Development E-LKPD Based Guided Inquiry Using Google Sites for Elementary School Students

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Abstract. Science learning in elementary school requires an active learning environment to build critical thinking. One of the mastering methods created to encourage students to search for and use a selection of information assets is guided inquiry. The motive of this assignment is to create an electronic pupil worksheet (E-LKPD) that is both valid and beneficial for 6th-grade primary faculty scholars. The 4-D (4-D) research and development model, which has 3 stages—[1] define, [2] design, and [3] develop—is the model that this study is based on. The findings show the high quality of the E-LKPD-based guided inquiry in terms of both validity and utility. 86.3% of material professionals and 83.3% of media specialists agreed that the test was valid. The results were beneficial and manageable, and the teacher's response received an average practical score of 88.89%. It can be concluded that it is possible and reasonable for basic school pupils to learn technology using E-LKPD-based guided inquiry utilizing Google Sites.

Keywords: E-LKPD, Guided Inquiry, Google Sites.

1 Introduction

Technology-based learning is growing rapidly in the 21st century and requires teachers to master learning models that adapt to new ways [1]. Natural Science (IPA), a required course, covers a variety of subjects related to the cosmos and life. One of the most critical subjects in primary school is science, which helps students understand nature and the environment and connect it to the scientific method. Adjustment of science learning with technology is considered important for the advancement of science, so that students can understand science concepts and be able to master modern technology [2]. Currently, science learning in primary schools is needed to build skills and competencies in gaining new knowledge [3].

Science learning in primary schools has the following objectives: 1) Understanding the basic concepts of science; 2) Have investigative process skills; 3) Solve problems through critical thinking skills; 4) Make conclusions; 5) Have a confident attitude; and 6) Master the concept of science. Observations in several elementary schools in Medan city show that scientific education still faces challenges, such as: 1) teacher-centered learning; 2) inexperienced teachers with technology; and 3) worksheets that fail to develop critical thinking skills. According to Tressyalina's [4] observation, the existing worksheet fails to assess pupils' skill

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and critical thinking capabilities. The same thing was expressed by Ikhwani and Kuntjoro [5] that printed LKPDs were ineffective because some students often forgot to bring them, resulting in students rarely using printed LKPDs to support their learning.
Technology-based learning is currently an obligation of teachers to carry out innovations in conducting learning in the classroom so that the quality of learning increases [6]. Teachers play a vital role in implementing learning by supporting students to become capable and problem-solving professionals [7]. Learners today need competency-based learning and skills to overcome the problems encountered in the industrial revolution 4.0. The need for skills and competence is useful as an important provision for learners so that they are able to contribute in solving the problems encountered. Learners need to practise problem-solving skills on a daily basis [8]. The current teacher-centred teaching approach is encouraged to adopt a learner-centred approach to make learning more effective and efficient [9].

Learning tools have a significant effect on how well the learning process proceeds; therefore, developing them is crucial. The guided inquiry approach emphasizes student participation [10]. Guided inquiry is a learning model that can help students enhance their ability to search for and solve problems by gathering information, processing that information, and drawing conclusions on their own based on questions from the teacher [11]. Guided inquiry-based learning can assist students in developing their ability to think critically and find solutions to any problems that the instructor or the learning process presents, as well as their capacity to communicate with others, understand concepts, take responsibility, and convey the process that has been examined [12]. The guided inquiry learning model is considered an inductive approach that works well for in-depth comprehension [13].

The use of Google Sites-based websites is one form of application that educators find to be effective and user-friendly [14]. ccording to Aulia [15], Google Sites is an easily navigable website that can be utilized by educators as a teaching tool. Teachers find it easier to use Google Sites as teaching resources due to its user-friendly interface, appealing design, and web-based learning capabilities [16]. The cost of Google sites as a learning tool is explained by Kusumaningtyas [17], who also notes that users can easily access other Google products such as Calendars, Forms, Docs, Gemini, and more. According to Sutisna's view [18], students' communication and engagement during learning activities are influenced by the use of technology-based learning materials. Consequently, the process of developing critical thinking skills and achieving successful learning outcomes is enhanced when technology is used in the classroom.

The goal of creating guided inquiry based on E-LKPD is to improve students' critical thinking skills. Moreover, E-LKPD-based guided inquiry has never been created or taught at the school; therefore, research on its development is necessary to help elementary school students strengthen their critical thinking skills.

2 Method

Using Thiagarajan's 4-D paradigm, this type of research is known as research and development (R&D). There are 4 stages in this development model: (1) Define; (2) Design; (3) Develop; and (4) Disseminate. This research consists of defining learning and product development stages. A good E-LKPD product will be obtained if the three stages are carried

out, so that the development objectives are fulfilled. E-LKPD, the product to be developed, will be tested for validity and practicality by utilizing Google Sites to determine the degree of feasibility and practicality of E-LKPD based on guided inquiry. Figure 1 shows the development flow graphically.

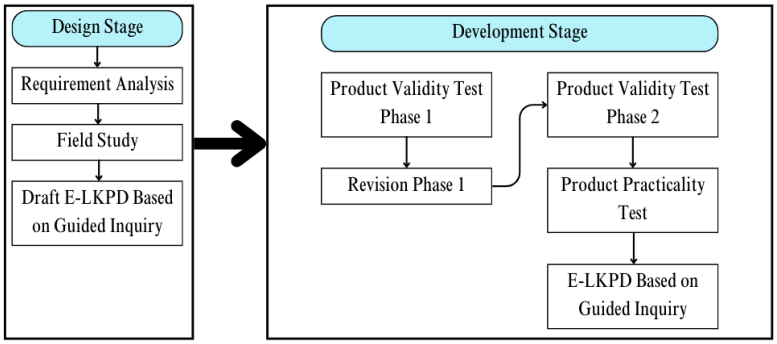

Fig. 1. E-LKPD development workflow

Based on guided inquiry, this research creates statements and questions regarding the validity and practicality of E-LKPD products after starting with a design that considers the basic competencies and learning objectives. Observation, interviews, validation questionnaires, and practicality questionnaires are the tools employed in this study. By determining the validation value of the product by expert validators consisting of material experts, learning media experts, and question creation experts, data analysis on validity was generated. Table 1 presents the criteria for the legitimacy of the E-LKPD products created.

Table 1. Criteria of Validity

Percentage	Classification
$85\% \leq P \leq 100\%$	Very Valid
$75\% \leq P \leq 84\%$	Valid
$65\% \leq P \leq 74\%$	Valid Enough
$55\% \leq P \leq 64\%$	Invalid
$0\% \leq P \leq 54\%$	Strongly invalid

Practicality data analysis was obtained by analysing the practicality questionnaire that had been filled in by teachers and students. Table 2 lists the criteria for the feasibility of developed guided inquiry-based E-LKPDs.

Table 2. Criteria of Practicality

Interval score	Criteria for validity
> 75% - 100%	Very Practical
> 50% - 75%	Practical
> 25% - 50%	Less Practical
0% - 25%	Not Practical

2.1 The Sampel

This research was conducted in several elementary schools in Medan city, North Sumatra, Indonesia. Five science teachers at the elementary school level, 2 experts in science learning materials, and 2 experts in learning media served as the study's subjects.

2.2 The Instrument

Information about the quality of the learning resources is collected using the tool. Learning material feasibility has a significant impact on the learning process when implementing an effective teaching and learning process, as shown in Table 3.

Table 3. Learning material expert assesment instrument

Eligibility components	Item of assessment
Content feasibility	1. Breadth of content
	2. Depth of content
	3. Accuracy of facts and concepts
	4. Accuracy of illustrations
	5. Suitability to the development of science
	6. Recency of features, examples, and references
	7. Contextual
	8. Salingtemas (Sains, Lingkungan, Teknologi, dan Masyarakat)
Persentation feasibility	9. Conciseness of concept
	10. Systematic consistency
	11. Balance between chapters
	12. Learner-centred
	13. Developing process skills
	14. Pay attention to work safety aspects
	15. Variety of presentation
	16. Introduction
	17. Table of contents
	18. Glosarium
	19. References
	20. Summary and concept map
	21. Evaluation
	22. Proper proportion of images and text
	23. Supportive illustrations

Information about the quality of the learning materials used is collected using the tool. Learning medium feasibility has a significant impact on the learning process when implementing an effective teaching and learning process, as shown in Table 4.

Table 4. Learning media expert assesment instrument

Aspects	Indicators
Media Design/Display	1. Icons/buttons/logos that assist users in using the programme
	2. Consistency of page shape and layout
	3. Accuracy of the order of the material presented
	4. Proportion of layout (text and image layout) is appropriate
	5. The colour proportion is appropriate

	6. The colour and font size of the title on the initial cover/opening of the media are appropriate. 7. Appropriate choice of background 8. Typeface selection is appropriate 9. Selection of appropriate font size 10. The shape of the navigation buttons is attractive 11. Consistent navigation button display
Visual and Audio Display	12. The suitability of the proportion of the images presented with the ELKPD display on computers and mobile phones is appropriate. 13. The animations and videos convey complex concepts visually and dynamically, and the clarity of the animations explains the concepts. 14. Smooth animation movement 15. Animation is in line with the concept of ELKPD 16. Interesting text and image animations 17. Supporting images according to the ELKPD concept 18. The choice of accompanying music is appropriate
Operations	19. Ease of operation of ELKPD 20. The instructions for using the media are clear 21. Creativity and innovation in ELKPD 22. Operating system compatibility with the programme 23. Proses pemuatan program ELKPD 24. Opportunities for ELKPD development against the development of science and technology

3 Result and Discussion

Researchers examined the product trial data to determine whether or not the product needed further revision. After the analysis, the data obtained that the product developed by the researcher received a valid and practical assessment with a very good category. So that researchers do not need to make further revisions to the product.

3.1 Validation of E-LKPD based on guided inquiry

Data from the material validation of guided inquiry-based science E-LKPDs were analysed using quantitative to qualitative data conversion consisting of two assessment categories. There are 8 assessment components in the content feasibility category and 15 assessment components in the presentation feasibility category. According to the findings of the material validation, the 2 experts' score is 86%; Table 5 provides details.

Table 5. Results of material expert response analysis

Eligibility components	Material expert 1	Material expert 2
Content feasibility	4.5	4.4
Presentation feasibility	4.2	4.3

The 3-category quantitative to qualitative records conversion method was used to analyze the data from the media expert validation of the guided inquiry-based science E-LKPD. There are 11 assessment components in the media design/display category, 7 components in the visual

and audio display category, and 6 components in the operation category. The 2 experts' score is 83% based on the results of the material validation that was conducted; details are shown in Table 6.

Table 6. Results of material expert response analysis

Eligibility components	Material expert 1	Material expert 2
Media design/appearance	4.1	4.1
Visual and audio display	4	4.1
Operation	4.3	4.3

3.2 Practicality of ELKPD based on guided inquiry

If experts and practitioners theoretically claim that learning tools in the form of E-LKPD based on guided inquiry can be applied in the field and the level of implementation falls into the best category, then the indicators used suggest that the developed learning tools are practical.

The total average response from 5 teachers is 88.89%, indicating that the evaluation falls into the very practical category according to predefined standards, based on the analysis of teacher responses to learning using the guided inquiry-based E-LKPD developed through Google Sites for science learning. According to the 5 teachers, the E-LKPD's learning strategies were understandable, and in addition to the guided inquiry-based E-LKPD's problem-solving instructions being clear and user-friendly, sufficient time was also allocated for completing the tasks. Therefore, it can be concluded that the guided inquiry-based E-LKPD has met highly practical criteria.

3.3 Discussion

The eligibility of E-LKPD based on guide inquiry has a significant result. This van bes seen form the average persentage 86% with very valid criteria. Research result Adnan et al (2021) the guided inquiry can encourage students‘ critical thinking in science learning [20]. Guided inquiry using learning based online has high quality in term of validity and prarticality [21]. Therefore, ELKPD based on guided inquiry can be used by elementary science teacher to encourage students‘ critical thinking and improve the quality learning students‘.

4 Conclusion

Based on the results of development, it can be conluded that (1) E-LKPD based guided inquiry with eligibilty components including feasibility content and feasibility presentation show that very valid; (2) The practicality E-LKPD based guided inquiry reviewed from the response of 5 science teachers. Teachers agreed to implement the E-LKPD based on guided inquiry and suitable for use in science learning, because this E-LKPD requires students to be more active in the learning process.

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