JPPIPA 9(12) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Human Reproductive System E-Module Teaching Materials using the Flip Pdf Corporate Application

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Received: July 6, 2023
Revised: October 28, 2023
Accepted: December 20, 2023
Published: December 31, 2023

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DOI: 10.29303/jppipa.v9i12.4573

Abstract: This research focuses on developing and implementing e-module teaching materials for the human reproductive system using the Flip PDF Corporate application. Following the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), the study begins with an analysis of student and teacher needs, along with an examination of the human reproductive system's basic competencies. The resulting e-module structure includes sections such as Introduction, Human Reproductive System overview, and Closing, among others. Expert validation, involving biologists and digital media experts, contributes to the development process. The study's implementation results indicate positive outcomes, with an average test score of 79.50, surpassing the KKM standard, and a good classification value. All students passed, with 53% achieving a good grade and 47% reaching a very good grade. Student responses also highlight the favorable material and technical quality aspects of the Flip PDF Corporate application. Overall, the research successfully demonstrates the effectiveness of the designed teaching materials for the human reproductive system.

Keywords: E-modul; Flip PDF corporate; Human reproductive system

Introduction

Teaching materials according to Prastowo (2013) are all materials that can be in the form of information, tools, or text which are arranged systematically, to acquire competencies that will be mastered by students and used in the learning process activities with the aim of planning and studying the implementation of learning, for example, textbooks, modules handouts, LKS, models or mockups, audio teaching materials, interactive teaching materials and so on. Meanwhile, according to Majid (2014), teaching materials are all forms of materials used to assist teachers or instructors in carrying out teaching and learning activities in class. The material in question can be in the form of written material. So, the teaching materials are only in the form of written materials.

This shows that teaching materials are a very important component in facilitating the learning process, so educators must create innovative and interesting teaching materials by the times that have entered the industrial era of 4.0, and everything has used digital technology. Then educators must provide teaching materials that are practical and do not burden students during the learning process.

Material about the human reproductive system is very important because it teaches us about important functions and processes that occur in the human body related to reproduction. The following are several reasons why this material is considered important: 1) Understanding of Reproductive Health: Understanding

How to Cite:
Sugianto, S., Liunokas, A. B., Listari, N., Dewi, N. P. Y. A., Rasyid, A., & Chaidir, D. M. (2023). Development of Human Reproductive System E-Module Teaching Materials using the Flip Pdf Corporate Application. *Jurnal Penelitian Pendidikan IPA*, *9*(12), 10965–10972. https://doi.org/10.29303/jppipa.v9i12.4573

the human reproductive system helps us understand how the human body reproduces and how to maintain reproductive health. With this knowledge, individuals can make informed and wise decisions about their sexual lives, contraception, and family planning, and address reproductive health issues. 2) Healthy Sexual Education: Materials on the human reproductive system are an important part of comprehensive sexual education. Knowledge of anatomy, physiology, and the reproductive cycle helps adolescents and young adults understand the physical changes that occur in their bodies during puberty. It also helps them understand the importance of concentration, healthy relationships, wise decision-making, and prevention of sexually transmitted diseases. 3) Family Planning: Knowledge of the human reproductive system is important in helping individuals and couples to make informed decisions about family planning. Understanding the menstrual cycle, ovulation and fertilization helps in identifying fertile and non-fertile periods, which is useful for managing pregnancy or avoiding unwanted pregnancies. This provides greater control over reproductive health and family life. 4) Male and Female Reproductive Health: Materials on the human reproductive system provide an important understanding of how the reproductive organs work in both men and women. This knowledge enables individuals to recognize the signs and symptoms of reproductive health problems, such as infections, hormonal disorders, and fertility disorders. With this understanding, they can seek the medical care they need quickly, avoid complications, and increase their chances of a healthy pregnancy.

Based on the preliminary study, students found some difficulties in learning the material on the human reproductive system including: Complexity of Anatomy and Terminology: Material on the human reproductive system involves an understanding of complex human anatomy and technical terms that may be difficult to remember. Abstract Biological Concepts: Some biological concepts related to the human reproductive system, such as the menstrual cycle, fertilization, and embryo development, can feel abstract and difficult to understand. Lots of Details and Information Available: Materials on the human reproductive system involve a lot of detail and information that needs to be studied. Sometimes, this amount of information can become confusing and difficult to remember. Subject Sensitivity: Materials about the human reproductive system involve sensitive and personal topics.

Based on these problems, it is necessary to develop digital teaching materials for the human reproductive system in the form of E-modules. Digital teaching materials are a set of materials or media that are arranged systematically for digital learning needs online and offline where the sources can be obtained from visual aids, audio, multimedia, animation, computers, and networks in the form of e-books or e-modules (Rusli et al., 2020).

Herawati et al. (2018) argues that electronic modules (e-modules) are digital teaching materials that have a general appearance design like a text module in general, but the content inside is equipped with various media components namely text, images, video, and animation, and uses attractive color proportions. According to Asmi et al. (2018), E-module is one example of technological development that can improve the quality of the learning process. His research shows that the e-module he developed was effective in increasing learning outcomes and strengthening student character.

According to Smaragdina et al. (2020), The advantages of e-module teaching materials are considered capable of providing different learning experiences for students, as well as increasing student motivation to study the materials provided. In addition, this teaching material also has the potential to be integrated with digital devices and internet technology which is very popular with the digital native generation.

Research result by Herawati et al. (2018) shows that interactive e-modules for class XI IPA SMA according to material experts and media experts are in a good category. In general, the application of interactive e-modules is categorized in the very good category and gets a positive response from students. There is a difference in learning achievement between the pre-test and post-test after using the chemical interactive e-module with sig < 0.05.

According to Muzijah et al. (2020) In his research, it shows that e-modules with exe-learning applications are suitable for training students' scientific literacy. The validity of the e-module was obtained in the very valid category, the practicality of the e-module based on the student response questionnaire was obtained in the practical category, and the effectiveness of the e-module based on the learning achievement test obtained an N-Gain score of 0.41 which was categorized as effective. In line with Fitriani et al. (2020) that the developed biology subject e-module is very feasible as a learning resource to be applied to students. Based on this background, this research tries to develop digital teaching materials E-Module for the human reproductive system using Flip PDF Corporate.

Method

The research development procedure follows the well-known working steps of the ADDIE approach

(Analysis, Design, Development, Implementation, and Evaluation) (Branch, 2019). The research steps include Analysis, Design, Development, Implementation, and Evaluation (Sugiono, 2014).

In the analysis stage, the researcher examines material from the human reproductive system from various sources. Preparation of teaching materials especially for software applications (Flip PDF Corporate), reviewing research methods, and reviewing the results of previous research. Next is to arrange the product, namely teaching materials for writing the human reproductive system using interactive media, Flip PDF Corporate. Researchers also analyzed the need for teaching materials, to prepare e-module teaching materials using Flip PDF Corporate.

At the Development stage, the researcher carried out development which included validating teaching materials to biology teaching material experts, especially at the 8th-grade junior high school level. Validation was carried out to determine the feasibility of teaching materials. Validation of teaching materials is carried out by Biology experts and digital teaching materials. The human reproductive system material was expertly validated by Biology subject teachers. Digital teaching material products in the form of E-Modules using Flip PDF Corporate are validated by digital teaching material experts. Revisions obtained based on input from the research of expert validators on teaching materials and digital teaching materials (e-modules) using Flip PDF Corporate.

At the Implementation stage, the researcher carried out the implementation stages: Field trials for class VIII students of SMPN 3 Pelered, at this stage the product will be tested on students who are potential users or beneficiaries of the product. This is to find out the effectiveness of teaching materials for the human reproductive system using Flip PDF Corporate and the needs of students in lessons using these teaching materials. Retrieve test data on student learning outcomes and response questionnaires, and perform data analysis on trial results.

At the evaluation stage, researchers will evaluate products that have been tested in the field. Using the evaluation stage aims to find out the results of the product being tested in the field. This can be obtained from student response questionnaire sheets and writing tests on the human reproductive system on teaching materials that have been developed using Flip PDF Corporate. Conducting evaluation aims to improve the product to be better and easier to use.

In this study, the data collection technique used was a questionnaire for assessing teaching materials and student learning outcomes tests. Observation is the activity of observing the learning process in class to get an overview of the teacher's activities before and after applying the human reproductive system e-module teaching materials during learning. The questionnaire is used as a data collection technique which is given in written form. Questionnaires or questionnaires are data collection techniques in the form of questions posed by researchers given in writing and forms of answers given by respondents in written form (Sudjana, 2006). The author will use a questionnaire as an instrument to collect data. The results of the questionnaire are in the form of scores of assessment results and suggestions for improvement which can be re-analyzed and described qualitatively. The questionnaire compiled by the author is in the form of an expert lecturer validation questionnaire. Tests are generally used to measure the results of student learning, especially learning outcomes related to mastery of teaching materials and teaching objectives. This test was carried out by researchers to obtain data and information about student achievement in certain biology subjects in teaching and learning activities. The test is an instrument to measure learning achievement. In this case, the test is used as a data collection tool to measure student competency (Sugiono, 2014).

Result and Discussion

Design of E-Module Teaching Materials for the Human Reproductive System Presented Using the Flip PDF Corporate Application

The results of the development carried out by the researcher show that the design of teaching materials for the human reproductive system has an e-module structure consisting of; Cover, Identity of Teaching Materials, Preface, Table of Contents, List of Figures, List of Tables, Chapter I Introduction (description, prerequisites, objectives), Chapter II Human reproductive system (Definition of the human reproductive system, structure and function of the human reproductive system, disorders of the human reproductive system, evaluation), Chapter III Closing, Bibliography, Glossary, and Author Profile.

The cover display for the human reproductive system e-module consists of the author's name, the title of the e-module, and the cover image of the human reproductive system. While the tool function consists of zooming which functions to zoom in and zoom out, and arrows to the left and right if using a PC then it has the function to open to the next and previous page, whereas if on an Android smartphone to open the previous and next pages just use a touch to the left and right to the right of each e-module page.

Table of contents page, there are arrow buttons to the right and left which function to enter the next page

or previous page, by touching the page to the left or right if using an Android smartphone. The display on the introductory Chapter I page consists of image media content and text content. Text content contains; description, prerequisites, content competencies, basic competencies, and final goals. Chapter 2 page displays consist of content on the human reproductive system, media images, video media, and content on interactive evaluation questions.

The results of the development of teaching materials for the human reproductive system are in line with the opinion of Prastowo (2013), that technically, the e-module is structured into four structures, namely: The title of the e-module, contains the module name of a particular subject or theme. General instructions, containing an explanation of the steps to be taken in learning, including basic competencies; biological staple; achievement indicators; reference; learning strategies; explain the approach, step method used in the learning process; learning activity sheets; instructions to understand the steps of learning activities; and evaluation. E-module material, contains an explanation of the material being taught. Evaluation, to measure the competence of students.

Powered by Lilis et al. (2019), that E-module teaching materials have seven characteristics including: E-modules can be used on laptops, notebooks, or PCs offline, E-modules can be used by educators, students, independently or publicly, E-modules -this module attracts attention, is easy to operate, helps understand the material, helps students independently, students can learn according to their abilities and desires because users can control the learning process themselves, Teaching materials E-module can make it easier for students to practice independently by following the available learning video steps, E-module teaching materials are supported by material that has been adapted to the core competencies and basic competencies of the 2013 revision of the 2018 curriculum, Answer keys for formative tests for each biology sub-topic are displayed after students answer all the questions presented so that students can measure their own level of competence that has been achieved, Students can fill in formative tests repeatedly as a form of exercise to achieve maximum results.

Opinion strengthened by Rozak et al. (2020) in their research that digital teaching materials have advantages, including the presence of image, sound, and learning video features as well as supporting icons that make teaching materials more attractive to use.

Table 1. Recapitulation of the Validation Results of E-Module Teaching Materials for the Human Reproductive System

Validated aspects	Number of Items	Validation Score	Average	Criteria
E-Module size	2	9	4.5	Very Good
E-Module cover design	9	35	3.9	Good
E-Module content design	9	38	4.2	Very Good

The human reproductive system e-module has several advantages such as the size or dimensions of the e-module which is very suitable for mobile and PC computer models, the cover design of the e-module is very attractive and elegant, and the material content in the e-module is very complete based on learning outcomes and is based on multimedia. So it can be proven that the results of the validation of the human reproductive system E-Module teaching materials (Table 1) carried out by learning media experts show that the validation of the E-Module size in the human reproductive system material has very good criteria, validating the cover design of the human reproductive system E-Module has good criteria, and validation of the exposition E-Module content design has very good criteria.

Table 2. Recapitulation of the Results of Validating the Content of Human Reproductive System Material on Digital Teaching Materials

Validated aspects	Number of Items	Validation Score	Average	Criteria
Content eligibility	11	47	4.3	Very Good
Presentation eligibility	10	41	4.1	Good
Biological assessment	11	40	3.6	Good

The results of content validation of the human reproductive system material (Table 2) on teaching materials in the form of E-Modules were carried out by Biology content experts. Demonstrate content feasibility validation, presentation feasibility, and biological assessment of human reproductive system material in digital modules (E-Modules), all of which have good criteria.

The validator provided a lot of input on the human reproductive system E-Module teaching material. This

input is so that the product being developed can be suitable for use in limited trials. These inputs include, Media experts suggest suggesting that the front cover of the e-module be revised with better and more attractive images and appearance so that students will not get bored in participating in Biology learning on the subject of the human reproductive system through e-module teaching materials. Image media content in the e-module should be replaced with video media. In line with the input of biologists, namely, the picture media in the e-module should be replaced with video media so that students can more easily identify, and analyze the content, structure, and biological rules of the human reproductive system of the news. Biologists also suggest that evaluation questions be improved to be more interactive with online media, thus deepening the analysis of the human reproductive system through practice questions.

Results of the Implementation of E-Module Teaching Materials for the Human Reproductive System Using the Flip PDF Corporate Application

The results of the implementation of the human reproductive system e-module teaching materials presented using the Flip PDF Corporate application show the value of the trial test results with an average of 79.50 above the standard KKM value and a good classification value. This proves that all student scores pass because they are above the KKM standard.

Based on the value classification (Figure 1), there are 53% of students have good grades, and 47% of students have very good grades.

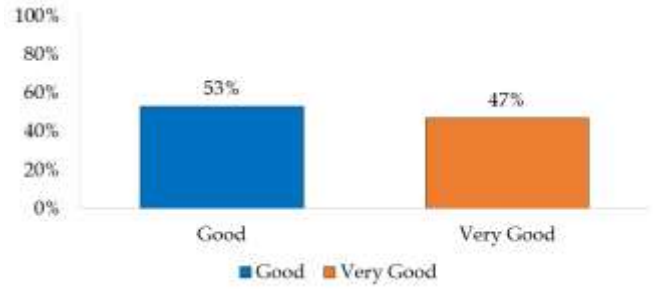

Figure 1. Classification of learning outcomes value

The results of the implementation also show that the material quality and technical quality aspects have good criteria. In the aspect of material quality the human reproductive system e-module teaching materials show that the material being taught is easy for students to understand, sentences on the human reproductive system can be understood by students, the order of presentation in the human reproductive system e-module using Flip PDF Corporate makes learning very precise, e -the human reproductive system module using Flip PDF Corporate makes students more active, and according to students learning using the human reproductive system e-module assisted by Flip PDF Corporate does not take long to understand human reproductive system material.

Aspects of technical quality and appearance show; the display on the human reproductive system e-module using Flip PDF Corporate is very beautiful; the human reproductive system in the human reproductive system e-module using the Flip PDF Corporate is legible; the quality of images, illustrations, text, and sound in e-modules of the human reproductive system using Flip PDF Corporate is very good; practice questions have very good assessment feedback; the composition of the color combination used in the digital module is very good; navigation inside the digital module (E-Modul) is easy to use; Sub-subject biology material in the human reproductive system e-module using Flip PDF Corporate is easily accessible via a PC or an Android smartphone so that students can interact more quickly.

This is in line with the opinion of Asmi et al (2018), that the advantages of E-Module can foster motivation for students; There is an evaluation that allows teachers and students to know which parts have not been completed or have been completed; Study materials can be broken down so that they are more evenly distributed in one semester; Study materials are arranged according to academic level; Can make modules more interactive and dynamic than printed modules which are more static; and Can use video, audio, and animation to reduce the high verbal element of the print module.

According to Smaragdina et al. (2020), the advantages of e-module teaching materials are considered capable of providing different learning experiences for students, as well as increasing student motivation to study the materials provided. In addition, this teaching material also has the potential to be integrated with digital devices and internet technology which is very popular with the digital native generation.

According to Krishnaprabu (2019) the advantages of e-module teaching materials namely: "One of the advantages is that students usually learn more in less time when receiving computer-based instruction and they like classes more and develop more positive attitudes toward computers in computer-based classes. Students can independently solve problems. There are no intrinsic age-based restrictions on difficulty level, i.e. students can go at their own pace. Students editing their written work on word processors improve the quality of their writing".

Research Alperi (2019) shows the use of Sigil digital teaching materials which are designed in the form of modules with their functions and advantages, can make students interested in learning and play a role in

increasing the learning independence of junior high school students. The stages of developing digital Sigil teaching materials (modules) are analysis, design, testing and development, implementation and refinement, evaluation and revision, and finally using them according to the target.

According to Zaini et al. (2019), Digital Book-based teaching materials are significantly higher than before using Digital Book-based teaching materials. In other words, the use of Digital Book-based teaching materials can improve student learning outcomes; Student learning outcomes after using printed teaching materials are significantly higher than before using printed teaching materials. In other words, the use of printed teaching materials can improve the learning outcomes of class X students in Mathematics; and The increase in student learning outcomes in which learning uses Digital Book-based teaching materials is significantly higher than the increase in student learning outcomes in which learning uses printed teaching materials.

According to Arlika et al. (2021) in their research, the digital modules he developed were very valid and suitable for use as supporting teaching materials in learning. In addition, from the results of the analysis after the media is applied it affects increasing student learning outcomes. Students can pass with scores above the minimum completeness criteria that have been set.

Supported by Khuzaimah et al. (2022) opinion based on his research that the problem-based physics learning e-module developed is effective in improving students' concept understanding skills. According to Rahma et al (2023), with the use of E-Modules based on the 5E Learning Model, learning becomes more interesting, interactive and effective in achieving learning goals. As well as helping students be more active, creative and independent in understanding complex chemical concepts.

Based on the results of research conducted by Miftakhurrohmah et al. (2023), there is a difference in average scores between before learning using the Guided Inquiry-Based E-Module and after using the Guided Inquiry-based E-Module in human subjects. excretory system.

Based on Andriani et al. (2021) research, it shows that: the temperature and heat e-module has been successfully developed in accordance with the guided inquiry model to increase students' scientific literacy, the guided inquiry-based temperature and heat e-module is very suitable for use in learning, the inquiry-based temperature and heat e-module guided effectively increases students' scientific literacy with high category N-gain scores.

According to Subari et al. (2022), the E-Module on ecology and environmental change with the guided inquiry approach that has been developed is in the category of very valid, very practical, and very effective in improving student learning outcomes.

According to Yanarti et al. (2022), E-module is very feasible and effective enough to be applied in learning, because it can be proven that the improvement results are quite effective with an average N-Gain of 62.9%. Apart from that, the gain for students who completed the KKM in the control class was 100 percent, while in the control class only 83.33% completed the KKM. Overall it can be guaranteed that. Meanwhile, according to Yevira et al. (2023), the development of the SETS-based science module that has been developed is effectively used to improve student learning outcomes.

According to Prabasari et al. (2021), the E-module based on problem based learning has been effective in improving students' ability to think critically, which is indicated by an increase in students' pretest and posttest scores, and based on the average result of the N gain score of 0.76. Agree with Manurung et al. (2023) that there is a significant influence on student learning outcomes who are given the additive chemistry e-module using the Discovery Learning model.

According to Ndoa et al. (2022), the application of physics e-modules based on flipped learning in physics learning, especially material on quantities and measurements, can increase the learning motivation of class X high school students.

Conclusion

Based on the results of research and development of e-module material on the human reproductive system. First, the design of human reproductive system teaching materials presented using the Flip PDF Corporate application has an e-module structure consisting of; Cover, Identity of Teaching Materials, Preface, Table of Contents, List of Figures, List of Tables, Chapter I Introduction (description, prerequisites, objectives), Chapter II Human reproductive system (Definition of the human reproductive system, structure and function of the human reproductive system, disorders of the human reproductive system, evaluation), Chapter III Closing, Bibliography, Glossary, and Author Profile. While the validation results of the human reproductive system E-Module teaching materials carried out by learning media experts showed that the size validation of the E-Module for human reproductive system material had very good criteria, validation of the cover design of the E-Module human reproductive system had good criteria, and validation of content design The exposition E-Module has very good

criteria. While the results of content validation of human reproductive system material in teaching materials show content validation, presentation feasibility, and biological assessment of human reproductive system material in digital modules (E-Modules), all of which have good criteria. Second, the results of the implementation of teaching materials for the human reproductive system using the Flip PDF Corporate application show that the value of the test results with an average of 79.50 is above the KKM standard and has a good classification value. This proves that all student scores pass because they are above the KKM standard. Based on the value classification, 53% of students have good grade criteria, and 47% of students have very good grade criteria. The implementation results based on student responses also show that the value of the material quality and technical quality aspects has good criteria.

Acknowledgments
Conceptualization, S.; methodology, A.B.L.; validation, N.L.; formal analysis, A.R.; investigation, M. N. S., and C. H. S. A.; resources, N.P.Y.A.D.: writing—original draft preparation, D.M.C.; writing—review and editing. All authors have read and agreed to the published version of the manuscript.

Author Contributions
All authors contributed to writing this article.

Funding
Frivate funding.

Conflicts of interest
There is not conflicts of interest.

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