

# Development of Student Worksheets Based Project Based Learning to Improve High-Level Thinking Skills (Hots) on Magnetic Material

DOI: <https://doi.org/10.47175/rielsj.v4i3.805>

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## ABSTRACT

*This study aims to develop LKPD based project-based learning to improve the validity of high-level, practical, and effective high-thinking skill. Learning products that are developed in the form of Students worksheets based on project learning. This type of research is the development of research and development (R&D) using the 4-D development model that developed by Thiagarajan. Data collected using expert validation, observation sheet, questionnaire response learners and teachers, and high-level thinking skills test. The results showed that LKPD based project-based learning in the valid and worthy category in use, the results of the validation of the material experts in stage I dan II are equal 76,47 % and 84% included into a very valid category, on the validation of the design expert design I and II is equal 81% dan 97% included in a very valid category, then on validation of language experts in stage I and II 62,50% and 90,62% located in a very valid category. LKPD based project-based learning has fulfilled aspects of effectiveness look at the various tests that have been done and declare that LKPD worth to use.*

## KEYWORDS

*Student worksheets; Project Based Learning; high level of thinking skills*

## INTRODUCTION

Higher order thinking skill currently the center of attention in the world of education, because of high level thinking skills are emphasized in the 2013 curriculum learning. High level of thinking ability as one of the important aspects of education (Agarina, M., Karim, A. S. and Sutedi, S., 2019) The capability of the hots is very important in the process of education because it may affect the ability of learners (Ramdiah et al,2019). Hots not only thinks remember and implement, but the high level of thinking, logical, reflective, metacognitive, and creative. HOTS-based e-learning also is carried out through the stages of preparation for the implementation of learning and evaluation for 16 learning activities. The contents of the activities include discussion of textual material, independent contextual exercises, and completing exams. This activity has an impact on the acquisition of positive student learning outcomes. As a follow-up suggestion, full vigilance is needed to seek more varied activities to be actively involved in learning activities and successfully (Herianto, E., 2021; Sari, I. A. D., Ambarita, A., & Darsono, D., 2017; and Dini, H.N., 2018).

Based on the results of the international studies on the ability of Indonesia participants in the international achievement where TIMISS results are only 5% of Indonesian participants who can work on with high categories and results of PISA Indonesia are ranked to 64 of 65 countries. Therefore, the application of the 2013 curriculum should be supported with

various learning devices that can actively develop learners, one of the teaching materials that can be used in the curriculum 2013 is the work plane of the learners or Students worksheets. Though it has been a lot LKPD what developed, but still alone cannot match the 2013 curriculum that is expected to help learners in building high-level thinking and active in learning in accordance with the 2013 curriculum in which demanding active learners in learning (Riyadi, Syarifah, T. J., & Nikmaturohmah, P., 2021; and Andriyani, Y.E., Ernawati, W.D.M., & Malik, A., 2018).

Student worksheets which developed to improve the high-level thinking skills learners refer to the syntax of the project-based learning model. Where the project-based learning syntax is selected because the project-based learning is a learning model based on learners so that it can obtain concepts by experiment or practicum. So learners expect to be able to investigate why an event can occur, collecting data and processing scientifically discover to find answers form a problem. The project based learning model is a model that is concerned about the importance of understanding of understanding or important ideas against a science, through the involvement of participants actively in the learning process. In learning-based discoveries, learners are encouraged to learn with most through their own active involvement in which teachers are facilitators for learners to have experiences and experiment that enables them to find knowledge for themselves (Hosnan, 2014).

Experts say that Students worksheets is one of learning resources that can be developed by teachers as a facilitator in learning activities (Aini, Nur A., et al., 2019). The LKPD are in the arrangement can be planned and developed in accordance with the conditions and situations of learning activities to be faced (Widjajanti, 2008). According to the association of education and communication technology (AECT) in ethicology of the word media is a plural form of the medium derived from the Latin is “Medius” which means middle. So, in the Indonesian medium can be in the artistic as the intermediary media can lead to a unit or forward the information. According to Trianto (2007), in the learning process is a process of learners to develop knowledge, thinking, and psychomotor skills. In learning IPA is something to be done by learners instead of something that is done to learners. Where in the current curriculum used demands active learners in learning and optimizing intelligence or talent that has been, then from it is done in the improvement in the understanding and the thinking skills of learners with the making of learning media in the form of speakers of learners.

Student worksheets can be developed with the creativity of teachers, such as creating a colored book and can invite learners to be imagined. It that can be used in learning should invite the activity of learners. One of them can use it with the corresponding model one of the project-based learning so that it can cause liveliness of learners. According to Hidayat (2013) there are several components in the purpose of using the workpiece of the leisure (Student worksheets) at the time of learning process (1) can provide the knowledge, attitudes and skills that need to have been in by learners, (2) can check the extent to the level of understanding of learners in learning to learning materials that have been given by the teacher, (3) can provide knowledge, attitudes, and skills that need to have been in by participants, (4) can check the extent to which levels of understanding of learners in learning to learning material that need to have been in by the teacher, (5) can develop and apply difficult learning material in conviction orally, (6) can help learners in obtaining material through learning activities containing tasks and can be done in practice.

The science learning about magnets is one of the physics materials in the invitation to class VI. This material is the basis of physics learning therefore learners should be understanding the concepts in the material in depth so if the launch is given the exercise or test of learners can answer with you in the other learners will be easy to learn the next science

material. In fact, still there are learners who have not midge in the material and cause misconceptions while studying learning materials. This is not leaving many learners not interested to study the science material related to physics. One way to help learners in understanding this material is by using LKPD that corresponds to learning.

Based on the description above the researcher has done initial observation at any of the elementary schools in West Aceh that is at the SD Negeri 24 Meulaboh Aceh Barat precisely on classroom VI in September 2021. In the observation that has been done to make that masi there are many constraints in the learning process related to the application of learning tools in the form of Student worksheets in accordance with the curriculum 2013 demanding learners can be active in learning or learning centered to learners. But in fact, it is used by some teachers at the school is not much different from the workplace that is in the teaching books available at school. Where the existing questions in Student worksheets are not in the category about the hots but it is still the loss category, so it is to make the learners cannot think high levels so difficult learners in answering the problems in the category of the Hots. From the issue, researchers are interested in conducting research on the development of the projected work spread (Student worksheets) based on projected based learning to improve high-level thinking skills (HOTS) on magnetic material in SD Negeri 24 Meulaboh, Aceh Barat.

## RESEARCH METHODS

This type of research is research and development of research and development (R & D). This research is done by using the model of the 4-D model development that developed by Thiagarajan with the stages to be made consisting of four stages namely; Define Stage, Design Stage, Development Stage, and Stone Deployment.

The test of the test in this study used the One Group of Pre-Test-Post-Test Design design. The first step to measure as an initial test (pre-test), then wearing a revolution in a certain period of time, then performed the final test (post-test). Designing pre-test and post-test ads with patterns in Table 1 below.

**Table 1.** Test of the Test

Test	Treatment	Test
$T_1$	X	$T_2$

Sugiyono (2013)

Description:

$T_1$  : Test the high level of thinking skills before learning.

$T_2$  : Test the ability of high levels after learning.

X : Learning by using LKPD based project

This research is tested in SD Negeri 24 Meulaboh Aceh Barat District. Subjects in this study are participants of the VI SD Negeri 24 Meulaboh Aceh Barat district. The trial to be done 1 times the trial. Which will be trial in class VI as many as 20 learners. Where the object of this research is the development of the project-based work-based project workplace to improve the high-level ability.

## RESULTS AND DISCUSSIONS

This research and development produce products in the form of teaching materials of learners (Student worksheets) on thematic learning for material IPA SD. The LKPD teaching material is a printed, medium-based learning process, created by the LKPD teaching materials made by following the Project Based Learning and in produce through the stages based on the 4-D development model that developed by Thiagarajan. Activity in this early stage aims to determine the initial problem faced by learners at the time of learning IPA with

the entrepreneurship theme on magnetic material. In this activity the researcher performed the initial observation that was done on SD Negeri 24 Meulaboh Aceh Barat, So the researchers found where in the learning process, learners still have not been able to think high levels. The exam results on thematic subjects especially in the class IPA classes VI Indicating that by 2020 learners still received 71 of the value of minimum completeness criteria 75 and in 2021 obtained 73 values that were still under minimal completeness which is valid 77 if viewed in the outline, the researcher has that the result of learning students is learned in the IPA lesson is still very low, this indicates that learners have not been able to think high levels. Seeing the value of the thrill of learners under KKM, the researcher did the development of teaching materials in the form

Student worksheets based on project learning-shaped prints with entrepreneurial themes on learning IPA with magnetic material has gotten the result of the previous stage of define and design stage and already in completion then produce the initial design of the media called on the draft I. Then the next stage is the development stage or development stage, the first phase is done in the process of development stage this is validate and evaluation.

Material from Student worksheets learning media developed in test based on the feasibility of several experts including materials, linguists and learning designs. Of the overall validation results of the disaster assessed by some experts, including materials, learning design experts, and language experts against developed products, thus getting a decent value for the test in the field. So on, each assessment of the validator can be viewed in the following table:

**Table 2.** Result of Validator Summary

No	Validation	Stage I		Stage II		criteria
		RTP	%	RTP	%	
1	Material validation	3,05	76,47	3,35	84	very valid
2	Design validation	3,2	81	3,9	97	very valid
3	Language Validation	5	62,50	7,25	90,62	very Valid

From the validation of the material expert at the stage of 3.05 with a percentage of 76.47%, in the stage II obtained an average score of 3.35 with a percentage of 84%. Validation of Expert Design of Learning Design in Phase I Acquired Average score of 3.2 with a percentage of 81%, in stage II obtained a score of a total of 3.9 with a percentage of 97% and last of the validation conducted by the limnologist with an average score in earnings of 2.5 with a percentage of 62.50%, at the stage II obtained a score of a value of 7.25 with a percentage of 90.62%. The learning media developed in the form of student worksheets based on project from the overall score then showed in a very valid category (very decent).

Individual trials conducted by researchers are to gain one of the practicalities of learning media developed by questionnaire responses learners against project-based student worksheets learning media projects developed and questionnaire of the teacher to the response in the use of student worksheets learning media. This test process is done at the SD school of 24 Meulaboh Aceh Barat. The data is earned through the questionnaire response learners and teachers later in the analysis so that it increases the accumulation of the learning media developed in Table 3 as follows:

**Table 3.** The results of the teacher's response analysis and learners to the student worksheets based on project learning

No	Validation	RTP	The average	criteria
1	Teacher response	88,4%	86,95%	very good

2 Learners' response 85,5% very good

Based on the overall data of the teacher's response analysis results and learners to the use of student worksheets learning based on projected based learning can be seen from the average value of the overall value of 86.95%. From the results of the teacher's response consisted of 4 people of which 1 principal, and 3 others are the Class of VI and the teacher who teaches in the class VI, while from the student's response consists of 20 people's educational classes VI.

### **Product Development**

Development of Student worksheets on based project Learning Media Learning on Entrepreneurial Theme with Magnetic Materials That is a learning material that has been developed by paying attention to various aspects of learning. This learning media developed is done to produce a product in the form of student worksheets based on project a valid class VI to improve the high-level thinking skills learners.

The process in this study is in the start of the initial analysis study, learners' analysis, task analysis, concept analysis that appears when the learning process on magnetic material. The data obtained in the early stages are the prevention of information that is guidelines for researchers to perform the needs of the needs in learning activities and to compile the concept of learning tools for magnetic materials to be developed further. The use of student worksheets based on project learning media is the concept that is served easily in the study, in understanding, and systematic. Student worksheets Learning Media Project Based Learning provides an opportunity for learners to learn according to their respective ways, young learning media is understood in due to learning media equipped with various supportive images. Student worksheets Learning Media is a printed, medium-based, medium-based learning media is also equipped with exercise answering questions to know the speech of learners after the learning process takes place.

### **Product Effectiveness Test**

The results of the research that has been done, that the development of Student worksheets learning media based projects based on learning in research using the 4D development model in the same as the Dick and Carey learning development model then finds the results of research that there is a difference to the use of Student worksheets learning based on projects based on project learning test results showing learning outcomes learned on the public by using Student worksheets learning media based project based learning higher than the learning outcomes performed by using learning media in the form of book package available at school. Student worksheets Based on project learning is developed following a six-point syntax PJBL of which is the first fundamental question, the second designing the plan, the third compiling a schedule, the fourth monitoring activation and development of the project, the fifth examining results, the sixth evaluation. The use of icon-based learning media in the learning process can awaken interest and desire learners and motivations that can drive independent, creative, effective, and efficient learning. In managing the learning methods to get optimal learning results, it is expected to overcome the saturation of learners in following learning. Based on the results of the tests, it can be said that the use of Student worksheets based on project learning media to improve high level thinking skills of country's SD Negeri 24 Meulaboh sub more effectively than the use of the package book.

## CONCLUSION

Based on the results and research discussions, the use of learning media is based on project learning, which is a significant improvement in the high level of ability of educated people in the country's 24 Meulaboh, which could be seen from learning, among students based on project learning but after learning to use the project based learning medium, project based learning has gained momentum. The highest-level thinking skills of the learner can be seen from pretest and posttest results where before the treatment of many of the learners did not reach a high level, but after treatment there were 14 learned participants of 20 students who scored at a rate of 85%, and 6 educated students of 20 students did not score at 15%. Then it can be said that the validity of the high-level thinking skill test is valid this is seen from the increasing results of learning participants in learning.

## REFERENCES

- Agarina, M., Karim, A. S. and Sutedi, S. (2019) 'User-Centered Design Method in the Analysis of User Interface Design of the Department of Informatics System's Website', ICITB 2019. 218–230
- Aini, Nur A., et al. (2019). Pengembangan LKPD Berbasis Problem Based Learning pada Pelajaran IPA Materi Gaya. *Jurnal Pendidikan Dasar UNJ*, 10 (1). 68-76. [10.21009/10.21009/JPD.081](https://doi.org/10.21009/10.21009/JPD.081).
- Hosnan. (2014). *Pendekatan Saintifik dan Kontekstual dalam Pembelajaran Abad 21*. Bogor: Ghalia Indonesia.
- Andriyani, Y.E., Ernawati, W.D.M., & Malik, A. (2018). Pengembangan Lembar Kerja Peserta Didik Elektronik Berbasis Proyek Pada Materi Termokimia Di Kelas XI SMA. *Journal Of The Indonesian Society Of Integrated Chemistry.*, 6-11.
- Dini, H.N. (2018). Higher Order Thinking Skills (HOTS) Dan Kaitannya Dengan Kemampuan Literasi Matematika. *Prosiding Seminar Nasional Matematika.*, 170-176. Universitas Negeri Semarang.
- Herianto, E. (2021). How to Apply HOTS-based E-learning in Higher Education?. *Randwick International of Education and Linguistics Science Journal*, 2(2), 157-169. <https://doi.org/10.47175/rielsj.v2i2.256>
- Hidayat. (2013). *Panduan Kreatif Untuk Membuat Bahan Ajar*. Yogyakarta: DIVA.
- Ramdiah, S., et al (2020). South kalimantan local wisdom-based biology learning model. *European Journal of Educational Research*, 9(2), 639-653. <https://doi.org/10.12973/eu-er.9.2.639>
- Riyadi, Syarifah, T. J., & Nikmaturrohmah, P. (2021). Profile of students' problem-solving skills viewed from polya's four-steps approach and elementary school students. *European Journal of Educational Research*, 10(4), 1625-1638. <https://doi.org/10.12973/eu-er.10.4.1625>
- Sari, I. A. D., Ambarita, A., & Darsono, D. (2017). Pengembangan LKPD Berbasis PBL untuk Meningkatkan Kemampuan Berpikir Kritis Pada Pembelajaran Tematik Kelas IV Sekolah Dasar. *Pedagogi: Jurnal Pendidikan Dasar*, 5(8).
- Sugiyono. (2011). *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*. Bandung:: AFABETA,CV.
- Trianto. (2009). *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta:: Perdana Media Group.
- Widjajanti, E. (2008). *Kualitas Lembar Kerja Siswa. (Online)*. Yogyakarta: Pelatihan Penyusunan Lks Mata Pelajaran Kimia Berdasarkan Kurikulum Tingkat Satuan Pendidikan Bagi Guru SMK/MAK di Ruang Sidang Kimia FMIPA UNY.