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ACTIVE LEARNING TO FIND CONCEPTS AND ALGORITHMS IN DECIMAL MATERIAL IN CLASS V ELEMENTARY SCHOOL

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ABSTRACT
Prior to learning, pre-tests and questionnaires were given to determine students' abilities and interests in learning decimal. Based on the results of the initial test, it was found that students' initial abilities were very low with an average grade of 15.50, and from the results of the questionnaire, all students said they did not like decimal learning. After active learning to find the concept of algorithms in decimal material, the class average value was 86.27, meaning that the level of classical student mastery was 86.27. This indicated that the student mastery level was relatively high. Of the 20 students, there were 19 people or 95.0% who had finished studying, so that classically learning decimal material had been completed. Judging from the specific learning objectives, all of them achieved above 65%. The results of the student questionnaire after the decimal material learning outcomes test was completed, obtained data that students felt happy with the learning they had just participated in. Students argue, the way is easy to understand and understand. With simple but interesting teaching aids, it can increase students' enthusiasm and interest in learning Mathematics. The classical learning outcomes have been completed based on the learning completeness criteria specified in the curriculum, specific learning objectives have been achieved based on the learning objectives achievement criteria, the student's response to learning is positive, the student's mastery of the material is high. It can be concluded that learning on decimal material in class V Elementary already effective.

Keywords
active learning; finding algorithms; Mathematics

INTRODUCTION

Learning is what students do, not what teachers do for students (Edwards & Protheroe, 2003). Learning is an active and purposeful process, not a passive process. This process may be more successful if appropriate learning tools are used and students are directed to the required activities at the right time (Nartiningrum & Nugroho, 2020). Learning conditions are closely related to the expected results. If only mastery of Mathematical operations is desired, then a learning process that is rote, exercises and tests is very sufficient. However, the expected results from teaching Mathematics today are much broader and deeper than just mastering Mathematical operations. A very important responsibility of the Mathematics teacher is to encourage creativity by helping students discover the basic ideas, rules and principles of Mathematics (Lopes et al., 2019). As a result of this emphasis on understanding and skills, many students will eventually find that the most interesting thing is studying Math. One feature that stands out in present-day Mathematics teaching is the increasing attention to developing the ability to find, examine and make generalizations. If students are expected to master these abilities, teachers must pay more attention to concept development and terminology.

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From studies and findings of experts and researchers that in the process of thinking, children go through various cognitive levels. One way to minimize this happening is to help students find certain ideas and ways for themselves.or algorithms to solve problems (Lorensia & Wea, 2015).

According to Nurhadi quoted in the 2004 Curriculum Book Questions and Answers (2004) says that the objectives of learning Mathematics are as follows (Hadi, 2004):

1. Train ways of thinking and reasoning in drawing conclusions, for example through investigation, exploration, experimentation, showing similarities, differences, consistency and inconsistency.
2. Develop creative activities involving imagination, intuition, and discovery by developing divergent, original thinking, curiosity, making predictions and conjectures, and experimenting.
3. Develop problem solving skills.
4. Developing the ability to convey information or communicate ideas, among others through oral conversations, notes, graphs, maps, diagrams, in explaining ideas.

We admit that every child learns at his own pace with a different style if they are prepared to learn. The Master's responsibility here is not only to encourage and motivate this readiness by providing a favorable environment, but also to provide it with diverse and effective experiences (Tampubolon, 2018). Thus, a teacher can design learning according to the readiness of his students (Gustiati, 2017).

The successful teacher always stimulates his students to plunge into a process and find the rules or methods for himself and then follow it with a discussion. Teachers and learning theorists have done just that. Students need time to investigate and discover patterns and relationships (Fitrina et al., 2016). They must make observations, organize these observations and then make conjectures and test the truth of these conjectures. The ability to make generalizations from these observations is at the core of the learning process.

The importance of students doing their own research becomes very clear when we realize that learning Mathematics is participating and not just watching a sports match (Ekawati, 2015). Thus, students will realize and understand what they are learning, how long they can retain what they have learned and what kind of behavior arises as a result of what they have learned.

METHODS

In accordance with the expected goals, the approach taken is a qualitative descriptive (Creswell & Poth, 2016) approach which then from the results obtained later, will be developed into an alternative learning to increase the activity of finding algorithms in decimal material in elementary schools. As subjects in the study were fifth grade students at Public Elementary School 177657 Siabalabal Kec. Sipahutar Kab. North Tapanuli for the 2020/2021 academic year. Meanwhile, the object of this research is student learning outcomes as a result of learning actions to increase activities to find algorithms in decimal matter.

A. Research procedure

The steps taken in this research are as follows:

1. Preparation phase
   At this stage the author analyzes the decimal material contained in the textbook. Then the writer makes a lesson plan (as contained in part B above), which is the result of being discussed with several teachers and Mathematics lecturers.
2. Implementation stage
   a. Before learning is carried out, the writer provides scissors, cardboard, ruler, plastic bag, gives initial tests and questionnaires
   b. Conduct learning according to the steps in part B. During the learning process, observations were made by two teachers at the school where the study was conducted to observe student activity during learning.
   c. After learning is complete, practice doing the questions. A week later, a test was carried out to determine student success in learning decimal material.
   d. After the test was carried out, students were given a questionnaire to find out the student's response to the learning that had passed.

B. Data analysis technique

1. Analysis of Learning Outcomes Tests

The learning outcomes test used refers to the behavior criteria to be achieved or the Test Benchmark Reference Assessment. This learning achievement test was prepared based on the formulation of specific learning objectives (TPK), in its preparation the author asked for responses from several Mathematics Teachers and Lecturers. There are 10 questions in this test. Furthermore, these items were tested on 40 students of grade V Elementary School, the trial data were analyzed. Test data analysis is an evaluation procedure for test quality. In the construction of the test, then the results of the analysis are used as input for revising the questions and this is what is used for the test at the end of the lesson. The intended trial data analysis includes:

2. Item Validity

Item validity is calculated to find out how far the relationship between one item's answers and the total score is. Arikunto (2013) states that to find out whether a measuring instrument has empirical validity, is to correlate the scores obtained on each item with the total score. If all statements compiled based on the concept are positively correlated with a total score, then it can be said that the measuring instrument has validity. This kind of validity states the validity of the item. To determine the validity of the item, the product moment correlation formula can be used as follows:

$$r_{xy} = \frac{N\Sigma xy - (\Sigma x \Sigma y)}{\sqrt{\{\Sigma x^2 - (\Sigma x)^2\}\{N\Sigma y^2 - (\Sigma y)^2\}}}$$

with x = item score

y = total score

r_{xy} = correlation coefficient between the item scores and the total score

N = the number of students who took the test (Arikunto, 2013)

For the interpretation of the correlation coefficient, the following range is used:

r ≤ 0.20 degrees very low validity
0.20 < r ≤ 0.40 degrees low validity
0.40 < r ≤ 0.60 degrees moderate validity
0.60 < r ≤ 0.80 degrees has high validity
0.80 < r ≤ 1.00 degrees very high validity

3. Discriminatory Power

An item has good discriminating power if the item can distinguish between smart students (upper group) and weak students (lower group). The discriminating power index is calculated using the –F statistic and –t statistic. Before the –t statistic is used, it is necessary to test the similarity of variance between the upper and lower groups. Due to the variance of the two groups, ie σ_a^2 and σ_b^2 is not known, then the variance is estimated respectively with $S_a^2$and S_b^2. Formula to determine S_a^2 and S_b^2 are as follows:

$S_a^2 = \frac{\Sigma(x_a - \overline{x}_a)^2}{n_a - 1}$ and $S_b^2 = \frac{\Sigma(x_b - \overline{x}_b)^2}{n_b - 1}$

with S_a^2 = upper group variance
S_b^2 = lower group variance
x_a = score of each upper group
x_b = score of each lower group
$\overline{x}_a$ = average score of the upper group
$\overline{x}_b$ = average score of the lower group

Moreover, we will test the similarity of the two variances of the upper and lower groups using the –F statistic. To that end, the following hypothesis is formulated:

$H_0: \sigma_a^2 = \sigma_b^2$ andH $H_a: \sigma_a^2 \neq \sigma_b^2$. The formula used is:

$$F_h = \frac{S_a^2}{S_b^2}$$

with criteria: accept H_0, if $F_{(1-\alpha/2,(n_a-1),(n_b-1)} \leq F \leq F_{\alpha/2,(n_a-1),(n_b-1)}$. If the variance of the lower group is the same, then the following t statistic is used to test the significance of the difference in the mean of the upper and lower groups:

$t_h = \frac{\bar{x}_a - \bar{x}_b}{S_p\sqrt{\frac{1}{n_a}+\frac{1}{n_b}}}$ with $S_p = \frac{S_a^2(n_a-1)+S_b^2(n_b-1)}{n_a-n_b-2}$(Ferguson, 1981: 182)

The formulation of the hypothesis is: $H_0: \mu_a = \mu_b$ and $H_0: \mu_a \geq \mu_b$
(μ_a and μ_b) each estimate o f$x_a$and x_a)

With criteria: if $t_h > t_{(\alpha;n_a+n_b-1)}$, then the test items are significant, and
if $t_h \leq t_{(\alpha;n_a+n_b-1)}$, then the test items are not significant.

If the variances of the upper and lower groups are not the same, then to test the significance of the differences in the upper and lower groups the following formula is used:

$$t_h^1 = \frac{\bar{x}_a - \bar{x}_b}{\sqrt{\frac{S_a^2}{n_a}+\frac{S_b^2}{n_b}}} \text{and} t_\alpha^1 = \frac{\frac{S_a^2}{n_a}t_{(\alpha;n_a-1)}+\frac{S_b^2}{n_b}t_{(\alpha;n_b-1)}}{\frac{S_a^2}{n_a}+\frac{S_b^2}{n_b}}$$

If $t_h^1 > t_\alpha^1$, then the test items are significant and if $t_h^1 \leq t_\alpha^1$, then the test items are not significant.

4. Test Reliability

Test reliability is measured using the formula:

$\alpha = \frac{K}{K-1}(1-\frac{\Sigma S_i^2}{S_x^2})$ with $\alpha$is the reliability coefficient of the test

K is the number of test items
ΣS_i^2 is the total variance of the test items
S_x^2 is the total variance

5. Sensitivity Test

To obtain the effectiveness coefficients of items based on learning, the teacher must give the same test before and after learning. Effective items will be answered correctly by more students after learning than before learning (Purwanto, 1984). The sensitivity measure of an item is basically a measure of how well the item differentiates between students who have received the lesson and those who have not. To calculate the sensitivity of the items used the following formula:

$$S = \frac{\sum_{i=1}^{n} U_{2i} - \sum_{i=1}^{n} U_{1i}}{N(\text{skormaksimal} - \text{skorminimal})}$$

with S = the sensitivity of the item
$\sum_{i=1}^{n} U_{2i}$ and $\sum_{i=1}^{n} U_{1i}$= each subject's total score before learning.
Maximum score = maximum score for each test item
Minimum score = minimum score for each test item
N = Number of students who took the pre-test and post-test

Test items are said to be good if the sensitivity of the test items is between 0 and 1. The criteria used to state that an item is sensitive to learning is if S ≥ 0.30.

C. Analysis of Learning Outcome Test Data

To analyze the test data on learning outcomes is carried out with the following steps:

1. Student mastery level

   According to Nurkancana in Helen (2005), the level of student mastery will be reflected in the high and low raw scores achieved and the conversion guidelines used are on a scale of five absolute norms.

   To determine the level of mastery of students used the following formula:

   PPS $=\frac{x}{N}x100\%$ where, PPS = percentage of student mastery

   x = score obtained by students

   n = the maximum score of the question

Table 1
Mastery level criteria

No.	Percentage	Mastery level
1	90-100	very high
2	80-89	high
3	65-74	moderate
4	55-69	low
5	0-54	very low

2. Completeness of student learning

   To determine the percentage of student absorption (PDS) individually, the following formula is used:

   PDS $=\frac{x}{N}x100\%$where, PDS = Percentage of students' absorption

   x = score obtained by students

   n = maximum score of the question

   with criteria: 0% < PDS < 65%: students have not finished studying

   65 % ≤ PDS ≤ 100%: students have finished studying

   To find out the percentage of students who have studied classically, the formula is used:

   D $=\frac{x}{N}x100\%$ where, D = percentage of classical learning completeness

   x = the number of students who have completed learning

   N = total number of students

   Based on the learning completeness criteria, if in that class there are 85% who have achieved at least 65% absorption, then classical learning mastery has been achieved.

   The completeness of each TPK is done by calculating the achievement of each item with the following formula:

   T $=\frac{\text{Si}}{S\text{max}}x100\%$ where, T = the attainment of each item

   Si = total student scores for each item

   Smax = total maximum score for item i (which represents each TPK

   With the criteria: 0% ≤ T < 65%: TPK has not been completed

   65%≤ T ≤ 100%: TPK has been completed

   The TPK achievement criteria are considered complete if at least 75% of the entire set TPK has been achieved.

   While the results of student responses were analyzed descriptively quantitatively in the form of percentages. Student responses are said to be positive if the average percentage obtained is more than 65% of the percentage of each individual who is in the happy category.

RESULTS

A. Analysis of Question Items

The questions (research instruments) that had been prepared were tested on 40 grade V elementary school students. Based on the results of the trial tests, the correlation coefficient r was obtained. r_{11} = 0,522 (the question has a moderate level of reliability); the results of the validity and difficulty level of the questions can be seen in the following table:

Table 2
Analysis of Questions Items

Number	Validity Coefficient	Validity Level	DK coefficient	Difficulty Level
1.	0.432	Modereta	58.3 %	Modereta
2.	0.843	Very high	50.0 %	Modereta
3.	0.1916	Very low	36.6 %	Modereta
4.	0.472	Modereta	58.3 %	Modereta
5.	0.3198	Low	33.3 %	Modereta
6.	0.0827	Very low	75.0 %	Modereta
7.	0.603	High	75.0 %	Modereta
8.	0.555	Modereta	66.7 %	Modereta
9.	0.0276	Very low	33.3 %	Modereta
10.	0.602	High	50.0 %	Modereta

Based on the reliability analysis of the questions and the table above, it can be concluded that the ten items can be used to measure the level of fifth grade students' mastery of the subject matter of decimals.

B. Analysis of Student Learning Outcomes

Based on the results of the calculation of data analysis (scores) of student learning outcomes obtained as follows: The average score of student learning outcomes is 86.27, meaning that the learning outcomes of fifth grade elementary school students for decimal material are high, thus the level of student mastery of decimal material is high ; classical student learning completeness, out of 20 students there are 19 people or 95.0% complete learning. Judging from the specific learning objectives, all of them achieved above 65%. From the results of observing student activities, all students were very active, the results of the questionnaire given to students after the learning outcomes test on decimal material was completed, obtained all data that students felt happy with the learning they had just participated in. Students think that this way is easy to understand and easy to catch. In addition, with simple but interesting teaching aids, it can increase students' enthusiasm and interest in learning Mathematics.

From the description above, it is obtained that the results of classical learning have been completed based on the learning completeness criteria specified in the curriculum, specific learning objectives have been achieved based on the criteria for achieving learning objectives, student response to learning is positive, student mastery of material is classified as moderate. Thus it can be concluded that learning on decimal material in class V Elementart School has been effective.

CONCLUSION

Based on the discussion and research results including the experience of researchers during the research, it can be concluded as follows; (1) the average score obtained by fifth grade elementary school students for decimal material was good, namely 76.27, (2) the level of student mastery of decimal material is moderate, namely 76.27%, (3) of the 20 students, there were 19 people or 95.5% of the 20 students who completed the study, meaning that classically learning for decimal material had been completed, and all of the specific learning objectives were achieved above 65%. Thus that learning for decimal material has been completed., and (4) student response to learning decimal material is positive.

REFERENCES

Arikunto, S. (2013). *Prosedur penelitian suatu pendekatan praktik*. Jakarta. Google Scholar

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications. Google Scholar

Edwards, A., & Protheroe, L. (2003). Learning to see in classrooms: What are student teachers learning about teaching and learning while learning to teach in schools? *British Educational Research Journal*, *29*(2), 227–242. Google Scholar

Ekawati, A. (2015). Pengaruh kecemasan terhadap hasil belajar matematika siswa kelas VII SMPN 13 Banjarmasin. *Math Didactic: Jurnal Pendidikan Matematika*, *1*(3). Google Scholar

Fitrina, T., Ikhsan, M., & Munzir, S. (2016). Peningkatan Kemampuan Berpikir Kreatif dan Komunikasi Matematis Siswa SMA melalui Model Pembelajaran Project Based Learning Berbasis Debat. *Jurnal Didaktik Matematika*, *3*(1), 87–95. Google Scholar

Gustiati, M. (2017). *Profil kemampuan penalaran matematis dalam pemecahan masalah ditinjau dari kecerdasan emosional dan gaya belajar siswa*. Pascasarjana. Google Scholar

Hadi, N. (2004). *Kurikulum 2004 Pertanyaan dan Jawaban*. Jakarta: Gramedia. Google Scholar

Hamalik, Oemar (2003), Proses Belajar Mengajar, Bumi Aksara, Jakarta. Google Scholar

Lopes, J., Silva, H., Catarino, P., Morais, E., & Vasco, P. (2019). Cooperative learning on promoting creative thinking and mathematical creativity in higher education. *REICE. Revista Iberoamericana Sobre Calidad, Eficacia y Cambio En Educacion*, *17*(3), 5–22. Google Scholar

Lorensia, M., & Wea, M. Y. (2015). Keefektifan Problem Posing Ditinjau dari Kemampuan Memecahkan Masalah Matematis dan Kreativitas Siswa SD Di Kabupaten Manggarai. *Jurnal Pendidikan Dan Kebudayaan Missio*, *7*(1), 32–39. Google Scholar

Marsini. (2006), Penerapan Pendekatan Kontekstual (Contextual Teaching and Learning). Depdikbud, Jakarta Google Scholar

Nartiningrum, N., & Nugroho, A. (2020). Online learning amidst global pandemic: EFL students' challenges, suggestions, and needed materials. *ENGLISH FRANCA: Academic Journal of English Language and Education*, *4*(2), 115–140. Google Scholar

Purwanto, M. N. (1984). *Theoretical and Practical education*. Bandung: Youth Work. Google Scholar

Sukino, dkk. (2018) Matematika untuk S.D. Kelas VII, Penerbit, Erlangga Jakarta

Tampubolon, T. (2018). Pembelajaran Aktif Dengan Percobaan Pada Bilangan Cacah Di Kelas V SDN 173189 Sosorpahu Kecamatan Sipahutar. *Tapanuli Journals*, *1*(1), 43–55. Google Scholar