European Journal of Research Development and Sustainability (EJRDS)
Available Online at: https://www.scholarzest.com
Vol. 3 No. 6, June 2022
ISSN: 2660-5570

STEAM-BASED PROJECT LEARNING DEVICE TEST ON PLANTAE MATERIALS FOR SMA NEGERI 1 BILATO
Test The Validity Of Steam Project Based Learning On The Material Of Kingdom Plantae To Increasing Students Creative Thinking

Zulkifli Raden, Ani M. Hasan, Novri Y. Kandowangko
Gorontalo State University
zulkiply@ung.ac.id

Article history:
Received: 26th March 2022
Accepted: 24th April 2022
Published: 6th June 2022

Abstract:
This research is a development research that aims to describe the validity of STEAM-based project learning tools in the form of lesson plans, LKPD and Thinking Tests using the PjBL learning model on Kingdom Plantae material at SMAN 1 Limboto. The results showed that the quality of the product produced based on the validity of the lesson plans met the very valid criteria with an average value of 158.5 from the validator, the LKPD met the very valid criteria of the validator with an average of 116.5 and the creative thinking test met the very valid criteria with a score of 116.5. an average of 44.5. Based on the results of the study, it can be concluded that the STEAM-based project learning tool on Kingdom Plantae material meets the very valid criteria for increasing students' creativity

Keywords: Learning tools, PjBL, creative thinking

INTRODUCTION

Education is a very important process in the formation of the personality and skills of students which ultimately aims to help students to be able to develop their potential, knowledge and skills. Achieving educational goals requires a learning process. Learning is defined as a process of behavior change as a result of individual interaction with the environment. Changes in behavior towards learning outcomes are continuous, functional, positive, active, and directed (Pane & Muhammad, 2017).

Improving the quality of education in Indonesia is always carried out through improving education following the changes and developments of life that are currently happening in the 21st century. One of these improvements is the shame of improving the curriculum from KTSP to Curriculum 2013. In the 2013 Curriculum changes were made to the four National Education Standards (SNP). namely graduate competency standards, content standards, process standards and assessment standards. Changes in these four elements ultimately lead to changes in learning activities and learning support facilities such as learning devices.

Learning devices are learning support facilities that contain lesson plans that describe in detail the competencies that will be achieved by students, learning designs that follow the syntax of certain learning models, activity guidelines for students and tools to measure the achievement of student competencies (Kusumaningrum & Djukri, 2016). Based on the results of interviews with Biology teachers at SMAN 1 Bilato said that teachers still have difficulty developing learning tools that follow the steps or syntax of certain learning models suggested by the 2013 Curriculum, one of which is the Project Based Learning Model. The Project Based Learning model is a learning model that organizes the class into a project where the learning process emphasizes contextual learning through complex activities such as giving students the freedom to explore learning activities, working on projects collaboratively, and finally being able to produce a product (Erlinawati et al. al., 2019).

In this study, the researchers integrated the Project Based Learning (PjBL) learning model with the Science, Technology, Engineering, Arts and Mathematics (STEAM) approach to support the development of skills in increasing students' creativity.

STEAM learning emerged as a response to the need to increase students' interests and skills in the fields of Science, Technology, Engineering, and Mathematics (STEM) (Quigley, Herro, & Jamil, 2017). STEAM combines "arts" with STEM learning for the purpose of increasing learner engagement, creativity, innovation, problem solving skills, and other cognitive benefits (Liao, 2016), and to improve job skills (e.g. teamwork, communication, adaptability).) necessary for career and economic advancement (Colucci-Gray et al., 2017).

Based on the description c described previously, so to solve these problems it is necessary to conduct a research with the title Test Validity of STEAM-Based Project Learning Devices on the kingdom Plantae material.

METHODOLOGY

This research was carried out at SMAN 1 Bilato in the even semester of the academic year 2021 – 2022. This type of research refers to the 4-D development model developed by Thiagarajan, (1974) in Sugiyono (2017).

Research Procedure

1. Definition (Define)

The define stage aims to determine and define the learning requirements, starting with an analysis of the objectives of the material developed by the device. In the context of developing learning tools, this stage is carried out by:

a. Curriculum Analysis

The curriculum analysis stage aims to find out the curriculum that applies in the school that is used as a place of research. Curriculum analysis aims to determine the basic competencies to be developed. This is done so that the learning tools are in accordance with the competencies in the curriculum.

b. Student Analysis

The student analysis phase aims to analyze the character of students at school. The things that need to be known to analyze students include: individual academic abilities, physical characteristics, group work abilities, learning motivation and so on.

c. Material Analysis

Material analysis is carried out to determine the material to be developed in the manufacture of learning devices.

d. Formulating Goals

The problem formulation stage is carried out to determine the learning objectives and competencies to be achieved in the learning process. These objectives and competencies are used as a reference in developing learning tools.

e. Learning Device Analysis

The learning device analysis phase aims to analyze learning tools that have previously been used in schools. The learning tools in question are RPP, LKPD and questions used in schools.

f. Study of literature

The study of literature aims to find supporting references related to the development of project-based learning-based learning tools. The study of literature serves so that researchers know and understand theoretically about the development of project-based learning-based learning tools so that the resulting product is valid and can be used efficiently.

2. Design

The purpose of the design stage is to design a learning device format. The device is made and designed according to the results of the analysis of students and subject matter to design the initial form of the device. The form of initial presentation of learning tools or draft I is by using a project based learning model that is ready to be validated.

3. Development (develop)

The development stage aims to produce learning tools that have gone through the validation process. The purpose of validation is that the learning device meets the validation criteria. The learning tools produced from the design phase will be validated by expert lecturers of education, materials and biology teachers.

The results of the validity assessment were obtained from the validation scoring of learning devices given by validators and practitioners using a Likert scale with a score range of 1-5.

Table 3.1. Guidelines for Scoring of RPP and LKPD validation instruments

Score	Criteria
5	Very good
4	Well
3	Enough
2	Not enough
1	Very less

a. Calculating the total score and based on data tabulation

b. The average score is then converted into qualitative data based on the following assessment criteria.

Table 3.2. Qualitative Score Conversion Guidelines

Score interval	Criteria	Category
$X > Mi + 1{,}8\ Sbi$	Very Valid	A
$Mi + 0{,}6\ Sbi < X \leq Mi + 1{,}8\ Sbi$	Valid	B
$Mi - 0{,}6\ Sbi < X \leq Mi + 0{,}6\ Sbi$	Quite Valid	C
$Mi - 1{,}8\ Sbi < X < Mi - 0{,}6\ Sbi$	Less Valid	D
$X > Mi - 1{,}8\ Sbi$	Invalid	E

RESEARCH RESULT

RPP Validity Analysis Results

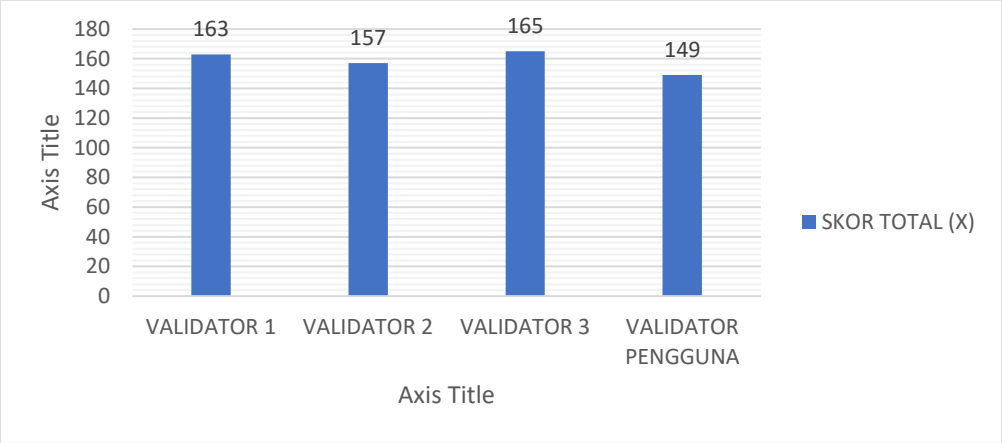

Figure 1. Results of RPP Validation Assessment by Expert Lecturers and Biology Teachers

Based on the overall RPP quality analysis by the validator, it ranges from a score of 3 with a percentage of 75% on aspects 11 and 28, a score of 3.33 with a percentage of 82.5% on aspect 12 with valid criteria, then a score of 4 with 100% participation in 30 aspects which are assessed with very valid criteria. . Therefore, the inquiry learning model-oriented lesson plans are feasible to use in the learning process.

LKPD Validity Analysis Results

The validity of learning tools is based on the assessment of expert validators and user validators. The results of the assessment are listed in table 3.

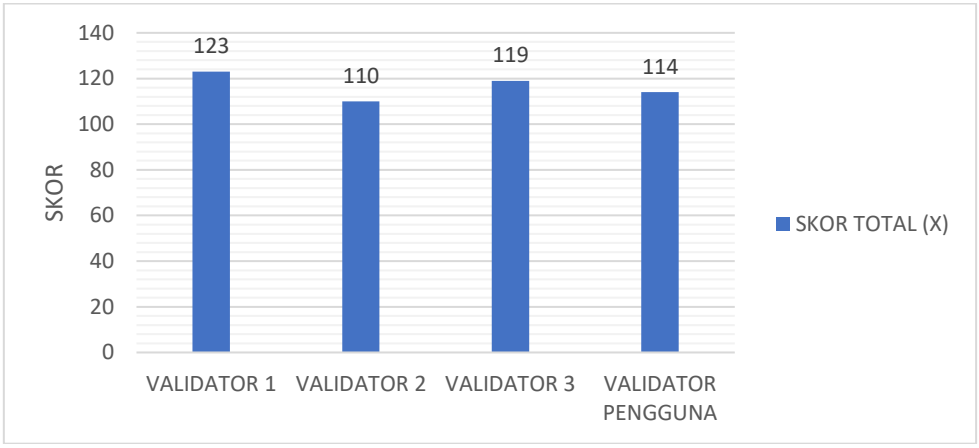

Figure 2. Results of LKPD Validation Assessment by Expert Lecturers and Biology Teachers

Based on Table 3, the overall LKPD quality analysis by the validator ranges from a score of 3.3 with a percentage of 82.5% in aspects 4, 12, 14 and 19 valid criteria, a score of 3.6 with a percentage of 91.5% to a score of 4 with 100% participation in 19 aspects assessed by very valid criteria. Therefore, the inquiry learning model-oriented LKPD is suitable for use in the learning process.

Creative Thinking Test Validity Analysis Results

The validity of learning tools is based on the assessment of expert validators and user validators. The results of the assessment are listed in table 4.

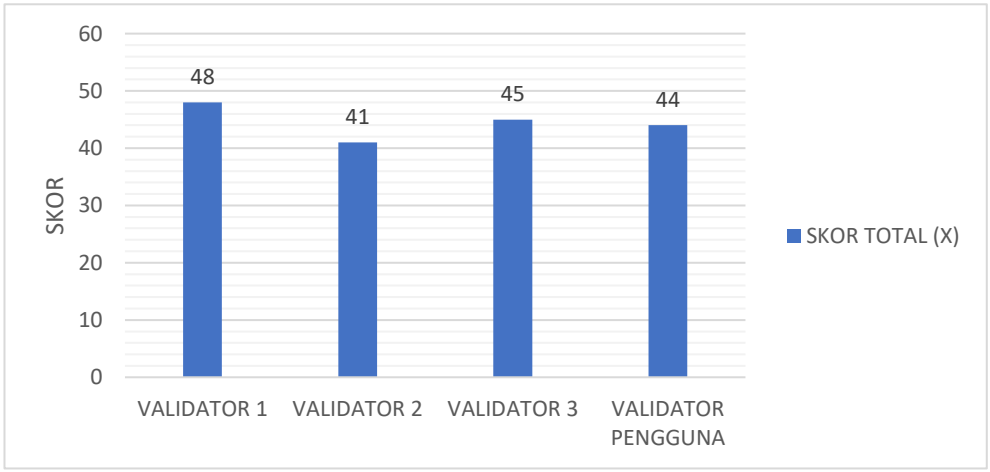

Figure 2. Results of the Validation of Creative Thinking Questions by Expert Lecturers and Biology Teachers

Based on Table 4, the validation analysis of the creative thinking test as a whole by the validator ranges from a score of 3.3 with a percentage of 82.5% on 7 aspects of valid criteria, a score of 3.6 with a percentage of 91.5% to a score of 4 with 100% participation in 11 aspects which are assessed with very valid criteria. Therefore, the question of the creative thinking test oriented to the inquiry learning model is suitable for use in the learning process.

DISCUSSION

RPP Validity

Based on the results of research on the development of project-based learning tools to increase student creativity by validators 1, 2, 3 and 4, especially for the implementation of the lesson plan, it belongs to the score range (X) of more than 142.86 with an average value of 158.5. The results obtained cannot be separated from the advice and input of expert validators, including: the learning steps in the RPP must be student center, Added Project assessment (Ecoprint), the RPP made must adapt to project-based learning steps. Based on input from the validator, the researcher tried to adjust the learning steps in the lesson plan with the learning steps of the model used.

According to Lestari (2013) the results of suggestions and input from the validator can be a quality control of the tools that have been developed. The team of experts provides comments and suggestions on the device that has been designed for the perfection of the product. Comments and suggestions from these experts are the basis for developing learning device products to be better than before.

Student Worksheet Validation

Based on the results of research on the development of STEAM-based project learning tools to increase students' creativity by validators 1, 2, 3 and 4 for LKPD belonging to the range of scores (X) more than 105.06 with an average value of 116.5 validation LKPD entered at very valid criteria. The results obtained cannot be separated from the advice and input of expert validators, including: adding a mini research project LKPD, the LKPD used is adjusted to the selected learning model, clarifying instructions in working on the LKPD and using sentences that are easily understood by students. These suggestions and inputs become materials in improving the LKPD, so that the LKPD gets very valid criteria with category A. This shows that the LKPD is suitable for use in the learning process in class X IPA SMAN 1 Bilato.

With the LKPD developed, students are more interested in participating in the biology learning process. Learning with activities carried out or liked by students, does not make students bored and will make students more active, because the basic potential of students can be actualized by participating in the activities contained in the LKPD (Syamsu, 2020).

Creative Thinking Test Validation

Based on the results of research on the development of STEAM-based project learning tools to increase students' creativity by validators 1, 2, 3 and 4 for creative thinking questions belonging to the score range (X) of more than 42.06 with an average value of 44.5 LKPD validation fit into the very valid criteria.

The results obtained cannot be separated from the advice and input of expert validators, including: Improving the use of ambiguous sentences in preparing questions and clarifying instructions for working on questions. These suggestions and inputs become material in improving creative thinking questions. Based on the validator's assessment of the creative thinking test with very valid criteria, it shows that the creative thinking test is appropriate to be used as a test at SMAN 1 Bilato. Ra'o et al., (2021) stated that the value of product validity has an effect on product implementation in both small and large scale tests.

CONLUSION

The results showed that the quality of the product produced based on the Aspects of the Validity of the RPP, LKPD and creative thinking tests met the very valid criteria so that it was feasible to be applied in learning Kingdom Plantae material in Class X SMAN 1 Bilato.

REFERENCE

1. Colucci-Gray, L., Trowsdale, J., Cooke, C. F., Davies, R., Burnard, P., & Gray, D. S. (2017). Reviewing the potential and challenges of developing STEAM education through creative pedagogies for 21st learning: How can school curricula be broadened towards a more responsive, dynamic, and inclusive form of education? British Educational Research Association.
2. Erlinawati, C. E. Singgih. B. Maryani. (2019). Project Based Learning Model Based on Stem Learning in Physics Learning. Journal of Physical Education, 4(1), 1-4.
3. Kusumaningrum, S. D. Djukri. 2016. Development of Project Based Learning (PjBL) Model Learning Tools to Improve Science Process Skills and Creativity. Journal of Science Education Innovation, 2(2), 241-251
4. Lestari, I. (2013). Competency-Based Teaching Material Development. Padang: Gem Academy
5. Liao, C. (2016). From interdisciplinary to transdisciplinary: An arts-integrated approach to STEAM education. Art Education, 69(6), 44–49.
6. Quigley, C. F., Herro, D., & Jamil, F. M. (2017). Developing a conceptual model of STEAM teaching practices. School Science and Mathematics, 117(2), 1–12
7. Pane, A., Muhammad, D. D. (2017). Study And Learning. FITRAH Journal of the Study of Islamic Sciences, 3(2), 333-352.

8. Ra'o, P. Y. Seku. John. B. Sukarman. H. J. Y. (2021). Development of Android-Based Biology Crossword Puzzles Materials on Motion Systems to Improve Students' Creative Thinking Skills. Journal of Mathematics and Natural Sciences Education, 11(2), 158-167
9. Sugiyono, 2017. Research and Development (R&D) Methods. Bandung: Alphabeta
10. Syamsu, F. D. 2020. Development of Student Oriented Worksheets
11. Learning Discovery Learning To Improve Critical Thinking Skills Learners. Genta Mulia, 11(1). 65-79