

PAPER • OPEN ACCESS

How is the student worksheet design (LAPD) based on project based learning (PjBL) models in Senior High School Physics X learning? Literature review

To cite this article: Bahagia Maharani and Yohandri 2020 *J. Phys.: Conf. Ser.* **1481** 012061

View the [article online](#) for updates and enhancements.

You may also like

- [The geometry of the ICRF-induced wave-SOL interaction. A multi-machine experimental review in view of the ITER operation](#)
L. Colas, G. Urbanczyk, M. Goniche et al.
- [Measured Reduction in Alfvén Wave Energy Propagating through Longitudinal Gradients Scaled to Match Solar Coronal Holes](#)
Sayak Bose, Troy Carter, Michael Hahn et al.
- [Forty years \(1983–2023\) with LAPD and for its future evolution](#)
K. Muraoka



ECS
The
Electrochemical
Society
Advancing solid state &
electrochemical science & technology

DISCOVER
how sustainability
intersects with
electrochemistry & solid
state science research

How is the student worksheet design (LAPD) based on project based learning (PjBL) models in Senior High School Physics X learning? Literature review

Bahagia Maharani* and Yohandri

Department of Physics, Faculty of Mathematics and Science, Padang State University, Padang, 2531, Indonesia

*bahagiamaharani.bm@gmail.com

Abstract. Teaching materials can help teachers in-class learning activities because they are composed of learning components and learning materials for students. Student Worksheets (LAPD) Based on Project Based Learning (PjBL) Models in High School X Physics Learning. This research was conducted at Class X High School. The instruments in the form of interviews, questionnaires and observations used a Likert scale. Development of Project-Based Learning (PjBL) based LAPD compiled using the Plomp model. The Arduino Uno microcontroller media development model uses the ADDIE model. LAPD has a category of very validity, practical and effective. Based on the above needs analysis needs the development of Student Worksheets Based on Project Based Learning (PjBL) Models in Senior High School Physics Learning X.

1. Introduction

Education is the process of learning the development of students so that they have spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by themselves, the people of the nation and the state [1]. Education is a supporting factor to improve the quality of human resources. This is supported by the quality of education taken by someone in learning. Educational success is achieved if there are efforts to improve the quality of education. Efforts to improve the quality of education are influenced by quality in the process and learning outcomes [2]. Learning in schools will be carried out well if done according to the applicable curriculum.

The importance of science education, the government is trying to improve the quality of science education by improving the curriculum, including the Education Unit Level Curriculum (KTSP) and now the 2013 curriculum. The 2013 curriculum makes students independent, active and creative. The component of the 2013 curriculum method at the high school / vocational level is that teachers must be able to develop learning strategies and use them so that students learn independently, actively, creatively and enjoyably and effectively. The 2013 curriculum can be used in physics learning. Physics is a branch of science in creating new technologies to keep up with the times. Physics is the pound of science and technology. The concept of physics can increase students' knowledge and admiration for God Almighty. Teachers must change the learning and assessment process based on the 2013 curriculum to get good results by attending seminars and training [3].

Based on the 2013 curriculum that the purpose of learning science is to provide direct learning experience through scientific process skills and attitudes. Science education is one of the sciences that allows students to explore their potential through learning experiences and allows students to research



and construct science optimally [4]. The reality is that there is still much science learning that is limited to the teacher delivering information and giving assignments and then students memorize the information and do the assignments, as a result, students experience boredom and ways of thinking do not develop so that the impact on students' scientific learning achievement is low. Student success in science is closely related to the ability of teachers to design learning activities. Learning that makes students active so that good learning outcomes. Learning activities can be optimized if the teacher designs learning designs, uses teaching materials and appropriate learning media. Teaching materials and learning media that are used can help in the learning process in class.

The teaching materials used are Student Worksheets (LAPD). The learning media is the Arduino Uno microcontroller. Teaching material in the form of LAPD contains steps of activities that students will do. Project-Based Learning Model is a learning model that makes students active. The Project-Based Learning (PjBL) model is oriented towards increasing student involvement. Uno Carduino microcontroller is a tool for calculating mechanical energy. The teacher must understand the concepts and how to apply the learning model. Based on the existing problems, researchers will develop Student Worksheets (LAPD) Based on Project Based Learning (PjBL) Models in Physics Learning X SMA with valid, practical and effective categories.

2. Method

Sugiyono, research development method is a research method to produce products and test their effectiveness. Research and Development are steps to produce new products or improve existing products [5]. The product developed is a Student Worksheet (LAPD) Based on Project Based Learning (PjBL) Model in PHYSICS X High School learning. Procedures for developing LAPD-based Project Based Learning (PjBL) models compiled in this study refer to the type of Plomp model development, which consists of three phases: preliminary research, development or prototyping phase and assessment phases [6]. The products that will be designed to build in this study are the Physics Practical Worksheet and Student Worksheet (LAPD) about business and energy using an Arduino Uno microcontroller. The learning media development model uses the ADDIE model which consists of five phases: analysis, design, development, implementation, and evaluation [7].

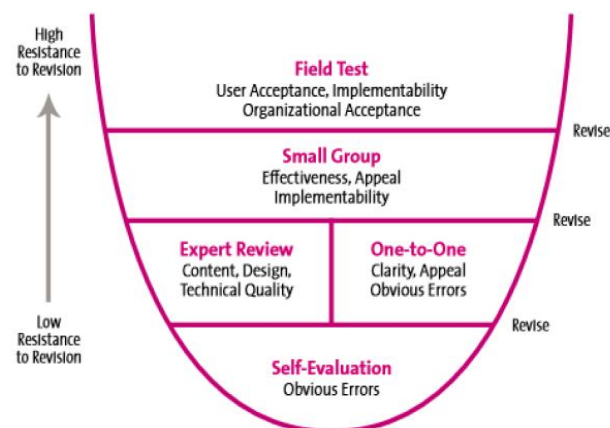


Figure 1. Plomp Model

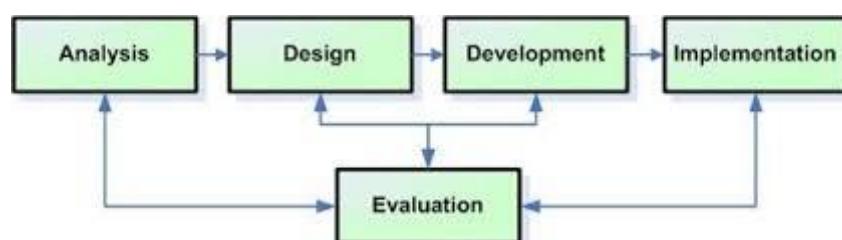


Figure 2. ADDIE Model

Data collection techniques using interviews, questionnaires, observations and a combination of the three using a Likert scale. The scale of the grading items is the evaluation criteria as in table 1 below:

Table 1. Distribution of Results [8]

Score	Category
$80 < x < 100\%$	Very good
$60 < x < 80\%$	Well
$40 < x < 60\%$	Enough
$20 < x < 40\%$	Less
$0 < x < 20\%$	Bad

3. Discussion

The research results that have been arranged include:

Table 2. Relationship of Project Based Learning (PjBL) Models and their Bound Variables

Model	Variable	Results
PjBL	Student learning outcomes [9]	<ol style="list-style-type: none"> 1. LKPD is very valid 2. Improving students' process skills in designing and designing, inferring and communicating based on gain values. Based on the value of GLM, there is an increase in designing and designing, experimenting, observing and interpreting data. 3. Increased mastery of moderate student material and student learning completeness 50%.
	Student learning creativity [10]	<ol style="list-style-type: none"> 1. Module characteristics have six syntaxes integrated with the module rubric. 2. Modules have graphic eligibility with very good categories. 3. Modules can enhance students' learning creativity in the medium category.
	Scientific Attitudes of Students [11]	There is an increase in scientific attitude in each cycle with a good category and achieve the value of minimal completeness criteria (KKM).
	Creative thinking ability [12]	Gives a significant influence on the ability to think creatively
	Learning activities and responses of students [13]	<ol style="list-style-type: none"> 1. Learning activities of students in learning in high criteria 2. Students' learning responses in learning within the criteria are sufficient
	Interest in learning and critical thinking of students [14]	Significantly influences the interest in learning physics and students' critical thinking skills.

Table 3. Relationship of Project-Based Learning (PjBL) Models, Materials and Teaching

Model	Theory	Teaching Materials
PjBL	Harmonic Motion	Student Worksheet (LKPD)
	Static Fluid	Module
	Straight Motion	-
	Momentum and Impulse	-

In table 2. State that the Project-Based Learning Model (PjBL) can measure all the dependent variables that want to be studied and have an increase in the results of the variables studied, such as learning outcomes, learning creativity, scientific attitude, creative thinking ability, learning activities, learning interest and students' critical thinking skills. In table 3. It states that the Project-Based Learning

Model (PjBL) can be used on all physics materials and can be integrated with teaching materials in the learning process, such as harmonic motion, static fluid, straight motion, momentum, and impulses.

Based on the research results obtained prove that the learning model applied by teachers in the classroom is very important in the learning process. The application of learning models by the material to be taught and by the characteristics of students will get maximum results.

4. Conclusion

Student Worksheets (LKPD) Based on Project Based Learning (PjBL) Models in Learning Physics X LKPD SMA is very valid, practical and effective and can make students able to learn independently and actively during learning.

References

- [1] Jufri, A. Wahab. 2013. *Belajar dan Pembelajaran SAINS*. Bandung: Pustaka Reka Cipta.
- [2] Suryadi, Ace dan H.A.R Tilaar. 1993. *Analisis Kebijakan Pendidikan Suatu Pengantar*. Bandung: PT. Remaja Rosdakarya.
- [3] Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 59 Tahun 2014 tentang *Kurikulum 2013 Sekolah Menengah Atas/Madrasah Aliyah*.
- [4] Wisudawati, Asih Widi dan Eka Sulistyowati. 2013. *Metodologi Pembelajaran IPA*. Jakarta: Bumi Aksara.
- [5] Sugiyono. 2010. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Bandung: Alfabeta,
- [6] Ploom, Tjeerd dan Nienke Nieveen. 2013. *Educational Design Reserch*. Enschede: Netherlands.
- [7] A. Priyadi, Benny. 2010. *Model Desain Sistem Pembelajaran (Learning System Design Model)*. Jakarta: Dian Aksara.
- [8] Riduwan. 2009. *Mudah Penelitian Untuk Guru, Karyawan, dan Peneliti Pemula*. Bandung: Alfabeta.
- [9] Sulaiman, Hadiid. 2017. *Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Project Based Learning Pada Materi Gerak Harmonik Untuk Meningkatkan Hasil Belajar Peserta Didik Kelas X SMA*. Skripsi.
- [10] Novianto, Nur Kholis. 2016. *Pengembangan Model Pembelajaran Fisika Berbasis Proyek (Project Based Learning) Pada Materi Fluida Statis Untuk Meningkatkan Kreativitas Belajar Siswa Kelas X SMA/MA*. Tesis.
- [11] Handayani, Dinda Putri. 2014. *Meningkatkan Sikap Ilmiah Siswa dengan Model Project Based Learning di Kelas VIII ASMP Negeri 8 Muaro Jambi*. Artikel.
- [12] Khanifah, dkk. 2016. *Pengaruh Model Project Based Learning Melalui Metode Pratikum Terhadap Kemampuan Berpikir Kreatif Pada Materi Getaran Harmonis Siswa Kelas XI MIA SMA Negeri 1 Comal*. JP2F, Volume 7 Nomor 1 April 2016.
- [13] Kristati, Yulita Dyah, dkk. 2016. *Model Pembelajaran Berbasis Proyek (Poject Based Learning Model) Pada Pembelajaran Fisika di SMA*. Jurnal Pembelajaran Fisika, Vol. 5 No. 2, September 2016.
- [14] Permata, Mika Dwi, dkk. 2018. *Pengaruh Model Project Based Learning Terhadap Minat Belajar Fisika dan Kemampuan Berpikir Kritis Siswa SMA Negeri 1 Kota Bengkulu*. Jurnal Kumparan Fisika Volume 1 Nomor 1 (2018).