Culture Based Learning Model in the Biology Module to Develop Students' Critical Thinking Skills

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Abstract. The online learning media that was really needed by the teacher in guiding a lesson. The Online Learning Media that made in this research is E-Module. E-Modules that is combined with a culture-based learning model will be very useful to be able to make students culturally aware and increase their criticality about the relationship between culture and Biology. This study aimed to develop the Biology E-module on Environmental Pollution material with a combination of culture-based learning models to develop the critical thinking skills of Junior High School students. This research was an RND (Research and Development) research. This first year research was only carried out the development stage from potential problems, data collection, product design, design validation, to design revision. This E-module was created by emphasizing learning activities with 3 syntax-based learning cultures, namely learning about culture, learning with culture, and learning through culture. To be able to develop critical thinking skills, each activity in the E-module was also made with an activity or practicum that puts indicators of critical thinking skills on each subject. The combination of culture-based learning syntax and critical thinking ability indicators contained in the E-module forces students to be able to carry out learning that always connects culture with the biological sciences around them. Students' critical thinking skills would also develop by placing every element of the culture of the community around students to be integrated in studying environmental conservation materials.

Keywords: module; critical thinking; culture-based learning

1 Introduction

Culture is something that is very close to a person. A student at school will hang out with his friends by bringing his cultural influence closely to carry out activities. The Director General of Higher Education said that learning must be integrated with culture. Culture-based learning is a strategy for creating learning environments and designing learning experiences that integrate culture as part of the learning process [1]. Culture-based learning combines 3 indicators, namely learning about culture, learning with culture, and learning through culture [2]).

Culture-based learning will be able to be realized in teaching and learning activities in the classroom if learning media that lead to culture have been prepared. Learning media that can be arranged are learning modules. The culture-based learning module is one of the answers to learning media that can lead us to culture-based learning. The module is a teacher-to-student

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communication tool. If the teacher wants to make culture the basis of learning, then the module can bridge that desire.

The culture that we want to integrate with the module in this research is the culture in Gunungkidul. Culture in Gunungkidul is a unique culture, not all regions have a culture like Gunungkidul. Until now, the people of Gunungkidul still hold tightly to this culture because this culture is required to be passed down from generation to generation. This culture is believed to have many positive values. Therefore, this culture must always be done every year.

The era of the Digital Era is starting to fade the culture in Gunungkidul, today's millennials only consider this culture "superstition". The way to introduce the positive and logical values of a culture that is considered "superstitious" to millennials is to take advantage of the role of the school. Schools are asked to make modules based on culture-based learning. The module contains indicators of learning through culture, learning with culture, and learning about culture.

The module that can be compiled containing 3 indicators of culture-based learning is the environmental pollution module. Environmental pollution material is considered suitable to be delivered with culture-based learning. Environmental pollution contains material that can be combined with indicators of learning about culture, learning through culture, and learning about culture.

Environmental pollution material is very suitable to be combined with culture. For example, in the cultural practice of giving offerings or mori cloth on a tree or river. By giving this treatment, the positive value is that plants and rivers are a form of life that deserves to be respected (sacred) so that being given a sarong and offerings of flowers has been carried out for generations since the ancestors. By doing this culture, people will not dare to cut down trees carelessly, carelessly throw garbage around the trees or rivers for fear of receiving punishment from the tree watchman or the guardian genie. The punishment is sometimes difficult to cure and understand in medical science.

This illogical punishment will make people afraid of treating rivers or trees badly. So culture is concluded to be able to overcome environmental pollution. This is also supported by previous research, namely according to Murdiati's research [3] forest sustainability can be maintained because the community places a sacred value on the existence of forests in Gunungkidul. Submission of local wisdom to overcome environmental pollution to students will be effective if it is delivered in an environmental pollution learning module.

The relationship between environmental and cultural pollution materials that can prevent environmental pollution is something that will be very interesting if students look for the connection themselves. Students are directed to be able to build their own knowledge looking for positive cultural value links to environmental preservation. By building their own knowledge according to the learning objectives and linked to the culture around them, it is hoped that their critical thinking skills will develop. Critical thinking ability is the ability to think logically, reflectively, systematically and productively which is applied in assessing situations to make good judgments and decisions [4].

Critical thinking ability is an ability that must be developed in the 2013 curriculum. The curriculum emphasizes that 21st century skills that students must have, namely 4C include creative, communicative, critical thinking, and collaboration. So on the basis of the demands of the curriculum, learning in schools is required to develop the 4Cs, one of which is the ability to think critically. On this basis, the researcher wants to conduct research on the application of culture-based learning to the environmental pollution module to improve critical thinking skills.

2 Research Methods

This research is a qualitative research . This type of research is Design and Development Research (D&DR). Richey and Klein [5] explain that Design and Development Research (D&DR) is "the systematic study of design, development, and evaluation processes with the aim of establishing an empirical basis for the creation of instructional and non-instructional products and tools and new or enhanced models that govern their development". Design and development in D&DR as a research model does not only focus on the final product, but the findings from research on products that have been developed.

The stages of the D&DR model are as follows "1) Identify the problems motivating the research; 2) Describe the objectives; 3) Design and develop the artifact; 4) Subject the artifact to testing; 5) Evaluate the results of testing; and 6) Communicate those results". There are two categories in the D&DR model, namely (1) product and tool research, and (2) research model [5]. This research is classified as a product and tool research category, where the design and development process is explained, analyzed and evaluated on the products that have been made [5]

Place and time of research

Place of research: Junior high school in Gunungkidul, Yogyakarta which includes MTs YAPPI Mulusan and MTs Muhammadiyah Monggol. Time of study: November 2020 - May 2021

Participants of Research

The participants in this study were material experts, media experts, and linguists whom the researcher chose to assess the module. The 3 experts were taken from peer lecturers and 4 science teachers in both schools. Other participants are users, in this case users is a Class VII student at MTs YAPPI Mulusan and MTs Muhammadiyah Monggol. The method of taking participants is by purposive sampling technique. The selection of participants is adjusted to the research objectives and research approach, so that they can obtain accurate information about what is expected from this research.

Research Instruments

The instruments in this research are media assessment questionnaires, language assessments, and material assessments related to the environmental pollution module based on the culture based learning model. The questionnaire will be assessed by media experts, discussion experts, material experts, and module users.

Data analysis

The data that has been obtained is then calculated by the formula [6] as follows:

$P=f/n \times 100\%$

Description :

P = Precentage
f = The number of scores obtained
n = Total maximum score

The result of the percentage score will be converted based on the following criteria:

Table 1. Eligibility criteria for student worksheet
Score (%) Criteria

Score **(%)**	Criteria	
61 - 100%	Very feasible	VF
41- 60%	Eligible	E
21- 40%	Fairly feasible	FF
0- 20%	Not feasible	NF

Source: [6]

3 Results and Discussion

The results of this D&DR or Design and Development Research research resulted in a learning media in the form of an environmental pollution module based on a culture based learning model. Culture based learning contains 3 main indicators, namely learning through culture, learning about culture, and learning through culture. The 3 indicators of the culture based learning model will be integrated with 6 sub-materials of environmental pollution. The sub-materials include Definition of Environmental Pollution, Types of Environmental Pollution, Environmental Pollution Factors, Environmental Pollution Impacts, and Ways of Overcoming Environmental Pollution. Each of these sub-materials will be integrated by researchers with 3 indicators of cultured based learning, namely learning about culture, learning through culture, and learning through culture. These 3 indicators will always be discussed in each sub-material of environmental pollution.

The first indicator is learning about culture. Culture is studied in one specific subject, about culture, for culture, not integrated with other subjects, and not related to each other [7]. The second indicator is learning with culture. Culture and its embodiment become learning media in the learning process, become the context of examples of concepts or principles in a subject, become the context of applying principles or procedures in a subject [7]. The third indicator is learning through culture. A method that provides opportunities for students to demonstrate the achievement of understanding or meaning created in a subject through a variety of cultural manifestations [2]. The following are the steps carried out in the D&DR research for the preparation of an environmental pollution module based on the 3 main indicators of the culture based learning model.

Identify the problem

Identifying a problem is a fundamental process in a research, at least the researcher must know what problem he wants to alleviate with the product or tool being developed. Usually in various cases of problems there are conditions where there is no product or tool that is able to alleviate or overcome the problems that occur. For this reason, the development of products and tools is expected to alleviate problems that occur in the field. This research raises the issue of the application of a culture based learning model that is not yet familiar in schools. Especially learning in Gunungkidul regional schools rarely applies this learning model. Even though it should be a cultural city area, students are also starting to be introduced to culture. The way to

introduce culture in schools is to apply a culture based learning model in learning any suitable material.

Another problem obtained is that because researchers are not teachers in schools, it will be very difficult to implement a culture based learning model in school materials. To be able to solve these problems, the researchers will integrate learning media with indicators of culture based learning models. The learning media that will be integrated with the culture based learning model is the module. So this study will formulate the problem of how to make a module by integrating a culture based learning model.

Describe the objectives

To alleviate or possibly overcome the problems raised in this research, the researchers designed and developed a module with environmental pollution material by integrating the indicator culture based learning model. Environmental pollution material has sub-materials including Definition of Environmental Pollution, Types of Environmental Pollution, Environmental Pollution Factors, Environmental Pollution Impacts, and Ways of Overcoming Environmental Pollution. Each sub-material will include indicators of learning through culture, learning with culture, and learning about culture. So in this research, the second step is to determine the research objectives that will answer the problem formulation, namely knowing how to make a culture-based learning model-based environmental pollution module.

Design & develop the artifact

The learning media that will be designed in this third step is the environmental pollution module with an integrated culture based learning model. The design of this module is as follows. The first sub-material, the notion of environmental pollution, will be integrated with indicators of culture based learning models, including learning about culture, learning through culture, and learning through culture. The first indicator of learning about culture in this sub-material presents the culture in Gunungkidul, namely the Labuhan culture. Labuhan culture is a culture of giving offerings to the sea by releasing it into the high seas. Labuhan deals with overcoming water pollution, especially plastic waste. Labuhan is done because there is a lot of pollution that occurs around the coast including water pollution and soil pollution.

The second indicator is learning through culture, by looking at the background of the port event, which is done to give offerings to the sea and its guardians, it is considered that the sea is sacred and there is a supernatural figure waiting. By doing the harbor, it is hoped that villagers or immigrants will be afraid to throw garbage into the sea because the sea is considered something sacred and there are guardian creatures who will guard the sea. So that the guard does not get angry, local residents must keep the sea clean by not polluting the sea and the area around the sea. Then for the third indicator, the Director General of Higher Education [8] states that learning through culture is a form of multiple representation of learning assessment or a form of understanding assessment in various forms.

For example, students are asked to make a portfolio about port culture and relate it to environmental pollution. Next, the teacher analyzes the students' cultural products to assess understanding of the previously discussed topics. This form of learning allows students to show the depth of their thinking and their soul about the concepts they have learned through their creative imagination.

Fig.1. The Labuhan procession carried out by the people of Baron Beach, Kalurahan Kemadang, Kapanewon Tanjungsari, Gunungkidul on Monday (28/09/2020)
Source: https://jogja.tribunnews.com/

Fig.2. There is a lot of garbage around the Gunungkidul beach
Source: https://jogja.antaranews.com/

The second sub-material is Types of Environmental Pollution. This material is presented again with a different culture in Gunungkidul. The culture discussed is apostolic. In the first indicator, namely learning about culture, in this module students are introduced to apostolic culture. Rasulan is a culture which in the apostleship activity is to give thanks for the harvest that has been given by holding joint prayers, giving offerings to village protectors, and performing performances for people's entertainment events. The activities of offerings in the apostleship that will be highlighted are giving offerings to trees, rivers, roads.

Then the second indicator, namely learning with culture, in this indicator students are invited to see offerings on the river, offerings on the highway, and offerings on trees, so students are directed to understand that these three things are protected by residents by placing offerings. Residents will be afraid to damage objects or places given offerings. Residents will make a place that is given sacred offerings and will not be damaged or polluted. So that water pollution in

rivers does not occur, air pollution on highways does not occur, soil pollution in forests with many large trees also does not occur. This is because the offerings placed at the apostles' ceremony, namely in rivers, roads, and trees, indicate that the place is sacred and there is a genie waiting for it, who will be angry if the place is damaged by humans.

Then for the third indicator, the Director General of Higher Education [8] states that learning through culture is a form of multiple representation of learning assessment or a form of understanding assessment in various forms. For example, students are asked to make an assignment to carry out a project to make a measuring instrument for the occurrence of soil, air, or water pollution using indicators from the Environmental Agency (BLH) and presented in a poster table that will be given to the wider community. Next, the teacher analyzes the students' cultural products to assess understanding of the previously discussed topics. This form of learning allows students to show the depth of their thinking and their soul about the concepts they have learned through their creative imagination.

Fig.3A and 3C. Apostles' Event to give thanks for the harvest
Fig.**3B.** The highway alms event so that the road watchman gives safety walkers
Fig.3D. Forest Alms Event for the forest guardian to give safety for villagers
Source: https://jogja.antaranews.com/

The next sub-material is the environmental pollution factor. The integration between this material and the first indicator is learning with culture, namely raising the culture of alms, mortar, watu kali or rocks in rivers that have many holes. Stones in the river are given offerings

in the form of incense and flowers, because these stones are considered to be waiting. 7 kinds of flowers, frankincense, incense, and betel leaf are always given on the stone. This is intended so that river watchers always provide safety to residents by always keeping the river from drying out all year round. The river in Gunungkidul is one of the main sources of water for the people of Gunungkidul.

The second indicator of learning with culture is that students are invited in the module to understand that by giving alms or offerings around the river, it will be able to keep the river clean and avoid water pollution. This is because local residents or immigrants will think if they want to pollute the river or damage the river for fear of being punished by supernatural creatures that guard the river. These creatures will make the perpetrators of river destroyers sick or will make river destroyers wretched. By carrying out sungi alms activities, the community can keep the river protected from water pollution.

The third indicator of learning through culture can be integrated with the module, namely by inviting students to do a practicum of taking water in rivers that have offerings and taking water in rivers that are contaminated with waste because there are no offerings, then students are asked to measure the pH, smell, and color of the water then compare and analyze them. .

Fig.4. The offerings around the rock of the Gowang Gunungkidul river
Source : nasional.republika.co.id

The last sub-material is the Impact of Environmental Pollution and Ways to Overcome Environmental Pollution. In this submaterial, integration with 3 indicators of culture based learning is the first indicator of learning through culture, students are invited through this module to learn about the chronicle culture. In this Babad Dalan culture, students are introduced to the Babad Dalan culture which is an event that falls on Kliwon Friday to commemorate the day when Ki Ageng Giring received Wahyu Gagak Emprit to establish the Mataram palace. These events last for approximately 5 days starting Monday to Friday. such as art performances, development marches, promotion of home industry products, and cultural parades [9].

The series of events of Babad Dalan closed with a cultural procession and a procession of 3 heirlooms of Mataram on Kliwon Friday, the procession was accompanied by a feast held by the community in their respective hamlet halls. Kirab is an event that showcases various community harvests, starting from crops from yards, rice fields, and livestock. This carnival means showing a form of community gratitude for God and the custodian of the land in Gunungkidul. During the carnival event, places that produce food ingredients such as rice fields, rivers, and fields are given long ilang. Panjang Ilang is an offering containing rice, side dishes, and setaman flowers as an offering to the guardian deities.

The second indicator is learning with culture in the series of events in the chronicle in which students are asked to respond whether if the fields, forests, and rivers are polluted and there are no crops, can the babad dalan event take place. If the Babad Dalan ceremony does not take place, will the students feel lost? So the impact if there is pollution in our village area or in Gunungkidul district will it have a good impact. With this reflection, students are directed to carry out the third indicator, namely learning through culture in the form of making a portfolio of written ideas if there is an impact of environmental pollution in my village.

After making written ideas in the portfolio, students are asked to be able to make what elements of activities in the chronicle culture can overcome environmental pollution. For example, does doing chronicle dalan as a thanksgiving for the harvest will make us love and care for the environment more, whether by making long ilang to rice fields, fields, and rivers can make us afraid of destroying the place.

Fig. 5. The shape of the Gunungan or Ancak which symbolizes the hope of a large harvest
Source : https://kumparan.com/tugujogja/

Fig.6. Panjang Ilang in the form of offerings given in rice fields, rivers, and fields during chronicle

Fig 7. Offerings in the rice fields
Source : https://kumparan.com/tugujogja/

Test the artifact

Product trials are carried out when the application is ready to be evaluated. At this stage of the test the artifact, the researcher only assessed 4 science subject teachers as expert validators, material validators, and media validators. In addition, the researcher also asked for help from an expert lecturer in learning media to carry out a media expert validator. Then students are also asked to do product assessments, because students are considered as users of the module.

Evaluate testing results

The evaluation is carried out based on data obtained from the responses of expert lecturers, students and teachers who have been collected for later analysis so that conclusions can be drawn about the product developed, whether it is in accordance with the research objectives or not. For this stage the researchers only made improvements on the basis of assessments from expert lecturers, students and teachers. Improvements were made to further refine the module.

Communicating the testing result

At this stage, the module should be reproduced and produced to various schools to implement this module. However, researchers have not carried out this stage, this stage will be carried out in future research. The purpose of this research is to improve students' critical thinking skills. So in this module it is also necessary to integrate indicators of critical thinking skills to be included in each sub-material of environmental pollution.

Indicators of critical thinking skills include providing simple explanations, building basic skills, concluding, providing further explanations, and developing strategies and tactics. Each activity contains indicators so that children can hone their critical thinking skills through modules [10]. Examples of activities in the module that integrate environmental pollution materials with critical thinking indicators are as shown in the image below.

KEGIATAN 2 (BERPIKIR KRITIS INDIKATOR)



Sumber : Gambar 1 dan 3 www.kabar handayani.com

Gambar 2: nasional.republika.co.id

1. Adakah sungai di sekitarmu? Apakah sungai tersebut airnya jernih? Pernahkah kamu melihat ada sesajen yang diletakkan di pinggir sungai? (*Elementary Clarification and Basic Support)*
   Jawab :
   ……
   ……
2. Jika ada sesajen yang diletakkan di pinggir sungai, apakah masyarakat berani mengotori sungai? Atau akan menjaga sungai tetap bersih karena takut dengan Sang Penunggu sungai? (*Inferences, advances clarification)*
   Jawab :
   ……
   ……

3. Bisakah meletakkan sesajen di pinggir sungai membuat orang takut mengotori sungai? Ungkapkan alasan jawabanmu! (*strategy and tactic)*
   Jawab :
   ……
   ……

Fig.8. Examples of application of critical thinking indicators in modules

From the above activities, we can get that the activities in the module always contain critical thinking indicators, in learning indicators with culture, and are related to environmental pollution materials. Seeing the offerings placed by the river as a form of local wisdom in Gunungkidul makes residents afraid to pollute the river because if they pollute the river, the creatures given the offerings will get angry and disturb the villagers. This is packaged in activities based on critical thinking indicators. For this reason, modules designed like this are expected to develop critical thinking skills. Testing the effectiveness of the module to develop critical thinking skills will be conducted in the second year at MTs and Junior High School in Gunungkidul.

The module design is also compiled containing several topics, namely:

a. Introduction
b. Definition of Environmental Pollution
c. Types of Environmental Pollution include Water Pollution, Soil Pollution, Air Pollution
d. Factors Causing Water Pollution, Soil Pollution, Air Pollution
e. Impact of Water Pollution, Soil Pollution, Air Pollution

f. How to Overcome Water Pollution, Soil Pollution, Air Pollution

Critical thinking attitude is emphasized in all module activities by using critical thinking indicators in the preparation of each activity in the module. Modules that have the uniqueness of their respective regional cultures will attract the attention of students more [11]. This interest will make students think critically about the relationship between material and their culture. To be able to develop every aspect of critical thinking, every activity in the module must contain critical thinking indicators. The first module activity must be based on giving a simple explanation, then the module activity is continued by building basic skills, after that in the activity students are also led to conclude, after that students are asked to provide further explanations, and finally from the activity students are asked to develop strategies and tactics in a problem involving local wisdom and environmental pollution.Validation and review were carried out by involving material validators, media validators, and language validators. Validation questionnaire modified from Nurul Hidayah's [12] questionnaire. Below will be presented the results of the validation in terms of language.

Table 1. Recapitulation of Validation Results from Linguists

Aspect	No.	Category	Percentage	Statement
Good and correct Indonesian Language	1	Module uses the rules of Indonesian that are good and correct	85 %	VF
	2	The module presents material, questions of understanding using language that can be understood by	87 %	VF
	3	Module uses Enhanced Spelling (EYD) rules well	85 %	VF
	4	The module uses Enhanced Spelling according to the guidelines it should be so as to help students understand the material	83 %	VF
Terminology	5	Module uses terminology that is in accordance with the concept which is the subject of	87 %	VF
	6	The module uses sentences in accordance with the Environmental Pollution material so that students easily understand the material	87 %	VF
	7	Modules use consistent sentences	100 %	VF
	8	The module presents sentences according to Indonesian grammar that are good and correct in	100 %	VF
Language Conformity	9	Modules use language in accordance with the development of students	85 %	VF
	10	Modules present material in language that is easily understood by students	88 %	VF
	11	The module uses a sentence structure in accordance with the cognitive mastery of students	85 %	VF
	12	Modules use sentences that are easily understood by students	96 %	VF
	13	Modules use communicative language	90 %	VF
	14	Modules use language that is effective and efficient	92 %	VF
	15	Modules using dialogue or interesting words	83 %	VF

The table above shows the results of the summarized language validation are very feasible. If the results of the language validation have been summarized very well, then the module can be said to have been successfully designed and developed to improve critical thinking skills by integrating a culture based learning model on environmental pollution material.

Table 2. Recapitulation of Validation Results from Material Experts

Aspect	No.	Category	Percentage	Statement
Material coverage	1	The depth of the material in the module is in accordance with the development of students	85 %	VF
	2	Completeness of the material in the module according to the development of students	80 %	VF
	3	The accuracy of the material presented in the Module corresponds to everyday life	87 %	VF
	4	The basic concept of the material in the Module is in accordance with the concept of Environmental Pollution	100 %	VF
	5	Modules have material that is easy to understand	85 %	VF
	6	Modules have material that adds to the knowledge of students	100 %	VF
	7	The module contains materials that use local wisdom of Gunungkidul	100 %	VF
	8	Modules have material presented in order of	92 %	VF
	9	Modules have complete material	88 %	VF
Suitability of Based Competence dan Main Competence of 2013 Curiculum	10	Relevansi tujuan pembelajaran pada Modul sesuai dengan Based Competence dan Main Competence 2013 Curiculum	85 %	VF
	11	The conformity of the material on the Module with the syllabus	100 %	VF
	12	The conformity of the material in the Module with Based Competence dan Main Competence of 2013 Curiculum	100 %	VF
	13	Consistency of questions and answers in the module according to Based Competence dan Main Competence of 2013 Curiculum	92 %	VF
Meaningfulness	14	The module which uses local wisdom material is meaningful for students	98 %	VF
	15	The material provides motivation for students to do things that are useful	98 %	VF

The table above shows that the results of the validation of the summarized material are very feasible. If the results of material validation have been summarized very feasible, then the module can be said to have been successfully designed and developed to improve critical thinking skills by integrating a culture-based learning model on environmental pollution material.

Table 3. Recapitulation of Validation Results from Media Experts

Aspect	No.	Category	Percentage	Statement
	1	Module has an attractive design	100 %	VF
	2	The module contains interesting pictures, so that students are interested in learning	100 %	VF
	3	The module provides practicum instruction sheets and practicum results so that students are helped in doing practicum	100 %	VF
	4	Modules use matching writing colors so they are not boring	90%	VF
	5	Module provides space for writing identities and has been arranged in position	89 %	VF
	6	The module provides activities so that students can be active in classes	100 %	VF
	7	Modules have interesting activities	100 %	VF
	8	Module uses activities in the environment as part of the material in the module	100 %	VF
	9	Modules use material that is combined with practicum activities	100 %	VF
	10	Modules have clear writing	100 %	VF
	11	Modul memiliki gambar yang variatif	85 %	VF
	12	Module displays an image size that corresponds to a font size	81%	VF
	13	The module has a font size that corresponds to paper size	80%	VF
	14	The module has an image size that fits paper size	80%	VF
presentation	15	Module has an attractive cover	85%	VF

The table above shows the results of media validation are very feasible. If the results of media validation have been summarized very well, then the module can be said to have been successfully designed and developed to improve critical thinking skills by integrating a culture based learning model on environmental pollution material. This module has been categorized as very feasible, so this module can be used as a learning medium to help teachers carry out teaching and learning activities [14]. Henceforth, in the second year of research after the module design is revised, limited testing, design revision, large-scale testing, and mass production will be carried out to make the module more feasible and mass produced as a credible teaching material.

However, although it has been said that it is feasible to use, there are some inputs given by the validator. The next step is the summary of the validation results and the validator's input will be used as material for revision. Revisions in this case are design revisions, language revisions, and material revisions according to input from experts. Revision of the Module Design will be carried out with reference to the follow-up to the input from the validator and reviewer. Furthermore, in the second year of research after the module design has been revised, limited tests, design revisions, large-scale tests, and mass production will be conducted.

4 Conclusion

This research has succeeded in developing an environmental pollution module that integrates environmental pollution material, 3 indicators of culture based learning model, namely learning about culture, learning with culture, and learning about culture to be able to improve students' critical thinking skills with categories that are very suitable for use from the validation results.

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