RESEARCH ARTICLE

Validity of teaching modules based on local wisdom of macroscopic fungi and PjBL-oriented to improve scientific attitudes and science literacy

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Abstract: One of the government's efforts to improve the quality of education in Indonesia is through curriculum changes. The independent curriculum prioritizes learning related to local wisdom. However, many teachers still need to implement learning in schools linked to the local wisdom of the area around students. This research aims to produce and validate a teaching module based on the local wisdom of macroscopic fungi at TAHURA Mojokerto with a Project-Based Learning (PjBL) orientation to improve scientific attitudes and science literacy. This development research was carried out using a 4D Thiagarajan Model. The analysis was carried out using a quantitative descriptive analysis technique. The data comes from the validation process by two expert lecturers. The results of the validity test of the learning plan obtained an average score of 3.56; the results of the validity test of learning media in the form of a macroscopic fungi herbarium, teaching materials "Kingdom Fungi", the Edible Mushroom booklet obtained an average score of 3.72; student worksheet validity test results received an average score of 3.52. The results of the recapitulation of validity data show a total score of 3.6 with a very valid category. Based on the results obtained, it was concluded that teaching modules based on macroscopic fungi local wisdom at TAHURA Mojokerto are PjBL-oriented to improve scientific attitudes and science literacy worthy of being applied in Biology learning at school.

Keywords: Local wisdom; macroscopic fungi; PjBL; scientific attitude; science literacy

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Introduction

Learning is a process of interaction between students and their environment so that changes in behavior for the better occur. In the learning process, the main principle is the involvement of all student potential (Saputra et al., 2014). The learning process requires the support of learning components in the form of learning models, learning strategies, methods, and appropriate teaching materials to support the achievement of goals (Haka, 2021).

In Indonesia, the curriculum as an essential reference for national education has repeatedly undergone changes and improvements. This is proven by the change in the 2013 curriculum to an independent curriculum. Based on the renewal from the 2013 curriculum to the independent curriculum, it is hoped that learning will not only focus on understanding the concepts of learning, but students can also understand the concepts acquired in their schools so that they can be implemented in students' daily lives. According to Adla and Maulia (2023), teachers have the flexibility to choose to share teaching tools so that learning can be adapted to students' learning needs and interests.

Teachers must use Local wisdom optimally for the learning process in schools. Teachers need to be

creative and innovative to use local wisdom in the environment around students as a learning resource. However, efforts to develop biology modules based on local wisdom still need to be widely used in school learning (Lestari et al., 2019). One solution that can be done is by integrating local wisdom values into learning materials at school. This is in line with the opinion of Haka et al. (2021), stating that schools can be said to be educational institutions to preserve the surrounding area in learning activities.

Quality education can be achieved by innovating and creating educational development (Sastria et al., 2020). According to Riefani (2019), mastery of the material by students must be supported by the availability of learning resources, learning media, and learning tools and by selecting appropriate learning strategies. So, we need an independent curriculum teaching module that integrates local wisdom.

According to Juanda et al. (2021), an effective and relevant teaching and learning strategy is needed in learning biology to meet the current generation's needs. Biology requires understanding, applying, analyzing, synthesizing, and evaluating high-level thinking (Haerunnisa et al., 2018). Learning biology must involve students in direct observation, not just listening and memorizing theory (Astuti et al., 2022). One of the efforts to apply the values of local wisdom in learning biology in schools is to develop modules based on local wisdom around (Lestari et al., 2019).

Kingdom fungi or mushrooms is a sub-material on the diversity of living things in the 10th-grade high school biology subject. This material has a wide scope, including the diversity of fungi, characteristics of fungi, reproduction of fungi, and their role in human life. The local wisdom possessed by each region varies greatly. With the diversity of regional potential, the development of regional potential and excellence needs special attention from the regional government so that students are not unfamiliar with their own region (Lestari et al., 2019).

One of the local wisdoms in Mojokerto Regency is TAHURA (Great Forest Park), which is located in Pacet Village, Pacet District, Mojokerto Regency. The uniqueness of the WPPS (Petung Sewu Panoramic Tour) TAHURA Mojokerto area is the large number of macroscopic fungis that can be found in the forest and the habits of the surrounding community regarding the use of edible mushrooms. The linkage of biology learning content with natural resources owned by TAHURA is a very strong value in enriching the treasury of local wisdom-based biology. Local wisdom in TAHURA Mojokerto can be integrated into learning through this material.

Macroscopic fungis have relatively large fruiting body sizes that can be observed directly with the eye as a natural source of learning (Damayanti et al., 2022). So, by making a macroscopic fungi herbarium taken from TAHURA Mojokerto, the teacher can make the media a learning resource for students. According to Damayanti et al. (2022), using learning resources that display real situations will greatly support student interaction with their learning resources optimally. In addition, another study conducted by Hoiroh and Isnawati (2020) stated that booklet media can help students get to know mushrooms more closely. Research by Aroyandini et al. (2020) states that the diversity of mushrooms found in Jejamuran Agrotourism can be used as a learning resource for Biology subjects based on local potential.

Creative and innovative learning models can improve student competence (Pramana et al., 2020). The Project-Based Learning (PjBL) model is one of the innovations in learning that can be used because PjBL aims to train students in critical, creative, and rational thinking, actively collaborate and communicate, improve understanding of the material being taught, and provide real experience to students. The advantage of PjBL is that projects can be selected or developed to achieve specific learning outcomes. The aim is for students to have independence and skills in completing the tasks they face (Saputra et al., 2014). The PjBL learning model builds teamwork between group mates and educators; students are more required to express ideas through opinions or questions that help them be more active during the learning process (Jannah et al., 2022). The PjBL model allows students to experiment in producing work based on related material. This will make students better master the learning material and can improve student achievement (Lukitaningsih, 2018). In line with research conducted by Lukitaningsih (2018), the application of PjBL in biotechnology shows an increase in students' character and learning achievement. Therefore, research is needed on applying PjBL to different materials adapted to the characteristics of PjBL. In line with research conducted by Lukitaningsih (2018), the application of PjBL in biotechnology shows an increase in students' character and learning achievement. Therefore, research is needed on applying PjBL to different materials adapted to the characteristics of PjBL. In line with research conducted by Lukitaningsih (2018), the application of PjBL in biotechnology shows an increase in students' character and learning achievement. Therefore, research is needed on applying PjBL to different materials adapted to the characteristics of PjBL.

Most students view biology as a complex subject because there is much memorization; students need more curiosity and a critical attitude in studying biology. As a result, students are passive in studying biology, so they are less able to encourage a scientific attitude in a positive direction. The teacher must consider this because it can affect the scientific attitude of students (Artaga, 2021). In line with the opinion of Septine et al. (2019), teachers must first train students' scientific attitudes so that when students' scientific attitudes improve, their' learning achievements will increase.

Science literacy skills support learning in science because science concepts always develop according to changing conditions of natural phenomena or current problems, such as learning biology (Faridah et

al., 2022). The low literacy skills of Indonesian students can be seen in various international surveys. The OECD survey through the PISA program 2018 showed that students' literacy skills in Indonesia were ranked 70th out of 78 participating countries. Meanwhile, according to UNICEF data, Indonesia ranks 60th out of 61 countries in science literacy capabilities. 21st-century learning requires skills in science literacy. If it is not immediately trained, it will impact students' ability to explain, relate, and make the right decisions in science problems in social life. It can be seen that science literacy in Indonesia still has a low score and is even decreasing (Riduan et al., 2021). According to Faridah et al. (2022), science literacy can make it easier for students to face science problems in everyday life.

Several related studies have developed a PjBL learning model with a scientific attitude and science literacy. Research by Fuadah et al. (2016) shows that Project Based Learning comes from learning the local environment's potential and positively affects students' understanding of concepts, scientific skills, and scientific attitudes. Research conducted by Hernawati et al. (2019) shows that using the PjBL learning model to raise topics in the surrounding environment can train science literacy skills. The research results show that project activity experience significantly affects science literacy skills.

Observations at SMA Negeri 1 Pacet Mojokerto show that learning using learning resources in the form of textbooks provided by the school and learning biology related to the local wisdom of macroscopic fungis has never been implemented in schools. Apart from that, there still needs to be more learning with project assignments, meaning students' scientific attitudes and science literacy need to be improved.

Observing some of the weaknesses and strengths in the observation activities and empirical studies above, it is necessary to overcome these problems. Previous research has yet to address the topic of local wisdom applied through teaching tools in the form of teaching modules. Development of teaching modules containing features that can train students' scientific attitudes and science literacy. The learning that will be carried out uses the PjBL model with bills in the form of products that address the topic of macroscopic fungi.

This study aims to develop teaching modules based on macroscopic fungi local wisdom and PjBL-oriented to train scientific attitudes and science literacy. The analysis in this study was based on observations and previous research studies. The results of the development of teaching modules are expected to be used by teachers in classroom learning. They can improve students' understanding of the existence of local wisdom in their area.

Method

Research Design

This type of research uses research and development methods (Research and Development). The design of this study applies the 4D model (define, design, develop, and disseminate) developed (Thiagarajan et al., 1974). This research was conducted at the Postgraduate Biology Education Study Program at Universitas Negeri Surabaya.

Context and Participants

The stages of this research refer to the 4D research model. The first stage is defined, which is divided into several steps: initial final analysis, student analysis, task analysis, material analysis, and formulation of learning objectives. Next is the design stage, which includes instrument selection, teaching device selection, format selection, and initial design. Then, at the development stage, this stage contains expert validation and revision. This research is limited to the development process and the validity of the product in the form of a teaching module set produced. two expert lecturers carried out the device validation process.

Data Sources

The data used comes from instruments that researchers have developed. The instrument used is a non-test instrument. The instruments used to collect data on teaching module devices are learning plan validation sheets, learning media validation sheets, and student worksheet validation sheets. The data collection method uses the validation method.

Validation includes aspects of appropriateness of content, suitability of presentation, and appropriateness of language. Validation is intended to obtain suggestions and input from validators. Suggestions and input from validators will be followed up to improve the development of local wisdom-based teaching modules.

Data Analyses

The validation results were analyzed descriptively and quantitatively. The device's validity is analyzed after obtaining scores from the validator and looking for the average score for each aspect. The results of the validation data for the development of teaching modules will be determined using the Likert scale

at Table 1.

Table 1. Likert scale criteria

Scale value	Assessment criteria
4	Very valid
3	Valid
2	Less valid
1	Invalid

The value obtained from the validator. The average results will be seen, after which the interpretation criteria will be determined. Average calculation using the Formula 1 (Samawati & Rahayu, 2021).

$$average\ score = \frac{The\ sum\ of\ the\ scores\ for\ each\ criterion\ of\ all\ validators}{number\ of\ validators} \quad (1)$$

These interpretation criteria are divided into several types, as listed at Table 2 (Ratumanan & Lauens, 2011).

Table 2. Likert scale interpretation criteria

Score	Interpretation criteria
3.6 ≤ P ≤ 4.0	Very valid
2.6 ≤ P ≤ 3.5	Valid
1.6 ≤ P ≤ 2.5	Less valid
1 ≤ P ≤ 1.5	Invalid

A teaching module can be declared valid and suitable for use if the minimum level of validity achieved is good enough. If the level of validity achieved below is reasonable enough, then revisions need to be made until a valid teaching module is obtained.

Results and Discussion

This research used a 4D model that produced teaching module products based on macroscopic fungi local wisdom at TAHURA Mojokerto oriented to PjBL to improve appropriate scientific attitudes and science literacy based on validation results. Teaching modules are learning tools arranged systematically and structured to assist learning. The teaching module developed by the researcher raised the topic of local wisdom in TAHURA (Great Forest Park) Raden Soerjo in Mojoketo Regency.

Teaching Module Development

Local wisdom associated with biology subjects is macroscopic fungi. The location for taking macroscopic fungis is in the WPPS (Petung Sewu Panoramic Tour) TAHURA Mojokerto area. Macroscopic fungis that researchers have taken were developed into learning media for the mushroom herbarium, and the results of the identification of macroscopic fungi are discussed in the teaching material "Kingdom Fungi". Local wisdom related to the material is associated with UPT TAHURA Mojokerto regulations local wisdom, the relationship between UPT TAHURA regulations and tree felling, macroscopic fungi growth and harvesting of mushrooms that the surrounding community can consume, and community knowledge about poisonous mushrooms and edible mushrooms. Besides that, the people there only take some mushrooms that cannot be consumed or are poisonous, knowing the benefits that these mushrooms can become decomposers, and wood or trees that are not taken and scattered on the ground can become a medium for mushrooms to grow. The developed module is expected to make it easier to understand the material and add insight regarding the local wisdom of the area so that it is fun to use, has clear concepts and sources, and can achieve learning objectives (Lestari et al., 2019).

According to Nadir et al. (2022), modules can be integrated with appropriate learning approaches and related to scientific contexts and problems in everyday life so that students know the relevance of the material being studied to real-life conditions. The teaching modules developed by researchers use independent curriculum guidelines with the PjBL model. In the teaching module, the project is carried out by students by making processed macroscopic fungis suitable for consumption. With project assessment, one can assess the suitability of the planned project, the ability to manage assigned projects, and the authenticity of the products produced (Saputra et al., 2014).

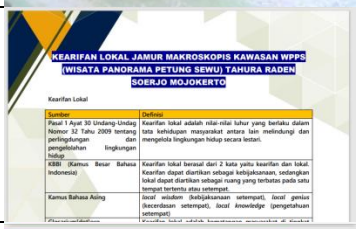
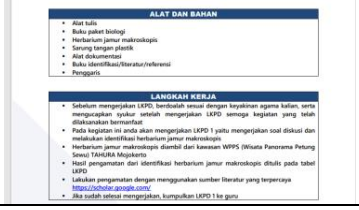
This teaching module consists of learning guidelines or learning plan, learning media (in the form of a macroscopic fungi herbarium, teaching materials "Kingdom Fungi", Edible Mushroom booklet), and student worksheet consisting of student worksheet 1 and student worksheet 2 (Figure 1 and Figure 2).

The description of the display of the teaching module device can be seen in Table 1. This teaching module is also equipped with assessment instruments and rubrics for the learning objectives. After determining a series of assessment processes that will be taken in the PjBL, determine each assessment's rubrics (Saputra et al., 2014).

Figure 1. Teaching Module Kit (a) Teaching module cover page; (b) Cover page of the mushroom herbarium media guide; (c) Back cover page of mushroom herbarium media guide; (d) Front cover page of teaching material "Kingdom Fungi"; (e) Back cover page of teaching material "Kingdom Fungi"; (f) Cover page of the Edible Mushroom booklet; (g) Front cover of student worksheet 1; (h) Front cover of student worksheet 2.

Figure 2. Several parts of the teaching module toolkit (a) Identity of learning plan; (b) Learning activities; (c) assessment sheet; (d) assessment rubric; (e) macroscopic fungi herbarium; (f) herbarium label; (g) fungal kingdom material; (h) results of macroscopic fungal identification at WPPS TAHURA; (i) local wisdom reading sources; (j) contents of the edible mushroom booklet (k) observation and identification activities in student worksheet 1; (l) project activities in student worksheet 2.

Table 3. Description of the display of the teaching module device

No.	Appearance	Information
Learning Plan		
1.		The learning plan created in the teaching module consists of identity points, general information, initial competencies, prerequisite material, learning outcomes, Pancasila student profile, facilities and infrastructure, target students, learning model, core competencies, trigger questions, learning preparation, learning activities, assessment, questions and remedial, student and teacher reflection, learning resources, bibliography.
Learning Media		
2.		The herbarium of macroscopic fungi taken from the WPPS TAHURA Mojokerto area and identified by researchers was preserved using 70% alcohol and replaced periodically or when the solution changed color. Then, the herbarium is labeled according to the classification of each fungus.
3.		The "Kingdom Fungi" teaching material contains chapters on introduction, reproduction, classification, role, list of macroscopic fungi in the WPPS TAHURA Mojokerto area, and local wisdom.
4.		The Edible Mushroom booklet contains various types of edible mushroom cultivation, business opportunities, mushroom business marketing, and Bio Entrepreneur.
Student Worksheet		
5.		student worksheet 1 presents student activities for conducting group discussions, observing, and identifying macroscopic fungi using herbarium learning media. student worksheet 2 gives project tasks for making macroscopic fungi preparations.
Assessment on Teaching Modules		
6.		The assessment of the teaching module consists of a pre-learning assessment, which includes cognitive and non-cognitive diagnostic evaluations, and a formative assessment, which provides for student worksheet, mushroom processing project assignments, group performance in presentations, and scientific attitude assessment.

This teaching module was developed with the characteristics of the PjBL learning model and links it to scientific attitudes and science literacy indicators.

Learning Plan Validity

With a learning plan, teachers can plan learning activities in a structured and planned manner and ensure that learning objectives can be achieved effectively. The learning plan developed by the researchers includes subtopics of the fungal kingdom, with validation results as shown in Table 4.

Table 4. Learning plan validity result

No	Aspect	Validator Score	
		Rater I	Rater II
Content Feasibility Aspect			
Learning Plan identity			
1	Formulate learning objectives	4	4
2	Teaching modules according to learning objectives	4	3
3	Learning objectives are based on the material presented	3	4
4	The learning method chosen is appropriate	4	4
5	Selection of appropriate learning models	3	4
Learning Activities			
6	The PjBL syntax is appropriate	4	4
7	Completeness and clarity of the learning scenario (introductory, content and closing stages)	3	4
8	Learning activities are designed and developed based on learning objectives and student potential	4	4
9	The time allocation determined is by the material to be taught	4	4
10	The choice of time allocation is based on the learning activity situation	4	3
11	The learning experiences that students will gain are written clearly	3	4
12	Learning activities are student-oriented	4	4
13	Learning activities can improve scientific attitudes and science literacy	3	3
Supporting Learning Activities			
14	Suitability of learning resources and learning media with learning objectives	4	4
15	The use of macroscopic fungi herbarium learning media, printed books and Edible Mushroom booklets supports learning activities	4	4
Aspects of Feasibility of Presentation			
Content Systematics			
16	Consistency, orderliness and balance of presentation	4	3
17	The use of letter variations is not excessive	4	3
Presentation Technique			
18	The cover illustration of the teaching module illustrates the content and reveals the character of the object	4	3
19	The details and color composition of the cover are appropriate	3	3
20	The attractive appearance of the macroscopic fungi teaching module	3	3
21	The completeness of the contents of the teaching modules presented is appropriate	4	3
Aspects of Language Feasibility			
Sequence and integration of thought flow			
22	Consistent use of terms, symbols, or icons.	4	3
23	Accuracy of sentence structure	4	3
24	Conformity of spelling, punctuation and writing order	4	3
Language use			
25	Use of language by PUEBI	4	3
26	The language used is easy to understand	4	3
27	The language used is simple and clear	4	3
28	The sentences used represent the delivery of the content	4	3
29	Correct use of words	4	3
30	The sentence used does not have a double meaning	4	3
Amount		**112**	**102**
Average		**3.73**	**3.4**
Category		**Very Valid**	**Valid**

Based on the results of the validation of the learning plan by the validator, the overall average score was 3.56 and was classified as valid. The validation results indicate that the teaching module component in a learning plan is suitable for use in learning. The content feasibility aspect received an average score of 3.7. These results indicate that the appropriateness aspect of the content in the indicators for determining the type of assessment, which includes learning objectives, suitability of learning plan content, and completeness of identity, is suitable but needs improvement in learning objectives using operational verbs. The learning activity indicators, including the PjBL learning model and learning activity planning, must be more detailed and linked to scientific attitudes and science literacy indicators. The supporting indicators for learning activities, which include the selection of learning resources and learning media, are good. The display feasibility aspect obtained an average score of 3.33. These results indicate that the content systematic indicators, which include orderliness, tidiness, and layout, are good. The presentation technique indicators, which include the presentation of the teaching module's cover and contents and the production's completeness, are good. However, the display presentation of the learning activities is more detailed. The language appropriateness aspect received an average score of 3.5. These results indicate that the indicators of coherence and language use are suitable. Educators can make good learning plans according to students' conditions as preparation before learning. Learning plans can measure quality achievements in biology learning (Anggis, 2023).

Learning Media Validity

Creative and innovative learning can be carried out if a teacher is clever in choosing which media is better and more appropriate for conveying a message (Irianti, 2020). The learning media developed by researchers are a macroscopic fungi herbarium, "Kingdom Fungi" teaching materials, and an Edible Mushroom booklet. Teaching materials are closely related to the learning process. The package book contains general material that seems to lack any connection with everyday life, such as the application of the material, which is still not related to real life; there are no teaching materials based on local wisdom, which makes students less aware of local potential and the surrounding culture and teaching materials which make less attractive students reduce students' learning motivation (Haka et al., 2021).

The herbarium of macroscopic fungi taken from the WPPS TAHURA Raden Soerjo Mojokerto area can be a natural learning medium for students. Students can observe and identify using an herbarium to practice scientific attitudes and science literacy. The teaching materials contain the results of mushroom identification and local wisdom. The insertion of local wisdom in teaching materials is a medium or way to preserve local culture and create a society that cares about the environment and preserves the local environment (Haka et al., 2021). The learning resources needed must also make it easier for students to understand the teaching material,

Learning media in the form of a macroscopic fungi herbarium that has been taken in the WPPS TAHURA Mojokerto area can also be used as an inventory for use in school learning. An inventory of fungal diversity is the first step in maintaining germplasm and maximizing its potential utilization in the future (Putra et al., 2019).

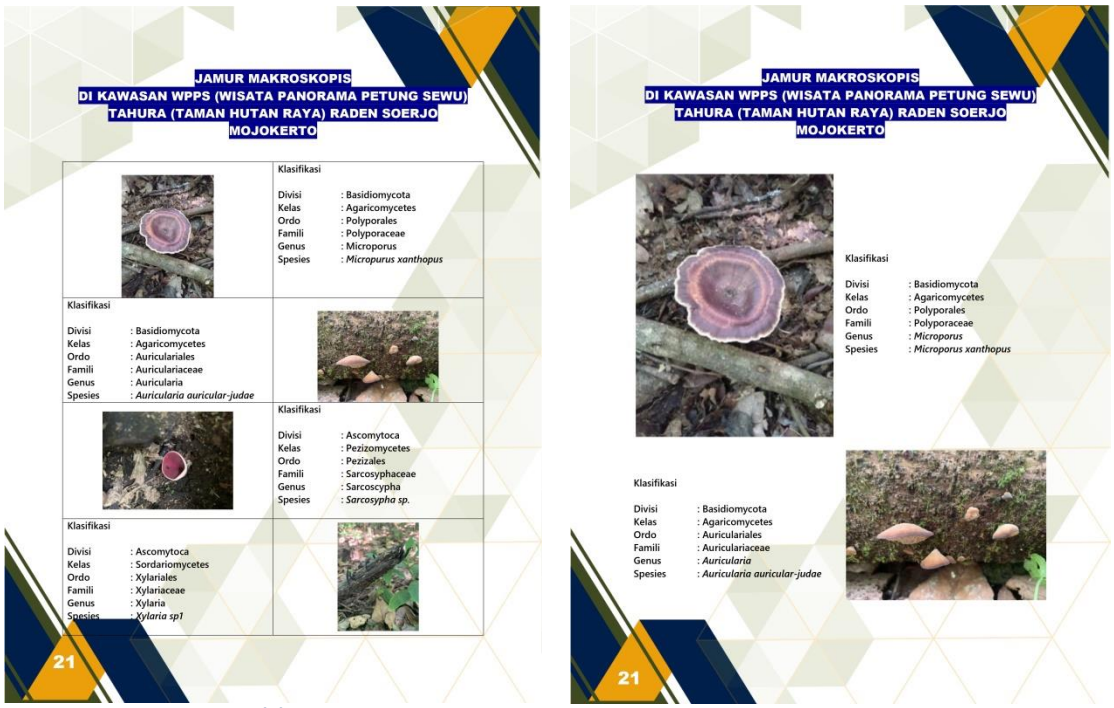
Edible mushroom booklet which contains mushroom business opportunities and mushroom business information that can be used as information on products that will be made by students using PjBL. The unique appearance of the booklet can motivate and attract students to focus on reading the information presented because they do not get bored quickly (Sary & Isnawati, 2023).

Table 5 show the learning media validity results. Based on the results of the validation of learning media by validators, the overall average score was 3.72 and was classified as very valid. The validation results show that learning media is suitable for use in learning. The content feasibility aspect obtained an average score of 3.76. These results indicate that the appearance and purpose of using the herbarium look good in the "kingdom fungi" textbook indicator, which includes suitability of content with the material, the accuracy of the material, and organization of writing the material is good in the Edible Mushroom booklet indicator which consists of the contents of the booklet it is good, however, need improvement in project information created by students. The feasibility aspect of the presentation received an average score of 3.75. These results indicate that the macroscopic fungi presentation indicators are good. The teaching material indicator "Kingdom Fungi" includes the systematic presentation, display of the location of the contents of the teaching material, design and illustrations are good but need improvement because the images presented in the teaching material look small. The Edible Mushroom booklet indicators, which include the layout, content display, design, and illustrations, are appropriate but need improvement because the images presented are too small. The language appropriateness aspect obtained an average score of 3.55. These results indicate that the coherence and integration of thought flow and language use indicators are suitable. However, it is necessary to recheck the writing procedures for Indonesian Language and improve the writing of image citations taken from the internet.

The improvements to the learning media after the validation process show that the images in the "Kingdom Fungi" teaching materials look small and are difficult to use to see the characteristics of the fungi found (Figure 3). The results after revision become better for students to see.

Table 5. Learning media validity results

No	Aspect	Validator Score	
		Rater I	Rater II
Content Feasibility Aspect			
Macroscopic Fungi Herbarium			
1	The herbarium media presented comes from TAHURA R. Soerjo Mojokerto	4	4
2	Mushroom herbarium media is by the learning objectives in the teaching module	4	4
3	Suitability of solution conditions and specimen color on wet herbarium media	4	4
4	Herbarium media information on the label is clear and complete	4	4
5	Completeness and condition of specimen components in herbarium media	4	4
6	Presenting a herbarium can train students' scientific attitudes and science literacy	3	4
7	Herbarium media can be used to observe and identify macroscopic fungi for students	4	4
Textbook "Kingdom Fungi"			
8	The teaching materials are by the kingdom of fungi material	4	4
9	Teaching materials contain local wisdom	4	4
10	Completeness of learning materials in a systematic sequence and arrangement	4	4
11	The truth of the content of the material	4	4
12	The material is presented clearly	3	4
13	The glossary contains essential terms in the text with an explanation of the meaning of the terms and is written alphabetically	3	4
Edible Mushroom Booklet			
14	Fill in the booklet according to the scope of the material	4	4
15	The systematic contents of the booklet are appropriate	4	4
16	Booklets can train students' creativity	3	4
17	Booklets can add information and serve as inspiration for students' project assignments	3	4
Aspects of Feasibility of Presentation			
Macroscopic Fungi Herbarium			
18	Herbarium media is safe and easy to move	4	4
19	Herbarium media is durable and can be used for ongoing learning activities	4	4
Teaching Materials "Kingdom Fungi"			
20	The size of the book title letters is more dominant and proportional than the size of the author's name	4	4
21	The color of the book title contrasts with the background color	4	4
22	Don't use too many types of letters	4	3
23	The separation between paragraphs is clear	4	3
24	The use of letter variations is not excessive	4	3
25	The general appearance is attractive	3	4
26	Linkages and consistency between learning materials	4	4
27	The material is presented coherently	4	4
28	Consistency, orderliness, and balance of presentation	4	4
29	The placement of sub-chapters or the equivalent (foreword, table of contents) is uniform or consistent	4	4
30	Illustrations clarify and facilitate understanding	4	3
Edible Mushroom Booklet			
31	The attractive appearance of the booklet	3	3
32	The appearance of the elements and the layout of the front, back, and back covers harmoniously have rhythm unity and are consistent	4	3
33	Describe the content of the teaching material and reveal the character of the object	4	4
34	The shape, color, size, proportions of objects correspond to reality	4	3
35	Don't use too many font types	4	4
36	Match the image with the text message	4	3
37	Appropriateness of appearance to the topic	4	4
38	The illustrations presented are based on the material content in the booklet	4	4
Aspects of Language Feasibility			
Sequence and integration of thought flow			
39	Consistent use of terms, symbols, or icons.	4	4
40	Accuracy of sentence structure	4	3
41	Conformity of spelling, punctuation, and writing order	4	3
42	Sequence and coherence between paragraphs	4	4
Language use			
43	Use of language by PUEBI	3	3
44	The sentences used to explain the material are easy to understand	4	3
45	The language used is simple and clear	4	3
46	The sentences used represent the delivery of the content	4	3
47	The choice of words according to the material presented	4	3
Amount		**181**	**169**
Average		**3.85**	**3.59**
Category		**Very Valid**	**Valid**



(a) (b)

Figure 3**.** **(**a) Before repair (b) After repair

Student Worksheet Validity

Student worksheet contains activities or activities carried out by students during the learning process and products produced by students after completing these tasks or activities. Student worksheet is often used to train and measure student competence or learning outcomes. In essence, student worksheet is a medium that can stimulate students' cognitive, affective, and psychomotor development (Safitri et al., 2021).

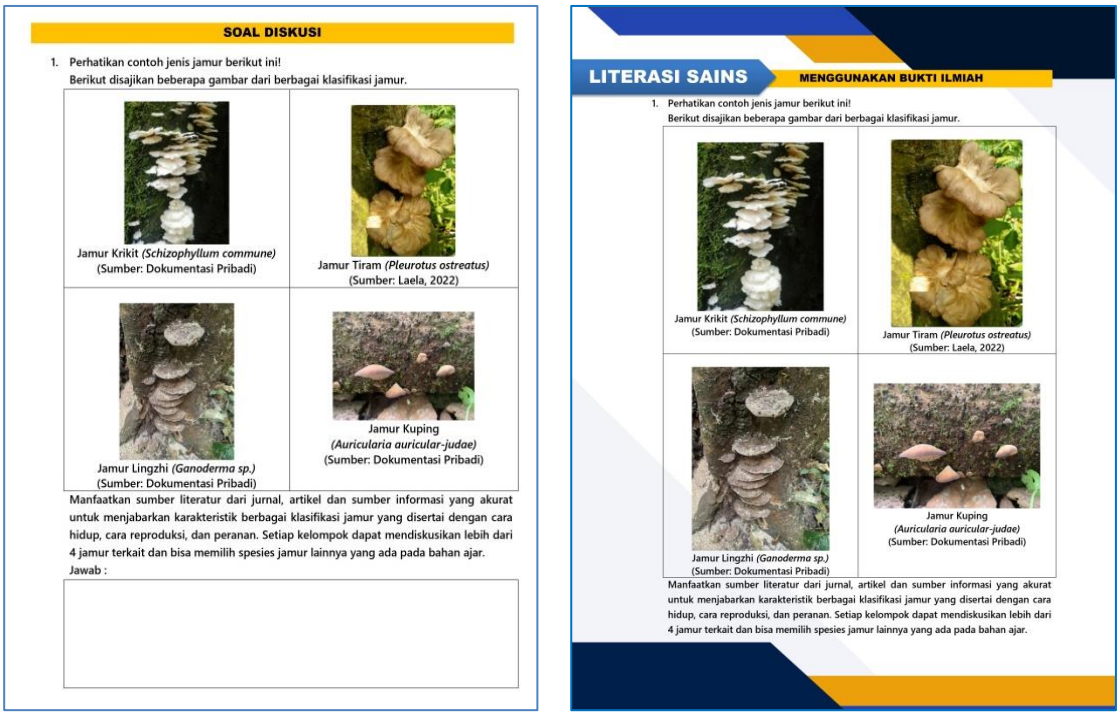
The student worksheet developed by researchers consists of 2 activities. The student worksheet developed consists of identity components, learning instructions, criteria for completing learning objectives, supporting information, tools and materials, work steps, and learning activities. Student worksheet 1 contains student activities to conduct group discussions, which are presented with three questions and one observation and identification question using the macroscopic fungus herbarium learning media. Student worksheet 2 contains the activities of each group to create a macroscopic fungi processing project design. The events approach in everyday life is very suitable to be used as a flow for preparing student worksheet so that it is easy for students to understand (Safitri et al., 2021).

Table 6 show student worksheet validity results. Based on the results of the validity of the student worksheet by the validator, the overall average score was 3.52 and was classified as valid. The validation results indicate that the teaching module components in the form of student worksheet are suitable for learning. The content feasibility aspect obtained an average score of 3.40. These results indicate that the PjBL learning indicators, which include the objectives and contents of the student worksheet, look good. Still, there need to be improvements in the student activity components in practicing scientific attitudes and science literacy. The feasibility aspect of the presentation received an average score of 3.5. These results indicate that the indicators for the appearance of the student worksheet and the learning presentation must be good but need improvement. The appropriateness aspect of the production must show parts that train scientific attitudes and literacy. The language appropriateness aspect obtained an average score of 3.67. These results indicate that the coherence and integration of thought flow are good. Still, it is necessary to check again on the language use indicators and straightforward, communicative, dialogical, and interactive indicators.

The results of the student worksheet before the revision showed that the features for training scientific attitudes and science literacy had not been seen in the student worksheet. After the student worksheet was revised, there were features for teaching scientific perspectives and science literacy by the indicator guidelines (Figure 4).

Table 6. Student worksheet validity results

No	Aspect	Validator Score	
		Rater I	Rater II
Content Feasibility Aspect			
PjBL Learning			
1	Suitability to learning objectives	4	4
2	Suitability of the contents of the student worksheet with the abilities and needs of students	4	4
3	The usefulness of activities to increase knowledge	4	4
4	Conformity with the PjBL learning model	3	4
5	Activities in student worksheets help students find concepts	4	3
6	Student activities are formulated clearly and operationally	3	4
7	The problems raised are appropriate to the student's level of cognition	3	4
8	Each activity presented has a clear objective	4	4
Ability to Improve Scientific Attitudes and Science Literacy			
9	The content in student worksheet activities leads to learning objectives to improve scientific attitudes and science literacy	3	2
10	The activities presented are by the indicators of scientific attitude and science literacy	3	2
11	Scientific attitudes and science literacy skills in student worksheets can be trained through observing and identifying macroscopic fungi herbarium and project work	3	2
Aspects of Feasibility of Presentation			
Student Worksheet Display			
12	The order of presentation in the student worksheet is appropriate	4	3
13	The instructions in the student worksheet are clear and easy to understand	4	3
14	The use of the typeface is clear, consistent, and attractive	4	3
15	Illustrations/pictures are clear and appropriate	4	3
16	The cover illustration is attractive and describes the content/material in the student worksheet	4	3
17	Discourse and images are interrelated	4	3
18	Visually attractive appearance	4	3
Learning Presentation			
19	The contents of the student worksheet are easy to understand	4	3
20	The objectives of the activities presented in the student worksheet are clear	4	3
21	The activity procedure uses command sentences	4	3
22	Student involvement	4	3
Aspects of Language Feasibility			
Coherence and Integration of Thought Flow			
23	Consistent use of terms, symbols, or icons.	4	4
24	Accuracy of sentence structure	4	4
25	Conformity of spelling, punctuation, and writing order	4	4
26	Clarity of instructions or directions	4	4
Use of Language			
27	Use of language by PUEBI	3	4
28	The language used is easy for students to understand	4	3
29	The language used is simple and clear	4	3
30	The sentences used represent the delivery of the content	4	3
Straightforward, Communicative, Dialogical and Interactive			
31	The language used is communicative	4	3
32	Conformity of sentences with the level of intellectual development of students	4	3
33	Dialogic and interactive	4	3
Amount		**125**	**108**
Average		**3.78**	**3.27**
Category		**Very Valid**	**Valid**



(a) (b)

Figure 4. (a) Before revision (b) After revision

Conclusion

Based on the research results, it can be concluded that the teaching module based on the local wisdom of macroscopic fungi is valid and suitable for learning in schools. This is supported by research results, which show that the validity of the learning plan is 3.56 in the valid category, the validity of the learning media is 3.72 in the very valid category, and the validity of the student worksheet is 3.52 in the valid category. Overall, the results of the validation of learning tools that researchers have developed obtained an average score of 3.6 in the very valid category.

Based on the results of the development research that has been carried out, the suggestion given by researchers is that research needs to be carried out regarding the application of local wisdom-based teaching modules in other areas to other biology learning materials. Using measured learning outcome indicators should be by the learning objectives to be achieved.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

A. L. Sary: methodology; analysis; writing original draft preparation; and review and editing. **I. Isnawati:** review, editing and lecture. **M.T. Asri:** review, editing and lecture.

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