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Self-assessment on the achievement of the ability of mathematical proportional application in Meaningful Instructional Design (MID) learning viewed from student's learning style

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Abstract

This study aims to (1) test the students' mathematical proportional reasoning ability to achieve classical mastery, (2) to analyze the average achievement of mathematical proportional reasoning ability in Meaningful Instructional Design learning by applying self-assessment with the common learning model (3) to test the proportion of students' mastery in Meaningful Instructional Design learning by applying self-assessment which is better than the proportion of the common learning model and (4) to obtain a description of students' proportional reasoning abilities of visual, auditory, and kinesthetic style of learning style. The method used in this research is Mixed Methods Concurrent Embedded Design. The quantitative subject of this study is the students of class VIII B MTs NU Banat Kudus as the experimental class which use Meaningful Instructional Design, while the subject of qualitative research is 6 students of class VIII B consisting of 2 students with the high and low value on mathematical proportional reasoning test in each learning style group. Eventually, the results of this study are (1) the achievement of students' mathematical proportional reasoning ability is significant in MID learning, (2) there is difference of proportional reasoning ability in MID learning model with a common used learning model, (3) the proportion of students' learning mastery by using Meaningful Instructional Design model with Self-assessment is higher than those who use the common learning model and (4) the students with visual learning style are able to propose and perform mathematical manipulation by understanding and remembering the material ever seen and written, the students with auditory learning style are able to make guesses, present mathematical manipulations, and draw conclusions by understanding and remembering material discussed, while students with kinesthetic learning style are able to make guesses, perform mathematical manipulations, and draw conclusions by understanding and remembering material which is ever practiced.

1. Introduction

Mathematics is a must be taught lesson to students from elementary, junior high school, to university. The purpose of mathematics based on Regulation of National Education Ministry (Permendiknas) No. 22 of 2006 highlights that mathematics aims that students are able to: (1) understand mathematical concepts, explain interrelationships between concepts and apply concepts or algorithms, flexibly, accurately, efficiently and appropriately in problem solving, (2) use reasoning in patterns and characteristics, perform mathematics manipulation in generalizing, compile he evidences or explain mathematic ideas and statements, (3) solve problems that include the ability to understand problems, design mathematical models, solve models and interpret solutions obtained, (4) connect the ideas with symbols, tables, diagrams or other media to clarify the situation or problems, and (5) have attitude of appreciating the usefulness of mathematics in life,

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that is curiosity, attention, and interest in mathematics learning, as well as a tenacious attitude and confidence in problem solving.

As well mentioned in above explanation that one of the goals of mathematics learning is that students are expected to have the ability to use reasoning on patterns and characteristics, perform mathematical manipulations in generalizing, compile the evidence or explain mathematical ideas and statements. Above all, one of the most important reasons is a proportional reasoning.

Proportional reasoning is a mental activity in coordinating the two quantities associated with the relation of change (worth or turning of value) to a number of other forces (Irpan, 2009). It is the reasoning about the understanding of the similarity of two relations structure in proportional problems (Johar, 2006). Again, Behr et al. (1992) explain that proportional reasoning means being able to understand the inherent multiplication relationships in comparison situations. As well explained by Dole et al. (2009), proportional reasoning is an important reasoning in mathematics learning that fractions, percentages, ratios, decimals, scales, algebra, and opportunities which require proportional reasoning. Because there are abundance of mathematical material which involve proportional reasoning abilities, consequently if students' reasoning does not develop well, otherwise they will have difficulty in mathematics learning. As Walle (2010) argues that up until now students need to have the right thinking about the formers of ratios and proportions as well as in what context these mathematical ideas emerge. A statement on the importance of proportional reasoning is also developed by NCTM (2000) that is proportional reasoning is quite important, hence it deserves to get a lot of time and efforts which then should be used to ensure its development properly. Based on the above statements, it can be concluded that students' proportional reasoning ability is very important to be developed properly.

Furthermore, learning style is one of the important variables in the way students perceive the lessons in school. It is the tendency of a person to receive, absorb and process the information (De Porter & Hernacki, 2008). Each student has his/her own learning style which is different from others'. According to De Porter & Hernacki, it is divided into three types, namely visual, auditory, and kinesthetic learning style. These types of learning styles are distinguished by their tendency to understand and capture information which more easily by visually, auditory, or doing by their own. In addition, another thing that affects students' mathematical proportional reasoning abilities is the use of instructional models applied by teachers. Learning Meaingful Instructional Design is the basic strategy of constructivist learning. Ausubel (Dahar, 1996) explains that meaningful learning is a process of linking new information to relevant concepts which are contained in a person's cognitive structure. The learning process prioritizes the meaningfulness, so students will easily remember the materials that have been explained by the teacher or probably the new one. Meanwhile, in this case, the instruction does not only refer to the context of formal learning in the classroom whose main purpose is not only to acquire certain skills and concepts but also to pay attention to students' attitudes and emotions. Then, design is a process of analysis and synthesis that begins with a problem and ends with an operational solution plan. All of the above-explanations emphasize the students to be able to link the concepts both given and newly delivered, how students can get the concept with the skills they have, and how the process of analysis on the solution obtained.

Besides, there are factors that influence the achievement of mathematical proportional reasoning that is teacher's treatment to students who incidentally have learning styles and different levels of understanding between one another. Therefore, teachers need to apply a formula to support the achievement of mathematical proportional reasoning abilities. One of them is by applying self-assessment, so they are expected to be more open and confident about the measurement ability. Self-assessment is not only beneficial for the student but generally, it can also benefit for the teacher. Because the teacher will easily know the lack of students' understanding by the students themselves so that teachers can make appropriate handling to explore the potential and students' mathematical proportional reasoning abilities as a form of follow-up self-assessment.

Based on above description, the researchers are interested to conduct a study entitled "Self Assesment On Achievement of Mathematical Proportional Reasoning Ability in Meaningful Instructional Design (MID) Learning from Students' Learning Styles".

This study analyzes the ability of proportional reasoning of class VIII students in Meaningful Instructional Design learning by De Porter &

Hernacki. While the student learning style use questionnaire adaptation of Mamluatul Mufida (2015) that has been validated by experts, namely visual, auditory, and kinesthetic learning style. Then, the mathematical proportional reasoning indicator used is a mathematical reasoning indicator which is collaborated with proportional problems and strategies to solve proportional problems. The students are from MTs NU Banat Kudus Class VIII and the material analyzed is comparative material.

Regarding to above explanation, it can be drawn that the aims of this study are; (1) to test the students' mathematical proportional reasoning ability in the Meaningful Instructional Design learning model in order to achieve the classical mastery; (2) to analyze the average of achievement of mathematical proportional reasoning ability in Meaningful Instructional Design learning applying self-assessment with the usual learning model is done (3) to test the proportion of students' learning mastery in Meaningful Instructional Design teaching which applies self-assessment which is better than proportion of learning model (4) obtaining a description of students' proportional reasoning abilities of visual, auditory, and kinesthetic style learning style.

2. Method

This study used a combination method of a concurrent embedded model (unbalanced mix quantitative and qualitative). The combined method of concurrent embedded design is a research method that combines both qualitative and quantitative research methods by mixing the two methods unbalanced. This study emphasizes more on qualitative than quantitative (Sugiyono, 2013). In this study, collecting and analyzing quantitative and qualitative data are done simultaneously to answer the research problem formulation.

Quantitative method is used to test the students' mathematical proportional reasoning ability in class VIII in Meaningful Instructional Design learning to achieve classical completeness, analyze the average achievement of mathematical proportional reasoning ability in Meaningful Instructional Design learning by applying self-assessment with normal learning model and test proportion students' learning mastery in Meaningful Instructional Design learning by applying self-assessment which is better than the proportion of the common learning model. While the qualitative method is used to determine students' mathematical proportional reasoning abilities in terms of learning style V-A-K with Meaningful Instructional Design learning. Indeed, qualitative is obtained through interviews with participants in depth.

The general subjects in this study are students of class VIII B and VIII A MTs NU Banat Kudus which amounted to 44 and 47 students. The researcher determined 6 students as the subject in research about the ability of mathematical proportional reasoning of class VIII student on Meaningful Instructional Design learning. Meanwhile, in terms of student learning styles, in each learning style, there 2 chosen subjects with criteria of 1 high and 1 low student.

The data collection techniques in this study is a test of mathematical proportional reasoning ability and interview. The results of mathematical proportional reasoning abilities test refer to mathematical reasoning indicators according to National Education Department (Depdiknas).

Then, the data analysis technique in this study is quantitative and qualitative data analysis. The quantitative test uses the data normality test, the data homogeneity test, the average initial data equation test using Independent-Sample T-test with SPSS software, the one-party (right) average test, the one-sided (right) proportion test, while the analysis of qualitative data test is done with the following steps: data reduction phase, data presentation, verification and conclusion.

3. Research & Discussion

3.1. Findings and Discussion of Quantitative Research

In the analysis of mathematical proportionality test results, normality test by Kolmogorov-Smirnov was done by using SPSS 16.0 software which obtained that the data of class research results are normally distributed. While homogeneity test was done by using Levene test using SPSS 16.0 software which obtained the data of research class and control class are homogeneous or have the same variant.

Based on the calculation of hypothesis test 1, obtained $z_{count} = 1.741$ with a significant level of 5%, which obtained that $z_{table} = z_{(0.5\text{-}\alpha)} = z_{(0.45)} = 1.64$. Because $z_{count} > z_{table}$, so H_0 is rejected. It means that proportional reasoning ability of class VIII students MTs NU Banat Kudus in Meaningful Instructional Design learning achieves mastery

learning in classical or at least 75% of the number of students in the class reached the value of 74.
Meanwhile, in hypothesis test 2 used the right-sided average test. The applicable test criterion accepts H_0, if $t_{count} < t_{(1-\alpha)}$ in which $t_{(1-\alpha)}$ is obtained from the distribution list t with dk = ($n_1 + n_{2-2}$) and probability (1-α) (Sudjana, 2005). Based on the calculation, it is obtained that $t_{count} = 2.663$ which is greater than t_{table}=1.67. It means that H_0 is rejected, while H_1 is accepted. Then, the average proportional reasoning ability of the experimental class by using self-assessment in Meaningful Instructional Design is higher than the average of mathematical reasoning ability of the control class with the common learning. In brief, there is difference reasoning ability of mathematical proportional of control class and experiment class.

While based on hypothesis test 3, it is obtained $z_{count} = 2.272$ with a significant level of 5% that obtained that $z_{table} = z_{(0.5-\alpha)} = z_{(0.45)} = 1.64$. Because $z_{count} > z_{table}$, so H_0 is rejected. It means that proportion of students' completion of experimental class using learning model Meaningful Instructional Design with self-assessment is higher than the proportion of students' mastery in control class by using the common learning model.
Regarding to above findings, it shows that the implementation of self-assessment in Meaningful Instructional Design learning can help students to achieve mastery learning.

3.2. *Findings and Discussion of Qualitative Research*

The questionnaire of learning style is used to identify individual learning styles. Then, to find the mathematics proportional reasoning, comparison test instrument was used. Meanwhile, to determine whether the students' mathematical proportional reasoning abilities which are obtained from the results of students' written tests are in accordance with the actual situation or not, the interview was conducted based on the interview guidelines that had been made before.

The results of filling the questionnaire of learning style of students class VIII B can be seen in the following tables.

Table 1. The Result of Class VIII B's Learning Style Questionnaire

Learning Style Type	Number of Students
Visual	10
Auditory	26
Kinesthetic	2
Visual auditory	3
Auditory Kinesthetic	1
Auditory Visual Kinesthetic	1
Total	44

In addition, the distribution of learning styles in class VIII B can be seen in the following diagram.

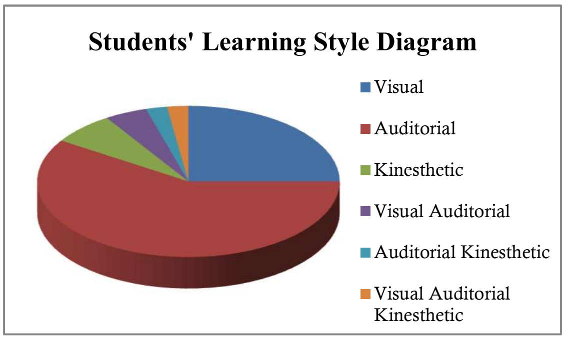

Figure 1. Distribution of Class VIII B Learning Style

Based on the results of research activities for the questionnaire learning style of students of class VIII B, it is found that there are students who occupy each learning style. The number of students who are classified as visual learning style type is 10 students (22.73%), auditory learning style is 26 students (59.09%), kinesthetic learning style type is 2 students (4.55%), auditory visual style is 3 students (6.82%), kinesthetic auditory style is 1 student (2.27%), and while visual kinesthetic auditory style is 1 student (2.27%). However, this study focuses only on three types learning, they are visual, auditory, and kinesthetic learning as well as in the opinion of DePorter and Hernacki. The percentage of the types of visual, auditory, and kinesthetic learning styles were (22.73%), (59.09%), and (4.55%), respectively. It means that the existence auditory learning style is higher than other styles, then followed by visual learning style and kinesthetic learning style.

The results of this study are similar to Rahayu's (2009) research findings that from 140 junior high school students, 66 students have visual learning style, 46 students have auditory learning style, and 28 students have kinesthetic learning style. It means that the visual learning style is the highest learning style. Sari (2014) also found that the type of kinesthetic learning style is a type that is rarely encountered.

Though Aditya (2015) finds that the percentage of student presence with an auditory style of learning style is higher than other learning styles. As Mulyati (2015) reveals that the types of visual and auditory learning styles are more dominant than the kinesthetic learning style.

Based on the results of questionnaire filling, then the selected research subjects can be seen in the following table.

Table 2. Research Subjects

Learning Style	Student's Code	
Visual	B-35	V1
	B-10	V2
Auditory	B-28	A1
	B-38	A2
Kinesthetic	B-11	K1
	B-18	K2

In this study, learning activities were conducted 4 times meeting in the experimental class. An observation of learning implementation was done in order to observe and assess the quality of researcher during the learning. It was done by using the observation sheet of researcher's ability to manage the learning by using Meaningful Instructional Design (MID) which was done by the observer that is mathematics teacher of class VIII B and class VIII A namely Nur Khusomah, S. Pd.

The learning process which was carried out during 4 meetings is in accordance with the RPP which has been prepared with the number of hours of study (jp) is 6jp. The first meeting was held on April 27th, 2017 with the number of lessons of 2jp, while the material is a direct proportion value. The second meeting was held on April 30th, 2017 with the number of lessons of 1jp, while the material is a matter of inverse proportion value. The third meeting was held on May 7th, 2017 with the number of hours of 1jp with the material was continuing the second meeting of the comparative inverse proportional value, and the fourth meeting was held on May 9th, 2017 with the number of hours of 2jp which is follow up of self-assessment by repeating the proportion of direct and inverse value by using a perfunctory of direct and inverse proportional.

The implementation of MID at the first meeting of draw on experience and knowledge stage, students are able to explore the prerequisite knowledge as an association material which is remembering previous material obtained. This circumstance shows that students are able to propose the conjectures.

In the Input stage, the teacher distributes LKPD with the help of visual aids to each group as a media for students to input information and mathematical concepts. At the first meeting, the students had difficulties in filling LKPD as for they rarely use LKPD assistance during the learning. In addition, they are still reluctant to write down the information that is known, asked and willing to immediately calculate the completion. However, because they are not used to dealing with the types of proportional reasoning problems, they find that it was difficult to determine which way they would use. Therefore, in reinforcement stage, they explore through exercise questions contained in LKPD to develop new understanding of students and teachers in order to guide individual and group investigation. The teachers give encouragement to students to really understand the problem first and get used to write down what is known and asked, and also provide guidance in preparing a completion plan.

Moreover, the application stage for the first meeting took a long time. Students tend to put each group to present the work in front of the class. Owing to the fact that they are less confident to show up in the front. However, this symptom can be resolved after the teacher provides understanding to the students. Finally, at the first meeting, the teacher appoints one of the groups to make a presentation regarding the discussion results and assigns a task to make a portofolio at the end of the lesson. Afterward, the learning was closed with conclusion, motivation, and assignment.

At the second meeting, the teacher invited students to observe the problems presented at the student orientation stage on the problem. They were able to name what is known and asked. They were also able to name a variety of proportionate problem solving strategies that were used in solving problems. Indeed, it did not take a long time to organize them in group. In the input stage, they have been used to write down the troubleshooting steps even though they were still getting difficulty . At the time of mathematical manipulation, they found that it was difficult because the numbers used in the problem were considered difficult. They have also been able to draw conclusions without the use of mathematical operations. At this second meeting, the presentation of the work does not take as much time as the previous meeting because they have already seen their friends complete it.

In the implementation of learning activities, the observation was conducted by the observer. The observation data of learning implementation obtained by the researcher are from observation of learning in the classroom at a current time.

Table 3. The Results of MID Learning Implementation Observation

Meeting	Assessment Score	Criteria
Meeting 1	85%	Excellent
Meeting 2	83,3%	Excellent
Meeting 3	81,25%	Excellent
Meeting 4	89,5%	Excellent
Average	84,76%	Excellent

Meanwhile, the teacher activity graph can be seen as in following Figure 2.

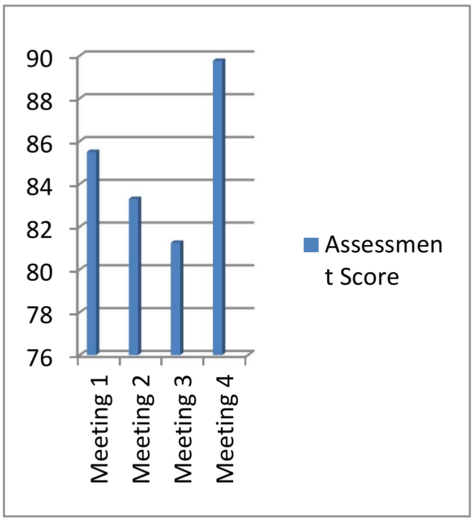

Figure 2. Student Activity Chart On Meaningful Instructional Design (MID) Learning

Student activity in MID mathematics learning generally shows excellent activity. It was observed during the learning process by filling the observation sheet provided (can be seen in the appendix) which was observed classically. Based on the results of observation on student activity classically during learning, the data obtained are as follows.

Table 4. The Results of Student Activity Observation

Meeting	Assessment Score	Criteria
Meeting 1	66%	Good
Meeting 2	78%	Good
Meeting 3	85%	Excellent
Meeting 4	87.5%	Excellent
Average	76,33%	Good

Table 4 shows that students' activity in the MID learning process conducted at each meeting has improved on the score.

The implementation of mathematical proportional reasoning abilities test was conducted on Thursday, May 11th, 2017 which was followed by 44 students. The mathematical reasoning test was followed by 91 students consisting of 44 experimental class students and 47 control class students. The results of descriptive analysis of the test of mathematical proportional reasoning ability in the proportional material are as follows.

Table 5. The Results of Mathematical Proportional Reasoning Ability Test

Class	N	Average	Highest Value	Lowest Value
Experiment	44	80,23	100	42
Control	47	73,34	100	43

Based on table above, it shows that the students' learning outcomes of the experimental class are better than the learning result of the control class. Then, the average of student test result with MID model is 80.23, while the usual learning is only 73.34. In other words, students' mathematical proportional reasoning skills with MID model are higher than those with common learning.

The hypothesis was conducted to find out the difference of students' mathematical reasoning achievement with MID model and the common learning model. From the hypothesis of analysis, it can be concluded that students' mathematical proportional reasoning with MID model is better than those with common learning.

After the students did mathematical reasoning ability test, then the interview was done toward the subject of research in order to get deep results about mathematical reasoning abilities of research subjects.

The description of the execution of the interview schedule of the research subjects is shown in Table 6.

Table 6. Implementation of Interview Schedule

Research Subject	Interview Execution
V1	Saturday, May 13th, 2017
V2	Saturday, May 13th, 2017
A1	Sunday, May 14th, 2017
A2	Sunday, May 14th, 2017
K1	Monday, May 15th, 2017
K2	Monday, May 15th, 2017

In this study, the research subjects for visual learning styles were V1 and V2. In the conjecture indicator, V1 and V2 wrote down what was known to the problem with sufficient criteria. They wrote down completely, yet too brief in giving information and not understanding the readers. However, they definitely understood what they wrote. It is in accordance visual learning style students' character according to DePorter and Hernacki (2000) that is in answering questions, they will answer with short answers. In this case, they are able to write down the known and asked questions in a complete but brief.

Further, V1 and V2 wrote the questions properly and correctly from the problems presented. They had sufficient criteria in writing the core formulas used in problem solving.

In the mathematical manipulation indicator, V1 and V2 had sufficient criteria in writing down the troubleshooting steps. Based on the results of interview with the teacher, they were not familiarized with writing down the troubleshooting steps in solving a math problem. V1 did not write down the solution steps because he was not used to writing it. However, V2 was able to write down the problem-solving steps well.

Besides, V1 and V2 have enough criteria in working according to the correct algorithm, completing mathematical operations and finding the answers from the problem. Yet, they were not able to complete the question number 2 as well as they could not find its answer. It is caused that they did not well understand the concept, consequently, they were not able to apply it to question number 2. As for question number 1, they complete question number 1 but with a step which was not sequential. However, he could find the final result requested matter. This is because question number 1 has ever given as an exercise during the learning, while number 2 has not.

The analysis of mathematical manipulation on subjects V1 and V2 is similar to visual learning style students' characteristic according to DePorter and Hernacki (2000) that is the students will have problems with remembering verbal instruction unless they write it. It means that students with visual learning style more easily remember something in written.

For more, V1 and V2 have sufficient criteria in the ability to draw conclusions from the problems presented. They wrote down the conclusions of the problems presented but there were some errors. These errors were found in the final result written on their conclusion.

Besides, the research subjects for auditory learning style are A1 and A2. In the conjecture indicator, they wrote down what was known from the problem with sufficient criteria. Subject A1 wrote things known to the problem completely and correctly. While the subject A2, in question number 2, wrote the known thing at the problem completely but still not clear yet. Consequently, the reader was confused to interpret it.

Then, A1 and A2 have good criteria in writing the asked problem which was presented. They have sufficient criteria in writing down the core formulas used in problem solving. A1 wrote the core formula used in problem solving. In question number 2, he wrote the core formula used in problem solving but not clearly described. Nevertheless, he was able to explain the core formula used orally well and correctly. While the A2 completely and correctly wrote the core formula used.

The results of the analysis of the ability to present conjectures on A1 and A2 are in accordance with opinion of DePorter and Hernacki (2000) that is auditory learning style students will have difficulty in writing, yet good in telling stories. It can be seen from students' written test answers which are brief, yet they are able to explain in the interview section.

In the mathematical manipulation indicator, A1 and A2 have good criteria for writing down the troubleshooting steps. They wrote down the problem-solving steps properly and correctly. Thus, they have enough criteria in working according to the correct algorithm and performing mathematical operations and finding the answers of the problems. Yet, they were not able to complete question number 2, consequently they could not find the results. It is caused that A1 and A2 have not understood the concept well. As for the problem number 1, they completed the question number 1 yet with a step that was not sequential. Nevertheless, they could find the answers of the question due to the problem number 1 had ever become as exercise in learning.

The analysis of mathematical manipulation ability on A1 and A2 is similar to auditory learning style students' characteristics according to DePorter and Hernacki (2000) that is they have problem with visualization work. Indeed, the matter of mathematical reasoning ability is the element of visualization. A1 and A2 could complete question number 1 because it has become an exercise in learning activities. While in question number 2 which has never been given during the exercise, they found that it was difficult because they are unable to visualize the concept. Thus, since they found difficulties with the visualization, as the result the errors occurred in performing mathematical operations.

However, A1 and A2 have sufficient criteria in the ability to draw conclusions from the problems presented. They wrote down the conclusions of the problems presented although there are some errors. These errors are in the final result written on their conclusion.

Furthermore, the research subjects for kinesthetic learning styles were K1 and K2 subject. In the conjecture indicator, K1 and K2 wrote down what was known with sufficient criteria. K1 wrote the known things from the problem completely and correctly. While K2, in question number 2, wrote the known thing from the question completely but not clear yet. Consequently, the readers are confused to interpret.

Again, K1 and K2 have good criteria in writing the questioned problem which was presented and the core formula used in problem solving. K1 and K2 wrote the question and the core formula used in problem solving completely and clearly.

In the mathematical manipulation indicator, K1 and K2 have sufficient criteria in writing down the troubleshooting steps. K1 wrote down the troubleshooting steps properly and correctly. While K2, on the question number, did not write down the troubleshooting steps. Nevertheless, he was able to explain verbally the number 1 troubleshooting steps.

Subjects K1 and K2 have enough criteria as the correct algorithm, performing mathematical operations and finding the answers of the questions. Yet, they were not able to complete the question number 2, as the result they could not find the result. Since they did not understand the concept well, they could not apply it to the question number 2. As for problem number 1, K1 solved problem number 1 yet not sequence. Nevertheless, he could find the final result of the problem since it had been used as an exercise in learning.

The results of the analysis of mathematical manipulation abilities in K1 and K2 are similar to kinesthetic learning style characteristics as well explained by DePorter and Hernacki (2000) that is they learn through manipulation. It means that students with kinesthetic learning are able to perform mathematical manipulations even though their manipulations are totally wrong.

Afterwards, K1 and K2 have sufficient criteria in the ability to draw conclusions from the questions presented. They wrote the conclusions of the problems presented yet there are some errors. These were found in the final result written on their conclusion.

4. Conclusion

With regard to description of analysis, there are several conclusion which can be drawn, They are as follows (1) the ability of mathematical proportional reasoning of the students of grade VIII B MTs NU Banat Kudus in Meaningful Instructional Design (MID) learning reached mastery in classical learning with proportion more than 75%; (2) the average of students' mathematical proportional reasoning ability in Meaningful Instructional Design (MID) learning which applied self-assessment is higher than those with common learning; (3) the proportion of students' learning mastery by using Meaningful Instructional Design model with self-assessment is higher than those with the usual learning model; (4) the classification of learning styles from 44 students of class VIII B MTs NU Banat Kudus obtained 11 students use visual type, 26 students use auditory type, 2 students use kinesthetic type, 3 students use visual auditory type, 1 student uses kinesthetic auditory, and 1 student uses visual auditory kinesthetic. (a) Visual learning type students are: (i) able to propose conjectures by writing down the known and asked things form the questions given, (ii) able to perform mathematical manipulations by solving the problem of proportional reasoning with the calculation strategy and (iii) unable to write conclusions correctly, (v) able to understand and recall material which have been ever seen and written. (b) Auditory learning type students are: (i) able to propose conjectures by writing the known and questioned things, (ii) able to do mathematical manipulation by solving the problem of proportional reasoning with equation strategy and finding the final results, (iii) able to write good and correct conclusions, (iv) able to understand and recall material discussed. (c) Kinesthetic learning students are: (i) able to conjecture and write down the known and asked things, (ii) able to perform mathematical manipulation by solving problems of reasoning proportional to operator strategy and finding the answers of the questions given, (iii) able to write good and right conclusions, (iv) able to understand and remember material that has been ever used.

References

Behr, M., Harel, G., Post, T., & Lesh, R. (1992). Rational number, ratio, and proportion. In D. Grouws (Ed.). *Handbook for Research on Mathematics Teaching and Learning,* 296-333. New York: Macmillan.

DePorter, B. & M. Hernacki. (2008). *Quantum Learning: Membiasakan Belajar Nyaman dan Menyenangkan* (26th ed). Trans. by Alwiyah Abdurrahman. Bandung: Kaifa.

DePorter, B. & M. Hernacki. (2000). *Quantum Teaching : Mempraktikkan Quantum Learning di ruang-ruang Kelas.* Trans. by Ary Nilandari. Bandung : Kaifa.

Dole, S., Wright, T., Clarke, D., & Campus, P. (2009). Proportional Reasoning. *Making Connection in Science and Mathematics (MCSAM),* 1-18.

Irpan, S. (2010). Proses Terjadinya Kesalahan Dalam Penalaran Proposional Berdasarkan Kerangka Kerja Asimilasi dan Akomodasi. *Beta Jurnal Tadris Matematika*, *3*(2), 100-117.

Johar, R. (2006). Penalaran Proporsional Siswa SMP. *Disertasi*. Surabaya: Universitas Negeri Surabaya.

NCTM. (2000). *Curriculum and Evaluation Standard for School Mathematics*. Reston: National Council of Teacher of Mathematics.

Sari, I. P. (2014). Analisis Penalaran Proporsional Siswa dengan Gaya Belajar Auditori dalam Menyelesaikan Soal Perbandingan pada Siswa SMP Kelas VII. *EDUMATICA| Jurnal Pendidikan Matematika, 4*(02).

Sudjana. (1996). *Metoda Statistika*. Bandung: Tarsito.

Sugiyono. (2013). *Metode Penelitian Kuantitatif, Kualitatif dan Kombinasi (Mixed Methods)*. Bandung: Alfabeta.