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Development of Moodle E-Learning in Learning Human Reproductive System in Junior High School

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Abstract

This study aims to analyze the development of Moodle-based e-learning on human reproductive system material for junior high school students. The type of research developed is Research and Development (R&D) with the 4D development model. This model consists of 4 stages, namely defining, designing, developing, and disseminating. Meanwhile, this research focuses only on the definition stage. The analysis of the definition stage carried out, namely: front-end analysis, learner analysis, task analysis, concept analysis, specifying instructional objectives. The research subjects consisted of thirty students and one junior high school science teacher. Data collection techniques through observation in the form of interviews and filling out questionnaires by students. Based on the results of the research and discussion that has been presented, it is necessary to develop alternative learning media, namely Moodle-based e-learning on human reproductive system material for junior high school students.

INTRODUCTION

Technological developments in Indonesia in the field of education are used in the teaching and learning process with the aim of improving the quality of education (Gafar & Abdoel, 2017). The rapid development of technology has encouraged educators to continue to update the learning media used in facilitating learning for students. Technology in the form of the internet is used as a medium to increase the effectiveness and efficiency of learning activities (Anih, 2016; Syafril et al., 2020). The number of internet users is increasing by the conditions of the Covid-19 pandemic to date which makes people accustomed to work and study from home (Jaelani et al., 2020; Yusnita et al., 2018). This activity is connected by the existence of electronic learning or better known as e-learning. E-learning supports distance learning systems by utilizing internet access through

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electronic devices, so that it can be done anytime and anywhere both when learning takes place face-to-face or offline, and strongly supports distance learning or online (Ahdar & Natsir, 2021).

Based on the results of observations in the form of interviews conducted with Science teachers in one of the junior high schools stated that the learning media used in the classroom are power point slides, laboratory equipment, videos through projectors, and textbooks. The media is allegedly less interesting for students, seen from the low interest in reading students to the material being studied, there are students who are not serious when learning takes place, and the low motivation of students in working on evaluation questions. The next obstacle is that students are not all present at school so that learning is unevenly obtained, and a lot of Natural Science material is not optimally resolved due to limited learning time in class.

The results of the observation questionnaire filled out by 30 students at the junior high school level stated that 70% had difficulty in understanding Natural Science material. This is because 90% stated that the material was too much, 56% stated that it was difficult to understand complicated material because of the process mechanism, 76.6% stated that the material was difficult because there were many new terms known, and 70% stated that the media used during the learning process was limited. Next, the questionnaire results show a percentage of 63.3% choosing human reproductive system material which is classified as difficult, and alternative learning media is needed.

The utilization of e-learning is an alternative choice for learning in schools. E-learning that is widely used at the high school to college level is Moodle. Moodle (modular object oriented dynamic learning environment) is defined as a place to learn by using an open source web-based learning model, which is open to modify its features according to user needs (Sampurno et al., 2015). The benefits of Moodle as a program that converts learning media into online web form, so that it can overcome the limitations of face-to-face frequency between educators and students (Herayanti et al., 2017).

Junior high school Pembangunan Laboratorium Universitas Negeri Padang has been using the Google Classroom type of e-learning since the Covid-19 pandemic until 2021. Google Classroom is stated by the teacher if its utilization is only limited to providing material and collecting assignments. In this case, learning does not take place optimally, while the use of e-learning should support and facilitate learning activities to be able to attract students' interest so that it does not take place monotonously, so that learning takes place effectively and time efficiently.

After the utilization of Google Classroom, schools use Geschool which is integrated uniformly at the secondary education level in Padang city. Teachers stated the shortcomings of using Geschool, namely the material is too little, the evaluation is not varied which only consists of 5 multiple choice questions. While in students there are also problems related to the lack of interest in participating in learning, which is known from the laziness of reading existing material, until the answers given by students on the evaluation are classified as perfunctory.

Moodle is an alternative learning media that can be accessed through electronic devices such as computers, laptops, and smartphones (Budiman et al., 2019). This access does not require an application because it is web-based, so educators and students can smoothly use Moodle without worrying about full storage on the device used. The use of Moodle is appropriate for online classes and learning outcomes are relatively as good as face-to-face learning between educators and students (Syaputra & Budiman, 2021). The advantages of important features in Moodle such as attendance, evaluation, quiz, discussion

forum and chat, as well as the main feature of being able to upload learning materials supported by various file formats (Restendi et al., 2020).

Moodle-based e-learning as information and communication technology to activate students to learn anytime and anywhere (Fauzi, 2020; Zainudin, 2020). The advantage of using Moodle for educators is that they can monitor and check the development of students' activities when accessing learning. All activities through Moodle can be monitored automatically, and educators can also provide direct feedback to each student. The results of the observation questionnaire show that all learners agree to develop Moodle-based e-learning media.

Based on research conducted by Sampurno in 2015, it proves that Moodle is suitable for use in learning with a valid category. Moodle has valid and practical criteria in learning media for Mathematics (Pratiwi & Silalahi, 2021). Moodle-based media development obtained valid and practical criteria in learning Biology (Sutraningsi et al., 2021). The use of Moodle resulted in positive interest in taking the Biology learning process and outcome evaluation course (Wicaksana, 2020). Based on the things that have been described and the advantages of using Moodle-based e-learning which is appropriate for use as a medium in learning Natural Sciences at the junior high school level in Indonesia.

METHODS

The type of research used is Research and Development (R&D) development research using the 4D development model (Damri et al., 2020; Asril et al., 2023; Syafril et al., 2020). This development model consists of 4 stages, namely defining, designing, developing, and disseminating. This research focuses on the analysis of the defining stage which consists of first, front-end analysis. Second, learner analysis. Third, task analysis. Fourth, concept analysis. Fifth, the formulation of learning objectives (specifying instructional objectives) (Asril et al., 2023; Damri et al., 2023; Wulandari et al., 2020). The research subjects consisted of 30 students in class IX at Junior high school Pembangunan Laboratorium Universitas Negeri Padang, and one Science teacher. Here are the defining stages in this study.

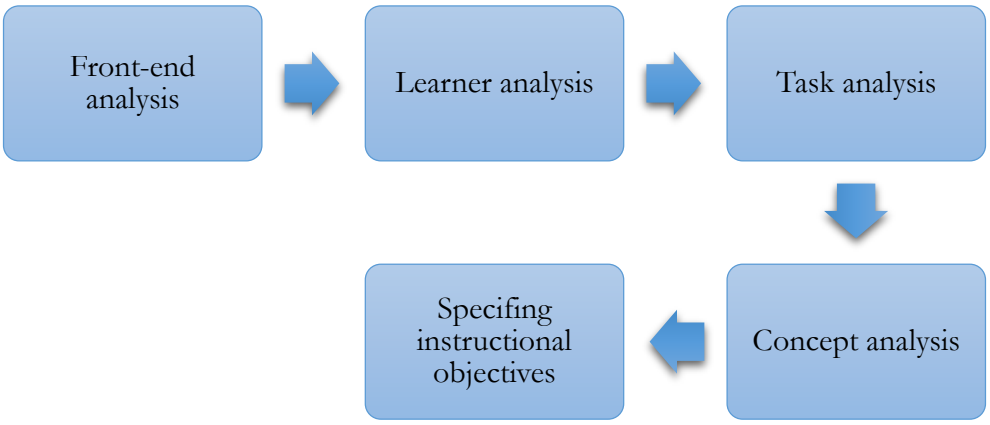


Fig 1. The defining stage of the research

First, the front-end analysis. Front-end analysis aims to analyze learning media and determine the basic problems faced by educators as well as students in learning Natural Sciences (Alatas & Solehat, 2022). The front-end analysis was conducted by observation in the form of interviews with Natural Science subject teachers and filling out questionnaires by 30 students of class IX of Junior high school Pembangunan Laboratorium Universitas Negeri Padang. Second, learner analysis. Learner analysis aims to pay attention to the characteristics of students,

learning style tendencies and students' interest in learning Science (Chaliq & Toifur, 2024; Engkizar et al., 2017).

Third, task analysis. Task analysis aims to analyze the abilities that must be possessed by students in the learning process of the independent curriculum. Task analysis is carried out by identifying the learning objectives of Natural Science, and learning outcomes related to aspects of understanding Natural Science and process skills. Fourth, concept analysis. Concept analysis is carried out by determining the basic concepts that are relevant and should be present in learning, to assist educators in planning learning procedures and sequences, and to assist students in achieving expected competencies. Fifth, analyze learning objectives (specifying instructional objectives). Learning objectives analysis is the stage of converting the results of task analysis and concept analysis into learning objectives that are used as the basis for planning Moodle-based e-learning (Mardiana et al., 2022).

RESULT AND DISCUSSION

The defining stage aims to define the requirements needed in learning, by analyzing the learning media used by schools, constraints and learning style tendencies of students, learning objectives of Science, learning outcomes related to aspects of understanding and process skills, as well as the material to be taught. The following are some of the steps taken at the defining stage.

First, the front-end analysis. Front-end analysis aims to analyze the learning media, determine the basic problems faced by educators and students in learning Science, and find alternatives to solve these problems. This stage was conducted through observation by interviewing educators, and distributing questionnaires to be filled in by students. Based on the results of interviews with Natural Science teachers at the Junior high school Pembangunan Laboratorium Universitas Negeri Padang mentioned that if the school has implemented an independent curriculum. The media used are power point slides, laboratory equipment, videos through projectors, and textbooks. The media is allegedly less interesting for students, it can be seen from the low reading interest of students in the material being taught, there are students who are not serious when learning takes place, and the low motivation of students in working on evaluation questions. The next obstacle conveyed by the teacher is that students are not all present at school so that learning is unevenly obtained, and complex Natural Science material is not optimally completed due to limited learning time in class.

Second, learner analysis. Learner analysis aims to pay attention to the characteristics of students, learning style tendencies, and students' interest in learning Science. Learner analysis is done by distributing questionnaires to be filled in by students. The results of the questionnaire from 30 students stated 70% of difficulties in learning Natural Sciences due to the limited media used, 63% chose the human reproductive system as material that requires alternative learning media, and a total of 66% of students chose the type of interactive multimedia (combined audio and visual, with images, text, and animation) as learning media used during learning.

Diagram 1. Analysis of students' difficulties in understanding Science material

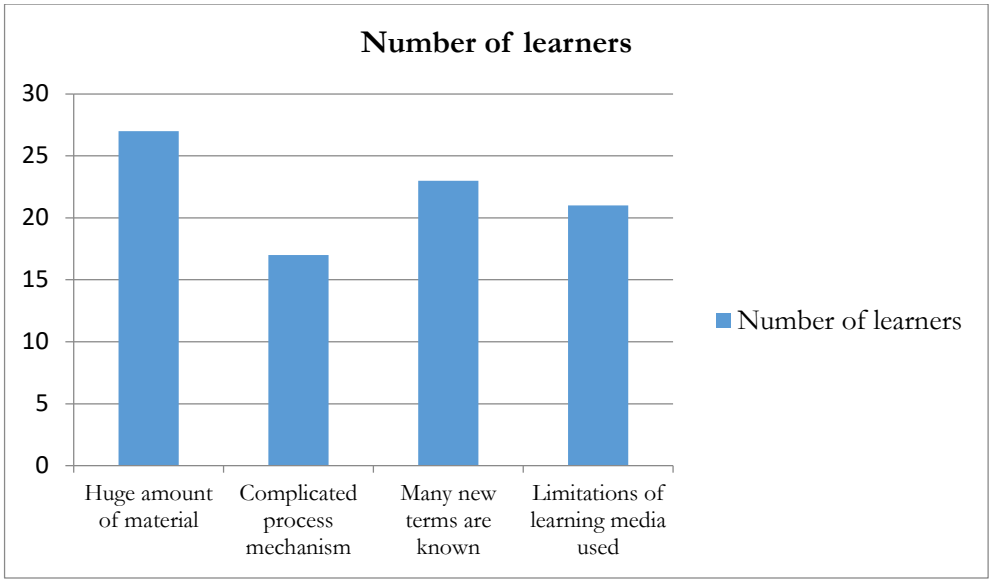
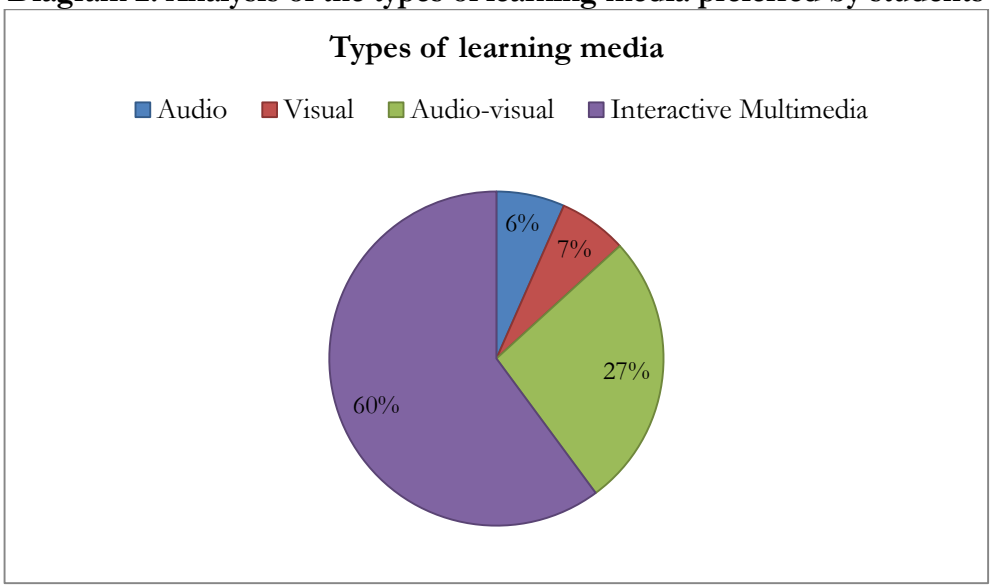


Diagram 2. Analysis of the types of learning media preferred by students



Third, task analysis. Task analysis aims to analyze the abilities that must be possessed by students in the learning process of the independent curriculum. Task analysis is carried out by identifying the learning objectives of Natural Science, and learning outcomes related to aspects of understanding Natural Science and process skills. The learning objectives of Natural Sciences are that through the scientific process, it is expected that the ability of students to reason critically in order to be able to process and manage information both qualitative and quantitative objectively, build links between various information, analyze, evaluate, draw conclusions and apply what is learned in new situations (Jamil, 2019; Riswakhyuningsih, 2022). Natural Science subjects are expected to facilitate students to be independent and able to collaborate with others (Prasetyorini et al., 2016).

The learning outcome of the understanding element of Natural Science is that students can identify the organizational system of life, and conduct analysis to find the relationship between the organ system and its function, as well as abnormalities or disorders that arise in the organ system (in this study the human reproductive system) (Kemdikbud, 2020). The following learning outcomes in

the process skills element are observing, questioning and predicting, planning and conducting investigations, processing, analyzing data and information, evaluating and reflecting and communicating results (Iskandar et al., 2023; Januarisman & Ghufron, 2016; Mu'arif & Surjono, 2016).

Fourth, concept analysis. Concept analysis is done by determining the basic concepts that are relevant and should be in the learning. Concept analysis aims to help educators in planning learning procedures and sequences, as well as helping learners in achieving the expected competencies. Concept analysis was conducted by identifying concepts in human reproductive system material for class IX junior high school level, which will be presented in Moodle-based e-learning. Researchers organize the concepts that will be taught systematically. Based on the results of the observation questionnaire, all of the 30 students agreed to develop Moodle-based e-learning on human reproductive system material. The concepts in the human reproductive system material are: first, cell division (mitosis and meiosis); second, the structure and function of male reproduction; third, the structure and function of female reproduction and fourth, diseases of the human reproductive system and prevention efforts.

Fifth, analyzing learning objectives (specifying instructional objectives). Learning objective analysis is the stage of converting the results of task analysis and concept analysis into learning objectives which are used as the basis for planning Moodle-based e-learning. The formulation of learning objectives is based on aspects of the learning outcomes of the independent curriculum. The following learning objectives on the material of the human reproductive system for class IX at the junior high school level are first, describing the phases of mitotic and meiotic division (Ramadhani & Martinez, 2022). Second, explain the characteristics of each phase of mitotic and meiotic division. Third, identify the organs that make up the reproductive system in men and women. Fourth, explain the functions of the organs that make up the reproductive system in men and women. Fifth, explain disorders in the human reproductive system. Sixth, explain efforts to prevent disorders of the human reproductive system.

CONCLUSION

Based on the results of observations through interviews with educators and filling out questionnaires by students as well as the discussion that has been described, it is concluded that there are difficulties for students in understanding Natural Science material (in this study the material of the human reproductive system). This is allegedly due to learning media that is less interesting for students and limited learning time in class. In response to this, an alternative learning media is needed, namely Moodle-based e-learning with interactive multimedia features that support distance learning, can be accessed anytime and anywhere via the internet network.

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