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Integration of Ethnoscience in Module Based 3D Page Flip Technology: Innovation Learning for Increase Creative Thinking Skill

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Abstract: This study aims to develop a medicinal plant module using 3D Page Flip technology integrated with ethnoscience to enhance students' creative thinking skills. The integration of ethnoscience connects scientific concepts with local wisdom, making learning more contextual, meaningful, and relevant to students' daily lives. The research follows the Research and Development (R&D) method using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The limited trial involved junior high school students familiar with local scientific knowledge. Instruments used included expert validation sheets, student response questionnaires, and creative thinking skill tests. The developed module was found to be highly valid, with a feasibility score of 87.5%. Its practicality was rated very high, based on teacher responses (84.40%) and student responses (87.52%). The results also showed a significant improvement in students' creative thinking skills after using the module. Therefore, the ethnoscience-integrated 3D Page Flip module is effective as a practical guide and learning media in biology to support the development of creative thinking skills.

Keywords: Ethnoscience; 3D Page Flip Technology; Medicinal Plant Module; Thinking Creative.

Introduction

Development technology rapid information and communication moment This can be utilized in the learning process teach at school so you can increase effectiveness and efficiency in learning (Ahmadi et al., 2017; Hanik, 2020). Source Study used for assisting teachers in carry out learning (Fitriani et al., 2019). Audio, booklets, brochures, e - books, flipcharts, games, journals, leaflets, multimedia interaction, mock- ups, e - modules, power points, videos, and web-based learning (WBL) is source Study ICT -based which can support learning (Jannah et al., 2020; Seruni et al., 2019). Learning modules play a very important role to awaken desire and produce motivation for student in the process learning (Ferdianto & Nurulfatwa, 2019; Imansary & Sunaryantiningsih, 2017; et al., 2018; Udayana et al., 2017). In the era of the Industrial Revolution 4.0 and in context learning 21st century, various module learning has Lots developed in form electronic or e- module (Elvarita et al., 2020; Wijayanti et al., 2016), so that selection of multimedia as learning media become very relevant, Furthermore, the integration values contextual based on locality to in module the proven can increase motivation and participation active participant educate in the educational process (Septicasari & Frasandy, 2018), so support creation meaningful and needs - oriented learning real students, For reach objective optimal learning is required quality modules, which are not only serve material in a way informative, but also

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integrates elements ethnoscience in a way balanced, The ideal composition of ethnoscience in module includes : content ethnoscience by 42%, skills investigate science 19%, science as method think 19%, and relatedness between science, technology and society by 20% (Sukowati et al., 2017; Kazempour, 2014). In addition, the utilization of technology in development modules needs done in a way appropriate for increase quality experience Study participant educate in a comprehensive way (Udompong et al., 2014; Engels et al., 2017). In context learning, one of real forms of progress technology is its integration in development (Ghaliyah et al., 2015). Especially at level school medium, where the use of media is based on technology the most dominant,

Instructional Media own role important in conveying information from source to participant educate as well as in stimulating active they during the learning process ongoing, (Ambarwulan & Muliyati, 2016; Hasanah & Nulhakim, 2015; Lubis & Ikhsan, 2015; Syahrowardi & Permana, 2016). One of the form innovations in learning media is with integrating technology into linking module with existing culture (ethnoscience), Learning technology like This is the right step, because ethnoscience is knowledge the original reflected in language, customs customs, culture, morals, as well technology created by society certain and contains values scientific (Damayanti et al., 2017).

Creativity in utilization of integrated learning media element ethnoscience not only support achievement objective learning, but also improving efficiency, power attraction, and smoothness of the learning process (Khairani & Febrinal, 2016; Susanti et al., 2015; Safitri et al., 2015; Mulyadi et al., 2016). One of the forms of learning media creative growth moment This is *flipbook,* namely innovation from *e-book* that presents experience read interactive as alternative learning media (Hayati et al., 2015; Kurniawati et al., 2016). Utilization technology in development module plant drug based on 3D Page Flip technology has become a relevant strategy in increasing quality learning (Anjarsari, 2016; Aditia & Muspiroh, 2013; Husain, 2014; Yuberti, 2015). One of them through development book electronic (*e-book)* using 3D Page Flip application (Cholik, 2017; Ferdianto, 2018; Irwandani & Juariyah, 2016)

3D Page Flip application is device software that allows user for change digital documents such as Microsoft Word, PowerPoint, or PDF files become *e-book* interactive with 3D effects, The output formats produced are very diverse, such as EXE, ZIP, HTML, 3DP, *screen saver,* and others (Alifya & Rahman, 2020). Visual and interactive advantages these making flipbooks more media efficient and attractive in support learning based on technology latest (Kurniawan et al., 2018; Simanjuntak et al., 2019). Some study previously has developed media based on 3D Page Flip software, such as *Multimedia FlipBook Basic Digital Techniques* and *Virtual Module Multimedia FlipBook,* which is proven can increase motivation, interests, and activities Study participant educate (Sugianto & Dony, 2013).

However thus, still Lots found constraint in utilization module plant drug based on 3D Page Flip technology based on technology by educators, which has an impact on less optimal stimulation think creative participant educate in the learning process, In fact, skills think creativity is very important in learning 21st century, namely ability For generate original ideas in finish problems and create solution innovative that is not unexpected (Rohana & Ahyudin, 2017). Thinking creative covers four indicator mainly, namely smoothness thinking (*fluency)*, flexibility thinking (*flexibility)*, originality of ideas (*originality)*, and elaboration or elaboration *of* ideas (Mubarokah & Wahyudi, 2019).

Based on observation initial work carried out by the team on site research, school school target at State Senior High School 2 Patra Nusa Manyak Payed Aceh Tamiang Not yet own device learning in the form of module plant drug based on 3D Page Flip technology 3D Page Flip application based on ethnoscience as supplement in activity learning, Therefore that, team researcher planning develop module plant drug based on 3D Page Flip technology is used to improve skills creative thinking participants educate.

Method

This research method uses a Research and Development (R&D) approach with the ADDIE model, which consists of the stages of Analysis, Design, Development, Implementation, and Evaluation. Development studies module plant drug based on 3D Page Flip technology consists of from indicators used in study This is according to Mustikasari, et al. 2018:10) there are 5 indicators ethnoscience, including : 1) collecting information scientific that will explained; 2) provide explanation in context general; 3) identify problem science in life, Data collection techniques use sheet validation eligibility and sheet practicality, to be tested by the team expert/validator (team expert module plant drug based on 3D Page Flip technology, team expert materials and teachers) and assessment the use evaluation Likert scale, The steps of the ADDIE model (Wartoyo & Trisiana, 2016).

Design used in study this is in accordance with development model module, plant drug based on 3D Page Flip technology module used in accordance ADDIE model procedure. According to Cahyadi (2019) in the ADDIE model procedure there are five stages, but in

study This only use until three stages that is stage development, Following is ADDIE stages in study.

Stages Analysis

Implementation process activities carried out on stage analysis study This is analyze develop module plant drug based on 3D Page Flip technology in learning is analyzed its eligibility in accordance with procedure development module plant drug based on 3D Page Flip technology that in the form of module plant new drugs, (Sugiyono, 2015). Based on stage The analysis carried out by the author begins with do interview to the class teacher X, results interview show during This module plant drug based on 3D Page Flip technology that used in learning not enough No varied, module plant drug based on 3D Page Flip technology that used in the form of module plant drug based on 3D Page Flip technology so that motivation participant educate For Study low,

Design Stages

At Stage This is stage designing module plant drug based on 3D Page Flip technology that will developed, Compiling the module plant drug based on 3D Page Flip technology module that started with arrangement framework, including : 1) collecting the material to be presented on module plant drug based on 3D Page Flip Technology mentioned, 2) designing module plant drug based on 3D Page Flip technology so that as interesting as maybe, 3) compose material in accordance with academic, 4) validating module based on 3D Page Flip technology, so that the module the worthy For used as module practical work biology about introduction utilization plant drug,

Stage Development

Designing product module plant drug based on 3D Page Flip technology can developed based on stages, First, the writer compile ingredients that have been collected in accordance with procedure making module plant drug based on 3D Page Flip technology, After that,do validity and practicality, if module plant drug based on 3D Page Flip technology is valid, then module plant drug based on 3D Page Flip technology has worthy For applied For implementation learning practical work biology, Second, the author make sheet validation and practicality for module experts / validators plant drug based on 3D Page Flip technology, materials, and teachers do not only validate but evaluate practicality, Third, the author validate module plant drug based on 3D Page Flip technology that done by experts module plant drug based on 3D Page Flip technology and materials and teachers. The purpose of doing validation is For know module plant drug based on 3D Page Flip technology compiled by the author worthy For used or no, Fourth, the author get input / criticism from the experts its validity, then writer can know existing weaknesses in module plant drug based on 3D Page Flip technology, Weaknesses That fixed For reduce weakness the,

Data collection technique

Data collection techniques used are: in the form of interviews and instruments in the form of sheet validation eligibility as well as sheet practicality, to be tested by the team expert / validator (expert) module plant drug based on 3D Page Flip technology, expert material Biology Education lecturer and subject teacher studies biology), and assessment the use evaluation Likert scale, This research interview, the author do interview with the class teacher, The purpose of this interview This is For identify the problem that occurred in the learning process taking place, According to Sudijono (2011) interview is A technique data collection used For gather explanation or statement made through ask answer oral in a way unilateral,

Validation sheet

Study this, writer perform validation test For know module plant drug based on 3D Page Flip technology that arranged a number of statement among them skills on the module plant drug based on 3D Page Flip technology in implementation activity learning practical work, material plant the medication delivered, the language used, the technique presentation, graphics, contents of the module plant drug based on 3D Page Flip technology and objective the learning that is delivered, This is whether module plant drug based on 3D Page Flip technology is worthy For used or No,

Practicality sheet

Study this, writer conducted a practical test for know eligibility module plant drug based on 3D Page Flip technology, whether worthy for applied in the classroom in learning process activities practical work biology,

Result and Discussion

Research result

Related with study this, the result study Maturadiyah & Rusilowati (2015) showed that from overall the textbooks analyzed, respectively general serve room scope category ethnoscience as stem body knowledge by 70.94%; science as method For investigate by 7.08%; science as method think by 19.08%; and interaction between science, technology and society by 2.90%. Usage module learning based on scientific has fulfil criteria effectiveness, with test results Study students who meet the requirements criteria completeness classical by 84.21% (Setiyadi et al., 2017).

In line with study Jusmasari, et al., (2019), which explains that analysis show four category eligibility, namely eligibility content 77.27%, eligibility 100% language, eligibility presentation 79.16%, and eligibility 95% graphics, based on matter said, book guide practical work chemistry the in accordance with BSNP and eligible used, Research Maflukha (2017) also showed that development module biology can increase results Study students, The module is said worthy after get validation from expert materials, media experts, and trials scale small.

Based on results researches said, research This will studying the Integration of Ethnoscience in Plant Module drug based on 3D Page Flip Technology : Innovation Learning For Push Skills Think Creative, Plant module drug based on This 3D Page Flip technology developed through three stages implementation applied research For activity learning practical work biology at SMA Negeri 2 Patra Nusa Manyak Payed, The data obtained from results study This will served in accordance stages research and development (R&D) research.

Stage Research and Collection Information

At the stage this, is done studies literature with school target namely Patra Nusa 2 State Senior High School, where all activity learning listed in the RPP. The material presented in module plant drug based on 3D Page Flip technology is designed in accordance with curriculum taught to students, said integration ethnoscience, In the application 3D Page Flip app, elements ethnoscience entered to in eye lesson biology through steps the following : (a) the teacher formulates indicator appropriate ethnoscience with competence basic, (b) insert ethnoscience to in main discussion, process, or science products, and (c) integrating ethnoscience to in syllabus and lesson plan. Literature study done with to study materials, images, and other supporting references from various source like books, journals, and help machine search like Google.

Stage design module plant drug based on 3D Page Flip Technology

At the stage this, development product beginning covers making draft module plant drug based on 3D Page Flip technology that covering front and back cover design, indicators achievement, content material, questions test, and cover, All element the packed in module with approach 3D Page Flip app, aiming For push students to be more active in construct knowledge they (Suryani, 2018). Compilation module plant drug based on 3D Page Flip technology is done based on the data obtained from studies introduction and also review eligibility the experiment that will be implemented at the high school level.

Plant module drug based on This 3D Page Flip technology consists of from a number of stages : (a) Cover, (b) Foreword, (c) Table of Contents, (d) Standards Competencies, (e) Basic Competencies, (f) Indicators, (g) Learning Objectives, (h) Introduction, (i) Materials, (j) Tools and Materials, (k) Procedures Work, (l) Task Introduction, (m) Bibliography, (n) Observation Results Sheet, and (o) Worksheet Practicum, Stages This used as reference design module plant drugs that use 3D Page Flip application, Arrangement draft module done by the team researcher with utilise relevant references,

Validation of Medicinal Plants- Based Module 3D Page Flip Technology

Module based 3D Page Flip application is said quality If fulfil a number of criteria, namely : 1) validity, which is carried out through a feasibility test module, Module validation done with give draft modules and questionnaires to two lecturers expert, namely expert materials and experts design module, Assessment validation module covers a number of components, such as characteristics module, quality modules, and language, Recapitulation percentage validity design module on each component design can seen in Figure 1.

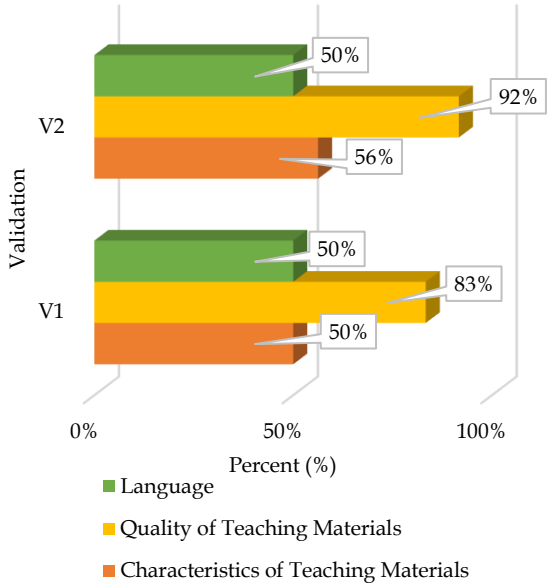

Figure 1. Validity of the Design of the Medicinal Plant- Based Module 3D Page Flip Technology on Every Design Components

Based on results validation design module plant drug based on 3D Page Flip technology in Figure 2, both validators provide different assessments to design module plant drug based on 3D Page Flip technology, Percentage highest contained in the components quality module plant drug based on 3D Page Flip technology, which includes aspects of format, organization, power

pull, shape and size letters, spaces, and consistency, However, the components characteristics module plant drug based on 3D Page Flip technology and linguistics rated Still low by both validators, so module revised in accordance with validator input and suggestions.

In addition, the answer questionnaires results are also used as reference in revision module plant drug based on 3D Page Flip technology, The module that has been revised Then given return to the validator for discussed more carry on before done testing, Revision considered finished if the validator states that developed module has been validated (Yerimadesi et al., 2018). The revised module design covers improvements to the module cover, additions divider module, and binding, Answer results questionnaire validation design module in a way overall can seen in Figure 3.

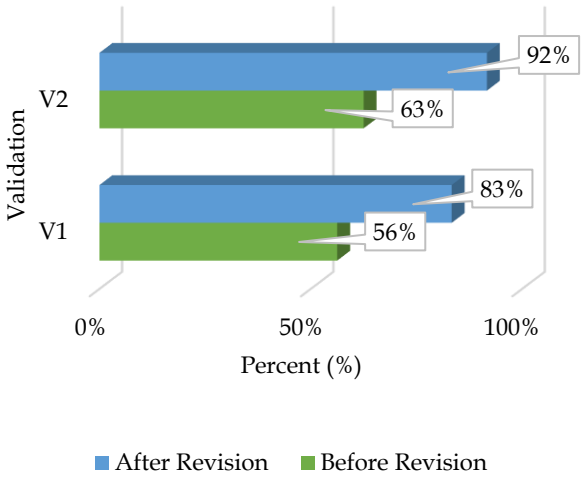

Figure 2. Validation of Medicinal Plant Module Design Based on 3D Page Technology by Experts

Based on Figure 3, there is improvement average percentage of validity design module plant drug based on 3D Page Flip technology after revision process is carried out, Validation results show that module the has fulfil criteria eligibility and declared valid for used in activity learning, With Thus, the revision process to design module practical work only done one time. The height level validity in aspects linguistics indicates that module nature communicative, presenting information in a way clear, appropriate with rules good and correct Indonesian spelling, and use effective and efficient language, Plant module drug based on 3D Page Flip technology that developed with use appropriate font type and size standards, proper layout, clear and attractive illustrations, pictures and photos, appropriate with guidelines writing module (Prostowo, 2011). In addition to the design module plant drug based on 3D Page Flip technology, content or material in module This was also validated by two experts. biology, Percentage validity Contents in a way summary can seen in Figure 4.

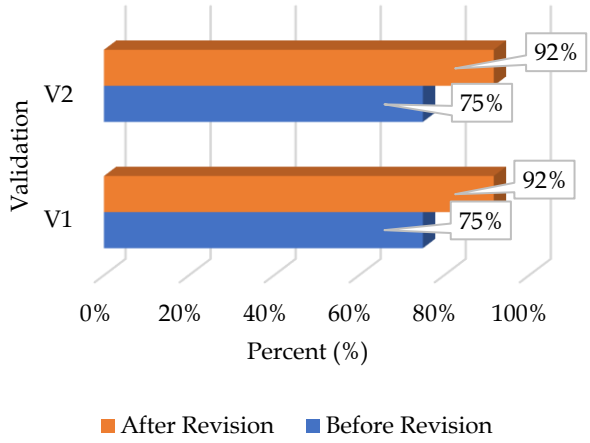

Figure 3. Validation of the Contents of the Medicinal Plants Module Based on 3D Page Flip Technology

Percentage validation material before and after revision show significant average increase, Based on results questionnaire, some repair done in accordance input from expert validator materials, including : (a) adjusting draft module plant drug with need learning, (b) adding picture tools and materials used, (c) adding a report format practicum, and (d) adding attachment, Module based This 3D Page Flip application categorized own validity very high content with aspect eligibility as following : (1) in accordance with demands core competencies and required materials user, (2) compilation module customized with development students, (3) compilation module in accordance with need material learning, (4) substance material module accurate, (5) content module add insight, and (6) characteristics module reflect moral and social values (Depdiknas, 2008).

Aspects of Practical Research of Teachers and Students of SMA Negeri 2 Patra Nusa

Study to practicality module plant drug based on 3D Page Flip technology plants drug integration ethnoscience This seen from results questionnaire filled out by teachers and students as user in limited testing scale small, Analysis descriptive done to every instruments used in study,

Teacher Response Questionnaire Results

Questionnaire results practicality filled by teachers aims For get information about level practicality module in limited testing, The teacher gives prediction and assessment about use module plant drug based on integrated 3D Page Flip technology ethnoscience in the learning process, By general, results questionnaires filled out by teachers can seen in Figure 5.

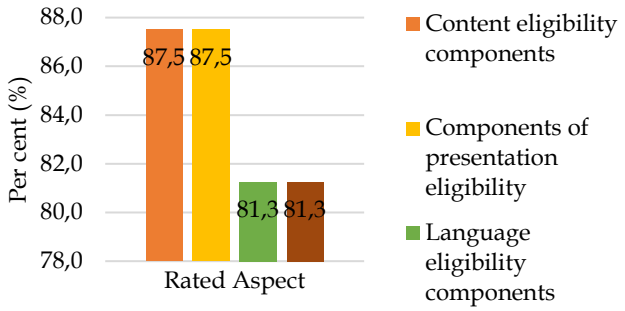

Figure 4. Teacher Response Questionnaire Result Data

Based on questionnaire filled out by teachers, module plant drug based on 3D Page Flip technology plants drug integrated ethnoscience gains value practicality as following : 87.5% for aspect component eligibility Contents with very practical category, 87.5% for aspect component eligibility presentation with very practical category, 81.3% for aspect component eligibility Language with very practical category, and 81.3% for aspect component eligibility graphics with very practical category.

In general overall, based on categories said module plant drug based on This 3D Page Flip technology received an average practicality score, by 84.40%, with very practical category from results questionnaire filled out by the teacher. The results of this show that module module plant drug based on integrated 3D Page Flip technology ethnoscience has considered very practical by teachers, so that can used for activity learning Biology at high school level.

Questionnaire Response Results Learners

Questionnaire results practicality filled by students aiming For get information about level practicality module in limited testing scale small, Students give prediction and assessment to module plant drug based on integrated 3D Page Flip technology ethnoscience that will used during the learning process, In general, results questionnaire practicality filled by students can seen in Figure 7.

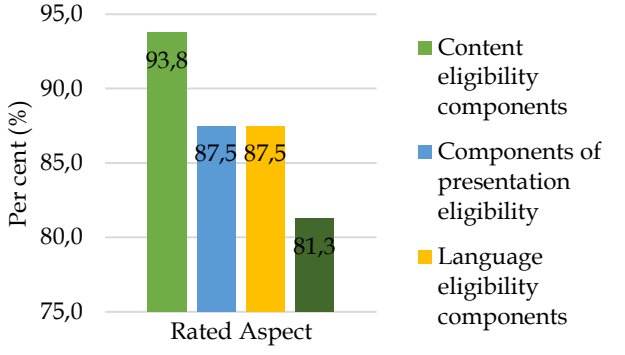

Figure 5. Student Response Questionnaire Results Data

Based on questionnaire filled out by teachers, module plant drug based on integrated 3D Page Flip technology ethnoscience gains value practicality by 93.8% for aspect component eligibility Contents with very practical category, 87.5% for aspect component eligibility presentation with very practical category, 87.5% for aspect component eligibility Language with very practical category, and 81.3% for aspect component eligibility graphics with very practical category.

In general overall, module plant drug based on This 3D Page Flip technology received an average practicality score, by 87.52% of results questionnaire filled out by participants educate, with very practical category, This result show that module plant drug based on integrated 3D Page Flip technology ethnoscience This has rated practical by participants educate as users, and worthy used in activity learning Biology at high school level.

Discussion

The results of this study indicate that the integration of ethnoscience in a 3D Page Flip technology-based module significantly improves students' creative thinking skills. This is reflected in the increase in pretest and posttest scores for creative thinking skills, which include indicators of fluency, flexibility, originality, and elaboration. The developed module was not only considered highly valid by experts (87.5%) but also highly practical based on teacher (84.40%) and student (87.52%) responses. This finding supports the research findings of (Fitriani & Setiawan, 2018; Juliyanto & Rahayu, 2021; Fradisa & Kartika, 2023) which state that local wisdom-based learning can improve critical thinking skills, especially in analyzing and explaining problems close to students' lives.

The module's practicality was also highly rated by students. This not only demonstrates ease of use but also reflects student engagement in meaningful and contextual learning. Indiana et al., (2024) explained that the ethnoscience approach enables students to understand scientific concepts through cultural bridges already familiar to them, thus accelerating and deepening the internalization of concepts. The same study also concluded that ethnoscience e-modules can improve critical thinking skills in students (Syaflin & Heryanto, 2023). This is because the content of these e-modules, in terms of graphics, media, language appropriateness, presentation appropriateness, and content appropriateness, is deemed appropriate and valid for improving the quality of learning. A similar opinion regarding the effectiveness of developing ethnoscience-based science teaching materials found that the use of ethnoscience-based teaching materials in integrated thematic learning in fifth grade elementary school is valid and practical for use in the learning process (Wijayanti et al., 2021). The conclusion is that the

development of teaching materials in the form of ethnoscience-based e-modules that are appropriate and valid can improve the quality of science learning in the classroom.

The findings of this study are supported by previous studies which stated that the flip e-module is suitable for use in the learning process (Mediatati & Suryaningsih, 2017; Musafanah, 2017; Seruni et al., 2019; Susilawati et al., 2020). However, the effectiveness of using the e-module in local wisdom-based learning is also greatly influenced by teacher competence, especially in mastery of ethnoscience. As stated by Walag et al. (2020), teachers must have at least a basic level of understanding of ethnoscience to be able to teach it effectively to students. The results of this study are supported by Winata et al., (2017) that the validation of ethnoscience-based practicum instructions was categorized as good with a percentage of assessment from the validator of 87%. The practicum module is a visual media that can help teachers by activating students in ethnoscience learning and can be used for a learning process activity. The results of the assessment by the validator of the ethnoscience-based science practicum module were analyzed descriptively quantitatively, then the overall score obtained based on the expert assessment was converted into a value range according to Darmayanti & Haifaturrahmah (2019) that the practicality was 66.27 or very practical, and the effectiveness value was 0.72 with very effective criteria.

Conclusion

Based on results research and discussion that has been described, can concluded that product module plant drug based on 3D Page Flip technology that analyzed consists of from three category, with mark percentage very valid aspect of 87.5% in the element quality, With Thus, the module plant drug based on integrated 3D Page technology ethnoscience stated worthy used as guide learning practical work biology, In addition, the results evaluation aspect practicality by biology teacher from five schools, including biology teachers at Patra Nusa 2 State High School, showed that module plant drug based on This 3D Page Flip technology achieved a percentage of 95.0% in very practical category, which is assessed by teachers as users on a scale small,

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Author Contributions
Nursamsu: create an e-modul application, Ekariana S. Pandia: Create validation instruments and conduct school observations, Asmaul Husna: Created the creative thinking instrument, Ernawati: Help validation E-Modul

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

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