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Development and Validation of Google Sites Technology-Assisted Student Worksheet to Increase Students' Collaboration Skills in Science Learning in Junior High School

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Abstract

Development and Validation of Google Sites Technology-Assisted Student Worksheet to Increase Students' Collaboration Skills in Science Learning in Junior High School. *This research is based on the problem of collaboration skills of students in class VIII F SMP Negeri 6 Jember which is still low in science learning conducted by observation. One way to overcome this is to develop E-LKPD assisted by Google Sites to improve students' collaboration skills. The purpose of the study was to examine the validity, practicality, and effectiveness of E-LKPD assisted by Google Sites to enhance student collaboration skills in science learning. The research design uses Research and Development (R&D) with the Plomp development model which includes preliminary research, prototyping stage, and evaluation stage. Products that have been developed, get a validation score of 94% with a very valid category. Practicality is 96.83% with a very practical category. The effectiveness of E-LKPD is 63% with the results of the N-gain test with a moderate category, 77% self-assessment with a high category in collaboration, and 88% student response questionnaire with a very good category. The results of this study can conclude that E-LKPD assisted by Google Sites can be said to be valid, practical, and effective in learning science in junior high school.*

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INTRODUCTION

Education in the 21st century is very important for learners to compete in the global era and contribute to building the nation's civilization to solve the problems of learners' lives (Fahrezi, 2022). Learners in solving problems must have skills that must be possessed, which consist of 4C which includes Critical Thinking and Problem Solving, Creativity, Communication Skills, and Collaboration Vely (Fitrah et al., 2022). One of the skills needed to face the challenges of the millennial century in science learning is collaboration skills (Dwipoyanti et al., 2024). Collaboration skills are one of the activities carried out in discussions between group members by proposing opinions, listening to discussions, and respecting differences in opinion from peers. The goal is to provide opportunities for group friends to provide opinions in order to get the same goal in solving a problem (Rodliyah & Fadly, 2023).

The results of previous research (Ulhusna et al., 2020) show that most students are still unable to work well together in groups. This can be seen from the tendency of one or two students who are active in doing the task, while others are less involved or do not understand what to do. In addition, according to (Mona & Rachmawati, 2023) states that collaboration skills are still low because each student has individualism or selfishness and concern for other friends is also still low. One of the low collaboration skills is also due to the learning media

that is not maximized and the teaching materials used are still conventional so that learning becomes monotonous and the teaching resources used are passive (Novendra et al., 2023). Based on the results of interviews obtained by SMPN 6 Jember teachers, it is known that teachers still use conventionoal media in teaching and have never used technological assistance in collaborating in it. According to (Wulandari et al., 2023) learning media is very important in teaching and learning to develop interest and increase motivation in learning.

Based on these problems, it can be seen that the quality of learning can be achieved by using learning materials in the form of E-LKPD supported by technological facilities in the learning process (Sitanggang & Lubis, 2023). E-LKPD is a media that contains tasks, usage guidelines, steps in solving a problem in the form of material or practice that students must do in electronic or digital form (Rizkika et al., 2022). Preparation in E-LKPD must pay attention to content, presentation, and graphics to attract students so that they are not easily bored in the learning process (Derta et al., 2023). E-LKPD development must be accompanied by technological assistance so that students can collaborate between group members, one of which is with the help of Google Sites.

Google sites is a website that comes from Google on a prepaid basis which is used to create websites privately or in groups. Google sites are usually used for teachers and students as learning activities. The results of student work can be seen on the google sites board layer so that they can see students who are active in discussion activities (Jubaidah & Zulkarnain, 2020). Collaboration using google sites is very interesting in science learning, because there are several interactive features such as text, images, animations, videos, and audio so that it can be interesting for students to collaborate between group members (Putri et al., 2024).

E-LKPD assisted by google sites is an alternative learning for teachers and students in performing collaboration skills. Google sites with easy features can make students more creative and active in technology during class in learning science with human digestive system material, because students can do E-LKPD work collaboratively. Based on the description above, it is suggested that the development of E-LKPD assisted by google sites can be attempted to improve students' collaboration skills in science learning in junior high school. The purpose of this research is to examine the validity, practicality, and effectiveness of E-LKPD assisted by google sites to improve students' collaboration skills in science learning in junior high school.

METHODS

The type of research used is Research and Development (R&D) designed using Plomp's development design (2013) which consists of 3 stages, namely preliminary research, prototyping stage, and assessment phase (Akker, 2013). Plomp's design is used because it has a systematic and flexible structure to validate products and develop products as learning resources for students. The stages of R&D research with the Plomp development model are as follows.

a. Preliminary research is used to find out the problems that exist in schools and previous research.
b. Protoyping stage is used to validate E-LKPD products assisted by google sites before conducting research.
c. Assessment phase is used to measure the practicality and effectiveness of E-LKPD assisted by google sites to improve students' collaboration skills..

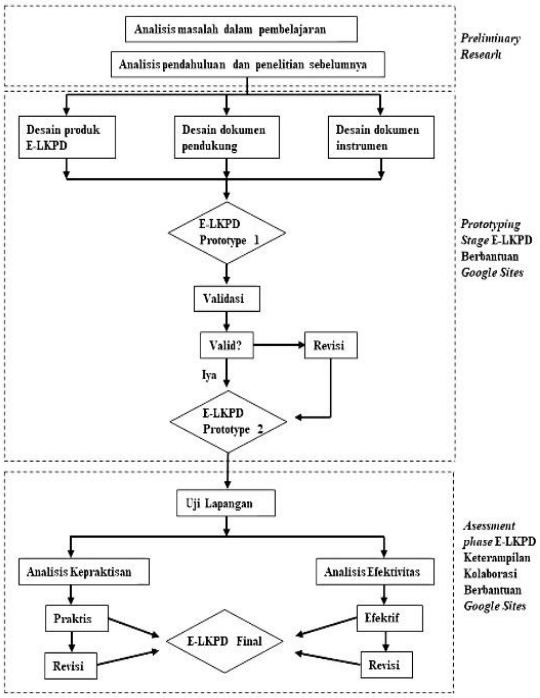

Figure 1. Stages of Plomp Development Model

The research was conducted at SMP Negeri 6 Jember in the odd semester to test the development of E-LKPD assisted by google sites. Making E-LKPD products in July 2024. Product trials at school were carried out from September to October in the odd semester of 2024/2025. The research population was carried out in class VIII of SMP Negeri 6 Jember. The population or subject selection was chosen based on purposive sampling, namely class VIII F, because information from one of the science teachers at SMPN 6 Jember stated that collaboration skills in class VIII still need to be improved.

The research data collection was divided into 2, namely primary data and secondary data. Primary data was obtained from the observation sheet of collaboration skills, self-assessment of collaboration skills, and student response questionnaire. Meanwhile, secondary data were obtained from interviews, observations, and documentation.

1. Analysis Method of Validity Test of E-LKPD Assisted by Google Sites

E-LKPD validation was conducted by 3 expert validators to validate the E-LKPD product before it was implemented in schools. Expert validators were conducted by 2 science teachers of SMP Negeri 6 Jember and 1 science education lecturer at the University of Jember.

Table 1. Validity Formulas and Criteria

Formula	**Validity Criteria**	
V= $\frac{Tse}{Tsh}$ x 100% **Description:**	**Percentage (%)**	**Category**
V = Validity	86<V≤100	Very valid
Tse = Total empirical score of validators	71<V≤ 85	Valid
Tsh = Total maximum score	56<V≤ 70	Valid enough
	41<V≤ 50	Less valid
	than less25<V≤ 40	Invalid

Source: (Safitri dan Mulyani, 2022)

2. Analysis Method of Practicality Test of E-LKPD Assisted by Google Sites

Practicality was carried out by 3 student observers of the Science Education University of Jember to fill in the observation sheet of learning implementation during learning in the classroom.

Table 2. Practicality Formula and Criteria

Formula

$P = \frac{Tse}{Tsh} x100\%$

Description:

P = Percentage of practicality
Tse = Total score achieved
Tsh = Total maximum score

Practicality Criteria	
Percentage (%)	**Category**
P≤80%	Very practical
$60 \leq P < 80$	Practical
$40 \leq P < 60$	Practical enough
$20 \leq P < 40$	Not practical
P<20	Very impractical

Source:(Purwati et al., 2022)

3. Analysis Method of Effectiveness Test of E-LKPD Assisted by Google Sites

a. N-gain test

The n-gain test is used to measure the collaboration skills of junior high school students, namely with the student collaboration skills assessment sheet.

Table 3. N-gain Test Formula and Criteria

Formula

$= \frac{<Sf>-<Si>}{100-<Si>}$

Description:

<g> = Average normalized gain score
<Sf> = Average score of the final observation sheet
<Si> =Mean score of initial observation sheet

***N-gain* Criteria**	
N-gain value	**Category**
(<g>) ≥ 0,7	High
0,3 ≤ (<g>)< 0,7	Medium
g < 0,3	Low

Source: (Hake, 1998)

b. Analysis of collaboration skills self-assessment

The self-assessment questionnaire is used to measure collaboration skills individually.

Table 4. Self-Assessment Formula and Criteria

Formula

%= $\frac{n}{N}$x100%

Description :

% = Percentage of cooperation skills according to students
n = Score obtained
N = Total number of scores

Self-Assessment Criteria	
Percentage (%)	**Category**
81-100	Very high
61-80	High
41-60	Medium
21-40	Low
to20 ≤20	Very low

Source: (Riduwan, 2013: 89)

c. Student response analysis

Analysis of student response questionnaires to assess the effectiveness after implementing the E-LKPD aided by Google sites that have been developed using student response questionnaires.

Table 5. Student Response Formula and Criteria

Formula

$P = \frac{The\ score\ obtained\ by\ the\ student}{Overall\ score}\ x\ 100\%$

Student Response Criteria	
Percentage (%)	**Category**
P > 80%	Very good

Description :
P = Percentage of student response

60%< $P \leq$ 80%	Good
40%< $P \leq$ 60%	Good enough
20 less20%< $P \leq$ 40%	Not good
P < 20%	Not very good

Source: (Agustini et al., 2020)

RESULTS AND DISCUSSION

The results of the research that has been conducted aim to produce E-LKPD assisted by Google sites to improve the collaboration skills of junior high school students on the material of the human digestive system in class VIII to obtain validity, practicality, and effectiveness in science learning at SMP Negeri 6 Jember. The E-LKPD development design uses the Plomp model, the following are the results of research on the stages of the Plomp development model.

1. Preliminary Research Stage

Preliminary research is the initial stage in conducting development which aims to obtain information on problems in schools in the learning process. This stage is carried out by observation, including problem analysis, needs analysis, curriculum analysis, theory analysis, student skills analysis, and material analysis.

Table 6. Analysis Results of Preliminary Research Stage

Stage	Data Collection		Results Obtained
Problem analysis	Reference/source gathering	✓	• Student collaboration skills in Indonesia are still relatively low, one of the factors is that teachers still use old learning methods. • The teaching materials used are still conventional so learning becomes monotonous and the teaching resources used are passive.
	Interview	✓	• The results of the interviews obtained were that the collaboration skills at SMP Negeri 6 Jember were still relatively low because some students were active and some students were not active due to lack of communication in discussions.
Needs analysis	Reference/source gathering	-	
	Interview	✓	The results of the interview obtained are that during class learning, teachers tend to still use tools such as PowerPoint Presentation (PPT) and also use teaching materials such as LKS and package books, but these teaching materials cannot be used to overcome students' low collaboration skills.
Curriculum analysis	Reference/source gathering	-	
	Interview	✓	The curriculum used at SMP Negeri 6 Jember is the independent curriculum.
Theory analysis	Reference/source gathering	✓	Theoretical results are obtained from several references that have been systematically organized in the background section.
	Interview	-	
Student skills analysis	Reference/source gathering	-	
	Interview	✓	• Students in class 8F are active in doing and collecting assignments given by the teacher, but in group work, some students are passive in their groups.

Stage	Data Collection		Results Obtained
			• Students in learning collaboration activities have never done a simple practicum, but students in performing collaboration skills have been done when making projects and presentations. However, in measuring it only from the naked eye, it has never been measured in writing.
Material analysis	Reference/source gathering	✓	The material has been adjusted to the content in the independent curriculum on the material of the human digestive system which is systematically arranged in the E-LKPD.
	Interview	-	

Data collection used in the preliminary stage is by collecting references and interviews. Reference collection is obtained from books, journals, articles, and the internet. Meanwhile, interviews were obtained from one of the science teachers at SMP Negeri 6 Jember.

2. Prototyping Stage

The prototyping stage is the stage of designing the E-LKPD design before it is developed. The prototyping stage includes the process of developing E-LKPD products assisted by Google sites, assessment instruments, and learning devices. The results of E-LKPD product development assisted by Google sites, assessment instruments, and learning devices are called prototype 1. Prototype 1 before being tested at school will be validated first by expert validators to test the feasibility of the product. The following are the results of the validation of E-LKPD assisted by Google Sites at the prototype 1 stage by expert validators as follows.

Table 7. E-LKPD Validation Results

No.	Assessment Aspect	Interval score			Percentage (%)	Category
		V1	V2	V3		
1	Content and Materials	1	0.98	0.98	99	Very valid
2	Graphics	0.94	0.94	0.94	94	Very valid
3	Presentation	0.95	1	1	98	Very valid
4	Language	0.8	0.9	0.9	87	Very valid
5	Collaboration Skills	0.85	1	1	95	Very valid
Average score		**0.91**	**0.96**	**0.96**	**95**	**Very valid**

Based on the results of data analysis in Table 8, it is found that the E-LKPD product has a percentage of 95% and is included in the very valid category. It can be concluded that E-LKPD is feasible to be developed in schools in science learning, because E-LKPD has met the feasibility of development, such as from content and material, graphics, presentation, language, and collaboration skills. Asmaryadi et al., (2022) state that teaching materials can be said to be valid if the predetermined components have reached the achievement score of the stages of developing a product. This is also supported by Sagita et al., (2024), which states that aspects that are validated on teaching materials such as E-LKPD such as content quality aspects, presentation aspects, and language aspects. The final product in the form of E-LKPD has fulfilled several of these aspects, it can be said that the product is said to be valid.

3. Assessment Phase

The assessment phase is the final stage obtained from the results of the E-LKPD product trial in the classroom, the get the results of the assessment of student collaboration in the product. The results of the final assessment of students' collaboration skills aim to overcome a problem in the classroom, especially in students' collaboration skills.

a. Practically

Assessment of the practicality of E-LKPD was obtained from the observation sheet of learning implementation filled out by 3 observers. The main task of the observer is to monitor the entire learning process from beginning to end to ensure that learning activities run according to the plan that has been prepared in the learning device, especially in the use of E-LKPD material on the human digestive system. The following are results of the E-LKPD practicality assessment that has been obtained from the initial meeting to the end can be seen in Table 8, which is as follows.

Table 8. E-LKPD Practicality Results

Meeting-	Observer percentage (%)			Percentage (%)	Criteria
	O1	O2	O3		
1	95	97.25	97.25	96	Very practical
2	100	100	98	99	Very practical
3	100	97.25	94.5	97	Very practical
4	95.75	93.75	91.75	94	Very practical
5	100	97.25	91.75	96	Very practical
6	100	96.5	100	99	Very practical
Average	**98.46**	**97**	**95.54**	**96.95**	**Very practical**

The results of data analysis in Table 9 show that E-LKPD has a percentage of 98.46% and is included in the very practical category. It can be concluded that the use of E-LKPD during classroom learning is by the learning tools that have been designed, namely the teaching module and ATP. This is very relevant to the statement. Jiwa (2022: 26) Which states that the developed product can be implemented by teachers and students in the field and can be used easily, so it can be said that the developed product is said to be practical.

b. Effectiveness

1) Observation sheet of collaboration sills analyzed using N-gain

Assessment of the effectiveness of E-LKPD products assisted by Google Sites is obtained from test instruments in the form of observation sheets of collaboration skills in several indicators during learning activities taking place using E-LKPD at school and home with the help of Google Sites. The collaboration skills observation sheet has 5 components in the context of solving problems in several indicators used to identify student collaboration skills. The following are components and indicators of collaboration skills can be seen in Table 9 as follows.

Table 9. Collaboration Skill Indicators

No.	Component	Indicator
1.	Willing to work in a group	Willing to be placed in a group that has been previously determined
2.	Able to control the group	a. Have effective group work procedures organized by group members

No.	Component	Indicator
		b. Able to share tasks with fellow group members well
3.	Able to communicate interpersonally	a. Communication between group members is open and participatory b. Able to express their opinions based on the experimental results obtained
4.	Ability to listen to opinions	Group members listen to each other's opinions
5.	Problem-solving or decision-making	Able to make conclusions based on the results of group discussions

(Crebert et al., 2011)

The collaboration skills observation sheet that has been analyzed will then be analyzed using the N-gain calculation from the initial and final meetings, which aims to determine the effectiveness of E-LKPD products in improving student collaboration skills. The following are the results of the analysis of the n-gain calculation obtained from the observation sheet of students' collaboration skills can be seen in table 10 as follows.

Table 10. N-gain Test Results

Component	Initial Meeting	Final Meeting	N-gain	N-gain (%)	Category
Number of Students	34	34			
Lowest Score	14	29	0.63	63%	Medium
Highest Score	86	100			

The results of the N-gain analysis in Table 10 are obtained from the observation sheet of collaboration skills for the initial meeting and the final meeting to measure the collaboration skills of students and get a score of 0.63 when converted into a percentage of 63%. The results of the N-gain calculation obtained from the initial meeting and the final meeting can be categorized as moderate.

The results of collaboration skills obtained from the N-gain test can be concluded that the E-LKPD product can be categorized as quite effective which occurs due to two cycles, namely to low to medium. This means that collaboration skills have increased in class 8F SMP Negeri 6 Jember. Oktaviani (2022) States that collaboration skills are obtained through an observation sheet of collaboration skills by an observer at each meeting. This is also relevant to the opinion of Octaviana et al., (2022) Cycle 1 and cycle 2 are obtained from the initial observation sheet and the final observation sheet. Collaboration skills can be said to increase if the final observation sheet is greater than the initial observation sheet.

2) Collaboration skills self-assessment questionnaire

Learner self-asessment analysis is a personal assessment of learners in measuring collaboration skills which aims to strengthen the data that has been obtained from the collaboration skills observation sheet. Self-assessment filling is done after doing several collaboration activities at each meeting, student fills in honestly on E-LKPD activities that have been carried out together with their group colleagues. The following are the results of the analysis of students' self-assessments after collaborating with their groups as follows.

Table 11. Analysis of Collaboration Skills Self-Assessment

Component	Score	Total	Percentage (%)	Category
Number of Students	34	0,77	77	High

Component	Score	Total	Percentage (%)	Category
Lowest Score	88			
Highest Score	139			

Based on the results of data analysis in Table 11, it was found that the collaboration skills self-assessment sheet of 34 students who filled in had a percentage of 77% and could be categorized as high. It can be concluded that after using the LKPD on human digestive system material, students in class 8F have collaboration skills with group members in conducting practicum activities, discussions, and homework using the Google site. Self-assessment aims to strengthen the data that has been obtained from the collaboration skills observation sheet. This is very relevant to the statement of (Rusmalinda & Rahmadani, 2022) In addition to collaboration test activities, students fill out non-test instruments in the form of self-assessment after using teaching material products which aim to assess themselves in carrying out collaboration skills with their group colleagues.

3) Student response questionnaire

The results of student response questionnaire data are data used to determine the response of students in using E-LKPD products in science learning in class and at home. The filling of the student's response questionnaire was carried out after the E-LKPD product trial process after being carried out in each activity. The following are the results of the analysis of the analysis of the students response questionnaire, namely as follows.

Table 12. Analysis of Student Response Questionnaire

Aspects	Percentage (%)	Category
Language	89	Very good
Format	88	Very good
Content	88	Very good
Effectiveness	86	Very good
Average student response	**88**	**Very good**

Based on the results of data analysis in Table 12, the percentage is 88% and can be categorized as very good. According to (Kartini & Putra, 2020) States that a good student response is the response of students during the learning process can make students happier and easier to absorb the knowledge that has been given by the teacher. The conclusion obtained from the results of the data analysis of the student response questionnaire after the use of E-LKPD material on the human digestive system to improve collaboration skills is very well received by students in science learning.

CONCLUSION

1. Validation

   Validation of E-LKPD products assisted by Google Sites was obtained from three validators and obtained an average of 95% with a very valid category and feasible to use to train students' collaboration skills in science learning in junior high school.
2. Practicality

   The practicality of using E-LKPD products gets an average of 95% and can be categorized as very practical for training collaboration skills.

3. Effectiveness

   The effectiveness of using E-LKPD products is carried out with collaboration skills sheets that have increased, and then the results of the initial and final collaboration skills observation sheets are calculated using the N-gain formula and get an average of 0.63 categorized as moderate. In addition, filling out the collaboration skills self-assessment gets an average percentage of 77% categorized as high and the student response questionnaire gets an average percentage of 88% categorized as very good.

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