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Article

## **Development of the *Etintec Student Book* (Ethnoscience-based Interactive Teaching Student Book) as an Interactive Learning Media Based on the Typical Ponorogo Culture on Ecology and Biodiversity Materials**

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### **ABSTRACT**

Science learning is still often considered difficult. But basically, it will feel easy if it is based on interest. Ecology and biodiversity material, which mostly contains theory, requires a strategy to get students interested, namely by associating something around them with that material. Based on this, research was carried out with the aim of developing an interactive student book called the *Etintec Student Book* on ecology and biodiversity based on the ethnoscience of culture typical of Ponorogo Regency. This research is development research with a modified model from 4D to 3D with stages including defining, designing, and developing. In the define stage, things are found that become a reference for designing innovative products, starting from learning problems to development goals. At the design stage, the *Etintec Student Book* product was produced including layout design, material preparation (narration, comics, Ponorogo cultural reviews), evaluation preparation consisting of crossword puzzles (TTS), digital evaluation with quizizz (QR Code), and project evaluation. And at the development stage validation was carried out on several learning media experts from science teachers and lecturers with a score of 3.58, meaning that this product can be used with minor improvements. This research can be continued with the field practice test phase and the effectiveness test so that later the *Etintec Student Book* can be widely used and the dissemination stage can be carried out.

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## **INTRODUCTION**

The problem of learning science which is still often considered difficult learning becomes a separate task for educational actors, especially for educators. Educators must always innovate to develop science learning with various strategies that can attract students' interest. Science learning innovation can be carried out on various aspects of learning, such as learning models, learning approaches, and especially learning media which are tools to facilitate educators in conveying knowledge to students.

One of the efforts to innovate science learning is through science learning media innovation. Learning media includes many kinds, such as student books, teaching modules,

learning videos, learning applications, and so on. One of the media that is often used in learning is student books. Student books or what are often referred to as textbooks are one type of teaching material that contains certain subject matter used to support learning activities and can be used to assist teachers in delivering learning to students to achieve the desired goals (Kurniawan, 2013).

Based on the problem of students' lack of interest in learning, the authors developed an interactive student book with the name *Etintec Student Book* which is an acronym for Ethnoscience Based Interactive Teaching Student Book which refers to an independent curriculum. Apart from these problems, the newly implemented independent curriculum is also the reason for the development of these innovations. The 2022 academic year is included in the initial year of implementing the independent curriculum. In this academic year, the implementation of the independent curriculum is still limited to driving schools with specific target grade levels. With the newly implemented independent curriculum, of course, there are still not many innovations regarding learning media that refer to this curriculum. The implementation of the new curriculum certainly also requires the emergence of various creations and innovations in the field of education so that its implementation can achieve the expected goals. The *Etintec Student Book* was developed as an interesting learning medium so that it can increase students' interest in learning so that they will find it easy to learn science. In addition, the *Etintec Student Book* was developed with material based on the independent curriculum so that it is relevant to the latest curriculum and is expected to be a useful innovation for the implementation of the independent curriculum in schools.

The *Etintec Student Book* is arranged in an attractive design, which is complemented by the presentation of material through a comic storyline. In addition, in this student book, there is an evaluation of students understanding at the end of each sub-chapter through the *quizizz* digital evaluation website, which can be accessed by students via Android with a QR Code code. So a student book made with interesting updates, attracts students' interest to learn and can build student knowledge. Therefore, the development of learning media through the curriculum and the characteristics of students need to be considered to support the achievement of learning objectives.

The material chosen in the development of this book is the material on ecology and biodiversity, which is one of the material chapters for grade 7 in the independent curriculum. This material was chosen because it contains many explanatory descriptions and can be related to the surrounding environment, including the unique culture of Ponorogo. Ponorogo is a district located in East Java Province, Indonesia. Ponorogo has a culture in the form of a regional dance called *Reog*. In the *Reog* art, there is a main dancer who uses *Dadak Merak* accessories. On the chest of the *Dadak Merak*, there is a model of a lion's head decorated with peacock feathers. The lions and peacocks depicted in the *Reog* are endangered animals that are protected and also a form of Indonesia's unique biodiversity. In addition, Ponorogo is also a district that has several ecological and biodiversity conservation locations, one of which is the existence of Wengker Park. Wengker Park was developed as a flora and fauna conservation park that can be used as an educational facility for natural knowledge. The uniqueness of Ponorogo's culture and potential related to the material on ecology and biodiversity can be linked to science learning. Based on the link between material and culture, ethnoscience is the right approach to use in the development of this innovation. Ethnoscience is a breakthrough in the world of education. Where ethnoscience is knowledge as a distinguishing feature of society from other societies, in which there is a study of the culture of certain communities (Sari, 2020).

Ethnoscience-based student books are very appropriate if used in learning activities that involve the introduction of original science and scientific science (Sari, 2020). Because in ethnoscience learning, students will be given material related to learning as well as an introduction to regional potential and culture. In addition, student activities are balanced with

process skills such as practicum and direct observation of natural and cultural conditions that exist in the community, especially in Ponorogo Regency which is useful for instilling an attitude of love and care for culture and the potential possessed by the region as well as one alternative to realize the formation of the character of nationalism by strengthening the value of local wisdom through the implementation of ethnosience with learner-centered learning (Widyaningrum, 2018). Therefore, ethnosience-based interactive student books can be a solution to science learning problems.

The development of the *Etintec Student Book* innovation is carried out using a 3D model, namely define, design, and develop. The define stage is the initial stage in determining the problem and defining the aspects that become the reference for the development of learning innovation. The design stage is the stage of designing and manufacturing the developed product. And the development stage is the validation test stage for learning media experts and product quality evaluation which in the end the product will be used as a learning media.

Based on this description, ethnosience-based development research was carried out in the dimensions of regional culture and local wisdom typical of Ponorogo Regency on ecology and biodiversity materials in the form of student books. So the purpose of this research is to develop an interactive student book with the name *Etintec Student Book* on ecology and biodiversity materials based on cultural ethnosience typical of Ponorogo Regency.

## METHODS

The method used in the development of this innovation is to use 4D which has been modified into 3D. The 3D development model consists of defining, and designing develop development (Siratte, 2017). This 3D model is used to research innovations up to the development and not yet to the dissemination or stage to determine the effectiveness of the innovation on students. There are several stages of work carried out by the author including definition fine, design, and development.

At the define stage, the definition or analysis is carried out. This initial stage contains activities to determine the problems and conditions needed in developing learning innovations. The define stage begins with an analysis of early-late findings. This analysis stage is carried out by identifying and determining the basic problems faced by students in science learning that require solutions through learning media development strategies. The next analysis is about the characteristics of students. This stage aims to determine the characteristics and needs of students as a reference for determining the concept of learning media to be developed. After determining and knowing the characteristics of students, then a concept analysis is carried out. At this stage, the authors identify, determine, and compile the main material to be developed in the learning media. The concept analysis is then continued with task analysis by the learning objectives and materials that have been set. And the define stage ends with Specifying instructional objectives. At this stage, the preparation of more specific learning objectives by the assignments given and based on the expected learning outcomes in the independent curriculum with ecology and biodiversity materials.

At the design stage, the design of the product framework is carried out (Solehudin, 2019). This stage includes designing and preparing work steps to produce the *Etintec Student Book*. And at the development stage, the author evaluates the validity of the product using the opinions of learning media experts from science lecturers and junior high school science teachers through validation test instruments, including several assessment components including content components with 5 test items, display components with 10 test items, the language component with 5 test items, as well as the use and presentation component with 6 test items, so that the total test is 26 items to produce an innovative learning device using student books that can be used for learning.

As for the calculation of the results of the validation test is done by using the formula  
**Average Rating per Validator:**

$$\text{Final score} = \frac{\sum \text{score obtained}}{\sum \text{item score}}$$

**Final Value of Validation Test**

$$\text{Final Value of Validation Test} = \frac{\sum \text{validator final value}}{\sum \text{validator final value item}}$$

**Score Interval** (Lailiyah, 2010)

**Table 1.** Interval Scores and Eligibility Criteria for Learning Media

Score Interval	Information
3,26 - X - 4,00	Very good
2,51 - X - 3,25	Good
1,76 - X - 2,50	Not enough
1,00 - X - 1,75	Very less

## RESULTS AND DISCUSSION

The development of the *Etintec Student Book* has gone through a research process with the expected goals. The research was carried out using a predetermined method, namely by adopting a 3D development model (define, design, and develop).

### Define Phase (Definition/Analysis)

At this defined stage, the definition and analysis of several things related to learning needs are carried out. The results of the steps of this stage are as follows:

#### 1. Early-Late Analysis

At the early analysis stage, the problem found was that science learning was still considered a difficult lesson, so many students were less interested in science learning. In addition to this, another problem found is the limited number of student books that use an independent curriculum. So the authors develop learning media innovations in the form of student books by implementing an independent curriculum. The independent curriculum is synonymous with real learning in life, so the author then chose an ethnoscience base to develop this student book. As for what is appointed as an element of ethnoscience here is the typical culture of Ponorogo Regency.

Student books as learning media innovations will be developed based on ethnoscience. Thus, a name was created for the student books to be developed, namely the *Etintec Student Book* (Ethnoscience-based Interactive Teaching Student Book) or an ethnoscience-based interactive student book.

#### 2. Analysis of Student Characteristics

Based on Kepmendikbudristek No. 56 of 2022 concerning Guidelines for Curriculum Implementation in the context of Learning Recovery that this independent curriculum is implemented in stages. As for 1 year of implementing the independent curriculum, it is intended for students in grades 1, 4, 7, and 10. Due to the focus of media development being on science learning in junior high school, grade 7 students are suitable to be the target of this media development.

As for the characteristics of 7<sup>th</sup>-grade students who are still in the transition period between primary and secondary schools, of course, they still have an attitude that prefers to play. Students at this stage tend to like things that are fun and attract their attention. So student books that will be developed as their learning media must be made in such a way as to attract attention and also be fun when used while studying.

Based on the characteristics of the 7<sup>th</sup>-grade students above, several innovations were added to the student books, including:

- a. Compiled with an attractive design  
The *Etintec Student Book* is arranged in an attractive and colorful design. Equipped with pictures that support the material. The page design is made in full color with the addition of *Reog* images, flora, and fauna to represent the contents of this learning media itself. The background color is varied so that students don't get bored while reading the *Etintec Student Book*.
  - b. Adding comics to the material  
In the developed student book, comics were added which aim to convey a sub-chapter of material. This comic is inserted among other material by taking a sub-chapter to be explained through the comic. This comic was created by raising the potential in Ponorogo, namely with a background in Ponorogo *Wengker Park*.
  - c. Evaluation of students' understanding of QR Code and TTS  
This *Etintec Student Book* is equipped with an evaluation of student understanding which is presented in a fun way through the *quizizz* game website which can be easily accessed by students via Android and also through the TTS (Cross Puzzle) game.
  - d. FYI (for your information) about Ponorogo  
This section contains links the concepts of ecology and biodiversity with the potential and unique culture of Ponorogo. There are two FYIs in the *Etintec Student Book*, the first relates *Reog* to biodiversity in Indonesia and a description of the Ponorogo *Wengker Park* as a form of biodiversity conservation efforts in Ponorogo
3. Concept Analysis and Content Structure  
This analysis is carried out to determine and arrange the main concepts that will be discussed in the student book. The concept is arranged systematically and hierarchically according to the desired learning outcomes and objectives. This *Etintec Student Book* was developed based on the ethnoscience of the typical culture of Ponorogo with the target of students in grade 7 at the SMP/MTs level. The materials based on the independent curriculum that will be used in the *Etintec Student Book* are materials on ecology and biodiversity. Based on the concept analysis carried out, the scope of the material to be discussed in the *Etintec Student Book* is as follows:
- a. Environmental influence on organisms
  - b. The interaction between the components of the ecosystem
  - c. Biodiversity in Indonesia
  - d. Human influence on the ecosystem
  - e. Conservation of biodiversity
- Concept analysis is continued by determining several components related to learning materials that will be included in the *Etintec Student Book* including:
- a. Determining the learning objectives of the material based on the desired learning outcomes by taking into account the guidelines for the preparation of learning objectives (TP) for the independent curriculum
  - b. Drawing up a concept map
  - c. Determining the sub-chapter of the material that will be made into a comic
4. Assignment Analysis  
This analysis was conducted to determine the form of *assignments* that will be presented in the *Etintec Student Book* to strengthen and determine the level of students' understanding of the learning material. The assignments in the *Etintec Student Book* include game-based evaluations at the end of each sub-chapter, observation activities and making projects in groups (entitled let's make it!), and the final project in the form of an environmental conservation project in the Ponorogo Regency area.

## 5. Specification of Learning Objectives

Based on the concept analysis and assignment analysis that has been carried out, it is obtained 5 points of specifications for specific learning objectives from the material that is the basis for the preparation of this *Etintec Student Book*, namely that students can understand the concept of the biotic and abiotic environment; students can describe the form of interaction between the components that make up the ecosystem; students can find out the factors causing the problem of the threat of biodiversity and be able to describe solutions to these problems; students can determine human activities that have positive and negative impacts on the ecosystem, and the students can make conservation efforts to the surrounding environment.

## Design Phase

At this design stage, the design and preparation of work steps are carried out to produce the *Etintec Student Book*. The design includes what components will be included in the *Etintec Student Book*. These components include cover design, title page, introduction, learning objectives, concept map, table of contents, introduction, material (narrative, comics, *quizizz* evaluation, QR Code, TTS, FYI about Ponorogo, and final project), bibliography, glossary, cover, back cover.

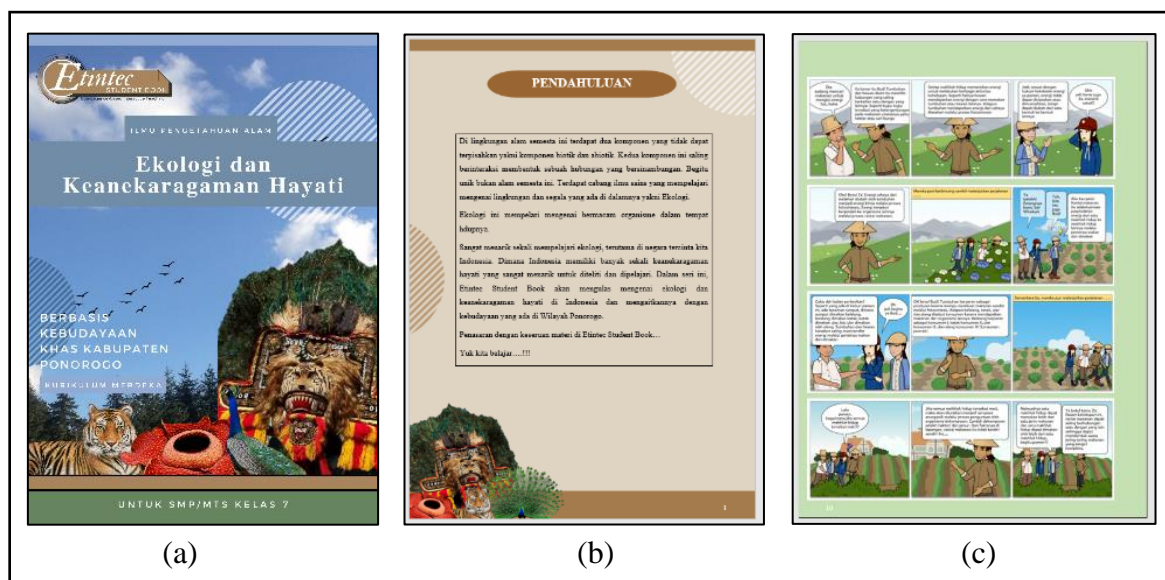


Figure 1. *Etintec Student Book* Design Components: (a) cover design, (b) book page design, (c) comic design.

## Develop Phase (Evaluation and Development)

At the development stage, validation tests were carried out on the *Etintec Student Book* by 4 learning media experts including 2 science lecturers from IAIN Ponorogo and 2 science teachers at SMP/MTs (1 teacher from MTs Al-Islam Joresan and 1 teacher from SMP Negeri 1 Sawoo). Where the feasibility validation test instrument used in the *Etintec Student Book* assessment consists of several assessment components, including content or content components, display components, language components, and use and presentation components.

Furthermore, from the results of the validation analysis of learning media experts, Ecology and Biodiversity Student Books based on ethnoscience, it is obtained that the calculation of the learning media expert test with the results of the assessment can be seen in table 1.

**Table 2.** Validation of Test Results by Lecturers and Science Teachers

Validator	$\Sigma$ score obtained	$\Sigma$ item score	Final score = $\frac{\Sigma \text{ score obtained}}{\Sigma \text{ item score}}$	Category
Science Lecturer 1	101	26	3,88	Very good
Science Lecturer 2	78	26	3	Well
Science Teacher 1	95	26	3,65	Very good
Science Teacher 2	99	26	3,80	Very good
<b>Average final result</b>			<b>3,58</b>	<b>Very good</b>

Based on table 2 It shows that the results of the validation test carried out by science lecturers and teachers with an average final result of 3.58 are in the very good category.

### ***Etintec Student Book as an Interactive Learning Media***

*Etintec Student Book* is an innovation of science learning media in the form of a student book that was developed based on ethnoscience to highlight the unique culture of Ponorogo Regency. Etintec is an anonymous ethnoscience-based interactive teaching. One component of its identity is interactive or interactive. The *Etintec Student Book* was developed into an interactive student book so that it is not monotonous, focusing only on material that can make students bored.

Interactive is something that reflects the existence of two-way communication that is mutually giving action and reaction, actively relates, and has reciprocity towards one another. Interactive learning media is a medium that is used as a support for learning which when used can lead to interrelationships between the media and its users. The learning media and the user will create a mutually influencing relationship in helping the delivery of the concept of learning material (Yanto, 2019). From this definition, it can be concluded that interactive learning media is a tool that is used as an intermediary to convey knowledge from educators to students, which at the time of its use will lead to interaction between students and the media or tools in a way that is interrelated and influences each other with the hope can improve student learning outcomes. Thus, learning media can be said to be interactive when the media can lead to interrelated relationships with students and provide influence.

*Etintec Student Book* is structured as an interactive learning media to help make it easier for teachers to convey knowledge to students. In addition, it also provides new learning experiences for students by using interesting media that can make it easier for students to understand the material content, especially in science learning.

*Etintec Student Book* is arranged with an attractive design to influence students in the form of interest in the visual appearance of the book. In addition, an attractive and colorful design will create a more pleasant atmosphere when students learn the material content. Both cover designs, book pages, comics, layout designs, and bookkeeping concepts are made as attractive as possible with uniqueness and attractive colors. In addition, the image and color components used in the design are images and colors that match the material content and also the concept of Ponorogo cultures, such as images of *Reog*, peacocks, and rare flora and fauna. Color backgrounds also use natural tones, such as blue, green, and brown to represent the colors of environmental components.

Apart from the design, the material contained in the *Etintec Student Book* is arranged interactively by using several question sentences at the beginning of the material. Before starting the material at the beginning of this book, there is a column of questions about what students want to know in learning the Ecology and Biodiversity chapter. The question serves to provoke curiosity about the material so that students will be more excited to learn the material.

*Etintec Student Book* is equipped with the presentation of material through comics. Comics are made aiming to provide variations on the presentation of material to students so that they can motivate them to learn. Comics were chosen as one of the innovations in this student book innovation because comics are visual media (suitable for inserting directly into the *Etintec Student Book*) that are widely consumed by children, the transition from children to teenagers, teenagers, and adults. Comics are also a medium that can be directed as a means of education by presenting material concepts through a simple fun storyline (Purwanto, 2013). 2 sub-materials are presented with comics in the *Etintec Student Book*, namely the biotic environment and energy flow sub-chapters. These two sub-chapters were chosen because they are closely related to the surrounding environment which can be used as a setting for comics and also be able to provide knowledge that is easier to understand through the presentation of storylines.

The evaluation system in the *Etintec Student Book* is arranged attractively by utilizing the *quizizz* website by presenting game-based questions that will certainly attract students' attention. In *Quizizz*, rankings will also appear which can be used by the teacher to determine the level of understanding of students and can also be created by making it a competition with rewards after completing the questions well. The *quizizz* game is presented based on a QR Code that can be accessed via students' androids, this is included in the interactivity of the *Etintec Student Book* as explained in (Yanto, 2019) that one indicator of interactive learning media is that the media is adaptive to the technological developments of 21<sup>st</sup>-century learning demands. *Quizizz* access via QR Code is one of the efforts to introduce technological developments to students.

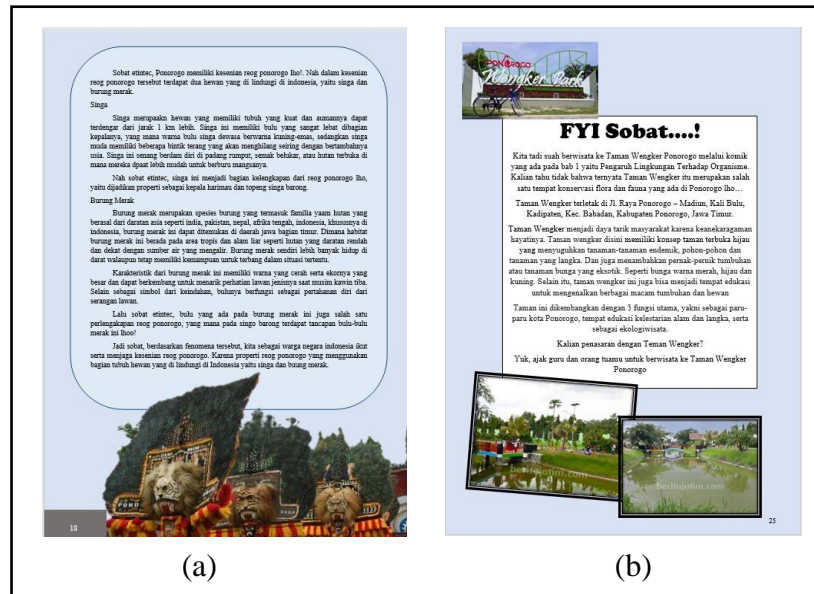
#### ***Etintec Student Book as Ethnoscience-Based Learning Media***

The term ethnoscience comes from the word *ethnos* which means nation and the word *science* which means knowledge. Ethnoscience (ethnoscience) can be interpreted as knowledge possessed by a nation or more specific ethnic groups or certain social groups where the emphasis on systems or knowledge tools is a distinguishing feature of society because the methods or procedures obtained are different from other communities that have become part of the community. from certain community traditions (Parmin, 2017). Therefore, this ethnoscience approach uses the knowledge that is by the culture of the community and is easy to integrate based on the behavior of the community.

This ethnoscience-based *Etintec Student Book* combines science learning, namely Ecology and Biodiversity, with the culture that develops in the community, especially in the Ponorogo area. The ethnoscience-based *Etintec Student Book* is inseparable from cultural science and local wisdom. It is suitable if used as a learning approach to increase and motivate students toward scientific knowledge (Emdin, 2011). In addition, the Student Book that uses the concept of culture as a learning resource can introduce students to a real phenomenon that is developing in Ponorogo which can be linked to existing scientific material as science. Therefore, the ethnoscience-based *Etintec Student Book* is a form of learning media that aims to guide students in discovering and building their knowledge of science and culture.

The ethnoscience approach contained in the *Etintec Student Book* is shown in linking learning materials on Ecology and Biodiversity in Indonesia with the culture in the Ponorogo region. One of the cultures that have become an icon of Ponorogo is the *Reog Ponorogo* art. In the Ponorogo *Reog* art, there are images of protected animals in Indonesia, namely lions and peacocks. Which has something to do with learning about biodiversity in Indonesia and conservation in that material. This specific association with the culture of Ponorogo Regency can be seen in the *Etintec Student Book* section For Your Information (FYI).





**Figure 2.** Components For Your Information (FYI) (a) FYI Reog Ponorogo, (b) FYI Taman Wengker.

In addition, not only the material is associated with culture. However, with the science process skills packaged through practicum and observation, these students directly identify the natural conditions in Ponorogo. This is done so that students can show an increased and high interest in scientific literacy with the existence of learning media that uses an ethnoscience approach.

### Validity of *Etintec Student Book*

Based on the results of the expert validation test of learning media conducted by lecturers and teachers, it shows that the average value of the validation test on the *Etintec Student Book* as a whole is 3.58 in the score interval, namely 3.26 – X – 4.00 with a very good category and stated worthy. This shows that the developed *Etintec Student Book* meets the criteria of a valid learning medium. However, of course, there are still inputs and suggestions from the validator, including there are some punctuation marks that are not correct in writing, there are still some typing errors, and there are some less effective sentence structures. This input can be used as a consideration for improving the suitability of using language in writing according to the General Guidelines for Indonesian Spelling (PUEBI).

## CONCLUSION

This research was conducted to develop an interactive student book with the name *Etintec Student Book* on Ecology and Biodiversity materials based on cultural ethnoscience typical of Ponorogo Regency. The development carried out is through a 3D development model. The 3D development model consists of define, design, and development stages. At the define stage, the problem is defined. The problem found is the lack of innovation in science learning media. So that the innovation of science learning media that can be used is an ethnoscience-based interactive student book. At the design stage, the design and preparation of work steps are carried out to produce the *Etintec Student Book*. And at the development stage, an evaluation of product quality is carried out with validation tested by learning media experts. The results of the development stage obtained a validation value of 3.58 in a score interval of 3.26 - X - 4.00 with a very good category and declared suitable for use as a science learning media.

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