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## Development Of E-Module Think Talk Write (TTW) With Nitro Pro As A Teaching Material On Material Biotechnology In High School

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### ABSTRACT

The purpose of this research is to produce Think Talk Write (TTW) electronic modules with nitro pro as teaching materials on appropriate biotechnology materials so that they can be used in distance learning. Data collection was carried out in March-April 2021 with 10 class XII students at SMA 1 Lubuk Batu Jaya and SMA 2 Lubuk Batu Jaya for the 2020/2021 academic year. The development model in research is Research And Development (R&D) development which uses the ADDIE development model which consists of 5 stages of development namely Analysis, Design, Development, Implementation, Evaluation. Data collection consisted of interview sheets, material expert validation sheets, media experts, biology teachers and student response questionnaires. Results of validation by material experts 82% (very qualified), media experts 94% (very qualified) and biology teachers 91% (very qualified), recapitulation results 87% with category (very qualified) and student response questionnaire results 88% (very good). It was concluded that the Think Talk Write (TTW) Electronic Module with Nitro Pro as a Teaching Material for Biotechnology Materials is very suitable for use in high school.

## 1. Introduction

In December 2019, the first case of pneumonia was reported in a fish market in Wuhan, Hubei Province. The disease is called Coronavirus Disease (COVID-19) which is caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) virus. The source of human-to-human transmission is through the mouth, nose or cough, and has spread widely in China and more than 190 other countries and territories. On March 12, 2020, WHO declared COVID-19 a pandemic. As of March 29, 2020, there were 634,835 cases and 33,106 deaths

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worldwide. While in Indonesia, there have been 1,528 positive cases of COVID-19 and 136 deaths (Susilo, 2020).

Since the COVID-19 case entered Indonesia, the government issued several regulations contained in Circular Letter No. 4 of 2020 concerning the Implementation of Education Policies in the Emergency Period of the Spread of Coronavirus Disease (COVID-19) which explains the process of learning from home through online/distance learning. This is implemented to provide a meaningful learning experience for students, without being burdened by the demands of completing all curriculum achievements for grade promotion and graduation (Education, 2020).

Based on the results of interviews conducted with several MGMP teachers in the field of biology studies at Indragiri Hulu High School, it is known that the problems currently being faced by students are that students are not independent and active in online learning, lack of supporting teaching materials and do not have a guidebook at home, weak internet connections that cause slow receiving of learning information, and there are some students who are located inland. This has an impact on student activeness and daily test scores in biology subjects, especially biotechnology material that does not reach the KKM, the number of students who have not reached the KKM is 50% of the total number of students.

Then there are several problems that are also faced by teachers, namely; difficult to convey material and provide practical demonstrations on biology material, teachers find it difficult to give daily grades or exercise questions because there are some students who do not collect quizzes and exercise answers. Teachers need alternative problem solving to improve the completeness of student learning outcomes in order to achieve KKM and teachers need teaching materials in which there are practice questions and practicum guides that can be accessed online or offline, making it easier for students to learn independently, actively and gain new experiences. With the above problems, the school is only able to facilitate school wifi for teachers and internet quota from Kemdikbud for students.

From these problems, researchers make electronic modules in biology subjects, especially biotechnology material, which will facilitate distance learning to add supporting teaching materials and students can learn actively and independently at home making it easier for students to understand learning material. Electronic modules or e-modules are e-modules that have interactive properties, facilitate navigation, allow displaying images, audio, video, and animation and are equipped with formative tests or quizzes that allow automatic feedback immediately (Suarsana & Mahayukti, 2013). Basically, E-Modules are part of today's technology-based learning innovations or what is commonly called E-Learning. Which looks in book format, presented electronically in the form of files using a hard disk, diskette, CD, or flash disk and can be read using a computer, cellphone or electronic book reader application (Wijayanto & Zuhri, 2014).

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Then the researcher chose the Think Talk Write (TTW) learning model as a solution to the problems that have been described, because the implementation of Think Talk Write (TTW) can help educators provide as much information as possible to students, can help students to develop active abilities, think, independently and communicate (discussion) so as to pour information (Wirawati, 2021). One of the software that can be used for making electronic modules is Nitro Pro, which allows to batch process files to convert documents to pdf. Not only can it be used to read PDF files, but it can also easily create, organize, edit, combine, and convert PDF formats, and there are many other features (Putra, 2019).

The material used in this study is biotechnology material on KD 3.10 Analyze the principles of Biotechnology and its application as an effort to improve human welfare and KD 4.10 Present a report on the results of experiments on the application of conventional biotechnology principles. The objectives of this study are; to produce Think Talk Write (TTW) e-modules that are feasible as teaching materials on biotechnology materials in high school and to determine student responses to Think Talk Write (TTW) e-modules as teaching materials on biotechnology materials in high school.

## **2. Methodology**

The model used in this study is the ADDIE development model. ADDIE development was developed by Dick and Carry, Sugiyono (2015) states that research and development (R&D) is a research method used to produce certain products, and test the effectiveness of products, ADDIE consists of 5 stages of development, namely the Analyze, Design, Development, Implementation, Evaluation stages.

Model development (R&D) can be interpreted as an effort to expand to bring a situation or situation in stages to a more perfect or more complete situation or a better situation (Trisiana, 2016). According to Usta and Guentepe (2017), the advantages of the ADDIE model are that it is simple, easy to understand and has a structure that can facilitate learner-focused teaching methods. The ADDIE approach is used in working on a sequence of research and development steps consisting of 5 stages as in Figure.1 Steps of the ADDIE Approach.

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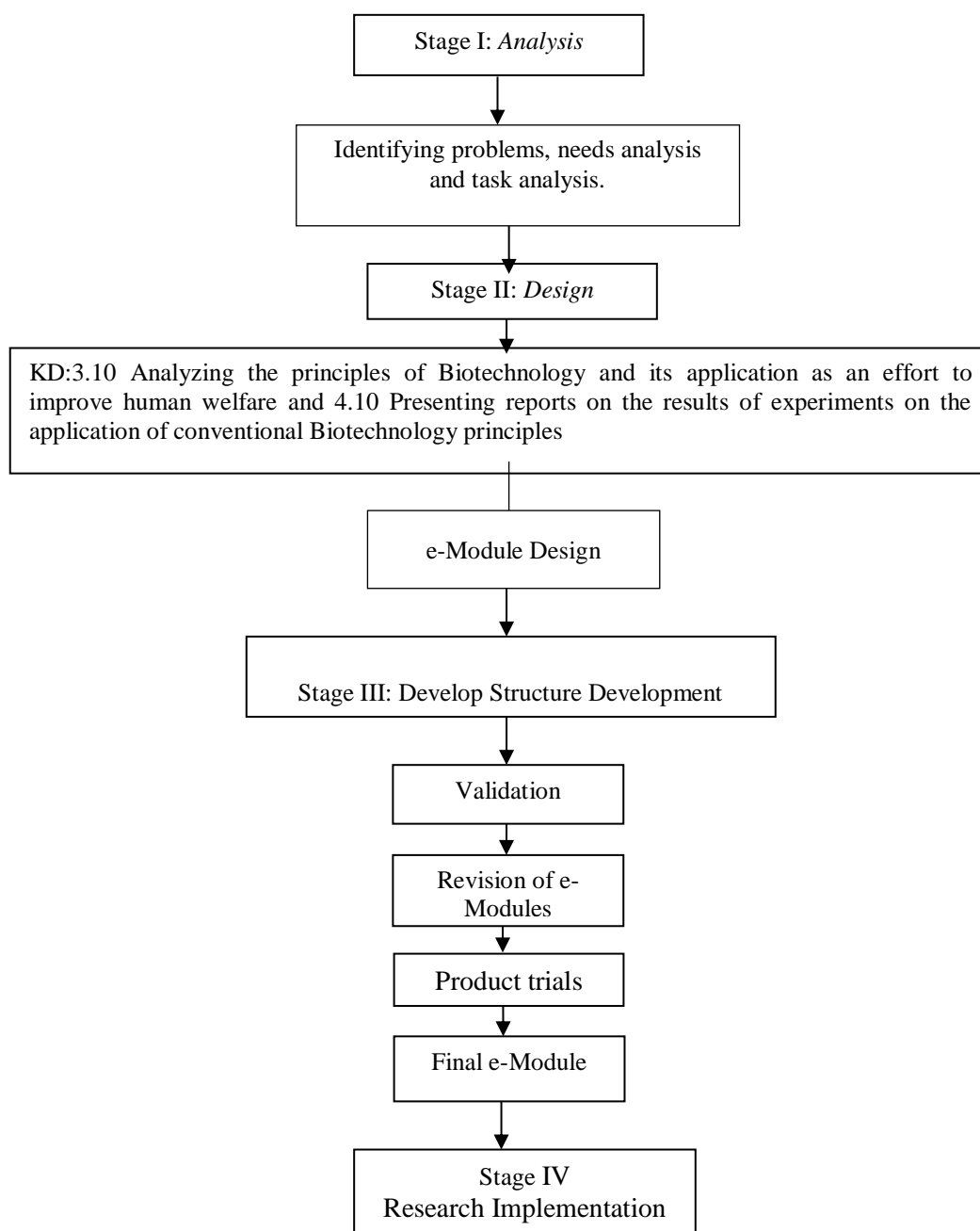


Figure.1 Steps of the ADDIE Approach, Sugiyono (2015)

The research data were analyzed using descriptive statistical techniques to obtain the average and percentage figures.

### 1. Validation

Validation was carried out by a team of validators, namely 2 material expert validators, 1 media expert validator and 2 biology teachers. The data collected are descriptive data and quantitative data, descriptive data obtained from input, responses, comments and suggestions for improvement obtained from experts from both material experts, media experts and high school biology teachers, and

quantitative data obtained from the validation sheet scores. The type of scale used is a linkert scale with a score of 1-4. This scale provides flexibility to validators in assessing learning devices in the form of modules that have been developed. The criteria for validation sheets and questionnaires are as follows;

Table.1 Criteria Assessment of E-Module Development Prasetiyo (2017)

Score	Indicator
1	Not feasible
2	Less feasible
3	Worthy
4	Very feasible

After the validation sheet is collected, then the percentage of each question item on the validation sheet is calculated using the formula below:

$$P = \frac{(\text{number of scores obtained on 1 item})}{(\text{maximum number of scores})} \times 100\%$$

Description: P = Percentage

Interpretation and summarization of results in accordance with the criteria for ideal assessment categories with the provisions contained in table 3.9 below.

Table.2 Interval Value of Validation Level, Prasetiyo (2017)

Score	Description	Test Decision
0% -24%	Very less valid	Not feasible and needs revision
25%-50%	Less valid	Less feasible and needs revision
51%-75%	Valid	Feasible but still needs revision
76%-100%	Very Valid	Very feasible and no revision if it reaches 100%

## 2. Limited Trial

Furthermore, a limited trial will be conducted in two schools with the same number, namely 10 students of SMA 1 Lubuk Batu Jaya and 10 students of SMA 2 Lubuk Batu Jaya and an individual test which will be tested on 10 students of SMA 2 Lubuk Batu Jaya. The data obtained from the limited trial questionnaire and individual tests were calculated using the following formula:

$$P = \frac{(\text{number of scores obtained on 1 item})}{(\text{maximum number of scores})} \times 100\%$$

Description: P = Percentage

Interpretation and summarization of results in accordance with the criteria for ideal assessment categories with the provisions contained in table 3.

Table.3 Interval Value of Limited Test Level, Prasetyo (2017)

Score	Description	Test Decision
0% -24%	Very less valid	Not feasible and needs revision
25% -50%	Less valid	Less feasible and needs revision
51% -75%	Valid	Feasible but still needs revision
76% -100%	Very Valid	Very feasible and no revision if it reaches 100%

### 3. Practicality Trial

After conducting a limited trial, researchers conducted a practicality trial which was tested on students who had studied biotechnology material, the practicality test was conducted at SMAN 2 Lubuk Batu Jaya with a total of 10 students. The data obtained from the individual test questionnaire was calculated using the following formula;

$$P = \frac{\text{(number of scores obtained on 1 item)}}{\text{(maximum number of scores)}} \times 100\%$$

Description: P = Percentage

Table.4 Individual Test Level Interval Values, Prasetyo (2017)

Score	Description	Test Decision
0% -24%	Very less valid	Not feasible and needs revision
25% -50%	Less valid	Less feasible and needs revision
51% -75%	Valid	Feasible but still needs revision
76% -100%	Very Valid	Very feasible and no revision if it reaches 100%

### 3. Results and Discussio

The development of e-modules using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation) consists of stages (1) Needs analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation. In this study, researchers only conducted up to the development stage. The following describes the three stages of research;

#### 1. Analyze

The first stage is the analysis stage which consists of needs analysis and student analysis. This needs analysis was carried out by interviewing several MGMP teachers in the field of biology studies at Indragiri Hulu High School. From the results of these interviews, teachers need alternative problem solving to improve the completeness of student learning outcomes in order to achieve KKM and teachers need teaching materials in which there are practice questions and practicum guides that can be accessed online or offline, making it easier for students to learn independently, actively and gain new experiences. And the results of the analysis of students at SMAN 1 Lubuk Batu Jaya obtained conclusions, namely;

1. Lack of mastery of the material, because there is no package book that is used at home.
2. The slow internet connection causes the material not to be delivered properly.
3. The distance between home and school, causing slow collection of assignments.
4. Students lack understanding of biology material, especially when the teacher does a demonstration.

After knowing some of the problems experienced by students, researchers developed an electronic module that can be used in distance learning or face-to-face learning. Electronic module or E-Module is an ICT-based module that has an interactive nature, makes it easy to navigate, allows displaying or loading images, audio, video, and animation and is equipped with formative tests or quizzes that allow automatic feedback immediately (Suarsana & Mahayukti, 2013).

## 2. Design

The design stage is designing e-modules with the Think Talk Write (TTW) learning model based on the 2013 Curriculum syllabus, and class XII biology books with biotechnology material. The description of making e-modules consists of determining the material, making covers, table of contents, instructions for using e-modules, making e-modules with the Think Talk Write (TTW) model and practice questions. The following e-module design images can be seen in Figure 2 e-module cover and think talk write (TTW) sheet;

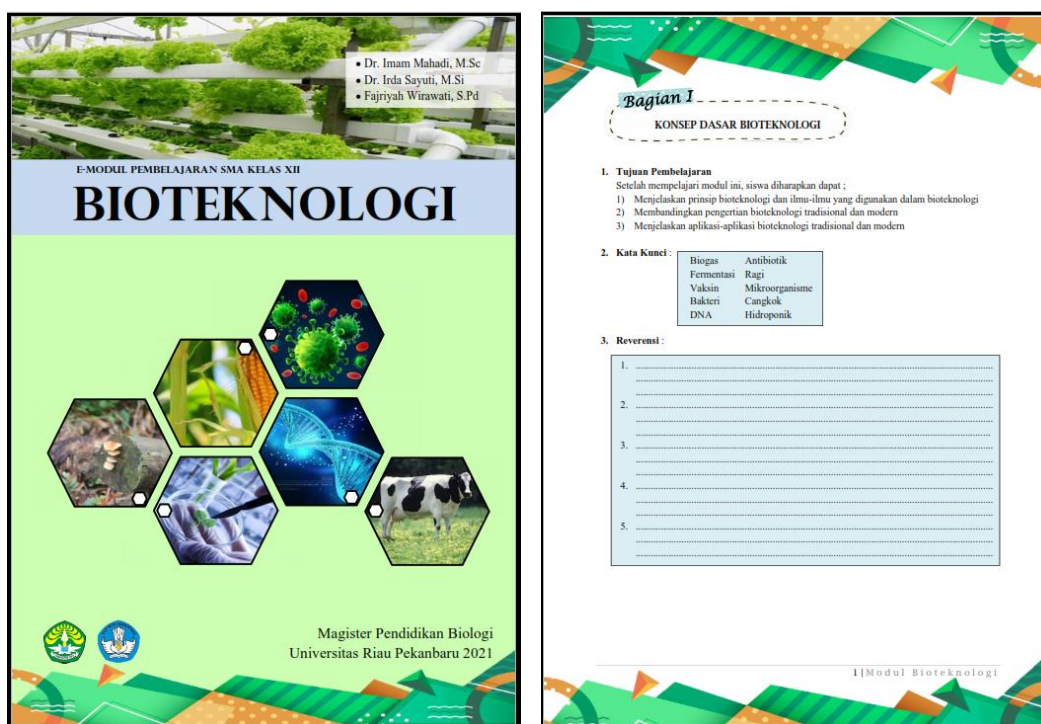


Figure.2 E-Module Cover and Think Talk Write (TTW)

### 3. Development

The purpose of the development stage is to produce a feasible e-module after revision based on suggestions from validators and student responses.

#### 1. Validation Results

The results of validation from experts are used as consideration for revising the e-module developed to meet the eligibility criteria (very feasible), if it is declared very feasible, then the biotechnology e-module with the Think Talk Write (TTW) model should be tested on students.

#### Material Expert Validation

Validation by material experts is divided into three aspects, namely aspects of content feasibility, aspects of presentation feasibility and aspects of language feasibility. The validation process is carried out by providing printouts of validation sheets, assessment rubrics and biotechnology e-modules. The following is a description of the validation in each aspect of the assessment in table.5 validation results from material experts;

Table.5 Validation Results from Material Experts

No	Aspect	Percentage (%)	Category
1	Aspects of content feasibility	85	Very Feasible
2	Aspects of presentation feasibility	79,7	Very Feasible
3	Aspects of language feasibility	82,1	Very Feasible
	<b>Average</b>	<b>82</b>	Very Decent

Based on Table.5, it can be explained that the results of the material expert validation from the aspects of content feasibility, presentation feasibility and linguistic feasibility obtained an average with an overall percentage of 82% with the category (very feasible). With a very feasible category in these three aspects, it means that the e-module developed has elements of conformity with the eligibility criteria, in other words, the material exposed in the e-module is appropriate in packaging the content and material so that it can be used as teaching material.

In line with the opinion of Susilo (2020) that one of the objectives of module preparation is to provide teaching materials in accordance with curriculum guidance by considering student needs, namely teaching materials that are in accordance with the characteristics of teaching materials and student characteristics.



## Media Expert Validation Results

Validation by media experts is divided into three aspects, namely e-module size, cover design and e-module content design. The following are the results of validation by media experts table.6 validation results from media experts;

Table.6 Validation Results from Media Experts

No	Aspect	Percentage (%)	Category
1	E-Module Size	100	Very Feasible
2	Cover Design	97	Very Feasible
3	E-Module Content Design	91	Very Feasible
<b>Average</b>		94	Very Feasible

Based on Table.6, it can be explained that the results of media expert validation from the aspects of e-module size, cover design and e-module content design obtained an average with an overall percentage of 94% with a category (very feasible), which means that it can be used in learning without revision. According to Febriyanti, (2017) e-modules can help students to learn independently and can measure their own level of understanding, in e-modules there is a final goal of learning activities to be carried out so that students can know what must be mastered and understood to achieve learning objectives.

## Biology Teacher Validation

The purpose of the assessment from the biology teacher is to see the attractiveness of the e-module, the utilization of the e-module and the suitability of the e-module with the 2013 curriculum, this is needed to find out the teacher's opinion as a basis for improving and improving the quality of the e-module.

Table.7 Validation Results from Biology Teacher

No	Indicator	Percentage (%)	Category
1	Attractiveness	91,7	Very Feasible
2	Material	88,8	Very Feasible
3	Language	92,5	Very Feasible
4	Usage	95,8	Very Feasible
<b>Average</b>		<b>91</b>	<b>Very Feasible</b>

Based on Table.7, it is explained that the results of the validation of biology teachers from the indicators of attractiveness, material, language and use obtained an average with an overall percentage of 91.7% with the category (very feasible). Thus e-modules on biotechnology material are categorized as very feasible and can be carried out limited trials or individual tests.

Recapitulation of validation results aims to see all the validation results from validation by material expert validators, media experts and biology teachers to see the feasibility of e-modules on biotechnology material. The feasibility results will

determine the future development of e-modules and conduct limited and individual trials. The following is a recapitulation of the validation results;

Table.8 Recapitulation of Validation Results from Experts

No	Validator	Percentage (%)	Category
1	Material expert	82	Very feasible
2	Media expert	94	Very feasible
3	Biology teacher	91	Very feasible
<b>Average</b>		<b>87</b>	<b>Very feasible</b>

Based on Table.8, a recapitulation of the validation results of material experts, media experts and biology teachers with an average percentage value of 87% with the category (very feasible) and the test decision is very feasible and not revised if it reaches 100%. According to Prasetyo (2017) if the average value of the percentage results is 75%-100% with the category (very feasible) then the test decision is very feasible to use and no revision if it reaches 100%. This is in line with research conducted by Fitriani (2020) with the title E-Module Development as a Learning Resource for Indonesian Language Subjects Class X MAN Central Lombok, with the results of the feasibility test obtained from media experts and material experts stating that e-modules are feasible to use with a value of 87.5% media experts and 96.31% material experts, then students respond positively with a value of 87.7%, therefore the e-modules developed are feasible to use. In this case, researchers still make revisions to improve the quality of e-modules and maturity in conducting limited trials and individual trials.

## 2. Limited Trial

The purpose of the limited trial was to obtain an overview of the feasibility of e-modules on biotechnology materials as well as improvements to e-modules based on comments and suggestions within a limited scope. The limited trial was conducted in 2 schools, namely SMAN 1 and SMAN 2 Lubuk Batu Jaya, each school was taken 10 students of class XII IPA, namely students who had studied biotechnology material. The following can be seen in Table.9 the results of the limited trial;

Table.9 Results of Limited Trial

No	Indicator	SMAN		Percentage (%)	Category
		1	2		
1	Display	91,4	85,4	88,4	Very Feasible
2	Material	88,5	84	86,3	Very Feasible
3	Benefits	90	90,8	90,4	Very Feasible
<b>Average</b>		<b>90,2</b>	<b>86</b>	<b>88,1</b>	<b>Very Feasible</b>

Based on Table 4.19, it can be seen that the results of limited trials conducted in two schools show an average percentage of 88% with the category (very feasible), and for the average percentage of SMAN 1 is 90% with the category (very

feasible), while the average percentage of SMAN 2 is 86% with the category (very feasible). It can be seen that the average percentage value in the two schools has a 4% difference, the average percentage value at SMAN 1 is higher than at SMAN 2, this is because the actions given to the two schools are different. The category is very feasible, which means that the e-module developed has an attractive appearance, good delivery of e-module content and is easy to use. This is in line with the opinion of Asantri (2018), the teaching materials used must have attractiveness, be easy to read, easy to use and convey messages well.

### 3. Practicality Trial

The results of the development of e-modules on biotechnology material that has been validated then carried out a practicality trial, with the aim of seeing how the use of e-modules developed. The practicality trial was conducted at SMAN 2 Lubuk Batu Jaya face-to-face, with a total of 10 students of class XII IPA who had studied biotechnology material. In the teaching and learning process, one meeting or 2 hours of lessons was conducted, on the material of biotechnology and the sub material of the basic principles of biotechnology. Before starting teaching and learning activities, researchers prepare learning equipment in the form of lesson plans, E-modules and module printouts, then researchers invite students to read and understand the contents of the module introduction. Teaching and learning activities are carried out using modules based on the Think Talk Write (TTW) learning model, by dividing students into 3 small groups, but this module can also be used individually.

Table.10 Results of the Practicality Trial

No	Indicator	Percentage (%)	Category
1	Display	88,9	Very Good
2	Material	88	Very Good
3	Benefits	93,3	Very Good
<b>Average</b>		<b>88</b>	<b>Very Good</b>

Based on Table.10, it can be seen that the e-module on biotechnology material at SMA 2 Lubuk Batu Jaya with an average percentage value of the results of the practicality trial is 88% with a category (very good). The display indicator obtained an average percentage of 89% with a category (very good), this was obtained from student comments when viewing the e-module with various inputs. Among other things, students mentioned that the appearance was good, interesting, the pictures were clear, the cover described biology and natural nuances. In the large Indonesian dictionary (KBBI) the meaning of biology is the science of the state of the nature of living things (humans, animals, plants) or life science. Which means that by looking at the e-module cover, students can conclude that they will study biology.

Then from the biotechnology e-module material indicator obtained an average percentage of 88% with a category (very good). Before starting the learning process students have studied biotechnology material, so that when studying e-modules students are easy to understand. The material in the e-module is equipped

with videos and explanations of the material, the material presented is different from the textbook. Students responded that the material in the e-module is easy to understand because there are keywords at the beginning of learning, so students can search for relevance sources first.

Furthermore, the indicator of the benefits of biotechnology e-modules obtained an average percentage of 93% with a category (very good). This can be seen from the students' responses when given the e-module, and asked how to use the e-module with android. In today's technological era, every student understands how to use it, so researchers have no difficulty explaining how to use the e-module. According to Afridiani (2021) the presence of android makes students excited in receiving learning materials, so it is not easily boring. Then according to Prasetyo (2017) if the average percentage value is 75%-100% with a very good category, then the test decision is very good to use and does not make revisions if it reaches 100%.

#### **4. Conclusion**

Based on the results of the research and data processing that has been done, it can be concluded that the development of the Think Talk Write (TTW) e-module on biotechnology material in high school is very suitable for use as teaching material in high school.

#### **References**

- Afridiani, W., & Faridah, A. (2021). Validity of Android-Based E-module Development for Food Control Course. *Educative: A Journal Of Educational Science*, 3(5), 2450-2458.
- Arsanti, M. (2018). Development of teaching materials for creative writing courses with religious character education values for PBSI study program students, FKIP, UNISSULA. *KREDO: Scientific Journal of Language and Literature*, 1(2), 69-88.
- Fitriani, F., & Indriaturrahmi, I. (2020). Development of e-modules as Learning Resources for Indonesian Language Subjects Grade X MAN 1 Central Lombok. *Journal of Research and Assessment of Educational Sciences: E-Saintika*, 4(1), 16-25.
- Febriyanti, R., Hidayati, N. R., & Pujiati, P. (2017, December). Preparation of a Research-Based Biotechnology Module on the Theme of Environmental Biodegradation as Teaching Materials for High School Class XII. In *Proceedings of SIMBIOSIS National Seminar (Vol. 2)*.
- Education, S. E. K. (4). Year 2020 on the Implementation of Education in the Coronavirus Disease (Covid-19) Emergency Period. Source: <https://www.kemdikbud.go.id/main/blog/2020/03/mendikbud-issues-se-about-implementation-of-education-in-emergency-time-covid19>.
-

- Prasetyo, N. A., & Perwiraningtyas, P. (2017). Development of an Environment-Based Textbook for Biology Course at Tribhuwana Tungadewi University. *Indonesian Journal of Biology Education*, 3(1), 19-27.
- Putra, T. M. (2019). Media Transfer Guide for Mechanical Engineering Final Project Works using Nitro Pro 8 Application in Padang State Polytechnic Library (Doctoral dissertation, Padang State University).
- Suarsana, I. M. (2013). Development of problem-solving oriented e-modules to improve students' critical thinking skills. *JPI (Journal of Indonesian Education)*, 2(2).
- Sugiyono, D. (2013). Educational research methods quantitative, qualitative and R&D approaches.
- Susilo, A., Rumende, C. M., Pitoyo, C. W., Santoso, W. D., Yulianti, M., Herikurniawan, H., & Yuniastuti, E. (2020). Coronavirus disease 2019: A review of the current literature. *Indonesian journal of internal medicine*, 7(1), 45-67.
- Trisiana, A. (2016). Development design of civic education learning model through ADDIE model to improve student character at Slamet Riyadi University Surakarta.
- Usta, N. D., & Güntepe, E. T. (2017). Pre-Service Teachers' Material Development Process Based on the ADDIE Model: E-Book Design. *Journal of Education and Training Studies*, 5(12), 199-210.
- Wirawati, F., & Amnah, S. (2021). Application of the Think Talk Write (TTW) Cooperative Learning Model to Improve Learning Outcomes during the Covid-19 Pandemic. In *Proceedings of the National Seminar on Health, Science and Learning*, 1(1), 760-769).
- Wijayanto, W., & Zuhri, M. S. (2014, November). Development of e-modules based on flip book maker with project based learning model to develop mathematical problem solving skills. In *Mathematics And Sciences Forum 2014*.

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