



Development of E-Leaflet Based Learning Media to Improve Student Learning Outcomes in Excretion System Materials

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Abstract

The excretory system is material that is considered relatively difficult by students, because teachers experience limitations in using learning media. Therefore, learning media are needed to attract students' attention such as E-Leaflets. This study aims to develop media-based learning *E-Leaflet* on excretory system material in improving student learning outcomes. This study uses research methods *Research and Development* using the ADDIE model. The subject of this study were 34 students. Limited trials in this study using the design *one group pretest-postest*. The instruments used in this study consisted of expert validation sheets, multiple choice instruments and student response questionnaires *E-Leaflet*. The multiple choice instrument is used to measure all levels of learning objectives. While the student questionnaire sheet is used to determine student responses to learning media. The expert validation instrument is used to find out. The results of the study show that media validation *E-Leaflet* expert included in the valid category without revision. While the validation of material content experts gets valid and appropriate category for use in the learning process. The results of the student response questionnaire received a positive response. The results of the N-Gain analysis show that the criteria are moderate. This shows that learning media *E-Leaflet* can improve students' biology learning outcomes.

Keywords : electronic leaflet; excretion system; student learning outcomes

INTRODUCTION

Corona Virus Disease (Covid-19) outbreak that has hit various parts of the world. Provides its own challenges for educational institutions, especially High Schools (SMA). To fight Covid-19 the government has banned crowds, social restrictions (*Social distancing*) and physical distancing (*Physical distancing*), wear a mask and always wash your hands. Through the Ministry of Education and Culture, the government has banned schools from carrying out face-to-face learning and ordered the learning process to be carried out online (Syah, 2020; Hendriyani *et al.*, 2021; Septiadi *et al.*, 2022). Although we know, field study will give more experience to students and precise result (Pertiwi & Lathifah, 2019; Fatonah *et al.*, 2023; Mufida *et al.*, 2023), however online system is the best way to deliver subjects now. Online learning is a new way of teaching and learning that utilizes electronic devices, especially the internet, in the learning process. Online learning is a form of delivering conventional learning that is poured in digital format via the internet. Online learning is considered to be the only medium for

delivering material between teachers and students, during a pandemic (Putria *et al.*, 2020; Aryati, 2021; Dewi *et al.*, 2021; Setiawan *et al.*, 2021).

Education is a conscious and planned effort to improve the life of a nation. Through education, human resources are formed that are useful for life in the future. Therefore education must be carried out as well as possible so as to produce a quality generation (Nurkholis, 2013; Sujana, 2019; Rahman, Munandar *et al.*, 2022). One of the things that can support a better achievement is the need for human resources, good infrastructure and management systems so that a conducive learning process occurs. To achieve conducive learning, it is necessary to apply educational media that are in accordance with the learning objectives or competencies to be achieved. The use of media in the learning process is something that cannot be ignored. Therefore, the existence of learning media can generate motivation to learn, direct interaction between students and teachers, improve learning outcomes and students can study independently according to their abilities and interests. It is not enough for the teacher to convey material using verbal alone but requires media that functions to convey messages to students (Junaidi, 2019; Moto, 2019; Zaki & Yusri, 2020).

Based on the results of interviews with biology teachers, it shows that biology learning outcomes are classified as low, especially in excretory system material. The average score for biology subjects on excretory system material is 65 below the Minimum Completeness Criteria score. Meanwhile, the Minimum Completeness Criteria at school is 72. This is because teachers experience that teachers experience limitations in using learning media at school. The factors causing low learning outcomes at school are the learning model applied, limited media, availability of textbooks and low student interest because textbooks are thick with many pages. Learning outcomes are abilities possessed by someone after receiving their learning experience. This ability includes cognitive, affective and psychomotor aspects. Learning outcomes in the learning process are very important, people who get learning outcomes as expected means getting success (Tafonao, 2018; Junaidi, 2019; Zaki & Yusri, 2020; Yusup *et al.*, 2021). One of the learning media that can be used to improve student learning outcomes is Leaflet-based learning media in electronic form.

The results of the analysis of giving online questionnaires to students, the use of learning media that is often used by biology teachers in general uses more slides *Power Point*, and the provision of material using the lecture method so that students feel bored. Sometimes textbooks are still used as a reference for students in studying the lesson as a whole. The textbooks that are still circulating show that the delivery of learning materials is difficult for students to understand because usually textbooks only display a few pictures, more text, and the thickness of the pages makes it seem boring for students. Leaflets are media in the form of sheets of paper with pictures and writing (usually containing more writing) on both sides folded so that they are small and practical to carry. Leaflets are very effective in conveying concise messages (Simamora, 2009; Lestari *et al.*, 2021; Wahyuni *et al.*, 2022). Leaflets as learning media are expected to help students understand the subject matter. Leaflets are compiled from various learning sources, both books and the internet and insert interesting illustrations that are put together in the form of leaflets (Futriyah, 2013; Meliyati, 2015; Dewi *et al.*, 2021; Nurfitri *et al.*, 2022).

The results of student interviews stated that they needed media that contained a summary of simple material that could be delivered by the teacher as a companion to printed books that had material coverage that was more concise, easy to understand and had interesting pictures that matched the material. Thus, we need a learning media in the form of electronic-based leaflets with the aim of increasing student interest in learning and achieving the expected learning objectives. Based on the explanation above, it is necessary to conduct research to develop E-Leaflet-based learning media to improve student learning outcomes in the excretory system material. This study aims to develop an E-Leaflet-based learning media on the excretory system material in improving student learning outcomes.

METHOD

This research was conducted from December 2020 to July 2021. This study is *Research and Development* using the ADDIE (model *Analyze, Design, Development, Implementation and Evaluation*).

The sample of this research is 34 student. The product developed is an E-Leaflet learning media on the excretory system material. The steps for the ADDIE development model are as follows :

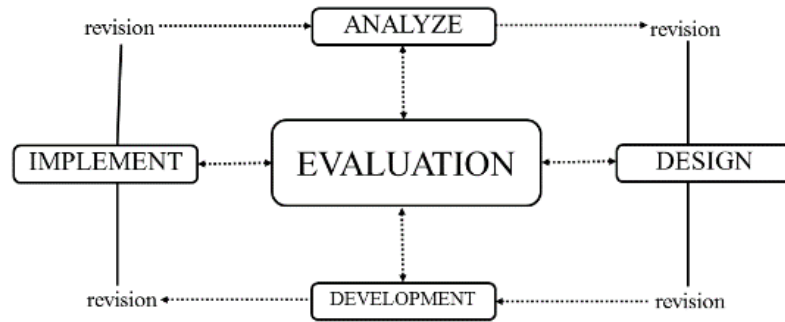


Figure 1. Flow Diagram of the ADDIE Model (Retnowati dan Istiana, 2018)

The first step is analyze at this stage, preliminary observations in the field are carried out which aim to determine the initial conditions in the school including the learning process, learning media, learning models commonly used by teachers and the average value of student biology learning outcomes. Second step is design, the design phase is to design instructional media E-Leaflet. The steps that must be taken at this stage are adjusting Content Competencies and Basic Competencies , Selection of E-Leaflet learning media format and Selection of the initial design in the development of E-Leaflet media. Development is the third phase focused on the realization of the products that will be made after drafted in the design phase E-Leaflet learning media in this study contains the function of the excretory system, organs, structure and function, the process of urine formation and disorders of the excretory system. After being produced, the next step is to validate the product with a team of experts. The results of the revision are to achieve the expected learning objectives. Products that have passed the validation expert will be implemented in the learning process as a learning medium that will be tested to the students. Field trials were conducted on a limited basis to students studying the excretory system material. In this study, the design was used *One Group Pretest-Posttest*. Students were given a pretest before being given E-Leaflet media treatment and posttest after being given E-Leaflet media treatment.

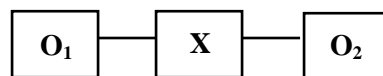


Figure 2. *One Group Pretest-Posttest Design*

Description, O₁ is Pretest Value (Before using E-Leaflet media), X is Treatment using E-Leaflet, and O₂ is Posttest Value (After using E-Leaflet media).

Next, students are given a formative evaluation. Biology learning outcomes that are measured are focused on the cognitive domain. The test is carried out with multiple choice questions. The data obtained in the form of quantitative data from the pretest and posttest scores obtained from students. The calculation of the score uses the following equation:

$$\text{Value} = \frac{\text{The number of scores obtained}}{\text{Highest score count}} \times 100\%$$

Learning by using learning media E-Leaflet can be seen its effectiveness on the ability of students' biology learning outcomes by finding the *N-Gain value* with the following formula:

$$N\text{-Gain} = \frac{\text{postest score} - \text{pretest score}}{\text{maximum score} - \text{minimum score}}$$

The determination of the criteria for the *N-Gain* value is presented as follows:

Table 1. Average Value of *N-Gain* (Ulum Ma'rifah, 2017)

Average N-Gain	Classification	Effective Level
(g) > 0,70	High	Effective
0,30 < (g) < 0,70	Moderate	Moderate Effective
0,30 > (g)	Low	Less Effective

Evaluation is the final stage of the ADDIE model development, the evaluation stage the students were given a questionnaire weeks to determine the response of students to instructional media E-leaflet that has been used. The results of the questionnaire serve as input for improving learning media in the future and as complementary data to answer the problem formulation.

RESULT AND DISCUSSION

Learning outcomes are abilities possessed both in terms of knowledge (cognitive), attitudes (affective) and skills, all of which are obtained through the teaching and learning process (Islahuddin & Abdurrahman, 2015; Moto, 2019; Siregar, 2019). The results of learning biology in the cognitive domain are the results of learning the knowledge obtained by students in biology subjects. Based on the results of preliminary observations in the field, there are several obstacles such as the low learning outcomes of students' biology in the excretory system material because teachers have limitations in the use of biology learning media. Based on the questionnaire given to students, information was obtained that students need media that contains a summary and is accompanied by interesting pictures. Based on the background above, the researcher made learning media e-leaflets which contain the function of the excretory system, organs, structure and function, the process of urine formation and disorders of the excretory system which are supported by attractive pictures and colors. E-Leaflets is then validated by two experts. the results of expert validation can be seen in the table 2 and 3.

Table 2. Expert media validation results 1

Assesment Indicator	Score Each Aspect	Maximum Score	Percentage (%)	Criteria
Display	7	8	87%	Valid
Cover Design	10	12	83%	Valid
Conten Design	40	44	91%	Valid
Overall Score			(57 : 64) x 100% = 89%	
Criteria			Score = 80 - 100% (Valid)	

Table 3. Expert media validation results 2

Assesment Indicator	Score Each Aspect	Maximum Score	Percentage (%)	Criteria
Display	6	8	75%	Valid
Cover Design	11	12	92%	Valid
Conten Design	36	44	82%	Valid
Overall Score			(53 : 64) x 100% = 83%	
Criteria			Score = 80 - 100% (Valid)	

Based on the validation results, E-Leaflet got an overall score percentage of 89% by the first expert, and an overall score percentage of 83% by the second expert and entered the valid category. This is in accordance with the opinion (Arikunto, 2013) which states that if the feasibility of learning media gets a score above 80%, it has a valid category and does not need to be revised. The results of the validation of the first expert media design on the content design aspect obtained the highest percentage of 91% and the second expert on the cover design aspect obtained the highest percentage of 92%. The design on E-Leaflets contains many factors including attractive colors, beautiful illustrations, and interesting pictures according to the material, which aims to beautify content and to attract the reader's attention (Piantola *et al.*, 2018; Dewi *et al.*, 2021; Lestari *et al.*, 2021). After being validated by media experts, E-Leaflets were also validated by material experts. Material expert validation was carried out by two experts. Material expert validation is carried out by filling out an assessment questionnaire sheet for each aspect of the assessment, there are several statements. The result can be seen in the table 4.

Table 4. Validation results of material expert E-Leaflet

Validator to	Rated Aspect		
	Content	Presentation	Language
1	20	10	12
2	19	11	11
Total Score	39	21	23
Maximum score	48	24	24
Percentage	81%	87%	96%
Criteria	Valid	Valid	Valid
Overall Score	(83:96) x 100% = 86%		
Criteria	Score 80-100% = Valid		

Based on table 4, it is known that the percentage content aspect obtained from the two validators is the highest, namely 95%, the presentation aspect is 87% and the language aspect is 82%. The results of the material expert validation are known to have valid criteria because they have a score of 80-100%. In the language aspect, the percentage obtained from the two validators is the highest, which is 96%. This high percentage is obtained because the language used in the material content is easy to understand, besides that the sentences are short and precise. Simple language will make it easier for readers to understand and remember the contents of the writing (Suprihatin, 2015; Tafonao, 2018; Kariska & Anindyarini, 2019). Testing the effectiveness of the E-Leaflet learning media on students using the *One Group Pretest-Posttest design*. the results of the *pretest* and *posttest* can be seen in table 5.

Table 5. The results of *pretest* and *posttest*

No	Criteria Implementation	<i>Pretest</i>	<i>Posttest</i>
1.	Total students	34	34
2.	Total score	2103	2797
3.	Minimal score	22	60
4.	Maximal score	90	95
Average		61,85	82,26

Based on table 5 After the trial, the average *pretest* result was 61.85 and the result *posttest* was 82.26. The minimum completeness criteria value for biology subjects is 72, therefore the results of research in the experimental class have exceeded the specified minimum completeness criteria. The results of the different test between before and after the experiment showed a significant difference regarding learning outcomes in the cognitive domain (Indriastoro & Rofiq, 2014; Careny *et al.*, 2017; Hardiyantari, 2017). This can be seen from the learning outcomes using E-Leaflet learning media on the excretory system material on student learning outcomes by looking for the *N-Gain value*. The *N-Gain value* is presented in the following table:

Table 6. Average value of *N-Gain*

No.	Criteria Implementation	Pretest	Posttest
1.	Total student	34	34
2.	Total Score	2130	2797
3.	Minimal Score	22	60
4.	Maximal Score	90	95
5.	Average	61,85	82,26
Score N-Gain 0,50 (Moderate)			

Based on table 6, it is known that the average *N-Gain* value obtained is 0.50 and is included in the medium category. Ineffective learning media can cause student learning outcomes to be low (Indriastoro & Rofiq, 2014; Hardiyantari, 2017; Gayathri *et al.*, 2021). This can be seen from the learning outcomes using E-Leaflet learning media on student learning outcomes by looking for the *N-Gain value*. The *N-Gain* value obtained is 0.50 and is included in the medium category. Based on the *N-Gain* value obtained, the E-Leaflet learning media material for the excretory system is effective in improving student learning outcomes. The use of Leaflet learning media is used to improve student learning outcomes (Futriyah, 2013; Meliyati, 2015; Agustiya *et al.*, 2017). The final stage of the ADDIE model of which stage of evaluation. This stage is seen from the student response questionnaire given after using the E-Leaflet media. The average value obtained from the results of student responses contained in table 15 received a positive response, which was 81%. Practicality and increasing student interest in learning media can be assessed by a student response questionnaire with a positive response (Sukmadinata, 2007; Nurkholis, 2013; Rahman *et al.*, 202). The learning media presented can be a learning resource that can help students learn so that learning objectives can be achieved (Fauziah *et al.*, 2018; Zaki & Yusri, 2020; Wahyuni *et al.*, 2022). Based on the results of the study, it can be concluded that E-Leaflets were developed in schools as learning media to assist teachers in teaching and improve student learning outcomes as the final result.

CONCLUSION

Based on the results of the study it can be concluded that the E-Leaflet was developed in schools as a learning medium to assist teachers in teaching and improve student learning outcomes. Then the final result of the development of the E-Leaflet is named Electronic Leaflet or abbreviated as (E-Leaflet). In the developed E-Leaflet there are also several supporting features such as Notifications/Information, discussions, reflections, Word Square games and learning videos to support the material. The developed E-Leaflet learning media also received an assessment from the results of validation by 1 media expert of 89% and 2 media experts of 83% in the valid category and received an assessment from material experts of 86% in the valid category. The developed E-Leaflet learning media is also able to improve students' biology learning outcomes. This is evidenced by the results of the value *N-Gain* of 0.50 by showing the medium category (quite effective) and getting an assessment of the results of the student questionnaire by 81%. E-Leaflet is valid and appropriate for use in learning activities.

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