Development of LKPD Based on *Think Talk Write* on the Material of Basic Laws of Chemistry Class X

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Article history	Abstract
	The material on the fundamental laws of chemistry taught at the high school level so far is still not optimal according to the demands of the curriculum. This can be seen based on the low national exam results. The national exam scores for basic chemical laws in 2018 and 2019 were 16.6 and 35.2, respectively. This study aims to (1) Describe the feasibility of TTW-based LKPD developed on basic chemical laws material, (2) Describe students' responses to TTW-based LKPD developed on basic chemical laws material, (3) Describe educators' responses to TTW-based LKPD developed on basic chemical laws material. This research method uses R&D with the 4-D model, namely defining, designing, developing, and disseminating. The subjects of this study were students of class X IPA 1 SMA Negeri 12 Banda Aceh, a total of 25 people. Data collection was carried out using instruments. The research instrument is the LKPD validity assessment sheet by experts, a questionnaire sheet for students' and educators' responses. The results of the feasibility assessment of LKPD, namely 93.3%, were excellent. The responses of students and educators to the LKPD each obtained 86% and 94.8% in the excellent category. Based on the study's results, the LKPD, based on think talk written on the material of the fundamental laws of chemistry, is feasible to use as teaching material.

1. INTRODUCTION

Implementing the 2013 curriculum requires learning using a scientific approach, namely focused learning, with students being more active, seeking information, and exploring chemistry by finding it themselves. Indayatmi (2020) states that the scientific approach develops students' attitudes, skills, and knowledge. The material of the fundamental laws of chemistry is classified in the 2013 curriculum. Apriliana et al. (2019) stated that the 2013 curriculum aims to produce Indonesian students who are productive, creative, and have superior attitudes. Based on the results of interviews with chemistry educators at SMA Negeri 12 Banda Aceh, information was obtained that the material on the fundamental laws of chemistry caused passive learning because others still dominated the teaching materials used in the form of package books, and students only received

material information from educators. Widayanti et al. (2022) stated that some of the problems students face in learning; namely, students are classified as low in communication, and it is not easy to express their thoughts because learning is centered on the teacher and little contribution to learning.

Students consider the material of the fundamental laws of chemistry challenging to learn due to their lack of student's ability to understand concepts and calculations. Norjana et al. (2017) stated that the level of understanding of class X IPA students atMAN 3 Malang on the material of the fundamental laws of chemistry obtained a score of 48.15% in the category of less. Based on the 2018 UN scores on the material of the fundamental laws of chemistry, they obtained a score below the KKM, namely 16.6, and in 2019, they obtained a score of 35.2 (Kemendikbudristek, 2020). This shows that the UN score on this material is still low. Therefore, an effort is needed to make the delivery of material, such as teaching materials, fun, concise, and straightforward. Teaching materials help students develop knowledge and help educators design teaching materials following the times (Yao, et al., 2022). One effort to present or convey material is to use LKPD teaching materials (Ainina, 2016).

LKPD is a teaching material that presents a method of completing a task by the basic competencies that must be achieved (Fajarini, 2018). LKPD can guide students to grow their knowledge and improve learning activities and results. In addition to using LKPD, the learning model supports students in growing knowledge and skills and engaging in active learning activities to show good learning outcomes. The LKPD developed is based on the think talk write (TTW) model by describing its steps.

One of the learning models that supports students in discussing is the think-talk-write (TTW) model. Listiana (2018) explains that the TTW learning model introduced by Huinker and Laughlin is basically through thinking, talking, and writing. The TTW learning model trains students to improve their ability to think, communicate, and explore information to achieve learning objectives (Nana, 2019). Learning with this TTW model will encourage students to be active in learning and groups. Huda (2013) stated that the TTW model consists of thinking, speaking, and writing activities, a form of teaching and learning activity that provides opportunities for students to participate actively. The TTW learning model can also be developed as LKPD teaching materials describing its steps. Learning using the TTW model assisted by LKPD can improve student learning outcomes. It can be seen that the comparison between classes that use TTW learning assisted by LKPD improves learning outcomes by 88.57%, compared to classes that apply TTW learning without LKPD assistance by 73.53% (Sogandi, et al., 2019).

2. METHOD

The research approach used is a qualitative approach. The type of Research and Development (R&D) research uses the 4-D model. The 4-D model defines, designs, develops, and disseminates (Satriani, et al., 2018). The research subjects were X IPA 1 class students; 25 were selected using purposive sampling.

The research data were collected by interviewing chemistry educators at SMA Negeri 12 Banda Aceh, analyzing the needs of students, the feasibility of LKPD, and the responses of educators and students to LKPD. Researchers gave a questionnaire sheet assessing the feasibility of LKPD to two expert validators. Data on the responses of educators and students were obtained through a questionnaire given after the LKPD was distributed.

Data analysis by calculating the percentage of student's needs obtained a value of 83, the feasibility of LKPD of 93.3%, educators' responses of 94.8%, and students' responses obtained a value of 86% with a very good category.

3. RESULTS AND DISCUSSION
Define Stage

The results of the interview show that educators have never used teaching materials in the form of TTW-based LKPD, especially on the material of the fundamental laws of chemistry. The results of the needs analysis showed that 60% of students consider learning more interesting using LKPD, and as many as 100% agree to apply TTW-based LKPD. Needs analysis aims to determine the need to solve a problem (Pradilasari et al., 2019).

Design Stage

This stage is to design LKPD based on the formulation of material and questions and determining basic colors and images. Using attractive images will make understanding more accessible and increase students' interest in solving problems (Indrawati et al., 2020). The process of designing this LKPD uses the Microsoft Word application. This is to the research of Annisya et al. (2016), which states that the LKPD structure generally includes (1) subject title (cover page), (2) competencies to be achieved, (3) indicators, (4) learning objectives, (5) work steps and supporting information, (6) tasks and (7) assessment.

Develop Stage

The LKPD that has been developed is then revised and validated by expert validators, namely two chemistry educators. Some of the suggestions given to the LKPD are adding pictures according to the material and adding TTW steps to each problem. The validation process is carried out by providing an instrument validation questionnaire to the validator.

Disseminate Stage

The dissemination stage knows the feasibility assessment responses of educators and students to the developed LKPD. The LKPD was revised according to the validator's suggestions and then assessed for feasibility. The feasibility questionnaire was given to two validators, and the feasibility percentage was calculated. The results of the feasibility recapitulation of the two validators can be seen in Table 1.

Table 1. Results of LKPD feasibility recapitulation

No	Assessment Aspect	Total Score	Feasibility (%)	Average
A	**Material Aspect**			
1	The learning objectives are outlined following the indicators.	8	100	
2	The instructions outlined in the LKPD illustrate the steps of the TTW model.	7	87.5	
3	The material is presented concisely.	8	100	
4	The material is presented systematically according to the indicators.	8	100	95
5	Materials contain relevant facts, concepts, and principles.	7	87.5	
6	The questions contained in the TTW model-based LKPD direct students to think critically.	8	100	
7	LKPD based on the TTW model can make it easier for students to understand the material of fundamental laws of chemistry.	7	87.5	
B	**Display Aspect**			
8	The LKPD cover is attractive and follows the material.	8	100	
9	The title is written by the material, with sentences that are clear, brief, and easy for students to understand.	8	100	
10	There is enough space for learners to write answers in the LKPD.	7	87.5	94
11	The writing uses a balanced composition of font size and type.	7	87.5	
12	The selection of colors contained in the LKPD attracts attention.	7	87.5	
13	The image design and display on the LKPD are visible.	8	100	
C	**Language Aspect**			
14	The language used is simple and easy to understand.	7	87.5	

No	Assessment Aspect	Total Score	Feasibility (%)	Average
15	Use sentences that do not contain double meanings	7	87.5	88
	Average Result		**93.3**	

Based on Table 1, the feasibility results obtained an average value of 93.3%, classified as very feasible. LKPD is suitable for use in chemistry learning to guide students in learning the material and make learning more enjoyable. Izzatunnisa et al. (2019) stated that the LKPD obtained a percentage of 89.33%, which met the very feasible category. This shows a positive response from the validator as an assessor of TTW-based LKPD products that can be tested for use in educators and students of SMA Negeri 12 Banda Aceh.

Educators' Responses to TTW-based LKPD
The LKPD assessment was done by distributing response questionnaires to three SMA Negeri 12 Banda Aceh chemistry educators. The results of the recapitulation of educator responses can be seen in Table 2.

Table 2. Educators response to the LKPD

No	Aspect Assessed	Total	Teacher response(%)
1	TTW model-based LKPD can be used as teaching materials at school.	12	100
2	LKPD based on the TTW model can be applied in learning the material of fundamental laws of chemistry.	12	100
3	The questions in the TTW model-based LKPD make it easier for students to understand the material on the fundamental laws of chemistry.	12	100
4	TTW model-based LKPD can motivate students to interact with other students.	12	100
5	TTW model-based LKPD can train students to improve speaking skills between groups.	11	91.7
6	TTW model-based LKPD can foster students' self-confidence.	11	91.7
7	LKPD based on the TTW model can add insight because it can develop the ability to think and express ideas among students.	9	75
8	LKPD based on the TTW model can be implemented on other materials in the chemistry learning process.	12	100
	Average Result		**94.8**

Based on Table 2, the average value is 94.8%, which is classified as very feasible. This shows that TTW-based LKPD on the material of the basic laws of chemistry received positive responses from SMA Negeri 12 Banda Aceh chemistry educators and is suitable for use in the learning process. The results of this study are supported by Fauzi et al. (2017), who state that the results of educator's responses to the LKPD developed obtained a percentage of 92.3%, classified as very feasible, can help educators and students in learning.

Learner's responses to TTW-based LKPD
The LKPD assessment was conducted by distributing response questionnaires to X IPA 1 class students totaling 25 people at SMA Negeri 12 Banda Aceh. The results of the recapitulation of student's responses can be seen in Table 3.

Table 3. Learners responses to the LKPD

No	Questionnaire Statement	Leaner				Result Score (%)				Average
		1	2	3	4	1	2	3	4	
1	I am interested in learning the material of the fundamental laws of chemistry with the	0	1	6	18	0	4	24	72	92

No	Statement									Result
	TTW model-based LKPD.									
2	The TTW model-based LKPD cover on the material of the fundamental laws of chemistry given is exciting and creates interest in learning.	0	2	13	10	0	8	52	40	83
3	The sentences in the TTW model-based LKPD on the material of the fundamental laws of chemistry are presented clearly and easily understood.	0	1	7	17	0	4	28	68	91
4	I find it easy to understand the material of the fundamental laws of chemistry by using LKPD based on the TTW model as a learning resource.	0	2	13	10	0	8	52	40	83
5	The information in the TTW model-based LKPD can add to my insight into the material of the fundamental laws of chemistry.	0	3	10	12	0	12	40	48	84
6	I am more motivated to learn by using the TTW model-based LKPD on the material of the fundamental laws of chemistry.	0	3	10	12	0	12	40	48	84
7	The pictures and illustrations in the TTW model-based LKPD on the material of the fundamental laws of chemistry interest me in studying the LKPD.	0	2	11	12	0	8	44	48	85
8	My learning atmosphere became more enjoyable with the TTW model-based LKPD on the material of the fundamental laws of chemistry.	0	0	11	14	0	0	44	56	89
	Average Result									**86**

Based on Table 3 above, students are interested in learning using TTW-based LKPD. As many as 84% of students agree that LKPD can increase learning motivation and add insight. Overall, the LKPD received a positive response of 86%. The results of this study are supported by Ardhiantari et al. (2017), who stated that LKPD can facilitate and interest students during learning by obtaining a percentage of 83.36%, which is classified as a very good category. The results of research conducted by Ardiansyah (2017) showed that learning with the TTW model could improve learning outcomes and improve student's communication skills.

4. CONCLUSION

From the research, the authors concluded that the feasibility of TTW-based LKPD on the overall average obtained a score of 93.3%, which is classified as very good. The educators' response to LKPD obtained an average score of 94.8%, and the students' response to LKPD as a whole obtained a score of 86%.

ACKNOWLEDGMENT

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