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THE DEVELOPMENT OF "AKSI" (AKTUALISASI SISWA) LEARNING MODEL TO IMPROVE HIGHER ORDER THINKING SKILLS OF NATURAL SCIENCE IN JUNIOR HIGH SCHOOL

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ABSTRACT

This research aims to develop a valid, practical, and effective AKSI learning model. The research method used is development research with adaptation of Thiagarajan development steps. Based on the results of the needs analysis on the questionnaire given to 15 science teachers in several regions in East Java, educators stated that the students' higher-order thinking skills were not optimal. 66.7% of teachers agreed that their students needed active learning to actualize their students' abilities. 23.3% of teachers strongly agree that their students need active learning to actualize their students' abilities Higher-order thinking skills show that students have C_4, C_5, and C_6 knowledge abilities. Based on these data it is necessary to develop a learning model that fits the needs, the AKSI learning model. This research aims to develop a valid, practical, and effective AKSI learning model. The research method used is development research with an adaptation of the development steps developed by Thiagarajan. The 4D development model is carried out with 4 research stages namely Define, Design, Develop, and Disseminate. The AKSI learning model has a validity score of 88.10% in the very valid category. The practicality value of the observation of the implementation is 89.24% in the very practical category, the teacher response test was 89,38% in the very practical category, and the student response test was 84.12% in the very practical category. The value of the model's effectiveness is to get an N-gain score for high-level thinking skills, which is 0.7 in the high category.

INTRODUCTION

Education has an important role in improving the quality of a country. Education also plays a role in preparing and developing reliable Human Resources to educate the nation's life, improve people's welfare, and build national dignity (Yayan Alpian et al., 2019). Based on Law Number 20 of 2003 concerning the National Education System, it is explained that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual religious strength, self-control, personality, intelligence, noble character, and the skills needed himself, society, nation, and state. To realize this role, it is necessary to improve the quality of learning regularly through the use of learning strategies.

Good learning can be achieved if the teacher can meet the demands of curriculum implementation. The independent curriculum results from an evaluation of the 2013 curriculum (Wartoyo, 2022). The independent curriculum provides freedom through independent learning and independent teaching. The independent curriculum embodies the characteristics of Pancasila students based on Permendikbud No. 22 of 2020 through the creation of Pancasila students who are critical, creative, independent, have faith and fear of God Almighty, and have noble character, work together, and have global diversity. These characteristics will be very good if applied in learning Natural Sciences.

The abilities useful in learning Natural Sciences are scientific abilities, one of which is shown by high-order thinking abilities. A student must have higher-order thinking skills by showing that the student has C_4, C_5, and C_6 knowledge abilities (Choirunnisa & Pahlevi, 2021). Higher-order thinking is students' abilities to analyze, assess, and create innovations in solving environmental problems (Ichsan et al., 2022). Higher-order thinking skills enable students to think with high competence and help students to find information and find solutions to problems so these two abilities are needed in science learning.

Based on the results of a needs analysis based on the numbers given to 15 science teachers in Banyuwangi, Jember, Pasuruan, Gresik, and Madura, educators stated that their students' high-level thinking skills were not optimal. so it is necessary to increase the score of higher-order thinking abilities. The ability to think at a higher level requires someone to do something based on facts and be able to make a solution to a problem

(Suparman, 2021). This ability is very important to have to train students to have good competency in learning (Rini et al., 2021).

Higher-order thinking is abilities that use thinking skills by not just memorizing but requires the ability to think optimally by providing links between existing facts. The role of environmental education will be very crucial to improve higher-order thinking ability and will require innovation in 21st-century education through the use of appropriate learning models (Rahmayanti et al., 2020).The right strategy will have an impact on the achievement of learning objectives. Indicators of higher-order thinking skills are analyzing (C_4), evaluating (C_5), and creating (C_6) (Lestari et al., 2022).

Higher-order abilities need students to have scientific abilities through the right strategy, for example by developing the right learning model. A good learning model that can be applied to learning fits the needs of the learning process (Amal et al., 2013) In developing this learning model, it is a development research by producing good products, which are valid, practical, and effective (Plomp & Nieveen, 2007). The learning model will also be a benchmark for how learning is carried out, so it is important to use the right learning model so that students can carry out learning according to the applied curriculum.

The availability of learning designs that are by time is important for achieving learning objectives. But until now the learning design that suits the needs is still limited. So far, science learning has been done by allowing students to work on difficult textbook questions and teaching students to practice experiments that exist in theory so that learning science is not by the constructivist approach. On higher-order thinking abilities is necessary to have an AKSI (*Aktualisasi Siswa*/student actualization) learning model which prohibits students from recognizing their problem environment and can provide useful solutions for the environment.

MATERIALS AND METHODS

The research method used in this research is development research with the Thiagarajan development model. with four stages of research namely D*efine, Design, Develop,* dan D*isseminate*. At the *define* stage, preliminary study activities are carried out through questionnaire distribution to 15 teachers from 15 junior high schools. At the *design* stage, the design of a learning model is carried out according to the needs

according to contextual-theoretical procedures. At the *develop* stage, an empirical study was carried out regarding the initial product in the form of an AKSI learning model, then validation, product trials, and revisions. At the *dissemination* stage, product/result dissemination activities are carried out from the development to several subjects. This research was conducted at 3 public junior high schools in Banyuwangi with A accreditation. The research data was obtained from product validity by three experts namely lecturers and using validity content and construct (Wicaksono et al., 2020), practicality data based on learning implementation tests, teacher response tests, and student response tests, learning model effectiveness data based on pretest scores /student posttest. Analysis of the data used in the analysis of validity, practicality, and effectiveness.

Score validation is analyzed and percentaged with the following formula:

$$\text{Validation}\frac{\text{Total achieved score}}{\text{Total expected score}} \times 100\%$$

The proportion of data generated from the formula above is then entered based on the validity category table (Akbar, 2016).

The practicality score is analyzed and percentage, with the following formula;

$$\text{Practicality} = \frac{\text{Total achieved score}}{\text{Totalexpected score}} \times 100\%$$

the practicality of the model will be closed and entered according to the practicality table (Akbar, 2016).

The effectiveness score is obtained based on the test scores of higher-order thinking skills.

$$Normalized\ gain\ (\langle g \rangle)\frac{postest\ score\ -pretest\ score}{Score\ maximum - pretest\ Score}\ X\ 100\ \%$$

The N-gain score obtained is based on formulas and categorization tables (Hake, 1998).

The AKSI learning model shows that the characteristics of the learning model provide opportunities for students to actualize themselves by freely implementing what students want based on the learning theme determined by the teacher. With the AKSI learning model, students are free to think about organizing information from learning resources, discussing problems using any point of view, designing and implementing projects in the way they discuss.

The AKSI learning model is structured to be able to create a learning atmosphere that can form higher-order thinking skills and creative thinking skills (Ariyana et al.,

2018). The AKSI learning model will emphasize the student centered learning approach which is a learning pattern centered on students who can play an active role in learning (Zubaidah, 2020). Student centered learning emphasizes interaction and not just transferring information, but rather students are involved to seek knowledge independently (Ridwan, 2021). When students are active in learning, the teacher's job is to guide and facilitate the learning process, it appears in the right learning process (Sulistriani et al., 2021).

The syntax of the AKSI learning model is planned to be able to provide provisions for students to have higher-level thinking skills and creative thinking (Nurwanti, 2022), therefore the following details show that the phases implemented in learning with the AKSI learning model will train the expected abilities based on indicators of higher-level thinking skills.

The syntax of the AKSI learning model is the steps carried out in the learning phase, the syntax of AKSI learning is stimulating, discussing, designing, doing, reporting, and inferencing, or can be abbreviated as SD3RI. In the table is an explanation of the syntax of the AKSI learning model:

Table 1. The syntax of the AKSI learning model

No	Phase	Activity Steps	Learning Theory
1.	*Stimulating*	- Directing learning resources in the form of readings/videos/images etc. - Problem giving	Cognitive theory, in Vygotsky's cognitive theory, states that children's cognitive development is shaped by the environmental context.(Santrock, 2011)
2.	*Discussing*	- Problem analysis - Project planning discussion - Providing arguments about the project - Project discussion in class	cognitive theory Problem solving theory begins with the assumption that most human behavior is motivated by problem solving, human thinking and information seeking begin with uncertainty and that is a problem. (Kim & Grunig, 2011)
3.	*Designing*	- Preparation for project implementation - Giving assignments to groups	Social Constructivist Theory Social constructivists emphasize the social context of learning and the idea that knowledge is built and constructed through the involvement of others and creates opportunities for students to evaluate and then students will refine their thinking by creating shared understanding.(Santrock, 2011)
4.	*Doing*	Implementation of the project as planned review	cognitive theory Problem solving theory begins with the assumption that most human behavior is motivated by problem solving, human

No	Phase	Activity Steps	Learning Theory
			thinking and information seeking starts from uncertainty, that is the problem (Kim and Grunig, 2011)
5.	*Reporting*	- Shows completed projects - Reporting project results	Social Constructivist Theory The application of constructivist theory related to activities in learning, relies on active activities through the form of doing something (doing) rather than passive activities/receiving knowledge transfer from educators. (Ngalimun in Kodir, 2018)
6.	*Inferencing*	- Evaluate project results	Gagne's Cognitive Theory information processing theory, namely that there is an interaction between internal conditions in the form of an individual's self-state and external in the form of environmental stimuli (Al-Mahiroh & Suyadi, 2020).

RESULTS AND DISCUSSION

Product validation that has been developed produces results in the form of quantitative and qualitative data obtained based on the assessment of expert and practitioner validators with the results of the assessment in **Table 2**.

Table 2. Validation results of the AKSI learning model

No	Content Validity		Construct Validity	
	Indicator	Percentage	Indicator	Percentage
1.	The learning theory presented is sufficient to be used as a basis for developing the AKSI learning model.	75.00%	The sequence of learning activities reflects project and cooperative learning	91.67%
2.	Comprehensive coverage of the theory supporting the model.	83.33%	The concept of character is relevant as the basis of the learning model	100%
3.	Instructional and accompanying impacts on learning are clearly stated.	91.67%	Appropriateness of the types of instructional impacts that can be achieved.	100%
4.	The principles of reaction in learning are clearly stated.	91.67%	Appropriateness of the types of accompaniment impacts that can be achieved.	83.33%
5.	The social system in learning is stated clearly.	83.33%	The background to the development of the model is clearly stated.	75.00%
6.	The support system in learning is stated clearly.	83.33%	Model development goals are clearly stated.	83.33%

No	Content Validity		Construct Validity	
	Indicator	Percentage	Indicator	Percentage
7.	The learning steps are clearly stated.	100%	The use of learning approaches is clearly stated.	91.67%
	Average	86.90%	Average	89.29%
	Overall average	88.10%		

The product validation results of the AKSI learning model based on **Table 2** show that the validation results of the learning model guidebook are 88.10% with a very valid category. the validator suggested showing significant differences with other learning models so that the name syntax was changed from presenting and reporting to reporting

Table 3. Observation value of large group test implementation

No	Indicator	Performance Percentage	Category
1.	Initial activity	91.67%	Very practical
2.	Core activities:		
	Stimulating(stimulation)	87.50%	Very practical
	discussing(Discussion)	87.50%	Very practical
	designing(Design)	83.33%	Very practical
	Doing(Do)	95.83%	Very practical
	reporting(reporting)	87.50%	Very practical
	Inferencing(conclude)	95.83%	Very practical
3.	Closing activities	84.72%	Very practical
	Average	89.24%	Very practical

Based on **Table 3** it is known that the large group test observation is 89.24% in the very practical category. The other test result data obtained is the teacher's response data to the AKSI learning model contained in the **table 4**.

Table 4. Large group test teacher response scores

No	Indicator	Average Percentage	Category
1.	Achievement of competence and learning objectives	95%	Very practical
2.	Student response	91.67%	Very practical
3.	The level of difficulty in implementing	83.33%	Very practical
4.	Adequacy of time	87.50%	Very practical
	Average	89.38%	Very practical

Based on the results of teacher response data in Table 4, it can be seen that the teacher's response to the AKSI learning model tested in large groups was 89.38% in the very good category. Qualitative data were also obtained from the results of teacher response tests based on large group trials. It is necessary to increase carefulness towards students who do not take part in learning and the need for handlers for students who do not take part in learning shows that the teacher advises to be more observant and pay close attention when there are students who may not follow the lesson.

Table 5. Large group student response test scores

No	Class	The number of students	Average Percentage	Category
1.	Test 1	38	80.74%	Very Practical
2.	Test 2	38	87.50%	Very Practical
	Average		84.12%	Very Practical

Based on **Table 5**, shows that the large group student response test scored 84.12% in the very good category

Table 6. Data on high-level thinking skills of large group students

No	Class	Pretest Average	Posttest Average	N-gain	Category
1.	Test 1	53,27	82.48	0.6	Medium
2.	Test 2	65,79	88.95	0.7	High
	Average	59,53	85,72	0.7	High

Based on the data in **Table 6**, it shows that the N-gain value for high-level thinking skills is 0.7 in the high category

At the define stage is the result of a questionnaire which states that there are still obstacles in improving higher order thinking skills. The questionnaire results show that there is a need to develop a learning model based on the difficulties experienced in learning, namely 40% agree and 60% strongly agree with the development of the AKSI learning model. Based on these data, it is necessary to develop an AKSI learning model to improve higher order thinking skills.

The next research stage is design. At this stage, planning is carried out by preparing the syntax of the learning model, learning model guidebooks, development instruments, and learning devices. The AKSI learning model is designed to be able to develop students' potential in actualizing themselves according to what students want and according to the knowledge that students have to be channeled into learning. Student involvement in learning is very important, with the development of self-actualization students will show their abilities optimally and have an impact on the learning outcomes obtained by students (Ningsih & Suniasih, 2020). Actualization is the need for students to become what students want according to their potential (Abdurrahman, 2022). The AKSI development model is designed to be able to provide opportunities for students to be free to be creative.

The development of the AKSI learning model at the design stage is carried out to develop a valid, practical and effective learning model (Tri et al., 2023). The AKSI learning model is used to assist students in improving higher order thinking skills. At this

stage, an instrument and guidebook for the learning model, the preparation of ATP and teaching modules as well as pretest/posttest questions of higher order thinking skills were prepared.

At the develop stage, instrument validation has been carried out with a validation score of 91.67% with a very valid category so that it can be used to assess product validation. Furthermore, validation of the AKSI learning model guidebook was carried out with a validation score of 88.10% with a very valid category. The ATP validation results were 88.89% with a very valid category. The results of teaching module validation amounted to 90.74% with a very valid category. The results of question validation amounted to 95.56% with a very valid category Some minor revisions were made to develop a better learning model by the validator's suggestions.

Based on validation data and suggestions, a valid product is produced and can be implemented for the next stage of research to conduct small group trials. In the small group trial, data were generated to assess the practicality of the model in the form of an assessment of the implementation of learning by observers with a score of 88.47% with a very practical category, the results of teacher responses of 86.25% with a very good category. The results of student responses were 88.29% with a very good category. Practicality tests based on observer assessments, teacher response tests and student response tests all three showed very practical or very good categories. so proceed with the effectiveness test analysis.

The effectiveness of the AKSI learning model can be analyzed based on the results of the student ability test. based on the results of the student ability test in the small group test produced a value of 0.7 in the high category. This shows that the AKSI learning model is influential in increasing students' higher order thinking skills so that it can be continued in the large group test.

The large group trial stage obtained learning implementation data with a score of 89.24% with a very practical category, and teacher response test data of 89.38% with a very good category. Student response test data amounted to 84.12% with a very good category, so it can be stated that the AKSI learning model in the large group test is practical and can be used in terms of practicality.

The AKSI learning model is a practical learning model based on observation data on learning implementation, test responses from teachers and students. In the *stimulation*

stage learning syntax, students will be trained to pay attention to learning sources and then collect information that can be accounted for and this is part of analyzing (Agussuryani et al., 2020). The next syntax is to conduct a *discussion*, by discussing, students learn to analyze problems and are able to hone their thinking fluency. Discussions will train students to think flexibly by creating ideas, suggestions, or asking questions (Zubaidah et al., 2017). The learning syntax after the discussion is *designing* then making the product (*doing*). Design activities train students to analyze and think elaboratively by making ideas more interesting and providing problem solutions (Syafi'i et al, 2011). The activity of making products is a form of creating work. Making a product is a change in perspective on something and organizing something into a new structure that did not exist before (Putranta & Supahar, 2019). After the product is realized by the students, a *reporting* syntax is carried out as a form of exercise in evaluating the product created. Making conclusions (*inferencing*) on the products created is part of the final stage of the AKSI learning model and is carried out by making connections between facts, theories and concepts which will be able to improve students' high-level thinking abilities (Ichsan et al., 2020).

The effectiveness of the AKSI learning model can be analyzed based on the results of the student ability test. based on the results of the student ability test in the large group test produced a value of 0.7 in the high category. This shows that the AKSI learning model has an effect in increasing students' higher-level thinking skills so that it can be continued in disseminate.

The next stage in this research is disseminate, namely the dissemination of products in the form of AKSI learning models in 2 schools, namely at Junior High School 1 Purwoharjo and Junior High School 2 Purwoharjo with the results of observations of the implementation of learning respectively 87.22% with a very practical category, and 86.67% with a practical category. The teacher response test was 89.38% with a very good category and 88.13% with a very good category. The student response test was 87.34% with a very good category and 81.72% with a good category.Based on these data, it shows that the learning model is practically implemented in science learning in the dissemination class.

The effectiveness test stage based on the results of the student ability test at Junior High School 1 Purwoharjo shows a test of higher order thinking skills with an N-gain

score of 0.8 in the high category and creative thinking skills get a score of 0.7 with the high category. While the students' higher-order thinking skills at Junior High School 2 Purwoharjo showed an N-gain score of 0.8 with a high category and higher-order thinking skills scored 0.7 with a high category. Based on these data, it shows that the AKSI learning model is effectively implemented in science learning in the disseminate class.

CONCLUSION

The AKSI learning model has a validity score of 88.10% in the very valid category. The practicality value of the observation of the implementation is 89.24% in the very practical category, the teacher response test was 89.38% in the very practical category, and the student response test was 84.12% in the very practical category. The value of the effectiveness of the model is to get an N-gain score for high-level thinking skills is 0.7 in the high category.

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