Development of Metacognition-Based Group Investigation Learning Model for College Students

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Abstract

This study examines the development of a metacognition-based group investigative learning model to improve the higher-order thinking skills of elementary school teacher education students at Medan State University in basic social science concepts courses. Learning in tertiary institutions requires a continuous renewal in developing learning to improve the quality of each alumni. Several students in the Basic Concepts of social science course in eleven classes showed unstable learning outcomes and needed improvement and development in learning outcomes that integrated higher-order thinking skills. It can be seen that the learning outcomes vary each year, but are still in the high category. Another phenomenon that has been found is that there are no lecturers in the field of social sciences in elementary school teacher education at Medan State University who develop learning models to improve the quality of learning. This study aims to determine the feasibility and effectiveness of developing a metacognition-based group investiagation learning model in the basic concepts of social science course in Elementary School Teacher Education, Medan State University. The model development design used is the Plomp development design. The results of the study show that there is feasibility and effectiveness of developing metacognition-based group investigation learning models.

Keywords: Group investigation, metacognition, higher order thinking skills

Introduction

Education is a means of educating the nation's children who can create quality human resources with the potential skills and intelligence they acquire. Education is very important when someone enters the world of work, so the government strives to improve the quality of education. Educationis supported by a good learning process in the success of increasing human resources so that students acquire skills and values that meet national standards (Farihah et al., 2023).

The purpose of education is a place or container that can allow a person to develop skills or talents only, but knowledge can realize itself and have a function in the needs of his life and the surrounding community. A forum for improving the quality of education through basic education to education in higher education by producing excellent student graduates.

Education in higher education will produce the nation's next generation who will enter the world of work. Elementary School Teacher Education is one of the bridges of someone who provides knowledge about being an educator as well as a teacher for elementary school students. Through learning programs in Elementary School Teacher Education, students are prepared with teaching skills, especially for elementary schools in realizing professional teachers.

To realize professional teachers in the field of Elementary School Teacher Education, students are required to have higher-order thinking skills. There are four aspects that support higher-order thinking skills in critical, rational, reflective, metacognitive, and creative thinking (King et al., 1998). High-level thinking skills in prospective elementary school teachers require understanding of concepts in the learning process to solve problems in everyday life. Mastery of concepts is concerned with the acquisition of knowledge through inductive processes. In the inductive process, students are involved in analyzing activities which are followed by drawing conclusions based on the analysis that has been done. This process deals with higher-order thinking skills.

The gap in the phenomenon found in this study is the gap between expectations and reality for the higher-order thinking skills of elementary school teacher education students. The hope found is based on Law of the Republic of Indonesia Number 12 of 2012 Article Article 13 paragraph 1 students as members of the Academic Community are positioned as adults who have their own awareness in developing their potential in Higher Education to become intellectuals, scientists, practitioners, and / or professionals and Article 13 Paragraph 2 that students as actively developing their potential by learning, searching for scientific truth, and/or mastering, developing, and practicing a branch of Science and/or Technology to become cultured scientists, intellectuals, practitioners, and/or professionals. But the reality obtained from this

study is that the higher-order thinking skills of dominant students still require improvement and guidance in developing higher-order thinking skills, resulting in the learning outcomes of dominant Elementary School Teacher Education students have not reached the very good category. The following is the data for high-level thinking skills of elementary school teacher education students of Medan State University Basic Concepts of Social Sciences courses in the second semester of the 2018/2019, 2019/2020 and 2020/2021 academic years below:

Table 1.   Higher Order Thinking Skills Test Data Results Elementary School Teacher Education Students of State University of Medan

No	Year	$\overline{X}$	Number of Students
1	2018/2019	71,9	417
2	2019/2020	80,3	420
3	2020/2021	83	530

Data Source: Lecturer of Basic Concepts of Social Sciences Elementary School Teacher Education, State University of Medan

The average score in the Basic Concepts of Social Sciences course in Elementary School Teacher Education, State University of Medan in 2018/2019 which was ten classes with a total of 417 students was 71.9, the average score for 2019/2020 which was 11 classes with a total of 420 students was 80.3, the average score for 2020/2021 which is 11 classes with a total of 530 students, which is 83. The results of these data can show that the Basic Concepts of Social Sciences courses in the whole class show unstable learning outcomes and need improvement and development in learning outcomes that integrate higher-order thinking skills. It can be seen that the learning outcomes in each year vary, but still in the high category. Explanation of the phenomenon found above, there is a gap between expectations and reality, so this study was followed up with the problem of higher-order thinking skills for elementary school teacher education students of State University of Medan in the basic concepts of Social Sciences course.

Furthermore, a research gap was found in this study, namely the gap between expectations and reality in this study, namely there are expectations obtained are Law of the Republic of Indonesia Number 12 of 2012 Article Article 13 paragraph 1 students as members of the Academic Community are positioned as adults who have their own awareness in developing their potential in Higher Education to become intellectuals, scientists, practitioners, and/or professionals and Article 13 Paragraph 2 that students as actively develop their potential by learning, searching for scientific truth, and/or mastering, developing, and practicing a branch of Science and/or Technology to become scientists, intellectuals, practitioners, and/or cultured professionals.

The fact that there are findings of PISA (Program for International Student Assessment)   survey data in 2018 explains that around 40% of

students in Indonesia reach level 2 in thinking with an OECD average of 78%, students can at least recognize the correct explanation for known scientific phenomena and can use this knowledge to identify, in simple cases (OECD, 2019). As well as research results that explain that attempts to teach thinking skills to college students, including preservice teachers, have not been totally successful, due to several factors (Coffman, 2013). Next is students' higher-order thinking ability in discussing environmental problems in the teaching and learning process is still low (Ichsan et al., 2019). The difficulty of students in solving the problems found is that students find it difficult to reach the breadth and application of the material obtained in learning, so many students cannot make ideas through HOTS learning (Cahyaningtyas et al., 2020). Referring to the research, it can be seen that there are research gaps found in this study, so the research was followed up with research on higher-order thinking skills in students, especially Elementary School Teacher Education, State University of Medan in the basic concepts of Science course Social.

The courses obtained by students are the basic concepts of Social Sciences, where students are required to understand concepts from Social Sciences. The Basic Concepts of Social Sciences course is a course that covers a wide range of social sciences organized through pedagogical and psychological skills, suitability and importance in the living environment for students and prospective teachers. Basic Concepts of Social Sciences including the main courses in the Elementary School Teacher Education study program, Faculty of Education, State University of Medan include nine Course Learning Outcomes, namely: 1) understanding the essence, structure of social sciences and history of the development of Science Social Knowledge, 2) understand the understanding of concepts, characteristics of concepts and the relationship of facts to concepts, 3) understand the scope and essential concepts of sociology, 4) understand the scope and essential concepts of economics, 5) understand the scope and essential concepts of history, 6) understand the scope and essential concepts geography, 7) understand the scope and essential concepts of anthropology, 8) understand the scope and essential concepts of   politics, 9) analyze the interrelationships between basic concepts of social science. Seeing that there are nine Learning Outcomes of the Basic Concepts of Social Sciences Course, it is necessary to develop self-potential to be done so that learning outcomes are achieved.

A very important component in achieving goals and success in learning is the use of appropriate techniques and strategies (Rahayu & Haq, 2020) (Mardhatillah et al., 2020). By applying these components of learning in the teaching and learning process, it can affect a person's skills in higher-order thinking. One of them is with the right learning model used for students. The learning model is a whole series of presentation of teaching material which includes all aspects before, during and after

learning carried out by educators and all related facilities used directly or indirectly in the teaching and learning process. Share models of how collaborative learning can be realized by teachers and researchers (Cai et al., 2018). In other words, this learning model can form collaborative learning with the role of teachers and researchers in it.

One of the learning models that builds student activeness in thinking is the Group Investigation learning model. The Group Investigation model can help students to understand a learning concept and can solve a problem in everyday life by means of group discussions. Group investigation is a learning model that can create new knowledge through problem solving (Fadilurrahman et al., 2019).

The development in this study is the development of a group investigation learning model in collaboration with metacognition. The reason for juxtaposing the group investigation model in collaboration with metacognition is that it is assumed to form students who are aware of the thinking activities they carry out in the learning process and are able to make a joint decision to solve the problems found. Metacognition-based learning teaches students to be aware of creative and active thinking activities and makes learning vary according to higher-order thinking skills. Higher order thinking skills have complex, non-algorithmic thinking, have many solutions, involve variations in decision making and interpretation, many criteria and require more and deeper thinking (Supiandi et al., 2019) (Mardhatillah et al., 2019).

Development of a metacognition-based group investigation learning model based on assumptions: 1) the development of this learning model is expected to be a reference material that can facilitate students in learning outcomes, especially in aspects of Social Science education based on an integrated independent learning curriculum Indonesian National Qualifications Framework, 2) the development of this learning model is more effective based on the perspective of learning outcomes obtained by students and efficiency in learning, and 3) the development of this learning model is very well done based on perspectives that still need learning development through the use of innovative learning models.

Looking at the facts that have been explained, this research was conducted at Medan State University with the target of elementary school teacher education students in the second semester of the Basic Concepts of Social Sciences course using a metacognition-based group investigation learning model designed in such a way as to encourage students to participate in learning to investigate a case in the scientific process with the right time Determined.

Based on this thinking, this study can find novelty, including: 1) the resulting learning model product is a remodel of the group investigation learning model based on metacognition, and 2) this learning model is a

result of new thinking in the field of Social Sciences Especially for students with steps that can provide opportunities for students in analyzing a problem, evaluating, and being able to develop creativity by making the latest innovations based on the development of the thoughts formed.

Methodology

Research Design

This research was conducted using a research and development (R&D) model. In this study, the development carried out was the development of a metakogyny-based group investigation learning model. This research focuses on product development where the product will be tested specifically in terms of feasibility, and the effectiveness of the development of the learning model and the final product will be evaluated. The development research designed is focused on improving the higher-order thinking skills of Medan State University Elementary School Teacher Education students.

Sample and Data Collection

Sample size on this research is 71 students from two classrooms, class H and class K, in the second semester of a social studies fundamental concepts course served as the study's sample with disproportionate stratified random sampling. The Research and Development model aims to find, develop and validate a product (Wahjusaputri & Bunyamin, 2022). At the finding stage, basic information identification activities related to the developed materials are carried out, followed by the stage of developing basic information which makes the product to be validated to test the feasibility and effectiveness of the product developed.

The stages carried out in developing this learning model, namely by determining the development design proposed (Akker et al., 2010). The development design proposed by Plomp shows a learning development design. The stages of development carried out in this design are five stages presented in the following scheme (Akker et al., 2013):

1. Prelimenary investigation. These activities include: a) initial investigation of learning models, b) initial investigation of learning tools.

2. Design. These activities include: a) designing learning models. Related components of designing learning models are designing syntax, designing social systems, designing reaction principles, designing support systems, and designing learning impacts, and b) designing learning tools. The design of learning tools is designing semester learning plans, student worksheets, lecturer manuals and student manuals.

3. Realization/construction. This activity is carried out byproducing an initial draft as a result of the model design.

4. Test, evaluation and revision. This activity is carried out considering the quality and quality of the products produced.

5. Last is implementation.

The instruments used in this study consist of:

1. Validation sheet, The validation sheets used are a) metacognition-based group investigation learning model book validation sheets, b) Semester Learning Plan validation sheets, c) student worksheet validation sheets, and d) student learning outcome test validation sheets.

2. Assessment sheet on the effectiveness of the model. The effectiveness of the metacognition-based group investigation learning model can be measured in four aspects, namely: (1) achievement of learning outcomes, (2) student and lecturer activities, (3) lecturer ability in learning management, and (4) student and lecturer responses to learning activities.


Results and Discussion

Development of a metacognition-based group investigation learning model in the elementary school teacher education department in the basic concepts of Social Sciences course which is carried out according to established procedures. The initial process in developing a learning model is to identify, and seek information related to the learning model that is currently applied or developed to analyze needs in data collection.

In the first stage by conducting an initial investigation or prelimenary investigation. The initial investigation activities carried out found problems during and in the middle of the research journey, identified information related to the learning model to be developed, namely the group investigation model, analyzed information about group investigation by looking for advantages and disadvantages as well as causes and effects in the use of the group investigation learning model, reviewed the appropriate theory related to Group Investigation, limiting the problems to be studied, and planning further activities by collaborating metacognition in the development of group investigation learning models.

In addition to identifying the learning model developed, this stage also conducts needs analysis by looking for data regarding learning procedures, learning problems, and learning models or methods used in the learning process. This activity was carried out in the elementary school teacher education department to obtain preliminary data on

integrated learning outcomes of students' higher-order thinking skills by implementing an independent curriculum based on KKNI. In fact, there are higher-order thinking skills of students using learning outcomes tests. Accordingto the average learning outcomes of second-semester Elementary School Teacher Education students in the basic concepts of Social Sciences integrated with higher-order thinking skills, namely:

Figure 1. Percentage of Student Learning Outcomes Test for Basic Concepts of Social Sciences Integrated Higher Order Thinking Skills T.A 2021/2022
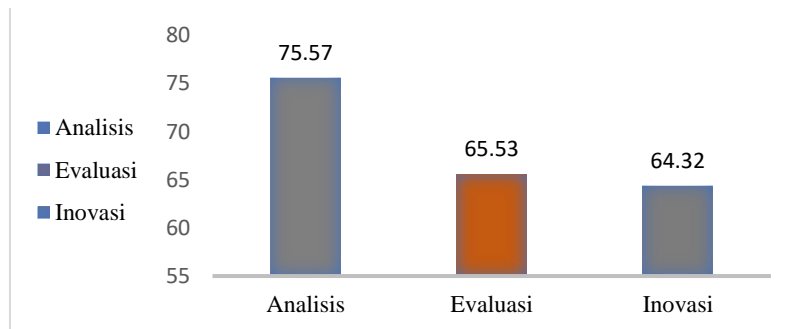
The data in figure 1 shows that there are average learning outcomes integrated with higher-order thinking skills in initial investigation activities in second-semester students of the Basic Social Sciences Concepts course, namely 75.57, namely the scope of analysis, at the scope of evaluation of 65.53 and 64.32 at the scope of innovation. In the initial investigation activities, researchers found shortcomings in evaluation and innovation activities, this triggered the need for improvement in higher-order thinking in students. It can be seen that the acquisition of scores in the initial investigation activities on evaluation and innovation has not reached the standard level of student assessment.

The results of observations during the learning process, students often carry out individual learning activities that do not form group / group learning. Similarly, there are students who still need guidance in understanding ongoing learning material, this shows that students' complex thinking skills have not developed.

The results of initial observations also show that there is rarely interaction between students with each other, and rarely given reflection by lecturers at the end of learning. So that learning has not been able to motivate students in learning and make students aware to change in learning patterns and better thinking patterns. Therefore, it is necessary to develop a learning model, namely a metacognition-based group investigation learning model in the basic concepts of Social Sciences course to improve student learning outcomes.

In the second stage in the process of developing a metacognition-based group investigation learning model, namely design. This activity, preliminary design planning is carried out on the learning model developed. The beginning of discovery activities results from the analysis and identification of phases or stage structures of the group investigation model.

In the third stage, namely realization / construction (realization / construction). This activity was carried out the making of the first design (prototype). The construction realization phase in the development of educational products is referred to as the production phase. This phase is a continuation phase of the design phase, namely making a first stage product (prototype).

In the fourth stage, namely test, evaluation and revision. This stage discusses giving consideration to decisions on the continuation of the manufacture of this product. There are several activities carried out, namely:

1. Conduct feasibility testing of all instruments by experts and practitioners

2. Validate the metacognition-based group investigation learning model with related learning tools.

Expert validation of the metacognition-based group investigation learning model was carried out by three validators for content validation criteria, and three validators for construct validation criteria. There are several improvements provided by validators to the development of learning models. These improvements are reviewed by validators to determine the level of validity of the learning model. The results of the analysis of suggestions provided by validators related to the learning model are:

a. Add a philosophical foundation in the book.

b. In the syntax write the phases briefly, concisely and clearly.

c. There is a foundation for development in the learning model.

d. Fix the cover more attractive by giving it some color.

Table 2. Results of Content Validation and Construct of Metacognition-Based Group Investigation Learning Model

Assessment Aspect	Average
Content Validation	3,8
Construct Validation	3,8

Table 2 it can be seen that there is validation carried out by material experts who measure the validity of the content of the development of a metacognition-based group investigation learning model in the basic concepts of Social Sciences course with nine the scope of assessment

aspects is supporting theory, metacognition-based group investigation learning model syntax, social system, interaction principle, support system, instructional impact and accompaniment, learning implementation, learning environment and tasks, and learning outcomes.

In addition to content validation of the learning model, there is further validation carried out by experts who measure the construct validity of the development of a metacognition-based group investigation learning model in the basic concepts of Science course Social Knowledge with eleven scopes of assessment aspects, namely book display, learning model components, supporting theory, syntax, social system, management principles, support system, impact instructional and accompaniment, implementation of learning, learning environment and task management and evaluation. The following table of content and construct validation results in the metacognition-based group investigation learning model.

Looking at the overall data on the content validation assessment aspect of the metacognition-based group investigation learning model, it can be seen that the average score is 3.8. Referring to the interval of determining the level of validity of the learning model that the number range $3 \leq Va < 4$ can be said that the product is valid. While the construct validation of the metacognition-based group investigation learning model, it can be seen that the average value is 3.8. Referring to the interval table determining the level of validity of the learning model that the number range $3 \leq Va < 4$ can be said that the product is valid.

3. Evaluation of the effectiveness of the metacognition-based group investigation learning model.

The effectiveness of this metacognition-based group investigation learning model can be seen from four aspects, namely student learning outcomes, achieving the ideal percentage of time for student and lecturer activities, the ability of lecturers to manage learning and the response of students and lecturers to learning components and activities.

The average acquisition of small group trial results was shown through student learning outcomes tests on the basic concepts of Social Sciences using a metacognition-based group investigation learning model, which was 75.5 with a medium category. In the analysis of group trial data was being carried out by 35 students with an average score of medium group trials of 80.59 with a high category. Meanwhile, the data analysis of large group/field trials was carried out by 71 students with an average score of learning outcomes test which was 82.25 with a high category.

The achievement of the ideal time percentage of student and lecturer activities is said to be effective if the category of student activity in listening / paying attention to the lecturer's explanation is 25% of what

is provided at each meeting, with a tolerance limit for achieving the ideal time percentage of student activities between 20% to 30% (20% ≤ PWI ≤ 30%).

In learning activities, namely in the aspect of listening / paying attention to the lecturer's explanation, which is 26% of the time provided at each meeting. Then the aspect of listening / paying attention to the explanation of lecturers / friends, there is student activity in reading student manuals and Student Worksheets, which is 18.33%. Furthermore, in the aspect of recording lecturers' explanations, taking notes from books or from friends, solving problems on Student Worksheets, summarizing group work, there is an average percentage of student activity time in learning, which is 27.83%.

Then in the aspect of discussing / asking questions between students and lecturers, between students and their friends, there was an average percentage of student activity time in learning in the first trial, which was 27.25%. Finally, in the aspect of doing something that is not relevant to learning, which is 2.67%. Thus, it can be seen that the average percentage of student activity time in learning in the five aspects carried out shows that the   application of the metacognition-based group investigation learning model syntax is effective for learning.

In addition to the average percentage of student activity time in learning, there is an average percentage of lecturer activity time in learning carried out in the first and second trials. It can be seen in the aspect of explaining the material / providing information, the average obtained is 26.50%. Then in the aspect of observing student activities, motivating, instructing, guiding student activities, there is an average acquisition of lecturer activity time in learning, which is 74.33%. Furthermore, in the irrelevant treatment aspect, an average value of 0.67% was obtained.

From the average value that has been described, it can be said that the percentage of lecturer activity time in the first and second trial learning in these three aspects shows that the application of metacognition-based group investigation learning model syntax is effective for learning. In addition, there was an average score of lecturers' ability to manage learning by implementing a metacognition-based group investigation learning model of 3.72 with a good category. Thus, it can be concluded that the metacognition-based group investigation learning model is effective for students in the basic concepts of Social Sciences course.

The criteria for the effectiveness of the learning model in the aspect of student and lecturer responses to learning components and activities amounting to at least 80% of the total subjects studied in the learning carried out gave a positive response to the components and learning activities. The average value of learning in student responses to learning components and activities is 87.84% with positive criteria. Furthermore,

the average value of learning in the lecturer's response to learning components and activities was 87.5% positive criteria with coverage of aspects of lecturers' opinions on the ability of learning devices, there were 87.5% who stated very helpful and 12.5% who stated helpful.

Meanwhile, in the aspect of lecturer assessment of the ability of learning devices, there were 87.5% who stated very helpful and 12.5% who stated helpful. Based on the average percentage found, it can be concluded that the lecturer's response to learning components and activities with a metacognition-based group investigation learning model shows a positive response and is effectively used for students in the basic concepts of Social Sciences course.

4. Field trial activities.

The results of this trial were carried out with small groups, medium groups, large groups / fields. Data analysis of small group trials was carried out by seven students to see the shortcomings of the metacognition-based group investigation learning model in the basic concepts of Social Sciences course. The average acquisition of small group trial results was shown through student learning outcomes tests on the basic concepts of Social Sciences using a metacognition-based group investigation learning model, which was 75.5 with a medium category.

In the data analysis, group trials were being carried out by 35 elementary school teacher education students with an average average score of medium group trials through tests of student learning outcomes integrated with higher-order thinking skills against basic concepts of Social Sciences courses using a metacognition-based group investigation learning model, which was 80.59 with high categories.

Meanwhile, the data analysis of large group / field trials was carried out by 71 elementary school teacher education students with the acquisition of average scores on learning outcomes tests of basic concepts of Social Sciences integrated with higher-order thinking skills using a metacognition-based group investigation learning model, which is 82.25 with a high category.

Research on the development of a metacognition-based group investigation learning model in the basic concepts of Social Sciences course, there is a student response to the use of the learning model, namely by giving an average of "very agree" responses which can be seen from the results of trials conducted in small, medium and large groups / fields. The following table obtains small, medium and large/field trial data

Figure 2. Small, Medium and Large/Field Trial Data Acquisition
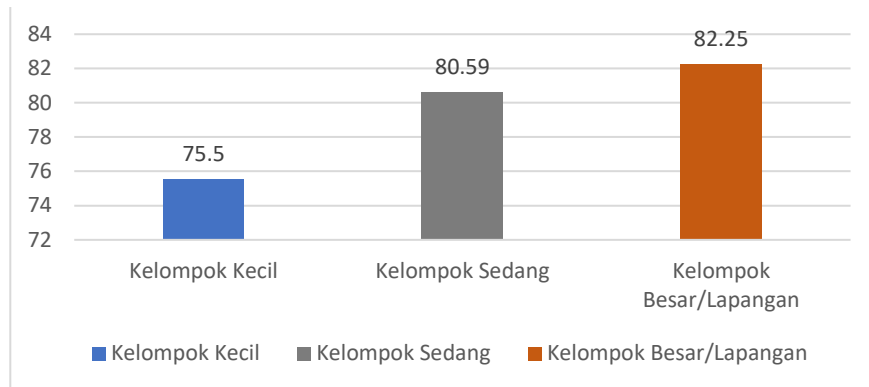
Finally, the fifth stage is implementation. This implementation stage is carried out in the application of learning using products that have been developed, namely with students in the second semester of Elementary School Teacher Education, State University of Medan in the Basic Concepts of Social Sciences course. The following metacognition-based investigative group learning model has been developed:

Figure 3. Metacognition-Based Group Investigation Learning Model
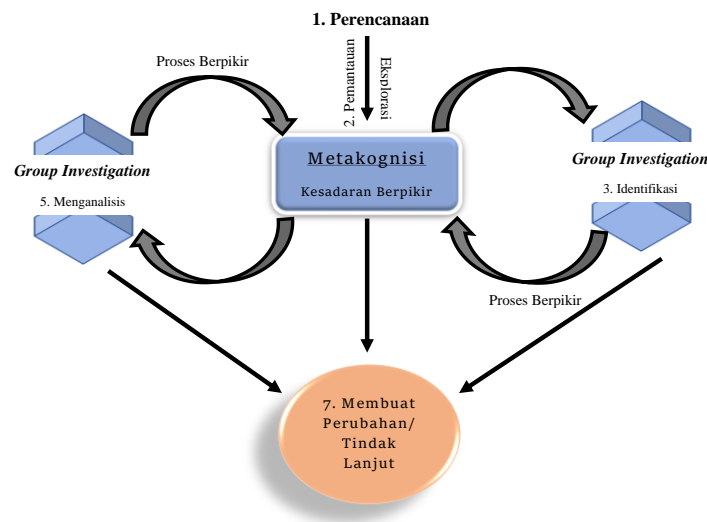
Conclusion

The feasibility of the metacognition-based group investigation learning model is seen based on the level of validity of the products developed including metacognition-based group investigation learning model books, and learning tools (RPS, lecturer manuals, student manuals and student worksheets). All products developed are declared valid by a team of experts and practitioners, so it can be said that all products from

the development of metacognition-based group investigation learning models are declared suitable for use.

The effectiveness of the metacognition-based group investigation learning model is seen from four aspects, namely student learning outcomes, achieving the ideal percentage of time for student and lecturer activities, the ability of lecturers to manage learning and the response of students and lecturers to the components and learning activities found can be concluded that it is effectively used for students in the basic concepts of Social Sciences courses.

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Bibliography

Akker, J. van den, Bannan, B., Kelly, A. E., Nieveen, N., & Plomp, T. (2010). An Introduction to Educational Design Research.

Akker, J. van den, Bannan, B., Kelly, A. E., Nieveen, N., & Plomp, T. (2013). Educational Design Research (pp. 1–204).

Cahyaningtyas, A. P., Sari, Y., & Pradana, A. B. A. (2020). High Order Thinking Skills: How Is It Integrated With Cognitive Assessment? Jurnal Ilmiah Pendidikan Dasar, 7(2), 109. https://doi.org/10.30659/pendas.7.2.109-120

Cai, J., Morris, A., Hohensee, C., Hwang, S., Robison, V., & Hiebert, J. (2018). Reconceptualizing the roles of researchers and teachers to bring research closer to teaching. Journal for Research in Mathematics Education, 49(5), 514–520. https://doi.org/10.5951/jresematheduc.49.5.0514

Coffman, D. M. (2013). Thinking about Thinking: An Exploration of Preservice Teachers' Views about Higher Order Thinking Skills. Phd Thesis, 1–161.

Fadilurrahman, M., Ismaniati, C., & Mustadi, A. (2019). Increasing Student Learning Activeness through Group Investigation. Journal of Physics: Conference Series, 1233(1). https://doi.org/10.1088/1742-6596/1233/1/012079

Farihah, Tanjung, S., Ampera, D., Sitompul, H., & Jahidin, I. (2023). Development of 3D-based Learning Modules for University Students. International Journal of Education in Mathematics, Science and Technology, 11(1), 56–73. https://doi.org/10.46328/ijemst.2715

Ichsan, I. Z., Sigit, D. V., & Miarsyah, M. (2019). Environmental Learning based on Higher Order Thinking Skills: A Needs Assessment. International Journal for Educational and Vocational Studies, 1(1), 21. https://doi.org/10.29103/ijevs.v1i1.1389

King, F., WKreidler, C., Keefe, E. B., Copeland, S. R., Harste, J. C., Baten, C. E., Goodson, L., Faranak Rohani, M., Caladine, R., & Lee, L. (1998). Higher Order Thinking Skills, Definition, Teaching Strategies, Assessment A publication of the Educational Services Program, now known as the Center for Advancement of Learning and Assessment. Voices from the Middle, 88(18), 495–496.

Mardhatillah, Kasmini, L., Yusrizal, Fatmawati, Rambe, T., & Yasrizal. (2020). The influence of information technology and communication technology (Ict)-based learning media on student learning outcomes in mathematics learning in elementary school. Advances in Mathematics: Scientific Journal, 9(12), 10569–10576. https://doi.org/10.37418/amsj.9.12.42

Mardhatillah, M., Sari, S. M., Surjono, H., & Muhtadi, A. (2019). Development of Teacher and Student Thematic Learning Books Based on Gender And Diversity for Elementary School Students In District of Aceh Barat. INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH, 8(10), 10–12.

OECD. (2019). PISA 2018 Results COMBINED EXECUTIVE SUMMARIES VOLUME I, II & III. PISA 2018 at a Glance, I, II & II. https://doi.org/10.1787/g222d18af-en

Rahayu, A. D., & Haq, M. S. (2020). Sarana Dan Prasarana Dalam Mendukung Pembelajaran Daring Pada Masa Pandemi Covid-19. Jurnal Inspirasi Manajemen Pendidikan, 9(1), 186–199.

Supiandi, U., Sari, S., & Subarkah, C. Z. (2019). Enhancing Students Higher Order Thinking Skill through Instagram based Flipped Classroom Learning Model. Atlantis Press, 253, 233–237. https://doi.org/10.2991/aes-18.2019.55

Wahjusaputri, S., & Bunyamin, B. (2022). Development of teaching factory competency-based for vocational secondary education in Central Java, Indonesia. International Journal of Evaluation and Research in Education, 11(1), 353–360. https://doi.org/10.11591/ijere.v11i1.21709