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E-modul Development Practical Worm Eeg Identification Schistosoma japonicum on the Feses Mammals as Media Biology Study

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Abstract

This research is to identify Schistosoma japonicum worm eggs in the feces of mammals so as to produce a practicum e-module on how to identify Schistosoma japonicum worm eggs in the feces of mammals that are suitable to be used as a practical guide for animal taxonomy courses. There are two research methods used, namely observational descriptive research methods and Research and Development (R & D). The results of the study of 201 samples of mammalian feces that were identified showed that there were 5 positive samples of Schistosoma japonicum worm eggs, namely 4 samples from pigs and 1 sample from buffalo. The n-gain calculations on the emotive development stage show thatg > 0,7, which is 0,97 and is interpreted in high categories so that e-modules usingADDIE model methods are worthy to be used as e-modules of animal taxonomi college science.

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Introduction

Entering the 21st century is no exception in the field of education, requiring educators and students to have the ability to master the field of technology, the goal is for students to have life skills or skills in learning and innovating by utilizing existing information media. The Ministry of Education and Culture formulated that the 21st century learning paradigm emphasizes the ability of students to find out from various sources, formulate problems, think analytically and cooperate and collaborate in solving problems (Kemendikbud, 2013).

One of the skills that must be possessed in the 21st century is the mastery of information technology or ICT Literacy (Information and Communication Technology) / ICT. LPTKs as educational staff-producing institutions equip teachers and prospective teachers to master things related to ICT. Seeing the development of Science, Technology and Arts (IPTEKS) which is quite rapid, it should be in the education curriculum, educators include lecture material related to information technology such as the development of electronic learning media / e-learning (Sole & Anggraeni, 2018). The use of digital technology in teaching materials today is very necessary. The Covid-19 pandemic requires learning to be done online.

Children and adults are already familiar with the use of android and the internet, so it is necessary to develop a module that is not a printed module but an electronic module. The electronic module is a form of self-study material that is arranged systematically which is displayed in electronic format, in which there is audio, animation, navigation so that it makes the learning process more interesting (Seruni et al, 2019).

The current tertiary curriculum emphasizes a scientific approach in learning such as observing, questioning, reasoning, conducting experiments and forming networks. The explanation above can be interpreted that learning at this time must be endeavored to provide activity so that learning must be supported by practicum activities. According to Koretsky (2011), practicum activities play a very large role, especially in building concepts and fostering a "feeling of liking" for lessons. Therefore, we need an appropriate learning media used to support practicum activities in Biology learning, so that the goals of Biology learning can be achieved. One of the media that can be developed as a teaching material is E-module media.

E-modules are teaching materials that are designed in an attractive way and make it easier for students to access them. Suarsana (2013) stated that the advantage of E-modules compared to print modules is that they are interactive in nature, facilitate navigation, allow display/load images, audio, video and animation and are equipped with formative tests/quizzes that allow immediate automatic feedback. Research activities by Hidayati and Pangestu (2017) that E-modules make it easier for students to study each material contained in

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them without having to carry them like books, students can simply download the e-modules that were developed on their cellphones. E-modules were developed to improve students' thinking skills and conceptual understanding.

Student difficulties in understanding Platyhelminthes material which is an animal taxonomy subject. This course is one of the courses that has a practicum that must be followed by students, where the learning process is assisted by a Lecturer or Assistant Lecturer who uses the module. In addition, based on observations of Biology Education students in semester 5 class of 2018, who are programming the Animal Taxonomy course, they experience problems understanding Platyhelminthes material. again during the covid-19 pandemic students did not practice either in the field or in the laboratory, and only used zoom media to conduct virtual meetings. The sub material discussed in Platyhelminthes concerns the meaning, classification, structure of the body, and its role in life. Another factor that makes it difficult for students to understand learning is one of which comes from their own thinking (intuition) and textbooks. The solution to the above problems is to develop teaching materials in the form of e-modules.

The current pandemic situation has greatly impacted the learning process, students need e-modules which are one of the teaching materials in digital form that can be accessed by students anywhere equipped with various visual media so that students can carry out the learning process well.

The advantage of using e-module media compared to print media is that it can make the learning process more interesting, interactive, can be done anytime and anywhere and can improve the quality of learning. The electronic module has the characteristics of a relatively small file size so that it can be stored on a flash disc, easy to carry, can be used off-line, can be studied anytime and anywhere as long as there is a computer/laptop. Then there are links that help to browse the material linearly and non-linearly so that it directs students to certain information.

The material for the practicum guide is the Trematoda sub-matter. The choice of Trematoda submatter with animal samples was Schistosoma japonicum because the worm is endemic to live in the Central Sulawesi region and only exists in the Lindu, Napu, and Bada areas. These worms can cause schistosomiasis.

These worms live in the veins of humans and mammals in several tropical and sub-tropical regions. There are three main species of trematode worms that cause schistosomiasis, namely Schistosoma japonicum, Schistosoma haematobium and Schistosoma mansoni. While the species Schistosoma mekongi and Schistosoma intercalatum are less frequently reported cases of infection. For survival, Schistosoma worms need an intermediate snail (Veridiana & Chadijah, 2013).

Schistosomiasis is a type of zoonotic parasitic disease, besides infecting humans it also infects other mammals. Such as: cattle (Bos sundaicus), buffalo (Bubalus bubalis), horses (Equus cabalus), dogs (Canis familiaris), pigs (Sus sp), civets (Vivera tangalunga). One thing that allows disease transmission from animals to humans is the continuous interaction between humans and animals. In the world it is estimated that as many as 56 million people are infected by at least one species of zoonotic Trematoda, and around 750 million people are at risk of infection (Elelu & Eisler, 2018).

Materials and Methods

There are two research methods used, namely observational descriptive research methods and Research and Development (R & D). Data collection involves observing risky farm animals, by taking and examining fecal samples of these livestock. The research was conducted in Napu District, Poso Regency. The samples were examined at the Palu Animal Husbandry service laboratory. This is due to the limited tools and materials used to examine worm eggs in animal feces at the Wuasa Napu Laboratory. Fecal sampling was carried out once for each cattle, buffalo, pig and dog. Furthermore, in the section on taking photos of worm eggs in animal feces using a cellphone camera. This research was carried out from September 2021 until completion. The sample in this study were Schistosoma japonicum eggs in Napu District, Poso Regency, which is the habitat of endemic worms in Central Sulawesi, Indonesia. Examination of samples was carried out using a multilevel filtration method. Meanwhile, to calculate the number of worm eggs using the floating method. In developing web-based e-module learning resources, it refers to the ADDIE model.

The results of the development of the practicum E-module: the results of the development of the e-module that has been developed using the ADDIE development model which consists of 5 main stages, namely: analysis, design, development, implementation and evaluation. The results of the e-module development research are as follows:

Results and Discussion

Results of Negative and Positive Identification of Mammals

Based on the results of the identification of Schistosoma japonicum eggs in the faeces of mammals, 2 animals were found to be positive for

Schistosoma japonicum worm eggs. The types of animals and the number of eggs found can be seen in table 5 below.

Table 1. Mammals that are positive for S. japonicum worm eggs

Location	Types of Animals	Number of Animals	Number of Animals There are Schistosoma Japonicum Eggs (tails)
Wasa Village	Pig	48	4
	Cow	49	0
	Dog	13	0
Prayer Village	Pig	15	0
	Cow	16	0
	Buffalo	40	1
	Dog	20	0

The results in table 5 above show that there were mammals infected with Schistosoma japonicum worms, namely four pigs and one buffalo.

Description of Schistosoma japonicum Worm Eggs

Based on research that has been carried out on the feces of mammals, there are differences in the negative and positive picture of infection with Schitosoma japonicum worms.



Figure 1. An overview of the comparison of negative and positive feces infected with Schitosoma japonicum worms found in feces

Results of Practicum E-Module Development

The results of developing e-modules that have been developed using the ADDIE development model, which consists of 5 main stages, namely: analysis, design, Development or Production, Implementation or delivery and Evaluated. The results of the e-module development research are as follows:

1. Analysis

The analysis carried out is an analysis of the problems and needs of students. An analysis of the problems and needs of students was carried out in the biology education study program FKIP Tadulako University using a questionnaire given to class 2018 students programming animal development courses for the 2020 academic year. The results of the questionnaire analysis of student needs are as follows:

Question	Answer
What do you think about the practice of animal development subject on animal taxonomy, especially in the Platyhelminthes class (class of blood trematodes)?	Very important
So far, what teaching materials and learning resources are used in the learning process and developmental practicum animal?	Modules, books, texts, and power points
What do you think about the teaching materials and learning resources used in animal development learning and practicum?	Helpful enough
During this Covid-19 pandemic, you do an animal taxonomy practicum of the blood trematode class?	Not

Based on the results of the student needs questionnaire, it can be concluded that students feel very important and need teaching materials in the form of e-modules in the learning process and practicum on blood trematodes and an interesting description of the Schistosoma japonicum worm which can infect mammals which can be accessed at any time.

2. Design

At this stage, the researcher makes an initial design of the e-module product according to the needs of students. There are six main pages in the product design process, namely the cover page, preface, table of contents, introduction, materials and activities, and bibliography. Each page has a different layout. After it has been designed, it is

included in the flipbook application. The design or initial design design as seen in the image below:





3.Development

E-modules are developed after the process of product design and manufacture of e-modules is complete held, After obtaining suggestions from the validator, the next stage of developing the e-module product is to improve it by measuring the validity of the feasibility that will be validated by expert validators (content, media and design) with the assessment instruments provided.

Table 2. Results of E-module Validation by Content Experts

Assessment Aspects	Score
Title accuracy with e-module	4
Correspondence between the title of the e-module and the contents of the material	3
Image and video pointer clarity	4
Image and video clarity	3
Correspondence between the image and the image pointer	4
The accuracy of supporting sources that can be used as a reference for finding reading sources that are relevant to the material	4
Gain score	22
Maximum score	30
Percentage	73.3 %

Table 3. Results of E-module Validation by Design Experts

Assessment aspect	Score
Material Description	75 %
Pictures and Videos	80 %
Image caption text	75 %

Table 4. Results of E-module Validation by Media Experts

Assessment aspect	Score
Title	9.5 %
Theory	72 %

As for the research activities at this development stage, in addition to the validation results from the various experts above, there are also activities for making e-modules as learning resources. Making this e-module uses the professional pdf flip application. Here are the steps for making it:

a) Installing the FLIP PDF Professional Application on Laptop/PC devices
b) Prepare Module Files to be converted to Flipbook form in PDF Format. To make it easier to input videos, a blank section is provided in the File Module with a size that adjusts the orientation of the video to be inserted (landscape or portrait).
c) Run the FLIP PDF Professional Application
d) Insert the Module File in PDF format by selecting the new project option
e) Choose the storage directory for the module file you want to convert. Then pressing open to include the file.
f) Furthermore, the video input process can be carried out by going to the page where to place the video that was previously provided.
g) Then hit the Movie tools and select the desired video frame.
h) The video is then arranged and adjusted to the available width of the blank section
i) Then inserting a video is done by selecting select video file on the video properties menu. Then click local file and select the video you want to include. Then click open.
j) If the video is successfully inputted, a display will appear showing screenshots of the video. All videos are inserted by repeating the same steps.
k) After inserting all videos. The final step is to export the module. This can be done by first pressing the save button at the top right of the application window.

l) Then choose the publish tool which is at the top of the screen.
m) Next, the output options window will appear. In the output options window, in the output folder section, the location where the e-module will be stored will be selected. Then choose the exe file format and finally press the convert button.
n) If the conversion process is successful, a success notification will appear

4. Evaluation

Conduct a formative evaluation to see the feasibility of developing e-modules for students on the subject of animal taxonomy systems. The measure of the success of developing this e-module is seen from student feedback from pre-test and post-test scores.

Pre-test Gain Score	Standard Deviation
68,56	4.66
Post-test Gain Score	Standard Deviation
89.38	3.93

5. Implementation

The implementation was carried out by means of a trial run by students by giving a questionnaire which had to be filled in with 8 questions. In addition, the implementation phase also includes the data collection stage in the form of pre-test scores and post-test scores.

Table 5. Student Response Results

Rated aspect	Average
Do you think the content of this e-module is interesting?	4.50
Do you think the content of this e-module is easy to understand?	4.18
How clear is the image in this e-module?	4.50
How clear is the writing (text) in this e-module?	4.40
Do you think the display of images on this e-module is interesting?	4.13
Do you think this e-module as a whole is interesting?	4.63
Can this e-module help make it easier to identify Schistosoma japonicum worm eggs through the multilevel filtration method?	4.40
Is the writing of the Latin language used in this module correct?	4.45
Total	4.94
Percentage of responses (%)	89.90

Table 6. Student Pretest and Posttest Results

Name	Pre-test	Post test
Respondent 1	75	95
Respondent 2	70	95
Respondent 3	65	88
Respondent 4	72	85
Respondent 5	64	90
Respondent 6	60	87
Respondent 7	65	95
Respondent 8	72	80
Respondent 9	70	88
Respondent 10	72	90
Respondent 11	66	90
Respondent 12	65	85
Respondent 13	60	86
Respondent 14	70	85
Respondent 15	75	90
Respondent 16	73	95
Respondent 17	74	90
Respondent 18	66	95
Gain score	1,234	1,609
Average	68,56	89.38
Maximum Score	90	

5. Evaluation

EThe valuation is carried out by looking at the feasibility of developing e-modules for students on the subject of animal taxonomy systems. The measure of the success of developing this e-module is seen from student feedback from pre-test and post-test scores.

Pre-test acquisition score = 68.56

Post-test acquisition score = 89.38

Then the n-gain test was carried out to find out that there was an increase between the pre-test and the post-test. The amount of increase is calculated by the formula n0gain minimized. N = 18.

The results of the n-gain calculation show that g > 0.7, which is 0.97 and is interpreted in the

high category and the practicum e-module of Schistosoma japonicum worm eggs in the faeces of mammals is suitable for use.

Table 7. Student Pretest and Posttest Results

Name	Pre-test	Post test
Respondent 1	75	95
Respondent 2	70	95
Respondent 3	65	88
Respondent 4	72	85
Respondent 5	64	90
Respondent 6	60	87
Respondent 7	65	95
Respondent 8	72	80
Respondent 9	70	88
Respondent 10	72	90
Respondent 11	66	90
Respondent 12	65	85
Respondent 13	60	86
Respondent 14	70	85
Respondent 15	75	90
Respondent 16	73	95
Respondent 17	74	90
Respondent 18	66	95
Gain score	1,234	1,609
Average	68,56	89.38
Maximum Score	90	

Development of E-module Practicum for Schistosoma japonicum Worm Eggs in Mammal Animal Faeces

The electronic module is an electronic version of a printed module that can be read on a computer and designed with the required software. E-module is a learning tool or tool that contains material, methods, limitations and ways of evaluating that are designed in a systematic and attractive way to achieve the expected competencies in accordance with the level of complexity electronically. Meanwhile, according to Priyanthi (2017), an electronic module or e-module is a display of information in a book format that is presented electronically using a hard disk, diskette, CD, or flashdisk and can be read using a computer or electronic book reader. Furthermore,

Development of e-module practicum for Schistosoma japonicum worm eggs in mammalian faeces using the ADDIE model with several stages, namely analysis, design, development or production, implementation or delivery and evaluation. Phase I of the analysis where the researcher analyzed the needs of students aimed at determining the basic problems needed in the development of electronic-based practicum modules. Based on the analysis results

questionnaire consisting of 8 questions, it can be seen that the problem during the Covid-19 pandemic was limited practicum activities so students needed practicum modules that could be accessed anytime and anywhere with clear explanations and instructions. Advantages of e-modules in the learning process are that they can increase the flexibility and effectiveness of learning, not limited to space and time. Furthermore, Suwasono (2014) argued that Information and Communication Technology (ICT) has an important role in the field of education, especially in the learning process. Various ICT solutions have proven to be able to play a role in improving education and learning services.

Stage II is design, based on the results of the analysis of student needs, the next stage is planning e-modules that suit student needs. This plan includes e-module components, such as preface, table of contents, introduction, materials and activities (basic theory, work procedures, independent assignments), as well as a bibliography.

Stage III, namely development, this stage carries out a validation process to determine the feasibility of the product to be developed according to experts, namely material experts, media experts, linguists. Validation was carried out by experts from among the lecturers at Tadulako University. Validation results are used as material for revision and evaluation according to input from experts. Based on the data from the assessment of three validators, namely media, content and design experts. In all aspects of the media obtained 69.5% and 72% with the proper category. The average score is translated into the achievement of the average score of each aspect. The content aspect of the e-module reached 73.3% in the proper category. The design expert validator for material descriptions obtained a score of 75% while for images and videos in the 80% category then for image captions obtained 75% of the three scores for e-module design in the feasible category. Then for the questionnaire the results of student responses to the practicum e-module of Schistosoma japonicum

worm eggs in the feces of mammals can be categorized as very good with an average score of 89.90%.

The development phase is complete, then it enters stage IV, namely implementation. In the implementation stage, after the e-module has been validated by an expert validator, the e-module is tested online by sending the e-module link with the appropriate instructions in the e-module, students carry out the learning process, then at the end students fill in independent assignments, then students fill out response questionnaires. student. From the results of student independent assignments obtained by analyzing the effectiveness of the module using the n-gain test, namely high (g> 0.7) of 0.97.

After the implementation stage and the e-module are declared feasible, then they enter stage V, namely evaluation. At this stage, revisions and improvements were carried out again based on suggestions and input from various parties including media experts, content experts and design experts as well as students. The measure of the success of developing this e-module is seen from the feedback from students who have filled out the questionnaire provided. From the evaluation results, it was concluded that from the development of an e-module on the identification of Schistosoma japonicum worm eggs found in the feces of mammals in North Lore District, this is feasible to use. This is proven based on the good percentage of questionnaire trials and independent assignment answers in e-modules.

Identification of content of Schistosoma japonicum worm eggs

Schistomiasis is caused by a trematode worm of the type Schistosoma japonicum with the snail Oncomelania hupensis lindoensis as an intermediary host. This parasitic disease can have an impact on economic losses and public health (Chitsulo, et al 2000). WHO (2020) reports that transmission of schistosomiasis is spread in 78 countries with an estimated 236 million people needing treatment in 2019.

This study used a multilevel filtration method to detect the presence of Schistosoma japonicum worm eggs in fecal samples of mammals. The filtered sample solution was filtered using a multilevel filter using 3 types of filtering levels. Furthermore, the filtered samples were examined using a microscope (Willingham et al, 1998).

The results of examining faecal samples of mammals in two villages, namely Sedoa village and Wuasa village, found four animals that were positively diagnosed with Schistosoma japonicum eggs in the faecal samples, these animals were four pigs and one buffalo. Whereas for cattle and dogs, no Schistosoma japonicum eggs were found in the faecal samples.

Mammals have a very important role in the transmission of schistosomiasis.

Buffalo animals are kept as releases and also have a habit of soaking in puddles so that there is a risk of infection with Schistosoma japonicum in locations where Oncomelania hupensis lindoensis snails are infected with Schistosoma japonicum. In accordance with the results of research by Gordon et al (2015) showing a higher prevalence of Schistosoma japonicum in buffalo because the habit of bathing allows these animals to also play a role in contaminating the environment with Schistosoma japonicum eggs. The research results of Gunawan et al (2014) also show that cows and buffaloes contribute greatly to the transmission of S.

The results of stool examination containing S. japonicum worms in cattle were not found from a total of 65 cows, dogs were also not found from a total of 33 dogs, and buffalo animals were only found to contain S. japonicum worm eggs out of a total of 40 buffalo tail. These results differ from studies in the Philippines which reported a schistosomiasis prevalence rate in cats of 11.9%; dog 19.9 %; pigs 2.9%, mice 31.3% and buffaloes 6.3%. Research in the area around Lake Dongting, China also reported the prevalence of Schistosoma japonicum in cattle was 8.47% and 4.56% in buffaloes (Jinming Liu et all 2012). This difference may be due to the fact that fecal collection is only carried out on domestic animals which are always around the house and away from foci.

Pigs were mostly diagnosed positive for Schistosoma japonicum worm eggs, namely 4 out of a total of 63 tails. This was possible because the conditions of pig farms had poor sanitation and hygiene that favored the existence of the Oncomelania hupensis lindoensis snail as a host between Schistosoma japonicum and its parasites. Carabin et al (2015) suggested that mammals infected with Schistosoma japonicum can spread it when excreting feces in or near watery areas, thereby increasing the risk of spreading Schistosoma japonicum to all types of hosts. Furthermore, Hu et al (2017) suggested that the transmission of Schistosomiasis is usually related to several biological characteristics such as ecology, economy, and policy.

To prevent transmission of schistosomiasis, the most important thing is to eradicate Oncomelania huspensis snails because these snails are hosts or intermediaries for mutations of schistosomiasis from one human to another as well as from one animal to another so that the transmission is not direct (Loliwu alpius, 2016).

Nurwidayati (2018) said that effective control of schistosomiasis is by breaking the chain of

transmission, namely controlling the schistosomiasis intermediate snail, Oncomelania hupensis lindoensis. Snail control activities by the Central Sulawesi Provincial Health Office are carried out in two ways, namely mechanically and chemically. Chemical control is carried out by spraying Bayluscide molluscicide every 6 months on the active focus. Mechanical control is carried out in various ways, for example repairing and constructing drains, cleaning drains, draining focus areas, utilizing focus areas to become productive land.

Conclusion

Mammals that became vectors for Schistosoma japonicum worms in North Lore sub-district, Wuasa village and Sedoa village, namely pigs and cows because they were found positive for Schistosoma japonicum worm eggs from 201 animals tested.

The practicum e-module for identification of Schistosoma japonicum worm eggs in the faeces of mammals is suitable for use as a practicum e-module in animal development courses, especially Animal Taxonomy.

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