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RESEARCH ARTICLE

DEVELOPMENT OF REAL QUESTING LEARNING MODEL FOR BIOLOGY LEARNING IN SENIOR HIGH SCHOOL.

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Abstract

Learning on Curriculum 2013 is expected to enrich students' learning experiences through a scientific approach. One of the activities of scientific learning approach questioning. Questioning activities are expected to arise from students. But the activity of asking students in biology learning is still low. Therefore, The REAL QUESTING learning model is developed to improve students' questioning skills. Product quality criteria for model development are validity, practicality, and effectiveness. The purpose of this research is to develop a valid, practical, and effective REAL QUESTING learning model. The research method used in this research is the research method of development of Borg and Gall. Based on the results of data analysis can be concluded that the development of REAL QUESTING learning model meets the three aspects of product quality criteria those are the validity 88.40 (very valid), practicality 81.40 (highly implemented) and, the effectiveness of the student,s questioning skill 77.50 (good), student learning with N-Gain analysis 0.75 (high), and student response 89.14 (strongly agreed) for use in main field testing.

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Introduction:-

Students at the secondary education level not yet subject to education or less actively involved in the learning process (Ministry of Education and Culture, 2015: 15). The condition like this shows that the process of teaching and learning is dominated by the teacher (Boleng and Corebima, 2014: 37). If the process of teaching and learning is teacher dominated, instruction becomes boring for students resulting in their minds wondering and may miss important facts (Otukile dan Mpho, 2018). The learning process that is dominated by teachers makes students unable to express themselves and direct their own learning. (Tabulawa, 2006)

The expected learning process in the 2013 Curriculum is learning that enriches students' learning experiences using a scientific approach to develop to develop student's skills The scientific approach of the 2013 Curriculum consists of observing, asking the question, gathering information, associating, communicating (Suyanto, 2017). Activity inquiring on scientific approach is an activity involving students (Hynes and Berry: 2014), but the student asking activities in learning is relatively low (Slamet, 2016). This shows the creativity and participation of students in learning are still not optimal. Creativity and student participation in learning can be grown through innovative

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learning models (Shoimin, 2014: 18). Therefore developed REAL QUESTING learning model designed to be able to provide learning experiences to ask students in the learning process so as to improve students' questioning skills.

The purpose of this research is to test product quality of REAL QUESTING learning model which includes validity, practicality, and effectiveness. After knowing the quality of products expected to produce REAL QUESTING learning model is feasible and can be applied in wider learning.

Method:-

Method applied in the development of REAL QUESTING learning model is *Research and Development*. Educational development research is a process used to develop and validate educational products (Borg and Gall, 1989).

Nieveen (1999) states that the quality of education development products has an important role in education. Furthermore, Nieveen (2010) stated that the quality of product development result refers to three criteria, namely validity, practicality, and effectiveness.

The development procedure of learning model REAL QUESTING refers to the design of Borg and Gall development model. This paper is only discussed until the small test scope is the fifth step that includes: (1) *research and information collecting*, (2) *planning*, (3) *develop a preliminary form of product*, (4) *preliminary field testing*, (5) *main product revision*

Data Collection Techniques:-

Collection techniques used in the development of learning models REAL QUESTING tailored to the criteria of product quality development of learning models are validity, practicality, and effectiveness. The compatibility of data collection techniques with these criteria is listed in Table 1.

Table 1:-Data Collection Techniques

Criteria	Data required	Data collection techniques	Instrument
Validity	Product quality of REAL QUESTING learning model	Validation Process	validation sheet of REAL QUESTING
Practicality	Implementation of REAL QUESTING learning model	Observation	observation sheet of REAL QUESTING
Effectiveness	Student asking skills	Observation	observation sheet of a student asking skills
	Learning outcomes	Test	Problem test
	Student response	Questionnaire	Questionnaire of student responses

Data Analysis Techniques:-

Data obtained analyzed descriptively to answer product quality learning model REAL QUESTING namely:

Validity:-

Validity obtained from instrument validation and validation of learning model. The data obtained are descriptive and quantitative. Descriptive data is obtained from validator suggestions or comments. Quantitative data is obtained from the assessment aspect using check-list (√) with the following criteria.

- (1) Score 4, if the validator provides excellent judgment.
- (2) Score 3, if the validator provides good judgment.
- (3) Score 2, if the validator gives a poor rating.
- (4) Score 1, if the validator gives a bad rating.

Further data validation results are analyzed using percentage data analysis techniques.

$$V = \frac{TSe}{TSh} \times 100\%$$

Description:-

- V = Validity
- TSe = Total empirical score obtained
- TSh = Total maximum score (Akbar, 2015: 82)

The percentage data obtained from the above formula is converted into qualitative descriptive data referring to the validity criteria as shown in Table 2.

Table 2:-Criteria of REAL QUESTING Learning Model

$81.25 \leq x \leq 100$	Very Valid	Product ready to be utilized in the real field for learning activity
$62.50 \leq x < 81.25$	Valid	The product can be continued by adding something less, make certain considerations, the addition is not too large and not basic
$43.75 \leq x < 62.50$	Less Valid	Revise by re-examining carefully and looking for weakness
$25.00 \leq x < 43.75$	Not valid	Revise large and basic about the content of the product

(Akbar, 2015: 78)

Practicality:-

To know the practicality of the learning model required data implementation REAL QUESTING learning model. Criteria of The Feasibility Learning Model are listed in Table 3.

Table 3:-Criteria of The Feasibility Learning Model

Model (%)	Category
$81.25 \leq x \leq 100$	Very accomplished
$62.50 \leq x < 81.25$	Implemented
$43.75 \leq x < 62.50$	Less performed
$25.00 \leq x < 43.75$	Not executed

(Akbar, 2015: 78)

Effectiveness:-

To know the effectiveness of the learning model required data about students' questioning skills, learning outcomes, and student responses.

Student's Questioning Skills:-

The data obtained were analyzed descriptively using percentage (%), is the score obtained by the students divided by the total score multiplied by 100%.

$$\text{Student's Questioning score} = \frac{\text{score gained by the student}}{\text{max score}(20)}$$

The determination of the Student questioning skills criteria refers to Table 4.

Table 4:-Student questioning skills Category

Questioning Skill (%)	Category
$81.25 \leq x \leq 100$	Very Good
$62.50 \leq x < 81.25$	Good
$43.75 \leq x < 62.50$	Less good
$25.00 \leq x < 43.75$	Not good

(Akbar, 2015)

Learning Outcomes:-

The improved learning outcomes were analyzed based on the normalized gain average score (g) using the following equation.

$$(g) = \frac{(\%post) - (\%pre)}{100 - (\%pre)}$$

Description:-

(g) = average score of normalized gain
 (%post) = average percentage of post-test score gained by students
 (%pre) = average percentage of pretest score gained by students (Hake, 2007).
 Category determination as listed in Table 5.

Table 5:-N-Gain Category

Score Normalized Gain	Category
0.70 ≤ Normalized gain	Height
0.3 ≤ Normalized gain < 0.70	Medium
Normalized gain < 0.3	Low

(Hake, 2007)

Student response to The REAL QUESTING learning model:-

Student response indicator to REAL QUESTING learning model consists of three indicators: a) Interest on learning, b) Usefulness to follow learning, c) Interest following learning for the next chapter. Student response is measured using a student response observation instrument consisting of 11 points statement with score range between 1 up to 4. Description for each scores figures as follows: a) 1 = disagree b) 2 = less agree c) 3 = agree, and d) 4 = strongly agree.

The data obtained were analyzed descriptively using percentage (%), is the score obtained divided by the total score multiplied by 100%. the criteria of student response to the learning model are listed in Table 6.

Table 6:-Criteria of student response to the learning model

(%)	Category
81.25 ≤ x ≤ 100	Strongly agree
62.50 ≤ x < 81.25	Agree
43.75 ≤ x < 62,50	Less agreed
25.00 ≤ x < 43.75	disagree

(Akbar, 2015: 78)

Results And Discussion:-

Results:-

Table 7:-Data Results Distribution Questionnaire

NO	VARIABLE	ANSWER	QUANTITY	%
1	ask questions in the biology learning process	Yes	41	12.4
		Sometimes	42	12.7
		No	248	74.9

Product Validation

Table 8:-Product Validation Results of Development of REAL QUESTING Learning Model

No	Variable	Indicator	Validator Rating (V)			Average (%)	Product Validity
			V1	V2	V3		
1	Model of REAL QUESTING Learning	a. Supporting Theory	75.00	100.00	87.50	87.50	
		b. Learning Model Structure	78.95	92.11	98.68	89.91	
		c. Selection of Media / Learning Resources	75.00	100.00	100.00	91.67	
		d. Feasibility of Language	75.00	89.29	89.29	84.52	
		Validation Average				88.40	Very Valid

Preliminary field testing Result

Table 9:-Results of Student Skills Assessment

Value of Inquiring Skills			
1st	2nd	3th	4th
52.50	61.25	65.00	77.50

Table 10:-Results *Pre-test* and *Post-test*

Learning cycle.	<i>Pre-test Score</i>	<i>Post- test score</i>	N Gain	Criteria
1 st	25.00	76.67	0.69	Medium
2 nd	35.00	83.67	0.75	High

Table 11:-Student Response to Learning Model REAL QUESTING

Average of Aspect Statement	Criteria
89.14	Strongly Agree

Table 12:-The Feasibility of REAL QUESTING Learning Model

No	Aspects	Average (%)	Category
I	Initial Activity	86.98	Very Implemented
II	Core Activities	88.98	Very Implemented
III	Final Event	84.03	Very Implemented
Average		81.40	Very Implemented

Discussion:-

The result of research and collecting information in Tables 7 shows that the number of students who ask questions in the last decade in biology learning is still relatively low at less than 15%. The low activity of asking students occurs because of several things such as factors of ignorance, prestige, and not given a chance. Student inquiry activities are an integral part of meaningful learning and science as well as the heart of science learning (Chin and Osborne, 2008). Thus the necessary learning conditions that can improve student ask activities through the development of learning models. Corebima and Bahri in Hariyadi (2017) explain that the learning model related to questioning activities of students is RQA (*Reading, Questioning, Answering*), Think-pair-strategy reinforces students' communication skills (Raba, 2017). Santrock (2011: 349) states that by having social skills then students will be able to communicate effectively. Steedlyet.al (2008) states that the inability to ask is related to the lack of socializing. Therefore, both models become the reference in the development of REAL QUESTING learning model.

The product of learning model development REAL QUESTING. The described the background and purpose of learning model development, theory supporting learning model, learning model structure, learning model characteristic (supporting theory, syntactic, social system, reaction principle, support system, instructional impact and companion impact), and how to apply the REAL QUESTING learning model.

One of the model characteristics is the syntax. The syntax is the stages of activity of the model. There is four syntax of Real Questing learning model, these are: (a) Reorientation, This syntax based on Thorndike theory about the *Law of readiness*, students readiness in the study will encourage learning to be beneficial (Schunk, 2012: 75). If students are ready, they will build their skill (Matsumoto, 2017), (b) Questioning syntax based on constructivism theory. Vygotsky explains the importance of social factors in learning (Bozkurt, 2017). This stage also refers to an *Individual cognitive constructivist theory* by Piaget that children think and reason differently at each stage of their cognitive development (Vygotsky, 1997), The learning process must be appropriate to the cognitive development so that the learner passes in order to achieve such goals (Bolton and Hattie, 2017). Groupings of students in constructivism is one of the important elements to maximize students' learning ability (Vygotsky, 1997)., *cognitive scaffolding* needs to be provided to facilitate students in order to solve the problem (Smagorinsky, 2018). Pedagogy based on constructivism requires an interaction between teacher and learner that includes eliciting of prior knowledge, exploration, and reflection (Moeed, 2013); (c) Investigation syntax based on Bruner's discovery learning theory that learning is in accordance with the active search for knowledge by humans and by itself gives the best results (Brunner, 1966), Through the investigation the students are given more opportunities to think, develop, and investigate the exciting things that disturb their curiosity (Evans, 1987).; (d) The fourth is solving syntax based on constructivism theory is that students as problem solvers. The problem solver is unsure how to cross the gap and

reach a successful solution at the outset, there are still some strategies which are viewed as more effective than others and could facilitate the solver's efforts (Gulacar *et al.*2013). Students must learn to seek a clear-cut solution (Evans, 1987)

Based on table 8 shows that mean of learning model indicator that supporting theory, model structure, media selection, and language validity equal to 88.40. Referring to the product validity criteria as shown in Table 1, the product has a very valid category. Referring to the product validity criteria of instructional devices as shown in Table 2, the product has a very valid category. This indicates that the product developed has fulfilled one of the criteria of validity or validity. Validity or validity means that the product developed has a validity of content and construct validity Content validity indicates that models are developed based on sufficient theory, while construct validity indicates that all components of the learning model are related to each other consistently (Nieveen 1999: 127). Thus the product is ready for use in the field for small group Test.

Preliminary field testing is small group test is an activity of testing the product of learning model to a small group of students consisting of 9 students representing 3 groups of knowledgeability that are low, medium, and high. Base on the data of Table 1 shows that the implementation of the learning model is 81.40. Referring to Table 3 on the Criteria of the Implementation of Learning Model then the application of this model is in the very done category. This value indicates that the product development meets the criteria of practicality. Product development results, concluded practically if the practitioner states theoretically the product can be applied in the field and the level of product implementation including good category. (Nieven, 1999).

Implementation of the preliminary field testing is also to determine the effectiveness of the model through observation of student's questioning skills, the measurement of student learning outcomes by using pretest and posttest, and student responses. Table 11 shows that the mean value of student's questioning skills at the 1st meeting was 52.50, the 2nd meeting was 61.25, the 3rd meeting was 65.00, the 4th meeting was 77.50 which means that the student's questioning skills do not immediately become good, This is reasonable because the students still need the training to have the skills asked as expected. Vale (2013) states that the skills of asking students require practice, guidance and practice in an environmentally active environment of inquiring. Based on Table 12 and Table 13 it can be seen that the post-test score was higher than the pre-test score. and N-gain score increase from 0.69 (medium) to 0.75 (high). This result suggested that the skills of the students have increased after treatment. It means that the model can improve student learning outcomes. Table 14 shows that student response to the learning model is 89.14 with the category strongly agree, It shows that students appreciate the REAL QUESTING learning model. This condition indicates that the REAL QUESTING learning model can increase the student's questioning skills, learning outcomes and getting a very good response, so the REAL QUESTING learning model meets the criteria of effectiveness. Nieveen,(1999) says that the effectiveness of the product seen from the level of student appreciation of the learning program and the desire of students to continue using the program. Effective products appear to be consistent between the objectives and the learning experience with the achievement of student learning outcomes.
Main Product Revision

In this step, the improvement is based on the findings. In this case, the observer provides input in order to maximize the use of media including IT in learning activities.

Conclusion:-

Product development of learning model REAL QUESTING meets three product quality development that is validity, practicality, and effectiveness. Validity value is 88,40 with the criterion is very valid, practical value with the value of 81.40 with the criterion is very done, effectivity value to ask student skill is 77.50 with the good criterion, student learning result value (N-Gain) is 0.75 with the high criterion and student's response value is 89.14 with criteria strongly agree. This model deserves to be applied in a large group test.

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