

# Development of Wizer.me-Based Electronic Worksheets Integrated with Problem-Based Learning on the Human Reproductive System Topic

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## ABSTRAK

Kurangnya variasi media pembelajaran interaktif menjadi salah satu penyebab rendahnya motivasi belajar peserta didik pada materi sistem reproduksi manusia yang bersifat abstrak. Penelitian ini bertujuan untuk mengembangkan E-LKPD berbasis Wizer.me yang dipadukan dengan model Problem Based Learning (PBL) pada materi sistem reproduksi manusia kelas XI, serta mengetahui tingkat kevalidan, kepraktisan, dan keefektifannya. Penelitian ini merupakan penelitian dan pengembangan (R&D) yang menggunakan model ADDIE (analysis, design, development, implementation, evaluation). Subjek penelitian adalah 23 peserta didik kelas XI MAN 2 Bulukumba. Data dikumpulkan melalui lembar validasi ahli, angket respons peserta didik dan pendidik, serta tes hasil belajar, kemudian dianalisis secara deskriptif kuantitatif. Hasil penelitian menunjukkan bahwa E-LKPD berbasis Wizer.me memperoleh nilai kevalidan 3,72 (sangat valid), nilai kepraktisan 3,18 (praktis), dan 100% peserta didik mencapai ketuntasan belajar sehingga memenuhi kriteria efektivitas berdasarkan ketuntasan klasikal. Dengan demikian, E-LKPD berbasis Wizer.me yang dipadukan dengan model PBL layak digunakan sebagai media pembelajaran pada materi sistem reproduksi manusia.

## ABSTRACT

The lack of variety in interactive learning media is one of the causes of low student motivation when learning about the abstract topic of the human reproductive system. This study aims to develop Wizer.me-based digital worksheets integrated with the Problem-Based Learning (PBL) model for the 11th-grade human reproductive system curriculum, as well as to determine their validity, practicality, and effectiveness. This study is a research and development (R&D) project that employs the ADDIE model (analysis, design, development, implementation, evaluation). The research subjects were 23 11th-grade students at MAN 2 Bulukumba. Data were collected through expert validation sheets, student and teacher response questionnaires, and learning outcome tests, and were then analyzed using quantitative descriptive methods. The results showed that the Wizer.me-based Electronic Student Worksheet achieved a validity score of 3.72 (highly valid), a practicality score of 3.18 (practical), and 100% of students achieved learning mastery, thereby meeting the effectiveness criteria based on classical mastery. Thus, the Wizer.me-based Electronic Student Worksheet integrated with the PBL model is suitable for use as a learning medium for material on the human reproductive system.

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## Introduction

The rapid advancement of technology in the twenty-first century requires the education sector to continuously innovate, particularly in providing interactive learning media that align with the characteristics of Generation Z learners. The implementation of the *Merdeka Curriculum* also promotes greater flexibility in the learning process by providing teachers and students with opportunities to develop instructional materials that are responsive to their needs and learning contexts. One such innovation is the Electronic Student Worksheet, a digital learning resource designed to guide students in independently understanding learning materials through computers or smartphones. Recent studies have shown that the development of digital platform-based Electronic Student Worksheet continues to expand due to their potential to enhance interactivity, promote learner autonomy, and increase student engagement throughout the learning process. The Wizer.me platform enables teachers to design more diverse learning activities by integrating videos, images, interactive quizzes, and automated feedback, thereby creating a more meaningful learning experience (Safitri et al., 2025; Yuliana et al., 2025).

The use of electronic student worksheets has been shown to be more practical and effective than conventional printed worksheets in enhancing students' collaborative skills in science learning (Octaviana & Wahyuni, 2022), while also promoting higher-order thinking skills (Susila et al., 2021). However, commonly used Learning Management Systems, such as Google Classroom, which are frequently integrated with Google Forms, still offer limited features and interactivity, highlighting the need for more varied and interactive Electronic Student Worksheet platforms (Kaliappen et al., 2021; Septiana et al., 2023). In addition to its accessibility, Wizer.me supports the implementation of problem-based learning by providing various features that enable students to explore concepts independently and collaboratively (Pamenang, 2024).

Furthermore, the use of Electronic Student Worksheet should be integrated with an instructional model that actively engages students in the learning process. Problem-Based Learning (PBL) was selected because it facilitates students' ability to analyze problems, develop solutions, and draw conclusions systematically within a self-directed Electronic Student Worksheet learning environment. Melina et al. (2021) reported highly positive student responses to PBL-based Electronic Student Worksheet, indicating their potential to enhance learning motivation. The human reproductive system was selected as the focus of this development because it is considered challenging for students due to its abstract nature, the limited possibility of directly observing physiological processes, and the need for higher-order thinking skills to understand the relationships between the structures and functions of reproductive organs (Afni, 2019;

Mulyaningsih et al., 2024). These characteristics necessitate digital learning media capable of clearly visualizing physiological concepts. Therefore, the development of a Wizer.me-based Electronic Student Worksheet integrated with PBL is considered a promising approach to facilitating students' conceptual understanding through interactive multimedia representations and structured problem-solving activities (Prayitno et al., 2024).

Several studies have developed Wizer.me-based electronic student worksheets or implemented Problem-Based Learning (PBL); however, these studies have generally been conducted in different subject areas and instructional contexts (Sahida & Wiradimadja, 2024; Faradilla, 2025). The novelty of the present study lies in integrating the stages of PBL into interactive activities within a Wizer.me-based Electronic Student Worksheet designed for the human reproductive system topic. The developed product incorporates videos, images, and various interactive activities, including multiple-choice questions, essays, fill-in-the-blank exercises, image labeling, and matching tasks, to facilitate problem-solving and help students understand the relationships among biological structures, functions, and physiological processes. This instructional design is expected to reduce reliance on rote memorization and minimize potential misconceptions related to the human reproductive system.

Preliminary observations and interviews conducted on September 4, 2024, at MAN 2 Bulukumba indicated that biology instruction was still predominantly delivered through lectures (37.5%), while smartphones were the most frequently used learning medium (36.5%), without adequate support from interactive instructional materials. The preliminary survey also revealed that 90% of students perceived the human reproductive system as a complex topic containing numerous terms that needed to be memorized, whereas 91.3% expressed interest in learning through a Wizer.me-based Electronic Student Worksheet integrated with PBL. These findings indicate the need for interactive instructional materials that can promote active student engagement while facilitating independent and collaborative problem-solving. Accordingly, this study aims to develop a Wizer.me-based Electronic Student Worksheet integrated with the Problem-Based Learning model for Grade XI students studying the human reproductive system at MAN 2 Bulukumba and to evaluate the validity, practicality, and effectiveness of the developed product.

## Methodology

This study employed a Research and Development (R&D) approach aimed at producing a Wizer.me-based electronic student worksheet whose validity, practicality, and effectiveness were empirically evaluated. The development process adopted the ADDIE model, which was selected because of its systematic, comprehensive, and adaptable framework for developing various types of instructional media and learning materials (Branch, 2009). The study was conducted at MAN 2

Bulukumba. The preliminary trial involved 17 Grade XI students from MA Aisyiyah Sungguminasa Gowa, while the main implementation involved 23 students from Grade XI Mathematics and Natural Sciences 2 at MAN 2 Bulukumba.

The analysis phase involved interviews with a biology teacher and a survey administered to students to identify instructional problems, learner characteristics, and their needs for appropriate learning media. The findings from this phase served as the basis for the design phase, during which the Electronic Student Worksheet was developed to include learning objectives, user instructions, video-based learning materials, and interactive activities delivered through Wizer.me. During the development phase, the product was constructed and subsequently validated by two expert validators with relevant qualifications and areas of expertise. The product was then revised based on the validators' feedback until it was deemed suitable for field testing.

The implementation phase was conducted with Grade XI Mathematics and Natural Sciences 2 students, who were organized into five groups and engaged in learning activities following the Problem-Based Learning syntax integrated into the Electronic Student Worksheet. The learning stages included problem orientation, student organization, investigation, development and presentation of findings, and analysis and evaluation of the problem-solving process. Following the learning activities, students completed a response questionnaire and a learning achievement test. The evaluation phase was conducted formatively throughout each stage of the development process and summatively after the implementation phase.

**Table 1**

Development Stages of the Wizer.me-Based Electronic Student Worksheet Integrated with Problem-Based Learning Using the ADDIE Model

| ADDIE Stage | Development Activities                                                                                                                                                                                         | Output                                             |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Analyze     | Conducting interviews with the biology teacher and administering a student survey to identify learning problems, learner characteristics, and instructional media needs.                                       | Initial product requirements and specifications    |
| Design      | Formulating learning objectives and instructions, preparing video-based learning materials and interactive activities, and integrating the PBL syntax into the Wizer.me-based Electronic Student Worksheet.    | Electronic Student Worksheet design/prototype      |
| Develop     | Developing the product, conducting expert validation, and revising the product based on validators' feedback.                                                                                                  | Validated and revised Electronic Student Worksheet |
| Implement   | Implementing the Electronic Student Worksheet with students working in groups according to the PBL syntax, followed by the administration of a student response questionnaire and a learning achievement test. | Data on practicality and effectiveness             |
| Evaluate    | Conduct formative evaluation throughout the development process and summative evaluation after implementation.                                                                                                 | Final version of the Electronic Student Worksheet  |

The research instruments consisted of an expert validation sheet to assess product validity, student and teacher response questionnaires to evaluate product practicality, and a 25-item multiple-choice learning achievement test to measure product effectiveness. Validity data were analyzed based on the mean scores assigned by the expert validators, using the criteria presented in Table 2.

**Table 2**  
Product Validity Criteria

| Score Range        | Category         |
|--------------------|------------------|
| $V > 3.4$          | Highly valid     |
| $2.8 < V \leq 3.4$ | Valid            |
| $2.2 < V \leq 2.8$ | Moderately valid |
| $1.6 < V \leq 2.2$ | Less valid       |
| $V \leq 1.6$       | Invalid          |

Practicality data were analyzed based on the mean scores obtained from the student and teacher response questionnaires. The practicality criteria were classified as highly practical (3.26–4.00), practical (2.51–3.25), less practical (1.76–2.50), and impractical (1.00–1.75).

**Table 3**  
Product Practicality Criteria

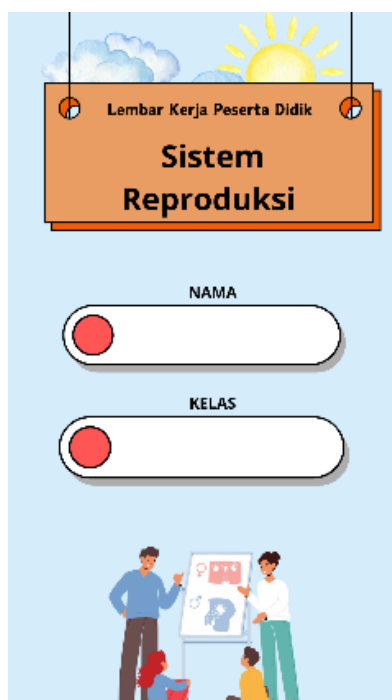
| Score Range | Category         |
|-------------|------------------|
| 3.26–4.00   | Highly practical |
| 2.51–3.25   | Practical        |
| 1.76–2.50   | Less practical   |
| 1.00–1.75   | Impractical      |

Effectiveness data were analyzed based on the percentage of students who achieved the Learning Objective Achievement Criteria (KKTP  $\geq 75$ ). The product was considered classically effective if at least 80% of the students achieved the minimum mastery criterion.

## Results and Discussion

The analysis phase revealed that Grade XI students at MAN 2 Bulukumba demonstrated a relatively low level of understanding of concepts related to the human reproductive system, particularly abstract content involving physiological processes. Consequently, students tended to memorize terminology without fully understanding the relationships among concepts. The high intensity of digital device use among Generation Z students, averaging 6–7 hours per day, provided the rationale for selecting Wizer.me as an interactive and flexible platform for developing the Electronic Student Worksheet. During the design and development phases, the Electronic Student Worksheet was created using a combination of Canva to design the cover and visual elements and Wizer.me as the platform for presenting learning materials and interactive exercises. These activities included multiple-choice questions, essay questions, fill-in-the-blank items, image-labeling

tasks, and matching exercises. The initial interface of the developed product is presented in Figure 1.



**Figure 1.** Initial Interface of the Wizer.me-Based Electronic Student Worksheet

Prior to implementation, the Electronic Student Worksheet was validated by two expert validators who assessed several aspects, including visual appearance, construct quality, content feasibility, video quality, item quality, language, and ease of use. The results of the expert validation are presented in Table 4.

**Table 4**

Expert Validation Results for the Wizer.me-Based Electronic Student Worksheet

| Assessment Aspect                                   | Validation Score | Category            |
|-----------------------------------------------------|------------------|---------------------|
| Visual Appearance                                   | 3.70             | Highly Valid        |
| Construct (Electronic Student Worksheet Components) | 3.90             | Highly Valid        |
| Content/Material Appropriateness                    | 3.50             | Highly Valid        |
| Video Quality                                       | 3.75             | Highly Valid        |
| Question Quality                                    | 4.00             | Highly Valid        |
| Language                                            | 3.50             | Highly Valid        |
| Ease of Use of the Electronic Student Worksheet     | 3.70             | Highly Valid        |
| <b>Mean</b>                                         | <b>3.72</b>      | <b>Highly Valid</b> |

Based on Table 4, the overall mean validity score of the Wizer.me-based Electronic Student Worksheet was 3.72, placing it in the highly valid category ( $3.4 < V \leq 4.0$ ). The highest score was obtained for the quality of the assessment items (4.00), indicating that the variety of item formats, including multiple-choice, essay, fill-in-the-blank, and image-matching questions, was considered appropriate for the learning indicators and objectives. This finding is consistent with Kaliappen et al. (2021), who reported that Wizer.me is effective as an interactive teaching tool within a TPACK-

based instructional framework, and with Melina et al. (2021), who found that PBL-based electronic student worksheets demonstrated very high validity in terms of both content and media quality.

The practicality of the Electronic Student Worksheet was evaluated using student and teacher response questionnaires after the product had been implemented in an authentic classroom setting. In the preliminary trial involving 17 students, the mean response score was 3.44, which was categorized as highly practical. The response results obtained during the main implementation stage are presented in Table 5.

**Table 5**

Practicality Results of the Wizer.me-Based Electronic Student Worksheet

| Type of Assessment  | Mean Score  | Category         |
|---------------------|-------------|------------------|
| Student responses   | 2.90        | Practical        |
| Teacher responses   | 3.45        | Highly practical |
| <b>Overall mean</b> | <b>3.18</b> | <b>Practical</b> |

Table 5 shows that the students' response score to the Wizer.me-based Electronic Student Worksheet was 2.90, while the teacher response score was 3.45, resulting in an overall mean practicality score of 3.18, which was categorized as practical. The practicality of the Electronic Student Worksheet was evaluated based on two aspects: ease of use and usefulness. Ease of use was reflected in the accessibility and operability of the Electronic Student Worksheet, which could be accessed anytime and anywhere through the Wizer.me link. Meanwhile, usefulness was reflected in the ability of the Electronic Student Worksheet to support both individual and collaborative learning activities. These findings are consistent with Sari et al. (2021), who reported that innovative electronic student worksheets play an important role in twenty-first-century learning by providing more flexible and interactive learning experiences than conventional printed instructional materials.

The effectiveness of the Electronic Student Worksheet was assessed using a 25-item multiple-choice learning achievement test administered to 23 students. The percentage of students achieving the predetermined learning mastery criterion is presented in Table 6.

**Table 6**

Percentage of Students Achieving Learning Mastery

| Score Range  | Frequency | Percentage  |
|--------------|-----------|-------------|
| 0–74         | 0         | 0%          |
| 75–100       | 23        | 100%        |
| <b>Total</b> | <b>23</b> | <b>100%</b> |

Table 6 shows that all students (100%) achieved scores within the range of 75–100, thereby meeting the Learning Objective Achievement Criteria (Kriteria Ketercapaian Tujuan Pembelajaran, KKTP  $\geq 75$ ). This percentage exceeded the minimum classical mastery criterion of 80% established in this study, indicating that the Wizer.me-based Electronic Student Worksheet integrated with Problem-Based Learning (PBL) met the effectiveness criterion based on learning achievement. This

level of mastery may be associated with the characteristics of the product, which presents learning materials through videos, images, and various interactive activities, including multiple-choice questions, essays, fill-in-the-blank items, image labeling, and matching exercises. These varied forms of representation provide students with opportunities to learn abstract concepts related to the human reproductive system through more structured learning activities. Nevertheless, because the study did not employ a pretest, these findings cannot demonstrate the magnitude of changes in students' learning performance or establish that the observed mastery was directly attributable to the use of the Electronic Student Worksheet.

Overall, the validity, practicality, and effectiveness of the product met the predetermined criteria. The high validity score can be attributed to the alignment of the Electronic Student Worksheet components with the learning objectives and to the quality of the assessment items, which received the highest ratings from the expert validators. The practicality of the product was supported by its ease of access through Wizer.me, its flexibility for both individual and group learning, and the availability of varied digital activities. Furthermore, the integration of videos, text, images, and interactive activities supports information processing through verbal and visual representations, as explained by the Cognitive Theory of Multimedia Learning (Mayer, 2024). The findings of Susila et al. (2021), Octaviana and Wahyuni (2022), and Navarrete et al. (2023) further support the potential of digital worksheets and video-based media to facilitate the learning process. However, the findings of the present study should not be interpreted as evidence of a causal relationship. Therefore, the Wizer.me-based Electronic Student Worksheet integrated with PBL is considered suitable as an alternative instructional medium for teaching the human reproductive system.

## Conclusion

Based on the findings and discussion, it can be concluded that the Wizer.me-based electronic student worksheet integrated with the Problem-Based Learning (PBL) model for the human reproductive system topic in Grade XI at MAN 2 Bulukumba was successfully developed using the ADDIE model, comprising the analysis, design, development, implementation, and evaluation phases. The developed product achieved a mean validity score of 3.72, which was categorized as highly valid, and a mean practicality score of 3.18, which was categorized as practical. In addition, all students (100%) achieved the Learning Objective Achievement Criteria  $\geq 75$ , indicating that the product met the effectiveness criterion based on classical learning mastery. Therefore, the Wizer.me-based Electronic Student Worksheet integrated with PBL is considered feasible for use as an alternative instructional medium for teaching the human reproductive system. Future studies are recommended to examine the implementation of the product in different schools and among

students with different characteristics to broaden the applicability and generalizability of the findings.

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