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Development Of Biological Ladder Snake Game For Learning Of Reproductive System At Class Xi Sman I Palu

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ABSTRACT
The embarrassment, complexity, and unease of reproductive system material frequently cause high school students to experience difficulty in comprehending it, which can result in a sense of tedium in the classroom. The objective of this research is to create the Biological Snake Ladder (BLS) as a learning aid for educational activities that are specifically designed for grade IX students and pertain to the reproductive system. This research is integrated into the Research and Development (R&D) framework of the 4D development model (Define, Design, Development, and Disseminate). The test participants in this research are 20 students in grade XI MIPA 5 at SMA Negeri 1 Palu. Validity analysis and questionnaire responses from students and instructors comprise the instruments employed. The validation analysis conducted by the expert team resulted in an average score of 83.89%, which satisfied the criteria in a highly feasible manner. At the same time, the average percentage of 86.79% in the questionnaire responses from students and teachers met the very pleasant criteria, thereby promoting a learning environment that is both engaging and pleasurable for students. The study's findings suggest that the development of Biological Ladder Snake (BLS) learning media using reproductive system material is a highly pleasant experience.

Keywords: *Learning Media, Reproduction System, Biological Ladder Snake (USB)*

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I. INTRODUCTION

High school biology classes serve the purpose of meeting curricular requirements and also aim to enhance students' higher-order thinking skills, as stated by Nisak (2021). Nevertheless, several students face difficulties comprehending biology lectures as a result of the profusion of intricate terminology and abstract content, particularly in the domain of the reproductive system. Students frequently conceal this subject matter with feelings of shame, social status, and unfavorable reputation. This leads to a range of challenges and impediments, such as students experiencing unease when it comes to presenting questions and engaging in open discussions in the classroom, resulting in a sense of boredom among students throughout the learning process on this particular subject matter. Ifatrizah and Mellisa (2022) conducted a study that reveals the abstract nature of reproductive system content, making it particularly challenging to understand. One obstacle is that not all schools have teaching materials and learning tools that effectively promote the study of reproductive system topics.

The educational institution, SMAN 1 Palu School, has been employing a diverse range of instructional resources, including package books, LKS, laboratory practicums, teaching modules, group discussions, and educational media like power presentations and instructional films. Students experience ennui, which impedes the achievement of optimal learning outcomes and generates an unpleasant learning environment. The daily exam results indicate that 60% of pupils need remediation since they did not complete the assessments.

Interviews conducted with grade XI students at SMAN 1 PALU uncovered that the biology learning experience in class lacked engagement and variety, particularly because of the restricted utilization of school-provided package books, PowerPoint presentations, and educational films as instructional aids. This finding indicates that a significant proportion of pupils face difficulties in understanding the given instructional materials and lose interest when the teacher just offers explanations. Consequently, this impedes their capacity to accomplish their educational goals and has an adverse impact on their academic achievements. Sani et al. (2019) conducted a study that supports this finding, revealing that 70.38% of students struggled to understand the school handbook's content, and 41.08% lacked access to educational resources. The research proposes the incorporation of relevant and diverse learning strategies in the classroom to promote students' comprehension of the subject matter. They should tailor this approach to their abilities and objectives, and utilize educational resources to enhance their learning experience.

An effective approach to addressing this issue is to employ educational game-based learning tools, such as the Biological Snakes and Ladders (BLS), which integrate gaming elements with the subject matter. The objective of this technique is to establish an enjoyable and dynamic learning environment that enhances students' proficiency in the subject matter (Rahmadani et al., 2023). The objective of this study is to create the Biological Snake Ladder (BLS) as an educational gaming tool for teaching reproductive system concepts to ninth-grade students. The popularity of the biological snake and ladder game among students can enhance their motivation, cultivate their attitudes and skills, promote collaboration among groups, and alleviate boredom, resulting in increased engagement in educational activities (Arman & Aprianda, 2017). The study by Janah and Mitarlis in 2024, which concluded that educational tools like snakes and ladders are effective for facilitating learning, aligns with this.

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II. MATERIALS AND METHODS

The research focuses on the development studies conducted at SMAN 1 Palu School in Central Sulawesi Province. We conducted the research in May 2024, during the first semester of the 2023–2024 academic year. The field of research and development (R&D) utilizes the 4D development models, which consist of the stages of define, design, development, and disseminate, as outlined by Maydiantoro in 2019.

The define step seeks to precisely determine and develop the necessary learning environments by conducting a thorough examination of the students. We will systematically structure and emphasize each subject presented in order to tailor the game to the students' needs. The Biology Snake and Ladder (BLS) learning medium enhances traditional snake and ladder games by integrating instructional content. The snake ladder under discussion consists of 100 tiles, each numbered from 1 to 100. In order to substitute each arbitrary number, participants select a challenge card that comprises three distinct colors: red, yellow, and blue. Each color is associated with unique questions and corresponding point values. This USB game proceeds through the following stages: 1). The instructor organizes the students into 4 groups, provides an explanation of the game's rules, and allows them 15-20 minutes to comprehend the content before commencing the game. 2). Students or apprentices start the game by rolling the dice individually until they obtain the number 6, which grants them entry into the game. 3. The player receives an additional roll if they roll the dice and land on the number 6. 4). Following the dice throw, the player proceeds to move their pawns. After receiving instructions to retract the challenge card, the students chose a card that featured a variety of biological problems. The tasks encompassed delivering presentations, responding to inquiries, making associations, and accumulating 5, 10, and 15 points. 5). When you come across a snake's tail, go down towards its head, then up the steps in the same manner. Students who achieve a score of 100 or successfully complete the task will receive points: 100 points for first place, 75 points for second place, 50 points for third place, and 25 points for fourth place. The team with the highest point total emerges as the victor and receives a gesture of gratitude.

During the design stage, researchers, led by a team of specialists, develop the biological snake ladder (USB) learning medium. In addition, they include supplementary tools such as educational modules on the reproductive system, questionnaires, evaluation tools, and incentives to boost the product's intricacy, usefulness, and efficacy. Prior to assessing pupils, the initial phase involves creating and verifying instructional media. The dissemination step's objective is to execute and disseminate questionnaires among students. The methodologies used include validity analysis and collecting questionnaire responses from both teachers and students. The expert team conducts a validity analysis using a validation sheet to evaluate the effectiveness of the Biological Ladder Snake (USB) learning medium. The analysis includes comments, reactions, critiques, and ideas for future improvements. The lesson teacher and students use the response sheet to complete a questionnaire that gauges their reactions to the newly developed USB learning media. Twenty students enrolled in grade XI MIPA 5 at SMA Negeri 1 Palu make up the participants of this study. Validity tests and practicality tests are the methods used for data analysis. The validity test requires the participation of two validators. Table 1 presents the accuracy and reliability of the utilized data analysis methods.

$$\bar{x} = \frac{\sum xi}{n} x\ 100$$

Information:

$\bar{x}$ = average rating score

$\sum xi$ = the number of scores from the assessor

n = Number of raters

Table 1. Criteria for the Level of Volatility

Value	Category
81-100	Excellent
61-80	Good
41-60	Enough
21-40	Less

0-20	Very less

Source: (Wayudi et al., 2020)

We conduct the practicality test by evaluating the questionnaire responses of educators and students using the data analysis approaches presented in Table 2.

$$\textbf{Value} = \frac{\text{Jumlah perolehan skor}}{\text{Jumlah butir penilaian}} \text{ X } 100$$

Table 2. Criteria for Practicality Level

Value	Category
81-100	Very fun
61-80	fun
41-60	Quite fun
21-40	Less fun
0-20	Very unpleasant

Source: modified from (Akbar *et al.*, 2021)

III. RESULTS AND DISCUSSION

Research Results

The goal of this project is to create a biological snake and ladder game (USB) using the reproductive system content from class IX MIPA 5, with the aim of promoting an interactive and pleasurable learning atmosphere. The biology snake and ladder game consists of three main elements: snake and ladder pieces, challenge cards with questions related to reproductive system material, and a set of game rules.

A team of validator lecturers, consisting of content, design, and media professionals, has officially verified the Biological Snake Ladder (USB) instructional game on reproductive system contents. The verified components consist of the Biology Ladder Snake Piece, question cards, gaming manuals, and instructional modules. Table 3 displays the findings, demonstrating an 83.89% achievement percentage using very attainable standards.

Table 3. Validation Test Results

It	Validator Team	Presented %	Criterion
1	Contents Member	86,67 %	Highly Worthy
2	Design Expert	80 %	Proper
3	Ahli Media	85 %	Highly Worthy
	Rata-rata	**83,89 %**	**Highly Worthy**

After a team of specialists (lecturers) validated the Biology Ladder Snake learning medium, we continued to apply it for students, monitoring the percentage results from both the instructor and students during the class. The teacher's reaction rate was 88.57%, while the student's answer rate was 85%. Table 4 demonstrates that the Biology Ladder Snake (USB) is an effective tool for studying the reproductive system.

Table 4. Results of the Teacher's and Student Response Questionnaire

It	Questionnaire	Presented %	Criterion
1	Teacher's Response	88,57 %	Very fun
2	Student	85%	Very fun
	Rata-rata	**86,79 %**	**Very fun**

IV. Discussion

Snake Ladder Biology (USB) educational games are implemented as a learning medium at SMAN 1 Palu with the consent of course lecturers and topic instructors. We designed this learning medium to be applicable to students. A panel of specialists, including subject-matter experts, design experts, and media experts, developed and verified the USB. Additionally, we gathered feedback from biology professors and 20 students to evaluate the effectiveness of creating an engaging and enjoyable learning environment during the educational process. The validation results indicate that the content expert team, which was assessed on six different aspects, achieved an average score of 4.33, equivalent to 86.67% of the total possible score. Similarly, the design expert team, assessed on seven aspects, obtained an average score of 4, corresponding to 80% of the total possible score. Lastly, the media expert team, evaluated on eight aspects, achieved an average score of 4.25, equivalent to 85% of the total possible score. The average validation result of 83.89% indicates that this USB is highly suitable for use as a learning medium. The expert team suggests adding learning objectives for students and making the points on the red card vary based on the difficulty level of the presented material. The media expert team suggested integrating guidelines for utilizing challenge cards into the educational medium. Additionally, the design expert team must provide information pertaining to the material's accomplishments, ease, and appropriateness. According to Sea

and Sunshine (2021), students can benefit from using educational games as long as they meet specific criteria. Students can effectively use the Biology Ladder Snake instructional game, specifically tailored for grade XI reproductive system subjects. The implement Both the biology teachers and the students at SMA N 1 Palu provided positive feedback regarding the implementation of USB media in the biology class for grade XI MIPA 5 students. Assessment, based on 7 aspects, resulted in an average score of 4.43 and a percentage of 88.57%. The student's assessment, based on five aspects and involving 20 students, resulted in an average score of 4.25 with a percentage of 85%. The overall average score of 86.79% falls within the category of "very pleasant" according to the criteria. Teachers and some students commented that the USB media was highly effective for learning purposes. When students get disinterested in the theories presented in the textbook, they may also utilize this USB learning medium to explore additional biological topics that enhance their learning experience. While several students commend USB instruction for its appeal, enjoyment, and simplicity of comprehension, others provide ideas for its use in other biological topics. While certain students derive satisfaction from their success, others experience discouragement from their failure. High school students who demonstrate a strong inclination, eagerness, and joy in the learning process can effectively utilize USB learning media. This is due to the fact that students can learn while simultaneously enjoying recreational activities. Awila et al. (2024) concluded that the snake and ladder learning medium is valid, practical, and effective for use in the learning process. Similarly, Nazhar et al. (2024) also found that snake and ladder educational games can enhance students' interest and improve their learning outcomes. This conclusion was based on an assessment of the learning process, learning activities, and the comprehensiveness of students' learning outcomes.

V. CONCLUSION

The study reveals that students greatly enjoyed the creation of the Biological Ladder Snake (BLS) learning media, which created an engaging and delightful learning environment for them. Positive feedback from 86.79% of instructors and students supports this. The researcher suggested that future researchers should use BLS media in both an enlarged print and a digital format.

REFERENCES

[1]. Akbar, A., Ali, A., & Salahuddin, S. (2021). Development of Powtoon-Based Biology Learning Media on Cell Matter. Al Asma : Journal of Islamic Education, 3(2), 295. https://doi.org/10.24252/asma.v3i2.25162

[2]. Arman, M. A., & Aprianda, H. (2017). Development of Snake and Ladder Game Media in Learning the History of the Islamic Kingdoms of the Archipelago at SMA N 4 Tanjung Jabung Barat. ITS Journal of Science and Arts, 6(1), 51–66.

[3]. Awila, A. A., Abdjul, T., Odja, A. H., Pikoli, M., Supartin, & Payu, C. S. (2024). Development of Learning Media for the Application of Snakes and Ladders on Energy Materials in Life Systems in Grade VII SMPN 1 Kabila Bone. Eduproxima: Scientific Journal of Science Education, 6(2), 737–750.

[4]. Bahari, F. vismala, & Yuliani. (2021). The Development of Snake and Ladder Games on Growth and Development Materials to Train Critical Thinking Skills of Grade XII High School Students. BioEdu. Scientific Periodical of Biology Education, 10(3), 617–626.

[5]. Ifatrizah, & Mellisa. (2022). Analysis of Learning Difficulties of Grade XII Science Students of SMA Negeri 9 Mandau Duri on Cell Reproduction Material. Biology and Education Journal, 2(2), 22–35.

[6]. Janah, M., & Mitarlis, M. (2024). Development of Chemistry Learning Media based on Joyful Learning with Snakes and Ladders Game on Stoichiometry material to Improve Student Learning Outcomes. Hydrogen: Jurnal Kependidikan Kimia, 12(1). https://doi.org/10.33394/hjkk.v12i1.10192

[7]. Maydiantoro, A. (2019). Research and Development Models. Journal of Research Methods, 10, 1–8.

[8]. Nazhar, S., Sugiarti, L., & Saputri, D. D. (2024). The application of the PBL model assisted by the snake and ladder digital educational game as an effort to improve student learning outcomes. Journal of Scientific Citations, 2(1), 82–90.

[9]. Nisak, N. Z. (2021). Analysis of the Needs of Biology Teaching Materials for High School Students Reviewed from the Level of Material Difficulty, High-Level Thinking Skills, and Student Learning Activeness. EduBiologia: Biological Science and Education Journal, 1(2), 128. https://doi.org/10.30998/edubiologia.v1i2.9629

[10]. Rahmadani, P., Rahaningsih, N., & Irma Purnamasari, A. (2023). Implementation of Biology Learning of Human Respiratory System Materials Using Educational Games. Kopertip : Scientific Journal of Informatics and Computer Management, 7(1), 24–28. https://doi.org/10.32485/kopertip.v7i1.286

[11]. Sani, Y., Fitriandika Sari, N., & Harahap, R. D. (2019). Analysis of Students' Learning Difficulties in Biology Material in Class XI of Muhammadiyah-10 Rantauprapat. Jomas, 1(3), 13–20.

[12]. Wayudi, M., Suwatno, S., & Santoso, B. (2020). A Study of Critical Thinking Skills Analysis of High School Students. Journal of Office Management Education, 5(1), 67–82. https://doi.org/10.17509/jpm.v5i1.25853