.* 2004;(October).
 5. Sfard A. When the Rules of Discourse Change, but Nobody Tells You: Making Sense of Mathematics Learning From a Commognitive Standpoint *Anna. J Learn Sci.* 2007;16(4):37–41.
 6. Kim D-J, Choi S, Lim W. Sfard’s Commognitive Framework as a Method of Discourse Analysis in Mathematics. *Int J Cogn Lang Sci.* 2017;11(11):481–5.
 7. Khan IA. Electronic Learning Management System : Relevance , Challenges and Preparedness. *J Emerg Technol Innov Res.* 2020;7(May):471–80.
 8. Sharov S, Filatova O, Sharova T. The Development of an Online Platform for Studying Ukrainian Literature. *TEM J.* 2020;9(3):1171–8.
 9. Aristovnik A, Keržič D, Ravšelj D, Tomaževič N, Umek L. Impacts of the COVID-19 Pandemic on Life of Higher Education Students : A Global Perspective. 2020;(August):1–34.
 10. Presmeg N. Commognition as a lens for research. *Educ Stud Math.* 2015;(December).
 11. Owusu_Fordjour C, Koomson C, Hanson D. THE IMPACT OF COVID-19 ON LEARNING - THE PERSPECTIVE OF THE THE IMPACT OF COVID-19 ON LEARNING -. *Eur J Educ Stud.* 2020;7(June):88–101.
 12. Aristovnik A, Umek L. Impacts of the COVID-19 Pandemic on Life of Higher Education Students : A Impacts of the COVID-19 Pandemic on Life of Higher Education Students : A Global Perspective. 2020;(August).
 13. Nardi E, Ryve A, Stadler E, Viirman O. Research in Mathematics Education Commognitive analyses of the learning and teaching of mathematics at university level : the case of discursive shifts in the study of Calculus. 2014;(December):37–41.
 14. Sfard A. There is More to Discourse than Meets the Ears : Looking at Thinking as Communicating to Learn More About Mathematical Learning. *Educ Stud Math.* 2001;(March 2001).
 15. Sfard A, Kieran C, Forman EA. Learning Discourse: Discursive Approaches to Research in Mathematics Education. *Educ Stud Math.* 2002;46(July 2014).
 16. Ryve A, Nilsson P, Pettersson K. Analyzing effective communication in mathematics group work : The role of visual mediators and technical terms. 2013;497–514.
 17. Berger M. Examining mathematical discourse to understand in-service teachers ’ mathematical activities Commognitive framework. *Pythagoras.* 2001;1–10.
 18. Nathan M. Exploring Sfard’s Commognitive Framework: A Review of. *JRME.* 2009;571–6.
 19. Sfard A, Kieran C. Thinking as communicating : Human development , the growth of Cognition as Communication : Rethinking Learning-by-Talking Through Multi-Faceted Analysis of Students ’ Mathematical Interactions. 2016.
 20. Zayyadi M. A Commognitive Framework : The Process of Solving Mathematical Problems of Middle School Students. *Int J Learn Teaching, Educ Res.* 2019;18(2):89–102.
 21. Siyepu SW, Ralarala MK. Making Sense of Mathematical Discourse : Implications for Success in the Learning of Differentiation in a University Classroom. *Alternation.* 2014;12(12):326–57.
 22. Gcasamba LC. A DISCURSIVE ANALYSIS OF LEARNERS ’ MATHEMATICAL THINKING : THE CASE OF FUNCTIONS. 2014.
 23. Ioannou M. A commognitive analysis of mathematics undergraduates ’ responses to a commutativity verification Group Theory task. 2016;
 24. Tabach M. COMBINING THEORIES TO ANALYZE CLASSROOM DISCOURSE : A METHOD TO STUDY LEARNING PROCESS. 2008;

25. Shinno Y. Reification in the Learning of Square Roots in a Ninth Grade Classroom : Combining Semiotic and Discursive Approaches. *Int J Sci Math Educ.* 2018;295–314.
26. Semradova I, Hubackova S. Teacher Responsibility in Distance Education. *Procedia - Soc Behav Sci.* 2016;217:544–50.