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Misconceptions about Integer and Fractional Numbers for Class V Elementary School Students Through Learning During The Covid-19 Pandemic

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ABSTRACT

Conceptual understanding is a basic ability that students must have. This ability becomes the foundation to be able to solve various forms of problems. In addition, a good understanding of concepts will help students understand the next material, because the material in mathematics is hierarchical. This study uses indicators of ability to understand mathematical concepts according to Kilpatricket al., (in Lestari and Yudhanegara, 2015) as follows: (a) Restate the concepts that have been learned, (b) Classify objects based on mathematical concepts, (c) Apply concepts algorithmically, (d) Providing examples or counter-examples of the concepts studied, (e) Presenting concepts in various representations, (f) Linking various mathematical concepts internally or externally. The research results show that mathematical misconceptions occur in elementary school students. The mathematical misconceptions found in this study are mainly related to concepts related to numbers and fractions. Concepts related to numbers include: (1) the concept of minus and negative signs (–) as operations and types of a number, (2) concepts related to decimal numbers, and (3) the concept of multiplication as repeated addition. Concepts related to fractions include: (1) the concept of fractions (2) the concept of percentages (3) the concept of addition and subtraction, and (4) the concept of multiplication and division of fractions.

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INTRODUCTION

The understanding of the concept of fractions that students receive when they occupy primary school is a very important factor because it can be a strength or even a weakness in the next, more complex stages. Misconceptions understood by students at the introductory stage can make it difficult for them when learning fractions at a higher level (Li & Smith, 2007; Morge, 2012; Naiser, Wright, & Capraro, 2004).

The concept of fractions is a concept that is difficult for some elementary school students to understand, it is not easy for grade 4 elementary school students to understand the concept of fractions which they first encountered since entering elementary school. Students still consider fractional material difficult (David W.Test & Michael F.Ellis, 2005; Brown, G.; Quinn, 2007; Bossé et al., 2018). On the other hand, fractions as part of mathematics subject matter are dominated by abstract objects (Saleh, Prahmana, Isa, & Murni, 2018; Saleh, 2013). A teacher as a facilitator and mentor of students requires the right strategy in carrying out the right learning process by considering students' thinking stages, especially for students who are at the concrete thinking stage (Zhang, Stecker, & Beqiri, 2017).

A teacher as a facilitator and mentor of students requires the right strategy in carrying out the right learning process by considering the stages of student thinking, especially for students who are at the concrete thinking stage (Zhang, Stecker, & Beqiri, 2017; Appleton, 2012; Gravemeijer, 2014). Students' understanding of fractions needs to be opened by showing and presenting real "fractions" through objects they can see and touch (Swanson & Williams, 2014). Teaching programs in elementary schools to provide opportunities for students to understand the concept of material as a key instrument of the learning process (Koenig, 2006; Nizar, Jember, Lukito, Amin, & Surabaya, 2017; Sumirattana, Makanong, & Thipkong, 2017; Molefe, Stears, & Hobden, 2016) The Covid-19 pandemic hit almost all countries in the world and especially in Indonesia and finally it was also felt in Indonesia. The Indonesian government is working hard to prevent the spread of Covid-19 from spreading. As an effort to prevent the spread of Covid-19 in the education sector, the Ministry of Education and Culture (Kemendikbud) has issued several circulars. One of these circulars regulates the implementation of education policies during the Covid-19 pandemic, namely the Minister of Education and Culture Circular No. 4 of 2020 concerning Implementation of Education Policies in the Emergency Period of the Spread of Coronavirus Disease (Covid-2019). In the second point of the circular letter, it is explained that: "...the learning process from home is carried out with the following provisions: first, it is carried out to provide a meaningful learning experience for students, without being burdened with the demands of completing all curriculum achievements for grade promotion and graduation. Second, it is focused on life skills education, including regarding the Covid-19 pandemic. The three learning activities and assignments can vary between students, according to their respective interests and conditions, including considering the gap in access/study facilities at home. Fourth, evidence or products of learning activities from home are given qualitative and useful feedback from the teacher, without being required to give a quantitative score/value."

Furthermore, the Ministry of Education and Culture also issued Circular Number 15 of 2020 concerning Guidelines for Organizing Learning from Home in the Emergency Period of the Spread of Covid-19 to strengthen the previous Circular Letter regarding learning during the Covid-19 pandemic (Ministry of Education and Culture, 2020). Human Resource Management in improving learning strategies in the new normal/post-Covid-19 era is an effort, mature readiness, provision both in terms of Information Technology skills and the progress of virtual learning. The most appropriate learning strategy in the new normal/post-Covid-19 pandemic era is to follow the rules of the Ministry of Education and Culture with virtual learning through an agreed platform. For this reason, two main elements in teaching and learning activities take place, namely students and teachers must be equipped, qualified and know the direction of learning that will be filtered in order to minimize misunderstandings between teachers and students (Syamsul & Novira, 2020). The learning that is carried out also does not have to be focused on online learning and giving assignments, especially in learning mathematics in elementary schools.

METHOD

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Concepts are symbols of thinking that are classified based on certain characteristics (Uno, 2009). According to Kilpatrik et al., (in Lestari and Yudhanegara, 2015) the ability to understand concepts is an ability related to understanding comprehensive and functional mathematical ideas. Conceptual understanding is a basic ability that students must have. This ability becomes the foundation to be able to solve various forms of problems. In addition, a good understanding of concepts will help students understand the next material, because the material in mathematics is hierarchical. This study uses indicators of ability to understand mathematical concepts according to Kilpatricket al., (in Lestari and Yudhanegara, 2015) as follows: (a) Restate the concepts that have been learned, (b) Classify objects based on mathematical concepts, (c) Apply concepts algorithmically, (d) Providing examples or counter-examples of the concepts studied, (e) Presenting concepts in various representations, (f) Linking various mathematical concepts internally or externally.

This research was conducted on 24 elementary school students. The instrument used was an essay test. The test material is the concept of integers, fractions, and percentages.

RESULT AND DISCUSSION

The results of the study show that concepts in mathematics play an important role. This is as stated by Schoenfeld (2005:5), "The concept is critically important because it points to a form of knowledge that is now understood to be a central aspect of competent teaching - and, one that is at variance with simple notions of teacher 'training'". This study aims to describe the mathematical misconceptions that occur in elementary school students. The mathematical misconceptions in this study are limited to concepts related to numbers and fractions. Some of the concepts related to numbers are:

(1) the concept of minus and negative signs (–) as operations and types of a number, (2) the concept related to decimal numbers, and (3) the concept of multiplication as repeated addition. Concepts related to Fractions include: (1) the concept of fractions (2) the concept of percentages (3) the concept of addition and subtraction, and (4) the concept of Multiplication and Division of Fractions. The discussion regarding the findings of misconceptions about these concepts is described as follows:

The minus sign(–) is defined as the symbol for subtraction. Meanwhile, a negative sign (–) is defined as the type of a number, namely a negative number, or at the elementary school level is a negative integer. In the concept of minus and negative signs, almost all of the respondents could understand and distinguish these things. However, there are still two respondents who experience misconceptions and confusion about this difference. This is because the respondent is used to saying "min or minus" both as an operation and as a type of number.

The respondent's understanding can be said to be good regarding the concept of decimal number values. As many as 24 respondents out of 28 respondents were able to compare the values of several decimal numbers given. However, there were four respondents who experienced misconceptions. This was found, for example, when respondents were asked to compare 0.2 and 0.20, these respondents said 0.2 <0.20. Based on the interview results, respondents considered that a decimal number with more decimal places is considered to have more value than the same number, but with fewer decimal places. In this case the respondent thinks that 0.20 is more than 0.2 because in the number 0.20 there are two decimal places, while in the number 0.2 there is only one decimal place.

Misconceptions related to the concept of fractions Students cannot describe fractions 1/3 or fractions ½ (experienced by 7 students out of 28 students) this is because students do not understand the meaning of fractions ½ or 1/3. Misconceptions also occur in adding and subtracting fractions, there are still students who add up the numerators of two fractions while the denominators are not the same (occurring in 8 students out of 24 students), the reason is that students do not understand the concept of addition and subtraction operations on fractions. While a small number of students experience misconceptions about multiplication and division of fractions, multiplying the quantifier but the denominator is the same (there were 3 students out of 24 students), the reason is that students do not understand the concept of multiplication and division operations on fractional numbers.

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Table 1. Summary of misconceptions among elementary students

No.	Concept	Misconceptions That Occur	Reason
1.	Minus sign and negative (–) as operation and type a number	Cannot distinguish between minus and negative signs (–). (Experienced by 2 respondents out of 28 respondents)	The habit of saying "min or minus" both as an operation and as a type of number
2.	Decimal Number	Assume that 0.20 is more than 0.2. (Experienced by 4 respondents out of 28 respondents)	Assume that the number is ecimal with more numbers behind comma has a value greater than the same number but with number of decimal places less
3.	Fraction Concept	Students cannot describe fractions 1/3 or fractions ½ (experienced by 7 students out of 28 students.	Students do not understand the meaning of fractions ½ or 1/3
4.	Addition and Subtraction Operations on Fractional Numbers	In addition and subtraction of fractions, there are still students who add up the numerators of two fractions while the denominators are not the same (occurred in 8 students out of 24 students)	Students do not understand the concept of addition and subtraction operations on fractions
5.	Multiplication and Division Operations on Fractional Numbers	Multiplying the quantifier but keeping the denominator (there were 3 students out of 24 students)	Students do not understand the concept of multiplication and division operations on fractional numbers

Based on Table 1, it is known that the misconceptions of mathematics in elementary school students are more common in concepts related to fractions. These results are in accordance with Gradini's research (2016) which examined mathematical misconceptions in teachers and students which stated that more mathematical misconceptions were found related to the concept of fractions.
The concept is one of the objects of mathematics. Furthermore, Gagne argued that concepts in mathematics are abstract ideas that convince people to classify objects or events into examples or non-examples of a particular object.

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Mathematical concepts are mathematical 'big ideas'. Knowing math concepts means we know the workings behind the answers. We know why we get the answers we get and don't need to memorize answers or formulas to find them. Because you know why things work, you can figure out your own answers and formulas for students to solve simple number-based problems. We are for students to solve simple number based problems.

Through the use of mathematics, students can calculate the purchase of goods in a store, determine the number of objects needed and calculate the distance. While the discipline of mathematics is becoming very complex, there are some basic math skills that every student can and should learn during their mathematics education program.

Math facts are something that can be memorized or written down. For example, the multiplication and addition tables are math facts because they tell us that the facts are 1 + 1 = 2 and 2 x 2 = 4. There are no ifs, ands, or buts about them.

Knowing math facts allows us to recall information when we need it, such as for a test. However, if we are given a similar problem but using different numbers or settings, then we won't be able to do the problem knowing only the facts and not the concept behind it. We don't know how the problem works so can't solve it due to the fact that what we do know doesn't include that particular problem. Let's compare some math concepts and math facts

The growing development of technology can be utilized in the learning process to help achieve learning objectives properly. One of the technological tools that can be used in the learning process is an Android mobile phone that is familiar to the public and students. According to (Ghavifekr, Ahmad Zabidi Abd Razak Muhammad Faizl A. Ghani, Ng Yan Ran, Yao Mei VIII, & Zhang Tengyue, 2014) information, communication and technology (ICT) skills can provide dynamic and proactive teaching in a learning environment. Meanwhile, according to (Kadiyala & Crynes, 2000) technology in education has been proven to be able to stimulate more interactive learning, effective grouping of students and cooperative learning. Teachers are indirectly required to be able to balance the implementation of learning in the classroom with the development of this technology. In the sense that teachers are able to integrate ICT in their daily learning activities. ICT integration in learning activities can be realized in various ways, such as ICT integration assisting teachers in replacing traditional teaching methods with technology-based teaching and learning tools and facilities. This is because the use of ICT devices will prepare an active and interesting learning environment for both students and teachers (Ghavifekr, Athirah & Rosdy). So, with the synergy between technology and learning, it is hoped that the implementation can run effectively and efficiently. the results of observations of several elementary students obtained data that students still experienced difficulties and did not achieve mastery learning in Flipped Classroom learning. This is because students still experience difficulties in the process of understanding mathematical abilities

CONCLUSION

The research results show that mathematical misconceptions occur in elementary school students. The mathematical misconceptions found in this study are mainly related to concepts related to numbers and fractions. Concepts related to numbers include: (1) the concept of minus and negative signs (–) as operations and types of a number, (2) concepts related to decimal numbers, and (3) the concept of multiplication as repeated addition. Concepts related to fractions include: (1) the concept of fractions (2) the concept of percentages (3) the concept of addition and subtraction, and (4) the concept of multiplication and division of fractions.

REFERENCES

[1] Amir-Mofidi, S., Amiripour, P., & Bijan-Zadeh, M. H. (2012). Instruction of mathematical concepts through analogical reasoning skills. *Indian Journal of Science and Technology, 5*(6), 2916–2922.

Volume 2, No.2, November 2022, Pages: 8-15
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http://internationaljournal.unigha.ac.id/

Retrieved from http://www.indjst.org/index.php/indjst/issue/view/2889

[2] Appleton, S. J. (2012). *Conceptual Understanding Of Fractions And Decimals For Fourth Grade Students* (Boise State University). https://doi.org/10.1016/j.kjss.2016.06.001

[3] Arends, F., Winnaar, L., & Mosimege, M. (2017). Teacher classroom practices and mathematics performance in South African schools: A reflection on TIMSS 2011. *South African Journal of Education*, *37*(3), 1–11. https://doi.org/10.15700/saje.v37n3a1362

[4] Bayaga, A., & Bossé, M. J. (2018). Semantic and syntactic fraction understanding. *International Electronic Journal of Elementary Education*, *11*(2), 135–142. https://doi.org/10.26822/iejee.2019248587

[5] Bossé, M. J., Bayaga, A., Fountain, C., Lynch-Davis, K., Preston, R., & Adu-Gyamfi, K. (2018). Fraction learners: Assessing understanding through language acquisition. *International Electronic Journal of Elementary Education*, *11*(2), 113–124. https://doi.org/10.26822/iejee.2019248585

[6] Brown, G.; Quinn, R. J. (2007). *Investigating the relationship between fraction proficiency and success in algebra* (pp. 8–15). pp. 8–15. Retrieved from https://www.aamt.edu.au/Journals/Journals-Index/The-Australian-Mathematics-Teacher/AMT-63-4-8

[7] Carpendale, J. I. M. (2018). from Piaget's Constructivist, Process Worldview to Methods. *Constructivist Foundations*, *14*(1), 82–84. Retrieved from http://e-resources.perpusnas.go.id:2091/eds/pdfviewer/pdfviewer?vid=7&sid=016b7680-d3ea-462f-a1cd-89ffcc2a75af%40sdc-v-sessmgr01 Concepts, D. F. (n.d.). *Developing Fraction Concepts*.

[8] David W.Test, & Michael F.Ellis. (2005). *The Effects of LAP Fractions on Addition and Subtraction of Fraction With Students With Mild Disabilities* (pp. 11–24). pp. 11–24. Retrieved from http://www.jstor.org/stable/42899825

[9] Gravemeijer, K. (2014). Local Instruction Theories as Means of Support for Teachers in Reform Mathematics Education. *Mathematical Thinking and Learning*, *6*(2), 105–128.

[10] Julie, H., Suwarsono, S., & Juniati, D. (2013). The First Cycle of Developing Teaching Materials for Fractions in Grade Five Using Realistic Mathematics. *Journal on Mathematics Education*, *4*(2), 172–187. https://doi.org/10.22342/jme.4.2.415.172-187

[11] Koenig, G. (2006). *Orchard Software and the NCTM Principles and Standards for School Mathematics Orchard Software and the NCTM Principles and Standards for School Mathematics*. 2–10. Retrieved from siboneylg.com › docs › NCTMPrinciplesStandardsPositionPaper

[12] Li, Y., & Smith, D. (2007). Prospective Middle School Teachers' Knowledge in Mathematics and Pedagogy for Teaching - the Case of Fraction Division. In H.-J. Woo, H.-C. Lew, K.-S. Park, & D.-Y. Seo (Eds.), *Pme 31: Proceedings of the 31St Conference of the International Group for the Psychology of Mathematics Education, Vol 3* (Vol. 3, pp. 185–192). Retrieved from https://eric.ed.gov/?id=ED499419

[13] Liu, C., Xin, Z., & Li, X. (2011). The Development of Chinese Students' Understanding of the Concept of Fractions from Fifth to Eighth Grade. *Journal of Mathematics Education*, *4*(2), 17–34.

Volume 2, No.2, November 2022, Pages: 8-15
ISSN 2775-4928 (Print) ISSN 2775-8893 (Online)
http://internationaljournal.unigha.ac.id/

Retrieved from http://educationforatoz.com/images/Liu_Xin_Li.pdf

[14] Molefe, L., Stears, M., & Hobden, S. (2016). Exploring student teachers' views of science process skills in their initial teacher education programmes. *South African Journal of Education*, *36*(3), 1–12. https://doi.org/10.15700/saje.v36n3a1279

[15] Morge, S. P. (2012). Family Connections Helping Children Understand Fraction Concepts Using Various Contexts And Interpretations. *Childhood Education*, *87*(4), 282–284. https://doi.org/10.1080/ 00094056.2011.10523193

[16] Naiser, E. A., Wright, W. E., & Capraro, R. M. (2004). Teaching Fractions: Strategies Used for Teaching Fractions to Middle Grades Students. *Journal of Research in Childhood Educations*, *18*(3), 193–198. https://doi.org/10.1080/02568540409595034

[17] Nizar, A., Jember, U. M., Lukito, A., Amin, S. M., & Surabaya, U. N. (2017). A Learning Trajectory of Indonesian 12-years Old Students Understanding of Division of Fractions A Learning Trajectory of Indonesian 12-years Old Students Understanding of Division of Fractions Faculty of Mathematics and Natural Science , Surabaya State U. *Southeast Asian Mathematics Education Journal*, *7*(2), 41–52. Retrieved from https://www.researchgate.net/publication/322701143_A_Learning_Trajectory_of_Indonesian_12-years_Old_Students_Understanding_of_Division_of_Fractions

[18] Özsoy, G. (2018). Pre-service teachers' use of visual representations. *International Electronic Journal of Elementary Education*, *11*(1), 49–54. https://doi.org/10.26822/IEJEE.2018143960

[19] Saleh, M. (2013). Meningkatkan Pemahaman Siswa tentang Konsep Pecahan melalui Benda Manipulatif. *Jurnal Serambi Ilmu*, *14*(2), 119–124. https://doi.org/http://dx.doi.org/10.32672/si.v17i2.544

[20] Saleh, M., Darhim, D., & Sabandar, J. (2017). The Enhancement of Problem Solving Ability Through. *International Journal of Education and Research*, *5*(5), 159–168. Retrieved from http://www.ijern.com/May-2017.php

[21] Saleh, M., Isa, M., Murni, Darhim, & Irianto, A. B. (2019). Student s ' Error Types And Reasoning Ability Achievement Using The Indonesian Realistic Mathematics Education Approach. *International Journal of Scientific & Technology Research*, *8*(07), 364–369. Retrieved from http://www.ijstr.org/research-paper-publishing.php?month=july2019

[22] Saleh, M., Prahmana, R. C. I., Isa, M., & Murni. (2018). Improving the reasoning ability of elementary school student through the Indonesian realistic mathematics education. *Journal on Mathematics Education*, *9*(1), 41–53. https://doi.org/http://dx.doi.org/10.22342/jme.9.1.504

[24] Swanson, D., & Williams, J. (2014). Making abstract mathematics concrete in and out of school. *Educational Studies in Mathematics*, *86*(2), 193–209. https://doi.org/10.1007/s10649-014-9536-4

[25] Wahyu, K., Amin, S. M., & Lukito, A. (2017). Motivation Cards to Support Students' Understanding on Fraction Division. *International Journal on Emerging Mathematics Education*, *1*(1), 99–120. https://doi.org/10.12928/ijeme.v1i1.5760

[26] Zhang, D., Stecker, P., & Beqiri, K. (2017). Strategies Students with and Without Mathematics Disabilities Use When Estimating Fractions on Number Lines. *Learning Disability Quarterly*, *40*(4), 225–236. https://doi.org/10.1177/0731948717704966

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