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Validity of Learning Devices Results of Integrating Scaffolding Forms in Biological Learning Using Learning Cycles 5E in Students that are Different Learning Styles to Complete Process Skills, Thinking Skills and Cognitive Learning Outcomes

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Abstract:- This study aims to describe the validity of the learning device as a result of integrating scaffolding forms in biology learning using the 5E learning cycle in students with different perceptual learning styles. This article is part of a research on developing an Integrating Scaffolding Forms in Biology Learning strategy (ISFBL strategy). Learning tools developed on the topic of human respiratory system biology class IX subjects in the form of syllabus, Learning Implementation Plan, Student Activity Sheets, teaching materials and test instruments. The research procedure consisted of the preliminary study stage, the development of learning strategies, operational learning strategies, validation tools, and empirical validation. The validation test method is carried out by experts and practitioners / teachers who are relevant in this field. The results of expert validation show that the learning device that integrates scaffolding forms in biology learning using the 5E learning cycle in students with different perceptual learning styles is declared valid and can be used in high school.

Keywords:- *Learning Devices, Scaffolding, Learning Style, Thinking Skills, Process Skills, Cognitive Learning Outcome.*

I. INTRODUCTION

The 5E learning cycle is very helpful for students' conceptual changes in teaching science concepts (Bybee et.al., 2006; Cepni 2012; Artun, 2012). In addition to thinking skills, science skills are skills needed by students to be able to live in the 21st century (Partnership, 2015). This learning cycle was conceived by Dewey and Piaget in providing students' experience in developing science concepts and skills. Piaget with the principle of constructivism which explains that knowledge is not a set of facts, concepts or rules that are ready to be transferred by the teacher, but students must construct that knowledge and give meaning through various learning experiences. This cycle continues to be supported and used as an inquiry-based (inquiry) approach that is effective in teaching science (Golston, 2012; Runisah, 2017). Although there has been a modification of the 5E learning cycle, the core activities of this learning cycle are activities that emphasize the inquiry approach, therefore how teachers engage, guide students to explore, explain, elaborate to evaluate still needs to be studied. When examined, in learning biology using the 5E learning cycle scaffolding needs to be added at each stage of learning using various scaffolding strategies to help their investigative experience and students' understanding of objects, organisms or their environment.

Based on Vygotsky's constructivism, the term scaffolding is a strategy that is a bridge that is used to build what students already know to something they don't know. Scaffolding as a way of teacher intervention on student learning needs to be done because it can move students' potential understanding, make students successful in completing assignments (Pol, 2015), enabling students to learn from experience (Reiser, 2004). As students move towards mastery of knowledge, the scaffolding gradually decreases to transfer learning responsibilities to students. Finally, the information internalizes within students and makes students learners who are independent (self regulated, independent learner) and can solve problems (Orey, 2010).

Instructional scaffolding according to Lange (2002) in Orey (2010), consists of two stages: (1) instructional planning developed to guide students from what they already know leads to an in-depth understanding of new material, and (2) an implementation plan, is support given

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by the teacher to students at each stage of the learning process. Hannafin et al. (1999) in Yun Jo (2015) identified four types of scaffolding, namely conceptual, metacognitive, procedural, and strategic.

The revised 2013 curriculum requires the application of the same pattern, while the target in this case students, are very diverse in terms of academic abilities, learning styles, intelligence, speed of learning, interests, and various other different aspects. According to Ibrahim (2010), leveling up students during the learning process will have an impact on learning outcomes. If you look closely, there are students who benefit and some don't. Facts in class there are differences in student learning styles. Mc Loughlin (1999), DePorter (2008) and Casidy (2010), defines learning styles as learning habits where a person feels the most efficient and effective way of receiving, processing, storing and releasing something that is learned. This understanding is closely related to the ways individuals learn. Judging from students' perceptual learning styles, the diversity of student learning styles in the classroom consists of several types namely visual learning styles, auditory learning styles, kinesthetic learning styles (DePorter et al, 2010). Some students learn very well just by seeing others do it (visually), while some students who are auditory rely on their ability to listen and remember. Others may be kinesthetic, learning primarily by being directly involved in activities.

Learning style is related to how a person processes information / stimulus received to enter into long-term memory. Atkinson and Shiffrin (Solso, 2008) explain that storage in short-term memory is assumed to be able to capture information that is given attention (attention) by individuals. This attention given is influenced by the role of perception. The quality of a stimulus that is successfully coded and stored by long-term memory is determined by the suitability of the stimulus with the strength of the individual sensory register. It can be interpreted that the role of perception, related to perceptual learning styles helps the quality of stimuli that are coded and stored in one's long-term memory.

The developed learning strategy can help students learn biology by integrating scaffolding forms at each stage of the 5E learning cycle that allows accommodating differences in students' perceptual learning styles, making it easier for students to perform each stage in the learning cycle (ISFBL strategy) Syntax of this strategy consists of Stimulate, Collection, Communication, Development, Feedback stages. This study aims to describe the validity of the Learning Outcomes of Integrating Scaffolding Forms in Biology Learning Using the 5E Learning Cycle for students with different learning styles.

II. METHODS

The research procedure refers to the Four D Model (Thiagarajan, 1974), which partly consists of several stages of development, namely preliminary studies, curriculum analysis of biology courses and analysis of student characteristics related to learning styles, analysis of learning objectives and forms of scaffolding, preparation of learning tools. The initial draft of the learning kit was reviewed, revised, reviewed again then validated, so that it became a prototipe learning devices. The method used in this study is a validation test conducted by three experts and three biology teachers / practitioners who are relevant in the field of biology education.

III. RESULTS

The learning devices uses the ISFBL Strategy developed on the topic of Human Respiratory System class IX high school adapted to the revised 2013 biology curriculum. The results of the validation of the learning devices consisting of syllabus, lesson plans, student activity sheets, teaching materials, test instruments are presented in Table 1-5 below.

1) Validation Results of Syllabus

No	Rated Aspect	Validation Score Average	Validity	R (%)	Reliability
1	Conformity of the syllabus format with the revised 2013 High School Biology Curriculum	4	Very Valid	100	Reliable
2	The suitability of learning outcomes indicators with basic competencies	4	Very Valid	100	Reliable
3	The suitability of the learning experience with indicators of learning outcomes	4	Very Valid	100	Reliable
4	Sufficient time allocation	4	Very Valid	100	Reliable
5	Conformity of assessment items with learning outcome indicators	4	Very Valid	100	
6	Conformity of source and material tools with learning outcome indicators	4	Very Valid	100	Reliable
	Modus		**Very Valid**		**Reliable**

Table 1:- Validation Results Of Syllabus

R = Percentage of agreement (Koefisien reliabilitas)

2) Validation Results of Learning Implementation Plan

The results of Learning implementation plans validation are shown in Table II.

No	Rated Aspect	Validation Score Average	Validity	R (%)	Reliability
1	Identity	3.95	Very Valid	99	Reliable
2	Purpose	3.93	Very Valid	99	Reliable
3	Material studied	4	Very Valid	100	Reliable
4	Language and time allocation	3.7	Very Valid	96	Reliable
5	Presentation method	3.9	Very Valid	97	Reliable
6	Learning Assessment	3.8	Very Valid	96	Reliable
Modus			**Very Valid**		**Reliable**

Table 2:- Validation Results of Learning Implementation Plan

R = Percentage of agreement (Koefisien reliabilitas)

3) Validation Results of Student Activity Sheets

The results of Student Activity Sheets are shown in Table III

No	Rated Aspect	Validation Score Average	Validity	R (%)	Reliability
1	Topic	4	Very Valid	100	Reliable
2	Purpose	3.8	Very Valid	96	Reliable
3	Organization and Content	3.6	Very Valid	91	Reliable
4	Questions	3.7	Very Valid	93	Reliable
5	Language use	3.7	Very Valid	94	Reliable
6	Presentation	3.7	Very Valid	94	Reliable
Modus			**Very Valid**		**Reliable**

Table 3:- Validation Results of Student Activity Sheets

R = Percentage of agreement (Koefisien reliabilitas)

4) Validation Results of Test Instrument

The results of *Test Instrument* are shown in Table IV

No	Rated Aspect	Validation Score Average	Validity	R (%)	Reliability
1	Material	3.8	Very Valid	96	Reliable
2	Construction	3.7	Very Valid	93	Reliable
3	Language	3.7	Very Valid	93	Reliable
Modus			**Very Valid**		**Reliable**

Table 4:- Validation Result of Test Instrument

R = Percentage of agreement (Koefisien reliabilitas)

5) Validation Results of Teaching Material

The results of Teaching Material validation are shown in Table V

No	Rated Aspect	Validation Score Average	Validity	R (%)	Reliability
1	Component contents	3.5	Very Valid	87.5	Reliable
2	Linguistic	4	Very Valid	100	Reliable
3	The overall shape and appearance	3.4	Very Valid	86	Reliable
Modus			**Very Valid**		**Reliable**

Table 5:- Validation Results of Teaching Material

R = Percentage of agreement (Koefisien reliabilitas)

IV. DISSCUSSIONS

The results of the validation of yllabi, lesson plans, student activity sheets, teaching materials and test instruments in Table I until Table V show that the learning devices are declared valid.

Table I validation results of syllabi show that all aspects assessed by the validator have a very valid category mode and the reliability of each aspect is 100. This means the syllabus of the ISFBL strategy learning device is said to be very valid.

The resukt of validation of Learning Imolementation Plan in table II shows that all aspects assessed by the validator have a very valid category mode and the reliability of each aspect ranges from 96 to 100. This means that the ISFBL strategy Learning Implementation Plan developed is said to be very valid.

The results of validation of Student Activity Sheets in Table III shows that all aspects assessed by the validator have a very valid category mode and the reliability of each aspect ranges from 94 to100. This means the ISFBL strategy ISFBL learning device which is developed is stated to be very valid. The student activity sheet as assistance provided by the teacher as stated by Bruner in Oakley (2004) in order to increased self-confidence begins by providing preliminary assignments that students can do with a little help, prepare assistance that allows students to complete assignments quickly, thus motivating students maintained until the next task. Worksheet must be able to help students carry out certain activities until the end of the activity so students can master one or more basic competencies.

The results of validation of Test Instrument in Table IV shows that all aspects assessed by the validator have a very valid category mode and the reliability of each aspect ranges from 93 to 96. This means that the ISFBL strategy test instrument is said to be very valid. The test instrument refers to the 2017 revised curriculum on assessments that must be carried out holistically and continuously covering all aspects of competency that students must master. Slavin (2011) explains the development of learning tools including learning objectives, what is given by the teacher, how much time is needed to achieve that goal, the media, learning methods and participation structures that can be used in the learning process.

The results of the validation of Teaching Material in Table V shows that all aspects assessed by the validator have a very valid category mode and the reliability of each aspect ranges from 86 to 100. This means that ISFBL strategy teaching materials developed are said to be very valid, can support the learning strategies developed. Mahmood (2011) explains that student teaching materials/ books as part of the curriculum are the main components in the teaching and learning process in the classroom to achieve learning objectives. Teaching materials are developed through ISFBL strategies according to competence, content coverage, relevant material and assignments.

V. CONCLUSSIONS

Based on the results and discussion above, it can be concluded that the results of the validation of the learning device resulting from the integration of scaffolding forms in biology learning use the 5E learning cycle for students with different learning styles, containing syllabi, lesson plans, student activity sheets, teaching materials and test instruments are declared valid.

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