



Feasibility of Learner Autonomy Oriented Physics Learning Material to Train Student's Science Process Skills

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DOI: 10.2057/bipf.v7i2.6405

Received: 11 May 2019 Accepted: 30 June 2019 Published: 30 June 2019

Abstract: Low level of student's science process skills is due to the lack of use of experiments in learning. The study was conducted to produce learning materials which oriented to valid, practical, and effective learner autonomy; so that it is feasible to train student' science process skills. The research uses the ADDIE development model design including Analyze, Design, Develop, Implement, and Evaluate. The research subjects were 30 students of class X B TKJ in one of vocational high school at Banjarmasin. The research instrument used a validation sheet, observation sheet from the lesson plan, observation sheet of science process skills, and test the learning outcomes of students. Further data were analyzed descriptively qualitatively and quantitatively. The results showed: 1) learning materials which oriented to learner autonomy were valid because the lessons plan, teaching material, student worksheet, and learning outcomes test were in the valid category, 2) learning materials which oriented to learner autonomy including practical because the component of lessons plans with direct instruction, guide inquiry and cooperative learning type group investigation in very practical categories, 3) learning materials which oriented to learner autonomy is effective because the cognitive N-gain tests are 0.51 in the medium category; 4) observations of science process skills in good categories and the result of N-gain science process skills tests are 0.76 in the high category. It can be concluded that the learning materials which oriented to learner autonomy were feasible to practice science process skills vocational high school's students.

Keywords: learner autonomy, learning materials, science process skills.

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How to cite: Zakiati, E., Mastuang, M., & Suyidno, S. (2019). Feasibility of learner autonomy oriented physics learning material to train student's science process skills. *Berkala Ilmiah Pendidikan Fisika*, 7(2), 105-114.

INTRODUCTION

Physics is a subject that can facilitate students in developing Science Process Skills or (SPS). SPS must be owned by students, especially in the implementation of the 2013 curriculum. SPS are the ability of students to carry out scientific methods to understand and develop science and discover knowledge using reason, thoughts and actions to achieve an expected learning outcome (Maradona, 2013; Toharudin, Hendrawati, & Rustaman, 2011). SPS is also a performance that involves cognitive and sensory skills in solving problems through scientific investigative activities (Salam & Miriam, 2016). This investigation activity is expected to be able to facilitate the active role of students to develop creativity and independence by the demands of the 2013 curriculum that requires a learning process that can give students the opportunity to develop student's inner potential.

Facts on the ground indicate that the physics experiments carried out at school are still very minimal. This fact was obtained from the observation of a pre-service teacher who practiced teaching in the schools. It was found that students' SPS in some schools was still very low. This was supported by the data from the preliminary study that has been conducted by the researcher; in the form of a written test to find out how far was the students' understanding of SPS. The subject of the preliminary study was Tenth Grade students in class B TKJ in one of vocational high school in Banjarmasin with 36 students, the result showed that a) 22.22% of students who are able to formulate hypotheses, b) 30.56% are able to identify variables, c) 5.56% are able to analyze the data and d) 13.89% are able to draw conclusions. This data is confirmed by the results of interviews with physics teachers in vocational high school, which is showed

that the learning methods that have been used so far are lectures and discussions.

The effort to overcome the problem of SPS low students' is done by using strategies that can slowly train students' SPS with the strategy of giving autonomy to learning because learning by using this strategy must be directed first, through efforts to give autonomy to students slowly and gradually (Salam & Miriam, 2016). This strategy is expected to be a solution to introduce SPS to students so that they are accustomed to processing skills. The strategy is to develop learner autonomy oriented learning materials.

Learner autonomy is a learning strategy that starts with the full role of the teacher then gradually shifts the role to the learner to be more active and independent. The step to change role is by applying the order usage of the learning model that starts with a teacher-dominated role towards the learner-dominated role in learning model (Salam & Miriam, 2016). The implementation of the learning model with the autonomy learner strategy has stages that start from the first model which is direct instruction, the second is guided inquiry, and the last is cooperative learning group investigation type. Improving teaching methods is another popular practice adopted by educationalists to facilitate learner autonomy (Dang, 2012). Application with gradually increase the level and simultaneously shift the role of students from less active to more active, students have the right and ability to learn for themselves (Smith, 2008). Learning autonomy sees learning as an active discovery process (Reinders, 2010). Learner autonomy is an idea that states if students are involved in learning activities such as decision making, students will be more enthusiastic in participating in learning (Balcikanli, 2010).

The application of physics modeling techniques in the setting of learner autonomy based learning effectively improves basic college student competencies (Salam & Arifuddin, 2018). Learner autonomy oriented learning materials is a learning material that is effective in improving learning outcomes (Salam, Miriam, & Misbah, 2017). Learner autonomy can attract students' interest and motivation in attending lectures (Salam, Prabowo, & Supardi, 2017). Science process skills can be improved through learner autonomy (Salam & Miriam, 2016). Learner autonomy can help to achieve high degrees of creativity and independence (Yan, 2012). However, existing studies are carried out for college students, so researchers see the need to develop learner autonomy oriented learning materials for vocational high school students. Therefore, the purpose of this study is to develop learner autonomy oriented learning materials that are valid, practical, and effective so that they are feasible to train the science process skills of vocational high school students.

METHOD

The design of this study is Research and Development (R&D) using the ADDIE model (Analyze, Design, Development, Implementation, and Evaluation). In this model, sequential stages are used starting with identifying the objectives of learning, analyzing the material to be taught in class, analyzing the characteristics of students, designing learning materials, developing learning materials by the format and standards in applicable regulations, carrying out validations and simulations, then implementation and evaluation.

Products that have been developed in this research are in the form of lesson plans, learning materials, students worksheet, and learning outcomes test.

The research subjects are 30 tenth grade students of class B TKJ in one of vocational high school at Banjarmasin. The instruments of the data collection consist of the teaching material validation sheet instrument, the observation sheet of the lesson plan implementation and science process skills as well as the results of student learning outcomes tests.

The technique in collecting research data is done in three ways; through validation, observation, and tests. Validation results data are obtained through the results of the assessment of learning materials by three validators; two experts and one practitioner to determine the validity of teaching materials. The results of the observations are obtained through observations by two observers on two characteristics of assessment; the feasibility of the lesson plans to describe the practicality and students' SPS to find out the achievement of the SPS. The test results are obtained through the scores of students to determine the effectiveness of teaching materials.

Validity is obtained through evaluating validators' assessment using the validation sheets that are filled in by the validators and then averaged. Whether teaching materials valid or not, it is obtained by comparing the validity scores produced with the criteria of validity (Widoyoko, 2016). The practicality of teaching materials is found through observational data on the implementation of lesson plans carried out by observers using observation sheets for lesson plans. The assessment of the implementation of the lesson plan is obtained by comparing the scores obtained with the criteria for the implementation of the lesson plan (Widoyoko, 2016). The effectiveness of teaching materials is measured through students cognitive learning outcomes tests who that consists of pretest and posttest, which then the effectiveness is

calculated using the normalized gain equation (Hake, 1998). Students' SPS achievements are measured through observers' observations and students' SPS tests. The skills that have been achieved are measured through observation using an SPS observation sheet. Assessment of the achievement of SPS students through observations was obtained from the results of comparing scores obtained with SPS assessment criteria according to Widoyoko (2016) and student achievement of SPS through tests is found through N-gain calculations.

RESULT AND DISCUSSION

Teaching materials are all the tools and materials that will be used by the teacher in conducting the learning process in the classroom (Gunada, Sahidu, & Sutrio, 2015). Learning materials from the development results that used in learning activities must be

feasible as measured from three aspects; validity, practicality, and effectiveness. Learning-autonomy-oriented learning materials developed to consist of four items, including; lesson plans, learning materials, student worksheets, and learning outcomes test, which will be used as learning tools in optical instrument material.

Four items in the learning materials were arranged into three meetings by applying three learning models, lesson plans, and student worksheets that arranged the model used. The first meeting of the lesson plan and student worksheets was prepared using the direct instruction model, the second meeting with the guided inquiry model and the last meeting with a cooperative learning model group investigation type.

The Validity of Learning Materials

The validity of learning materials measured using a validation sheet. The validation results are listed in Table 1.

Table 1 Results of Validation of The Developed Teaching Materials

Learning Material Assessment Aspect		Validity		Reliability	
		Score	Category	Score	Category
Lesson Plan	Learning objective	3.40	Valid	0.98	High
	Formulation				
	Language	3.33	Valid		
	Served content	3.33	Valid		
	Time	3.61	Highly valid		
Teaching Material	Content feasibility	3.18	Valid	0.98	High
	Presentation feasibility	3.13	Valid		
	Language feasibility	3.09	Valid		
	Graphic feasibility	3.36	Valid		
Student Worksheets	Student worksheets form	3.29	Valid	0.81	High
	Language	3.08	Valid		
	Student worksheets content	3.11	Valid		
Learning Outcomes Test	Item question 1	3.08	Valid	0.57	Intermediate
	Item question 2	3.08	Valid		
	Item question 3	3.08	Valid		
	Item question 4	3.08	Valid		
	Item question 5	3.08	Valid		
	Item question 6	3.08	Valid		
	Item question 7	3.08	Valid		

Table 1 shows the validity of instructional materials as a result of

development. Teaching materials are said to be valid if they are included in

the valid category (Noor, Zainuddin, & Miriam, 2017).

Table 1 explains the validity of the lesson plans that made valid based on the problem formulation aspects, the language, the content presented and the time shows that is on average as valid, these results indicate that the lesson plans results from development can be said to have fulfilled the lesson plans component in accordance with the components contained in the Indonesian Ministry of Education and Culture No. 22 of 2016 concerning process standards for primary and secondary education units, so that the lesson plans developed are feasible and valid to use.

The results of the development of the lesson plans in this study consisted of three lesson plans for three meetings with a time allocation (3×40 minutes) for one meeting which included: 1) lesson plan the first meeting regarding eye and glasses material using the direct instruction model, 2) the second meeting lesson plan concerning camera material and magnifying glass using the guided inquiry model, and 3) lesson plan at the third meeting on microscope and binocular material with a cooperative learning model group investigation type. The lesson plans developed refers to the 2013 curriculum format as well as the curriculum that has been applied to the class that was the target of the trial.

The results of the learning material validation indicate valid categorical of validity so that it is feasible to be used as a guideline for students. Quality learning material must meet the four elements of feasibility; the feasibility of content, presentation, language, and the feasibility of graphic (Muslich, 2010). The results of the validation show that the learning material produced by the development has fulfilled the requirements of a student's book that can be said to be good and appropriate regarding the content, presentation,

language, and graphics used by the education unit.

Learning material developed functions as a source of learning for students which are systematically arranged, and there are facts, principles, and procedures so that they can attract students' interest as part of one medium of learning when learning takes place. The learning materials of these optical instruments were made and developed into three meetings; the first meeting is optical instruments material concerning the eyes and glasses, the second meeting is on the subject of cameras and lights, and the third meeting material is on the subject of microscopes and binoculars. This learning material consists of components which include 1) the cover of the overall learning material, 2) concept maps, 3) basic competencies, 4) indicators, 5) learning objectives for each meeting, 6) keywords and material descriptions, 7) images that support the description of the material, 8) problem examples, 9) experimental activities, 10) summary at each meeting, 11) physics info, 12) glossary; and 12) bibliography.

The results of the student worksheet validation that has been developed show validity with valid categories. Thus, it can be tested by the teacher in the class. Student worksheet is a learning material that can accommodate or facilitate students in learning activities so that it becomes more directed (Rohaeti, Endang, & Padmaningrum, 2009), because the student worksheet that has been developed has a valid category so that the student worksheet can be used as a guideline for students in implementing learning with the 2013 curriculum.

The student worksheet is a sheet that contains instructions and tasks that are used as a guide for students in mastering the material to achieve the learning objectives which usually contains instructions and steps to complete a task. Student worksheet can

be said as an extension of the teacher's hand in training students to work, whether practicing or solving questions.

The student worksheet results from the development consisted of three parts so that they could accommodate learning activities into three meetings. In the first student worksheet, it is used the direct instruction learning model, the student worksheet will be dominated by clues, considering that in the direct instruction model students still have to get a lot of help from the teacher. In the second student worksheet the guided inquiry learning model is used, the instructions were reduced as the teacher's role was reduced in class. This aims to make students train better of their SPS. The third student worksheet uses cooperative learning groups investigation type that only contains student worksheet technical instruction, such as information to write down the purpose of the experiment, tools, and materials, the formulation of hypotheses, identification of variables, experimental steps, observational data, and the results of data analysis and conclusions.

The results of learning outcomes test validation for each item are indicated as valid. Valid learning outcomes test is a learning outcomes Test that has been tested through validation, which includes aspects of general construction and language assessment (Osnal, Suhartoni, & Wahyudi, 2016). In making learning outcomes test questions that have been developed, there is a question grid, in

the question grid, there is an answer key. Each line (points) of the answer has its own score, and those scores will be added to the weight of a question by making a score on each line (points) the assessment will be more objective.

Learning outcomes test is an instrument that can measure the success of a learning process that is in the form of the level of understanding of students on learning that has been done and can also measure the effectiveness of learning material as a result of development (Anisah, Wati, & Mahardika, 2016). Learning outcomes test results from the development consisted of seven items, six items about students' knowledge of optical equipment material that had C4 cognitive domains and one item about SPS questions which contained aspects that had been trained during the learning process. The developed learning outcomes test is tested on students during the pretest and posttest. The results of the pretest and posttest are used to calculate the N-gain so that it is useful to determine the effectiveness of the learning materials from the development and can find out how far the level of understanding achieved by the students.

The practicality of Learning Materials

The results of observations from the implementation of the Lesson Plans that have been developed can show in Table 2.

Table 2 Observation Results of Lesson Plans Implementation

Number of Meeting	Lesson Plan Implementation		Reliability	
	Mean	Category	Score	Category
1	3,53	Highly practical	0,78	High
2	3,89	Highly practical	0,66	High
3	3,79	Highly practical	0,70	High

The results of the implementation of the lesson plans for the three meetings are presented in Table 2, the first meeting using the direct instruction

model of the whole phase was well implemented so that the average implementation of the first meeting lesson plan is highly practical, the

second meeting using the guided model inquiry also the categorical average is highly practical and the results of the implementation of the lesson plan for the third meeting with the model of cooperative learning investigation group type is also in a highly practical category. Learning materials are said to be practical if they are practical and easy to administer (Widoyoko, 2016). From the results of the average observation of lesson plans implementation for the three meetings it can be concluded that the lesson plans are very practical which means that the use of this autonomy learner-oriented Lesson Plans is easy to implement.

Learning Material Effectiveness

The results of effectiveness are obtained from the calculation of N-gain of students through learning outcomes test results of students.

Table 3 Learning Outcomes Test Cognitive Results of Students

	Learning Outcomes Test Score	Effectiveness	
		N-gain	Category
Pretest	6.46	0.51	Intermediate
Posttest	54.62		

Table 3 shows that the acquisition of N-gain results of students is in the intermediate category, it can be interpreted that learning materials are effective to improve the cognitive abilities of students. Effectiveness can be obtained through the value of pre-test and post-test of students (Selvia, Arifuddin, & Mahardika, 2017), but seen from the results of the average post-test scores, students have not been able to achieve the expected minimum completeness criteria, but if it seen from the pre-test value of the original students. Students obtained an average of 6.46 after being taught using learning-autonomy oriented learning materials the ability of students significantly increase, it can be seen through the post-test average score of 54.62. This indicates

that this product is effective or can provide results in increasing learning outcomes of students because the results of calculations and data analysis have met the minimum category of the feasibility of learning materials. This means that it can be concluded that the learning materials developed are quite effective and suitable to be used in the learning process. These results are in line with the other relevant researches (Salam, Miriam, & Misbah, 2017a; Tilfarlioglu, 2011) that learner autonomy makes a significant contribution to academic success.

Science Process Skills

In this study, training SPS is one of the main goals that must be achieved. SPS is a series of skills that include cognitive skills, social and intellectual skills of a student who can be trained by using student worksheet (Mahfuziannor, Suyidno, & An'nur, 2014). The following are the results of SPS student achievement, which are reviewed through observations presented in Table 4. The results of SPS achievement through written tests are presented in Table 5.

Table 4 Achievement of SPS through Observation

Observation Aspect	Mean	Category
M1	4.00	Very good
M2	3.89	Very good
M3	3.31	Very good
M4	3.06	Good
M5	3.50	Very good
M6	3.17	Good
Mean	3.49	
Category	Very good	

Table 4 shows the average gain for each aspect observed on average, it already has a very good category. Aspects of SPS are assessed through observations which included six aspects of observation, namely formulating hypotheses (M1), identifying variables (M2), trying or collecting experimental

data (M3), analyzing experimental results (M4), drawing conclusions (M5), and being able to compile a trial procedure (M6). The SPS of students is categorized as very good, which is also supported by the results of the written SPS test presented in Table 5.

Table 5 Results of Written SPS Test

SPS Test Score		Effectiveness	
		N-gain	Category
Pretest	0.00	0.76	High
Post-test	76.30		

Table 5 presents data from the results of calculation of N-gain SPS test of students. The effectiveness of the results of the SPS test is categorized as high, and this result is in line with the results of SPS achievement which are assessed observationally in Table 4, so it is known that SPS of students who were previously in insufficient category that was obtained through preliminary studies have significantly developed.

This means that students' SPS has increased after being taught by using learning materials with autonomy learner strategy which can be interpreted that autonomy learner-oriented learning materials are feasible to train students' SPS because the products of this development have been arranged in such a way to facilitate students not only developing cognitive abilities only but also training process skills. Learner autonomy based learning is rooted in constructivist learning that requires students to build their own knowledge through the learning activities they do (Miriam & Salam, 2016; Salam *et al.*, 2017). Learner autonomy developing a certain mindset that sees learning as an active process of discovery (Reinders, 2010).

The essence of learner autonomy-based learning is to optimize students' initial knowledge to process building new knowledge (Salam & Arifuddin, 2018). These teaching materials are arranged by the strategies used through the use of learning models that begin

with the teacher's role in full and then gradually decrease so that the responsibilities carried by the students will be more. This is what requires students to develop their science process skills independently because students are always taught to be responsible for the tasks given to them, then these results are also supported by research that has been done by (Salam, Miriam, & Misbah, 2017; Salam & Miriam, 2016) which states that autonomy learner-based learning can increase SPS.

CONCLUSION

The developed autonomy learner-oriented learning materials that aimed to train students' science process skills are proved to be feasible because they have met the criteria of validity, practicality, and effectiveness. This is viewed from a) learning materials are valid because the validation results of learning materials are in the valid category, b) learning materials are practical because the implementation of the lesson plans is very practical, c) learning materials are effective because N-gain of cognitive learning outcomes in the intermediate category, and d) the achievement of SPS for students is effective because the results of SPS observations are in a very good category and the acquisition of N-gain in the high category.

Thus, teachers are recommended to apply learner autonomy oriented analysis of material learning to student's science process skills train. It is also recommended for other researchers to examine how the learner autonomy oriented physics learning material in training other skills and abilities of students.

REFERENCE

- Anisah, A., Wati, M., & Mahardika, A. . (2016). Pengembangan Perangkat pembelajaran getaran dan gelombang dengan model inkuiri

- terstruktur untuk siswa kelas viiia SMPN 31 Banjarmasin. *Berkala Ilmiah Pendidikan Fisika*, 4(1), 1–12.
- Balcikanli, C. (2010). Learner autonomy in language learning: Student teachers' beliefs. *Australian Journal of Teacher Education (Online)*, 35(1), 90-103.
- Dang, T. T. (2012). Learner autonomy: A synthesis of theory and practice. *The Internet Journal of Language, Culture and Society*, 35, 52–67.
- Gunada, I. W., Sahidu, H., & Sutrio, S. (2015). Pengembangan perangkat pembelajaran fisika berbasis masalah untuk meningkatkan hasil belajar dan sikap ilmiah mahasiswa. *Jurnal Pendidikan Fisika Dan Teknologi*, 1(1), 38–46.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 1(68), 64–74.
- Mahfuziannor, M., Suyidno, S., & An'nur, S. (2014). Pengembangan lembar kegiatan siswa (LKS) dan media penunjang materi ajar untuk melatih keterampilan proses sains. *Berkala Ilmiah Pendidikan Fisika*, 2(1), 78-88.
- Maradona. (2013). Analisis keterampilan proses sains siswa kelas xi ipa SMA Islam Samarinda pada pokok bahasan hidrolisis melalui metode Eksperimen. In *Prosiding Seminar Nasional Kimia 2013, Samarinda*, 62–70.
- Miriam, S., & Salam, M. (2016). Pembelajaran berbasis learner autonomy untuk melatih kemampuan berpikir tingkat tinggi mahasiswa. In *Prosiding-Seminar Pendidikan Ipa Mengembangkan Keterampilan Berpikir Tingkat Tinggi Melalui Pembelajaran Ipa. Fakultas Keguruan dan Ilmu Pendidikan Universitas Lambung Mangkurat*.
- Muslich, M. (2010). *Text book writing dasar–dasar pemahaman, penulisan dan pemakaian buku teks*. Yogyakarta: Ar-Ruzz Media.
- Noor, M., Zainuddin, Z., & Miriam, S. (2017). Pengembangan perangkat pembelajaran IPA fisika melalui model pengajaran langsung dengan metode problem solving. *Berkala Ilmiah Pendidikan Fisika*, 5(3), 328–339.
- Osnal, O., Suhartoni, S., & Wahyudi, I. (2016). Meningkatkan kemampuan guru dalam menyusun tes hasil belajar akhir semester melalui workshop di kkg gugus 02 kecamatan sumbermalang tahun 2014/2015. *Pancaran Pendidikan*, 5(1), 67–82.
- Reinders, H. (2010). Towards a classroom pedagogy for learner autonomy: A framework of independent language learning skills. *Australian Journal of Teacher Education (Online)*, 35(5), 1-15.
- Rohaeti, E., Endang, W., & Padmaningrum, T. (2009). Pengembangan lembar kerja siswa (LKS) mata pelajaran sains kimia untuk SMP. *Jurnal Inovasi Pendidikan*, 10(1), 1–11.
- Salam, A., & Arifuddin, M. (2018). Teknik pemodelan fisika dalam setting pembelajaran berbasis learner autonomy. *Jurnal Fisika Flux*, 15(1), 47–53.
- Salam, A., & Miriam, S. (2016). Pembelajaran berbasis learner autonomy untuk melatih keterampilan proses sains, 233–239.
- Salam, A., & Miriam, S. (2016). Pembelajaran berbasis learner autonomy untuk melatih keterampilan proses sains. *Jurnal Sains dan Pendidikan Fisika*, 12(3), 233–239.

- Salam, A., Miriam, S., & Misbah, M. (2017a). Pembelajaran fisika berbasis learner autonomy dengan metode pemecahan masalah pada topik gelombang. *Jurnal Sains Dan Pendidikan Fisika*, 13(3), 231–237.
- Salam, A., Miriam, S., & Misbah, M. (2017b). Teaching problem-solving skills through learner autonomy based learning and local wisdom insight. In *1st International Conference on Social Sciences Education- " Multicultural Transformation in Education, Social Sciences and Wetland Environment"(ICSSE* (pp. 1–4). Atlantis Press,1-4.
- Salam, A., Prabowo, P., & Supardi, Z. I. (2017). Pengembangan perangkat perkuliahan inovatif berdasarkan tingkat otonomi pebelajar pada perkuliahan fisika dasar. *JPPS (Jurnal Penelitian Pendidikan Sains)*, 4(2), 547–556.
- Salam, M., Miriam, S., & Misbah, M. (2017). Implementasi perangkat pembelajaran berorientasi learner autonomy dan kearifan lokal untuk melatih keterampilan pemecahan masalah. In *Seminar Nasional PIPA ULM*. Banjarmasin.
- Selvia, M., Arifuddin, M., & Mahardika, A. I. (2017). Pengembangan bahan ajar fisika sma topik fluida berorientasi masalah lahan basah melalui pendekatan contextual teaching and learning (CTL). *Berkala Ilmiah Pendidikan Fisika*, 5(2), 213–222.
- Smith, R. (2008). Learner autonomy. *ELT Journal*, 62(4), 395–397.
- Tilfarlioglu, F. Y. (2011). Supporting self-efficacy and learner autonomy in relation to academic success in EFL classrooms (a case study). In *Theory and Practice in Language Studies*, 1, 10–1284.
- Toharudin, U., Hendrawati, S., & Rustaman, A. (2011). *Membangun literasi sains peserta didik*. Bandung: Humaniora.
- Widoyoko, E. P. (2016). *Evaluasi program pembelajaran*. Yogyakarta: Pustaka Pelajar.
- Yan, S. (2012). Teachers roles in autonomous learning. *Journal of Sociological Research*, 3(2), 557–562.