The Implementation of Comic Supplementary Tutor Feedback In Contextual Teaching Hybrid Learning on The Achievement of Higher Order Thinking Skill Viewed From Students' Mathematics Disposition

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Article Info	Abstract
	This study aims to determine the quality of learning by applying comic supplementary tutor feedback in contextual teaching hybrid learning in order to achieve students' higher order thinking skills in mathematics. The method used in this study is mixed methods with sequential design. The results of this study showed that the implementation of comic supplementary tutor feedback in the contextual teaching hybrid learning had a certain quality on achieving students' higher order thinking skills in mathematics. In subjects with higher category disposition, it revealed that the answers of subject 1 and subject 2 have reached the indicator of analyzing and evaluating, but the indicator of creating has not been seen yet. Moreover, subjects with moderate disposition category showed that the answers of subject 1 and subject 3 have reached the indicator of analyzing and evaluating but the indicators of creating have not been seen yet. Whereas subject 2 showed that indicators of analyzing, evaluating, and creating have not been achieved yet. However, subjects with low category disposition showed that the answers of subject 1 did not show the achievement on the indicator of analyzing, evaluating and creating, but at the evaluating stage, there was already a correct answer until the end

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INTRODUCTION

The improvement of education in the industrial era 4.0 towards the era of society 5.0 is an obligation that is demanded for every group and individual in a country. For that reason, the ministry of education and culture in Indonesia states that one of the efforts to improve education is launching a program namely BERMUTU (Better Education Through Reformed Management Universal Teacher Upgrading) (Kemendikbud, 2014). These efforts can be realized through the existence of good learning in order to improve the education nowadays.

Learning is a process passed by students to get guidance and teaching in the classroom so that they can change their way of learning from experience in order to form a process of knowledge that begins with cognitive conflict. In fact, the learning that has taken place at this time is still not successful to improve the students' quality in terms of knowledge. This can be shown in the classroom learning activities, teachers provide learning by using models and methods that are still teacher-centered, so that the interaction between teachers and students in conducting discussions, exploration, and investigations related to ideas is still not optimal. This situation shows that the students are still not able to follow what the teacher wants, such as solving problems, communicative discussion, and exploring learning (Putra, 2017; Effendi, 2012).

That such thing is also desirable in mathematics learning that binds to cognitive processes. Mathematics learning pursues the students' thinking process in developing concepts to apply mathematics in daily life. Through mathematics learning, the students' way of thinking is expected to develop well because mathematics has structure as well as strong and clear linkages between existing concepts (Wibowo, 2017).

The improvement in the quality of mathematics learning cannot be separated from the actual learning objectives. The purpose of learning mathematics is to equip students with logical, analytical, systematic, critical, creative, and team work abilities (BSNP, 2006; Lismareni, 2015). In line with this reason, the goal of mathematics learning is to improve the ability of problem solving, communication, and students' mathematical connections (NCTM, 2000). However, the results of the survey shown by Trends in Mathematics International and Science Study (TIMSS) in 2015 stated that children's thinking ability in Indonesia was considered low, TIMSS results stated that the average mathematics of students in Indonesia was 406, ranking the 40 out of 42 countries participated in TIMSS. This was also shown in the Program for International Students Assessment (PISA) released by the Organization for Economic Co-operation and Development (OECD) in 2019 showing that the mathematical ability of students in Indonesia was ranked 72 out of 78 countries evaluated. Therefore, the students' ability to think in mathematics in Indonesia is still low, one of which is the higher order thinking skills. For that reason, higher order thinking skills of mathematics in Indonesia need to be increased or developed.

Higher order thinking skills in mathematics mean the ability to connect, manipulate, and change the knowledge and experience that has been critically and creatively owned in determining decisions to solve problems in new situations (Dinni, 2018). However, the fact shows that solving mathematical problems still use low order thinking skills that make it difficult for students to develop their higherer order thinking skills (Rochman and Hartoyo, 2018). Nowadays, higher order thinking skill is no longer a new term. Teachers as well as students must be accustomed to this field starting from the process of preparing learning tools up to the evaluation, because this skill demands a process of thinking in the cognitive domain to make the students be able to analyze and evaluate problems solving critically and creatively (Lusiyana, 2018).

The indicators used to measure the higher order thinking skill include: (1) analyzing, means that students can distinguish, organize, and connect mathematical problems; (2) evaluating, means that students can check and criticize the problems found in mathematics; and (3) creating, which means that students can formulate, plan, and produce something from the problems given by the instructor (Krathwohl & Anderson, 2002). The higher order thinking skills in mathematics can be seen from affective aspects, one of which is the disposition of mathematics.

Mathematical disposition is a positive attitude towards mathematics (Lusiyana, 2018).

Mathematical Disposition is a desire, awareness, dedication, and a strong tendency for students to think and do mathematics in a positive way (Akbar, 2018). Relationship and appreciation of mathematics is a tendency to think and act in a positive way (NCTM, 2000). Based on the definition above, the disposition of mathematics is the interest of students in learning mathematics and the tendency of students to consider mathematics in a positive way.

There are seven components of mathematical disposition according to Polking, which then are broken down into three mental functions of mathematical disposition namely cognitive, affective, and conative as presented by James Beyers. They are (1) cognitive dispositional mental function covering two subcategories namely connection and argumentation, (2) Affective dispositional mental functions include six subcategories, namely Nature of Mathematics, Usefulness, Worth whileness, Sensibleness, Mathematics Self-Concept, Attitude, and Math Anxiety, and (3) Conative dispositional mental function which only has one subcategory namely Effort / Persistence (Bayers , 2011).

As for realizing learning that can develop higher-order thinking skills in mathematics, there is a need for effective and qualified learning innovations in accordance to the actual learning goals, one of which is the existence of models in mathematics learning to make students not feel monotonous in the learning process. The model that can be used in mathematics learning is Contextual Teaching Hybrid Learning (CTHL). The Contextual Teaching and Learning Model is a learning model that directly links mathematics learning material with everyday life so students can build knowledge with what they often do and can deduce the problems that exist in mathematics material (Sailo, 2017). Meanwhile, hybrid learning is integrated with CTL so that learning is not only Face to Face (F2F) but learning is done in a Virtual Workshop (VW) (Asyrofi, 2016). Hybrid Learning is a combination of learning through face-to-face in class and online learning (Sowanto, 2019). In connection to the contexts of everyday life and the existence of hybrid learning, it can add interesting things to the innovation of mathematics learning, one of them is the media of mathematics comics.

Comics can be defined as a cartoon form that expresses characters and plays a story in a sequence that is closely connected with the picture and is designed to provide entertainment to the reader (Sudjana & Rivai, 2011). Comic is one of the media that is close to stories or illustrations of real events that become an interesting learning material in mathematics. Learning mathematics using comics can provide a full of joy and fun learning activity, because students can get something different in their learning process such as there are some pictures and illustrations of real events in everyday life (Nuroeni, 2013). In addition, in the process of making comic media, feedback can also be inserted in mathematics learning in order to stimulate interaction between teachers and students.

Feedback defined as an action given by the teacher to help students in understanding and mastering the material delivered by the teacher (Windarsih, 2017). Feedback can help students and teachers become more focused on learning mathematics (Anggraini and Hudiono, 2015).

Based on the description above, learning innovations that will be carried out are expected to foster development and improvement of students' higher order thinking skills in learning mathematics. In addition, this learning model can be a reference for every teacher to make learning innovations in order to create a more meaningful and enjoyable learning.

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METHODS

The research method used in this study was Mixed Methods with sequential design. The design form was specifically using sequential explanatory design. This design form was done by combining quantitative and qualitative research method gradually but in different values.

This research was conducted at SMP Negeri 4 Cirebon City with quantitative research subjects are mathematics teachers and students of grade VII. In quantitative research, it will be conducted on all students of class VII I by giving them a model of contextual teaching hybrid learning with comic supplementary tutor feedback and VII K by using a model of contextual teaching hybrid learning. The quantitative sampling technique used was random

sampling. On the other hand, for the qualitative research, the research subject is called informants. The informants that were taken in this study came from the disposition categories, respectively from the high, moderate and low dispositions.

The qualitative sampling technique used was purposive sampling. The data collected in this study were using quantitative and qualitative approaches. Then, the instruments used were questionnaires, tests, observations, interviews, and documentation.

RESULTS AND DISCUSSION

Penelitian ini menguji kualitas This study examined the quality of learning which consisted of learning mastery test, classical mastery test, proportion difference test, and average difference test. The learning mastery test was conducted in order to find out whether the experimental class has reached minimum mastery or not. The average score on the students' mathematical higher order thinking skill was at least 68, according to the Minimum Mastery Criteria (KKM) taken from the Actual Completion Limit (AFB). The learning mastery test used one sample T test and right tailed test with a minimum mastery criterion was 68. Based on the calculations, the t_{count} is 3.351. Because 3,351> 2,026, H_0 was rejected, which means that the average value of students' mathematical higher order thinking skills have reached the actual mastery level.

Classical mastery test was conducted to find out whether the students' mathematical higher order thinking skills in the experimental class have achieved classical mastery or not. In this study, if the number of students who are able to complete the final test is at least 75% of the students in the class, it can be said that the learning process has achieved classical mastery. The test used was a one sample right tailed proportion test. Based on manual calculations, it obtained that z_{count} = 1.42 > z_{table} = 0.92. So H_0 is rejected, which means that more than 75% of all students have exceeded the KKM on tests of higher order thinking skills in mathematics.

The average difference test in this study was used to find out whether students higher order thinking skills in learning mathematics using comics supplementary tutor feedback in contextual teaching hybrid learning was better than students higher order

thinking skills in contextual teaching hybrid learning. The test used was the right tailed Independent T test. Based on the calculation, the t value is 2.60. Because 2.60 > 1.99, H_0 is rejected, which means that the average test results of students' higher order thinking skills in learning mathematics using comic supplementary tutor feedback on learning contextual teaching hybrid learning were more than the other students that only used contextual teaching hybrid learning.

A proportion difference test was conducted to find out whether the proportion of students who completed individually on the final test of students higher order thinking skills in learning mathematics using comic supplementary tutor feedback in contextual teaching hybrid learning was better than the other students who only given contextual teaching hybrid learning. This difference in proportion test uses a right tailed test. Based on manual calculations obtained z_{count} = 3.50 > z_{table} = 0.99. So H_0 is rejected, which means that the proportion of students higher order thinking skills in learning mathematics could exceed the KKM through the implementation of comic supplementary tutor feedback on contextual teaching hybrid learning rather than the proportion of students who exceed KKM in contextual teaching hybrid learning.

The results of higher order thinking skill in mathematics based on the category of mathematical disposition revealed that there are patterns high disposition categories. One of the results of a higher order thinking skill test showed that the subjects were able to complete the test very well. The score of their higher order thinking skills was 100. The description of the test execution based on the analyzing indicator (C4) can be seen in Figure 1.
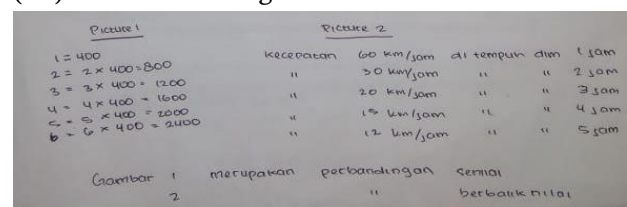

Figure 1. Results of Analyzing Indicator in High

Disposition Category

Based on Figure 1, the test done by subject 1 has been completed. Subject 1 could parse, formulate, and examine question number 1 without giving any

stages of completion. Overall subject 1 has done the test well and the answer was correct.

The description of test execution based on the evaluating indicator (C5) can be seen in Figure 2.
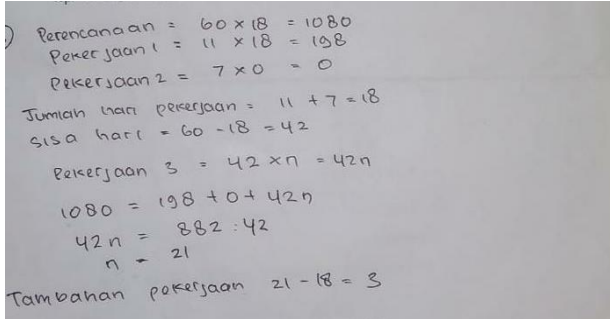

Figure 2. Results of Evaluating Indicator in High

Disposition Category

Based on Figure 2, the test done by subject 1 has been completed. Subject 1 was able to give the correct answer by emphasizing the problem up to the end of question number 5 without giving any reason in completing the test.

The description of the test execution based on the creating indicator (C6) can be seen in Figure 3.
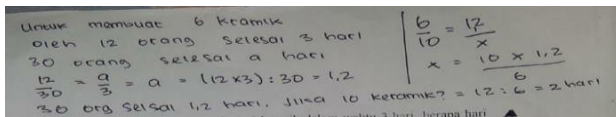

Figure 3. Results of Creating Indicator in High

Disposition Categories

Based on Figure 3, the test done by subject 1 has been completed. Subject 1 solved problem number 4 correctly. But, in solving the problem, he was not able to design a solution by integrating the information contained in the test.

Meanwhile the results of higher order thinking skills in mathematics based on the category of mathematical disposition shows that there was also a pattern in a moderate disposition category. One of the results of a higher order thinking skills test showed that this subject was able to do the test very well. This subject gets a 100 score in his higher order thinking skills test. The description of the test execution based on the analyzing indicator (C4) can be seen in Figure 4.
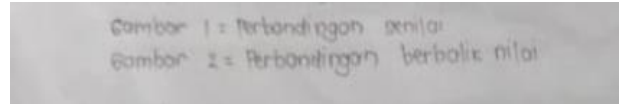

Figure 4. Results of Analyzing Indicator in Moderate Disposition Category

Based on Figure 4, the test done by subject 1 has been completed. Subject 1 was unable to parse, formulate, and check the question number 1 and by not giving the stages of completing the test, but subject 1 answered correctly.

The description of the test execution based on the evaluating indicator (C5) can be seen in Figure 5.
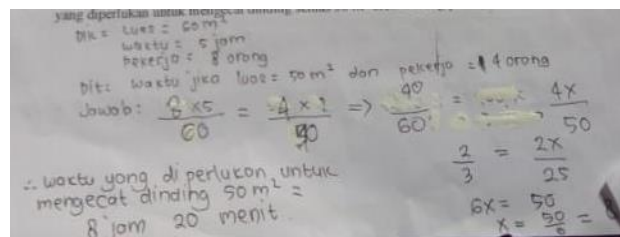

Figure 5. Results of Evaluating Indicator in Moderate Disposition Category

Based on Figure 5, the test done by subject 1 has been completed. Subject 1 was able to give the correct answer by affirming the problem to the end of question number 3 without giving any reason in solving the questions.

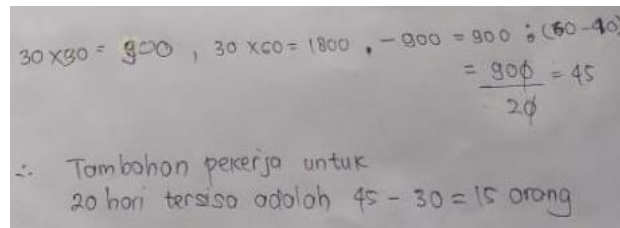The description of the test execution based on the creating indicator (C6) can be seen in Figure 6.

Figure 6. Results of Creating Indicator in Moderate

Disposition Category

Based on Figure 6, the test done by subject 1 has been completed. Subject 1 solved the question number 6 correctly, but in solving the question, he was not able to design a solution by integrating the information contained.

The last, the results of higher order thinking skills in mathematics based on the category of mathematical disposition showed that there were also patterns in low disposition categories. The results of

higher order thinking skills test showed that this subject was able to do the test quite well. The score of his higher order thinking skill test was 63. The description of the test execution based on analyzing indicators (C4) can be seen in Figure 7.
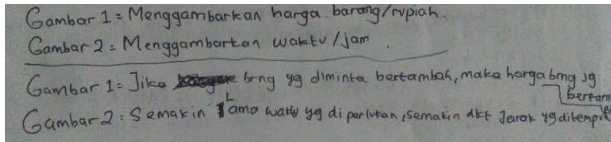

Figure 7. Results of Analyzing Indicator in Low

Disposition Categories

Based on Figure 7, the test done by subject 1 has been completed. In completing the test, subject 1 can parse and provide the stages of completion in question number 1 but he's unable to formulate the problem so that the answer is less precise.

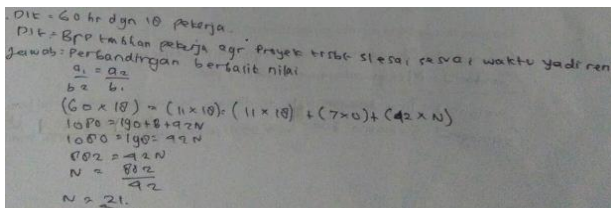The description of test execution based on the evaluating indicator (C5) can be seen in Figure 8.

Figure 8. Results of Evaluating Indicator in Low Disposition Category

Based on Figure 8, the test done by subject 1 has been completed. He was able to give less answer and could not answer the question up to the end of question number 5. Besides, he was also unable to provide a reason in solving the problem.

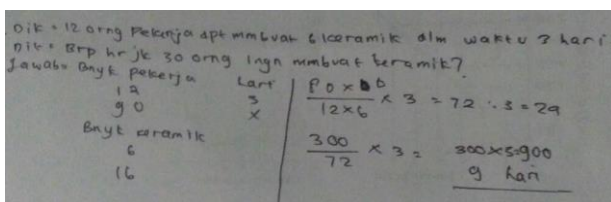The description of the test execution based on the creating indicator (C6) can be seen in Figure 9.

Figure 9. Results of Creating Indicator in Low Disposition Category

Based on Figure 9, the test done by subject 1 has been completed. Subject 1 solved question number 4 correctly. But, in completing the test, he was not able to design a solution through integrating the information contained in the question.

CONCLUSION

The implementation of comic supplementary tutor feedback in the contextual teaching of hybrid learning can achieve higher order thinking skills in mathematics learning. This is indicated by the results of calculations that have reached the learning mastery, 75% are classical mastery. Meanwhile, there exist a proportion and better average difference between the experimental and control classes. In subjects with higher category disposition, the answers have reached the analyzing and evaluating indicators, but the creating indicators does not exist yet. In subjects with moderate disposition categories, the answers have reached the indicators of analyzing and evaluating but there is still no achievement in creating indicators. Moreover, the subject with low category disposition showed that they do not give the answer that has reached the analyzing, evaluating and creating indicator, however at the evaluation stage there is already a right one in answering the answer up to the end.

REFERENCE

Akbar, P., Hamid, A., Bernard, M., Sugandi, A. I. (2018). Analisis Kemampuan Pemecahan Masalah dan Disposisi Matematika Siswa Kelas XI SMA Putra Dalam Materi Peluang. *Journal Cendekia: Jurnal Pendidikan*, 2(1), 144-153.

Anggraini, W., & Hudiono, B. (2015). Pemberian Umpan Balik *(Feedback)* Terhadap Hasil Belajar Dan Self-Efficacy Matematis Siswa Kelas VII SMP. *Jurnal Pendidikan dan Pembelajaran*, 4(9).

Asyrofi, M. A. M., & Junaedi, I. (2016). Kemampuan representasi matematis ditinjau dari multiple intellingence pada pembelajaran hybrid learning berbasis konstruktivisme. *Unnes Journal of Mathematics Education Research*, 5(1), 32-39.

Beyers, J. (2011). Development and Evaluation of an Instrument to Assess Prospective teachers'

dispositions with respect to mathematics. *International Journal of Business and Social Science*, *2*(16), 20–33.

Dinni, H. N. (2018). HOTS *(High Order Thinking Skills)* dan Kaitannya dengan Kemampuan Literasi Matematika. In *PRISMA, Prosiding Seminar Nasional Matematika* 1, 170-176.

Effendi, L. A. (2012). Pembelajaran matematika dengan metode penemuan terbimbing untuk meningkatkan kemampuan representasi dan pemecahan masalah matematis siswa SMP. *Jurnal Penelitian Pendidikan*, 13(2), 1-10.

Kemendikbud. (2014). *Implementasi Kurikulum 2013*. Jakarta: Kementrian Pendidikan dan Kebudayaan

Krathwohl, D. R., & Anderson, L. W. (2002). Taxonomies of educational objectives. *Encyclopedia of education*. 7, 2429-2433. Anderson, L.W. (Ed.), Krathwohl, D.R. (Ed.), Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J., & Wittrock, M.C. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives (Complete edition). New York: Longman.

Lismareni, N., Somakim, S., & Kesumawati, N. (2015). Pengembangan Bahan Ajar Materi Aritmetika Sosial Menggunakan Konteks Bahan Bakar Minyak dengan Pendekatan Pendidikan Matematika Realistik Indonesia di SMP. *Jurnal Pendidikan Matematika*, *9*(1), 48-58.

Lusiyana, D., & Sumliyah, S. (2018). Analisis Disposisi Matematika Berdasarkan Higher Order Thinking Taksonomi Bloom (Studi Kasus Mahasiswa Pendidikan Matemaika Universitas Muhamadiyah Cirebon). *Phenomenon: Jurnal Pendidikan MIPA*, 8(1), 1-12.

NCTM. (2000). *Principle and Standards for School Mathematics*. (Online). (http://www.nctm.org, diakses [19 Desember 2019].

Nuroeni, (Ed.). (2013). Pengembangan Multimedia Komik Pembelajaran Matematika Berbasis Kontekstual untuk Bahan Ajar KPK dan FPB. *Jurnal Ekuivalen-Pendidikan Matematika*, 5(1), 79-80.

OECD. PISA (Programme for International Student Assessment). [online]. Tersedi: https://www.oecd.org/pisa/data/ [12 Desember 2019]

Putra, F. G. (2017). Eksperimentasi pendekatan kontekstual berbantuan Hands on Activity (HoA) terhadap kemampuan pemecahan masalah matematik. *Al-Jabar: Jurnal Pendidikan Matematika*, 8(1), 73-80.

Rochman, S., & Hartoyo, Z. (2018). Analisis *High Order Thinking Skills* (HOTS) Taksonomi Menganalisis Permasalahan Fisika. *Science and Physics Education Journal (SPEJ)*, 1(2), 78-88.

Sailo, I. (2017). Peningkatan Keterampilan Menulis Karangan Narasi Menggunakan Model Contextual Teaching and Learning Siswa Kelas IV. *Basic Education*, 6(5), 501-507.

Sowanto, S., Andang, A., Mutmainnah, M., & Saputra, H. A. (2019). Kemampuan Self-Efficacy Mahasiswa Melalui Bahan Ajar Metode Statistika Menggunakan Hybrid Learning Pada Tantangan Revolusi Industri 4.0. *Supermat (Jurnal Pendidikan Matematika)*, *3*(2), 65-73.

Sudjana, N., & Rivai, A. (2011). *Media pembelajaran*. Bandung: Sinar Baru Algesindo.

Tim, B. S. N. P. (2006). Panduan penyusunan kurikulum tingkat satuan pendidikan jenjang pendidikan dasar dan menengah. *Jakarta: BSNP*.

TIMSS & PIRL. (2016). Trends International Mathematics and Science Study. Tersedia di https://timssandpirls.bc.edu/ [12 Desember 2019]

Wibowo, A. (2017). Pengaruh pendekatan pembelajaran matematika realistik dan saintifik terhadap prestasi belajar, kemampuan penalaran matematis dan minat belajar. *Jurnal Riset Pendidikan Matematika*, 4(1), 1-10.

Windarsih, C. A. (2017). Aplikasi Teori Umpan Balik (Feedback) dalam Pembelajaran Motorik pada Anak Usia Dini. *Tunas Siliwangi: Jurnal Program Studi Pendidikan Guru PAUD STKIP Siliwangi Bandung*, 2(1), 20-29