

E-ISSN: 2614-3984



Universitas Negeri Jakarta



BIOSFER:
Jurnal Pendidikan Biologi

P-ISSN: 0853-2451
E-ISSN: 2614-3984

Biosfer: Jurnal Pendidikan Biologi
Volume 15, Nomor 2, 2022

Biosfer: Jurnal Pendidikan Biologi (Journal of Biology Education) which has E-ISSN 2614-3984 published by Universitas Negeri Jakarta, Indonesia. Biosfer: Jurnal Pendidikan Biologi is published as one of the efforts to publish research results related to Biology education. Biosferjpb received research results from various parties oriented to the upgrades of science and technology education in biological scope, in order to become a source of scientific information that can contribute to overcoming educational problems, especially in increasingly complex biology.

Topics covered in the journal include modern biology education content, teaching strategies for the classroom and laboratory, field activities include ethnobiology, applications, professional development, social and ethical implications of biology and ways to incorporate such concerns into instructional programs, as well as reviews of books and classroom technology products. Papers about religion, culture and local wisdom related to biology education rigorous are welcomed.

Editor-in-Chief

Dr. Rizhal Hendi Ristanto, S.Pd., M.Pd

Editorial Advisory Board

Prof. Ruhul H. Kuddus, Ph.D.

Prof. Dr. Siti Zubaidah, M.Pd

Dr. Rekha Khoul

Prof. Dr. Wolfgang Nellen

Prof. Fred Nyabuti Keraro

Dr. Hidayah Binti Mohd Fadzil

Prof. Dr. Endang Susantini, M.Pd

Editors:

Ade Suryanda, S.Pd, M.Si

Dr. Nur Ismirawati, S.Pd., M.Pd

Dr. Setiyo Prajoko, S.Pd., M.Pd

Prof. Dr. Marleny Leasa, S.Pd., M.Pd

Dr. Agus Prasetyo Utomo, S.Si., M.Pd

Sri Rahayu, M.Biomed

Dr. Ilmi Zajuli Ichsan, S.Pd., M.Pd

Daniar Setyo Rini, S.Pd., M.Pd

Sponsorship

Biosferjpb was published in cooperation of:

1. Department of Biology Education, Universitas Negeri Jakarta, Indonesia
2. Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Negeri Jakarta, Indonesia.

DAFTAR ISI

The effect of respiratory augmented reality media on analysis and evaluation skills of eight grades students Tri Jalmo, Ismi Rakhmawati, Kiki Nuraini	169-177
Development of project based biotechnology teaching books Hilarius Jago Duda, F Rahayu Esti Wahyuni, Antonius Edy Setyawan, Markus Iyus Supiandi, Yakobus Bustami	178-191
Cognitive learning outcomes with an inquiry learning model assisted by Macromedia Flash material on plant structures Marleny Leasa, Meltina Agnes Lewier, Marni Maelan	192-202
Development of learning video on sub materials interaction in the ecosystem based on functional feeding group of macrobenthos Sisi Marda Lorensa, Andi Besse Tenriawaru, Wolly Candramila	203-213
Analyzing students' science process skills through mobile learning using virtual laboratory Aida Fikriyah, Mochammad Ahied	214-230
Student problem solving skills in PBL model: Viewed from the discourse sheet Nurkhairo Hidayati, Tengku Idris, Peny Husna Handayani	231-241
Blended-problem based learning with integrated social media-based learning media in improving students' critical thinking skills Samuel Agus Triyanto, W Wahidin, Nina Hartania, Ai Solihat, S Sutrisno	242-254
The effect of problem-based learning integrated individual rotation route on islamic character and critical thinking ability Fendy Hardian Permana, Hajriani Hi.Padu, Rr Eko Susetyarini	255-262
Development of a science process skills-based interactive website 'bioenial' on environmental pollution material Atika Budi Rahmawati, Sugiharto Bowo, Slamet Santosa	263-279
Game-based learning: An alternatif learning model in covid-19 distance learning Puspita Ratna Susilawati, Luisa Diana Handoyo	280-291
Gender-based and grade-level mapping of student genetic literacy in the midst of the covid-19 pandemic Alvin Dewa Yanuar, Sri Wahyuni, Diani Fatmawati, H Husamah, Lud Waluyo, Ahmad Fauzi	292-301

The Development of creative thinking and problem-solving skill instrument of plant growth in high school	302-312
Bernadetta Ersi Purwandari, S Supriyatin, Rizhal Hendi Ristanto	
Environmental literacy profile of senior high school in Mowewe Southeast Sulawesi	313-319
Nur Fadhilah Muhlis, Ahmad Yani, Siti Darwa Suryanni, Ambo Upe	
Implementation of PjBL using unila's moodle v-class and its interaction of students' intrinsic factors	320-331
Dina Maulina, Nadya Meriza, Median Agus Priadi, Ismu Sukamto	
Development of integrated spermatophyta module potential of local plants on students' independence and concept mastery	332-343
Rifai Kasman, S Suhartini	
Analysis of high school student's mental model on fungi: Representation of students' conceptions	344-354
Yanti Hamdiyati, Taufik Rahman, Sanchia Azaria Sulaeman	
Rasch model: Quality of final semester assessment items for class x on biology subject	355-367
Bekti Isnaeni, Nani Aprilia, Much Fuad Saifuddin	



The effect of problem-based learning integrated individual rotation route on islamic character and critical thinking ability

Fendy Hardian Permana*, Hajriani Hi.Padu, Rr. Eko Susetyarini

Biology Education, Faculty of Teacher Training and Education, University of Muhammadiyah Malang, Indonesia

*Corresponding author: fendy@umm.ac.id

ARTICLE INFO

Article history

Received: 25 February 2022

Revised: 21 June 2022

Accepted: 28 July 2022

Keywords:

Blended Learning

Character Building

HOTS

Industrial Revolution 4.0

Meaningful Learning

ABSTRACT

Entering the 21st century the quality of human resources is focused on critical thinking because they are able to compete in the era of globalization, which is developing so fast, as well as human resources who have good character. To improve critical thinking skills, the learning model must be active, innovative, and creative. This quantitative study aims to see the effect of the Individual Rotation Route learning model based on Problem Based Learning in improving students' critical thinking skills and Islamic character. The design of this study used a Quasi Experiment with Pre-test Post-tests Non-Equivalent Control Group design which involved 2 classes, each consisting of 20 students of class VII SMP Aisyiyah 3 Malang, Indonesia. Critical thinking ability is measured using critical thinking rubrics and Islamic character is measured using character success indicators. Collecting data using pre-test, post-test, assignment, and observation. In analyzing the data on students' critical thinking skills, the One-Way ANCOVA test and the One-Way ANOVA Islamic character test were used. The results of this study indicate that there is a significant change after being given the Individual Rotation Route learning model based on Problem Based Learning on students' critical thinking skills and has an effect on students' Islamic character because students are actively involved in the learning process.



© 2022 Universitas Negeri Jakarta. This is an open-access article under the CC-BY license (<https://creativecommons.org/licenses/by/4.0>)

Permana, F. H., Hi.Padu, H., & Susetyarini, R. E. (2022). The effect of problem-based learning integrated individual rotation route on islamic character and critical thinking ability. *Biosfer: Jurnal Pendidikan Biologi*, 15(2), 255-262. <https://doi.org/10.21009/biosferjpb.26219>



INTRODUCTION

At this time we are entering the 21st century, where developments are very rapid in the field of technology which has a major influence in various aspects, including in the world of education (Khoiroh, 2017). With the existence of the 21st century where this is marked by the era of the industrial revolution 4.0 which makes this 21st century a century of openness and a century of globalization. At this time Indonesia is entering and even running in the era of the industrial revolution 4.0 which is believed to be able to create quality human resources, open up extensive job opportunities, and build human work that is easier and faster and gets satisfactory results (Mardhiyah et al., 2021). In addition, the 21st century is also called the industrial age of "Industry age" and is also called the "Knowledge age" this is because all efforts in skill acquisition through self-acustoming and also all fulfillment of life's needs in various aspects are based on science (Syahputra, 2018). This means that education has a very broad scope so that the quality of education must be improved to produce superior and characterized human resources (HR) who are able to compete in the era of globalization (Muhali, 2019). Improving the quality of human resources through education, starting from basic education to the tertiary level, is the key to being able to follow developments and be able to compete in the industrial revolution 4.0 because in this 21st century learning applies creativity, critical thinking, collaboration, problem solving, skills. communication, community, and character skills (Lase, 2019).

Thinking skills are needed in life, especially in competing in the era of the industrial revolution 4.0. One of the thinking skills is critical thinking. Critical thinking is able to analyze and evaluate information, raise vital questions and problems, formulate questions and problems clearly, collect and evaluate relevant information using abstract ideas, be open-minded, and communicate with others effective (Duron et al., 2006). The ability to think critically is a very important ability to have because in the 21st century the rapid development demands resources to think rationally in dealing with the problems encountered and provide appropriate solutions in solving these problems (Karim & Normaya, 2015). In addition to critical thinking, a person must also have a good character in order to become a superior generation. That character is a key to success for the world of education or in general, and based on research in the 90s by American researchers that most students excel because of the characters they have, such as being honest, responsible, and always careful to understand something (Omeri, 2015).

Behind the positive impact of technological developments in the world of education, if it is not followed by the cultivation of the Islamic character of students with *siddiq*, *fathonah*, *amanah* and *tabligh* characters, education cannot be achieved. Students' cognitive, effective, and psychomotor abilities will be good and increase if the 4 characters above are properly instilled in students, than there will be a character crisis. Because Islamic character or what is known as *akhlakul karimah* is a goal in education and one of the psychological factors that influence it is critical thinking. Therefore, the link between critical thinking and Islamic character is very important for students, so that they have a strong foundation and have a stand for the creation of a superior generation who not only has high critical thinking ability but also has good character to be able to compete in the 21st century and live independently. According to Koesoema (2010), when a person has an Islamic character, he will have the principle of a truth that can be accounted for, and can be trusted in every decision making, and is correct in conveying an alternative in problem solving.

Especially in learning Natural Sciences (IPA) because this science is the basis of several sciences, namely science in the field of health, science in the field of geology, and science in the field of the environment. To study science, we need a scientific method to understand concepts, not just reading, writing or memorizing because science is built from facts, concepts, principles, and laws about everything that exists in nature (Redhana, 2012). In addition,



science learning requires students to understand principles, understand science concepts and students are required to be able to think critically where students must be able to solve given problems, so a teacher must be able to create learning models that can facilitate students to think critically, because with this model Conventional or lecture models will make students feel bored and have no motivation to learn and teachers cannot encourage students to develop students' critical thinking skills (Shofiyah & Wulandari, 2018). The critical thinking ability of students is currently one of the things that is considered and continues to be developed in learning. However, at this time, students still have low critical thinking skills. This is known based on the results of the programme for international students assessment (PISA). The problem of low critical thinking skills of students also occurs in several schools in Indonesia. One of the factors causing this to happen is because teachers are still not in a position to use learning models during the teaching process.

In improving critical thinking skills and shaping students' Islamic character, a teacher has an important role. A teacher must be able to master technology and keep up with the times and be smart in choosing active, creative, innovative, and effective learning models to be applied to students in the learning process (Muthmainnah & Suswandari, 2020) one of the learning models that is believed to be able to improve students' critical thinking skills is an Individual Rotation Route based on Problem-based Learning. The Individual Rotation Route learning model based on Problem-based Learning is a learning where students will be more active and students will also be introduced to learning using technology so that students keep abreast of developments in the 21st century and students are presented with a problem and must be able to solve problems given by being balanced with character instilling in students (Ambarli et al., 2020). Individual Rotation Route is a learning model which during the learning process will rotate according to the direction of a teacher and students are given the opportunity to intensively ask questions that have not been understood. While PBL is a learning model where students are directed to solve the problems given. Individual Rotation Route and PBL are two different learning models that are combined to achieve learning objectives.

Based on previous research, many have investigated the blended learning rotation route type of station rotation route and lab rotation route in the learning process. The effect of the stationary rotation route model on the learning outcomes of elementary school students. Several other studies have also studied the station rotation route model of learning on the motivation and character of students with the result that there is a relationship between students' learning motivation (Muthmainnah & Suswandari, 2020). The same research but what they saw was student learning motivation and student learning outcomes. The PBL model has been widely researched but, PBL combined with Individual Rotation Route does not yet exist so that the purpose of this research is to see the effect of the Individual Rotation Route based on Problem Based Learning in Improving the Critical Thinking Ability and Islamic Character of Students in Junior High School Science Learning (Munzadi, 2018). This research needs to be done because the findings obtained are used as the basis for researchers to see the effectiveness of the Individual Rotation Route learning model based on Problem Based Learning in Improving Students' Islamic Character and Critical Thinking Ability

METHODS

Research Design

This research is a quasi-experimental quantitative research with pretest posttest non-equivalent control group design. This study used two classes, namely the experimental class and the control class. Class VII A as the experimental class got the Individual Rotatoin Route learning model based on Problem Based Learning and class VII B as the control class got the Individual Rotation Route learning model. This research was conducted at SMP Aisiyah



Muhammadiyah 3 Malang on Jl. M. Husni Tamrin No.3, Klojen, Kec. Klojen, Malang City. Research data collection was carried out from August to October 2021.

Population and Samples

The population in this study were students of SMP Aisyiyah Muhammadiyah 3 Malang which consisted of and the sample was class VII students which as a whole consisted of 2 classes, all of which were sampled in this study. The reason why the researcher chose grade VII as the sample in this study was because grade VII was the first batch to apply the K-13 curriculum and the lack of student learning activities, especially in using technology, especially in collecting assignments. And the main reason for the seventh grade level as the sample is because these students are students who are in the transition period from elementary school to junior high school level so they need special attention, especially in applying learning models for them. Sampling used a sampling technique, namely simple random sampling or random sampling without regard to the existing strata or without any consideration.

Instrument

In this study, to measure critical thinking skills by measuring students' ability to focus on answering simple questions, concluding and making further explanations using a rubric and Islamic characters were measured using character success indicators. So that the data collection technique uses pretest sheets, posttest sheets, assignments, and observation sheets

Procedure

In the application of the PBL-based Individual Rotation Route learning model, there are several activity steps, namely: 1. Seeking of information; 2. Acquisition of information; AND Synthesizing of knowledge. In this study there are independent variables, namely the Individual Rotation Route learning model based on Problem-based Learning, the dependent variable is the students' critical thinking ability and Islamic character, while the control variables are learning materials, teachers, pre-test, post-test, and assignments. The implementation and flow of research carried out as follows:

1. Arrange the material that will be given during learning
2. Make a Learning Implementation Plan (RPP) for the teaching process 2 times a week on the classification of living things.
3. Prepare critical thinking instruments and Islamic character instruments to be used
4. Carry out learning with predetermined materials using a blended learning system, which uses 2 classes, namely the experimental class and the control class
5. Conduct a pre-test before being given treatment in the experimental class and control class to determine the students' initial abilities
6. Carry out the learning process, namely the experimental class gets the Individual Rotation Route learning model based on Problem-based Learning and the control class gets the lecture learning model
7. Conduct a post-test after being given treatment in the learning process to see the final ability of students in both the experimental class and the control class.

Data Analysis Techniques

The data analysis technique used for students' critical thinking skills is the One-Way ANCOVA test because the data analysis uses pre-test and post-test scores, while for Islamic characters using the One-Way ANOVA test because the data analysis is based on observations.



However, before testing, it is necessary to test the assumptions, namely the normality test and homogeneity test using SPSS version 22.

RESULTS AND DISCUSSION

The data on the results of critical thinking skills that have been tested using Kolmogorov-Smirnov and using Levene's Test. The results of the analysis of the two tests reported that the critical thinking skills data met the assumption of normality, namely [D(40) = 137, p = 0.056] and homogeneity also met the assumption of homogeneity, namely [F(1.38) = 0.640, p = 0.429]. Therefore, the data can be analyzed using the One-Way ANCOVA test. The results of the analysis of these tests are presented in [Table 1](#).

Table 1.

The results of the One-Way ANCOVA of Students' Critical Thinking Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5953.098 ^a	2	2976.549	17.958	.000	.493
Intercept	5215.407	1	5215.407	31.465	.000	.460
PreTes	3936.698	1	3936.698	23.750	.000	.391
Kelas	2375.329	1	2375.329	14.330	.001	.279
Error	6132.902	37	165.754			
Total	228176.000	40				
Corrected Total	12086.000	39				

a. R Squared = .493 (Adjusted R Squared = .465)

The results of the One-Way ANCOVA test showed that there was a significant difference in critical thinking skills between grade one and other classes based on the analysis by controlling the students' initial critical thinking ability [F(1.37) = 14330, p = 0.001, p2 = 0.279]. The results of this study are based on the Kolmogorov-Smirnov analysis and are in line with several studies that have conducted studies that tested the effect of the blended learning model on rotational routes with station rotation routes and lab rotation routes which stated that there was an effect on student learning outcomes.

While the data on the results of the Islamic character of students who have been tested using Kolmogorov-Smirnov and using Levene's Test. The results of the analysis of the two tests reported that the student's Islamic character data met the normality assumption, namely [D(40) = 132, p = 0.077] and homogeneity also met the homogeneity assumption, namely [F(1.38) = 3, 586 p = 0, 66]. Therefore, the data can be analyzed using the One-Way ANOVA test. The results of the analysis of these tests are presented in [Table 2](#).

Table 2. The One-Way Anova Test Results of Islamic Characters

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	184.900	1	184.900	12.251	.001
Within Groups	573.500	38	15.092		
Total	758.400	39			

In the results of the One-Way ANOVA test, the value of p = 0.001 indicates that there is a significant change in the Islamic character of students between one class and another.

Based on the results obtained, the Individual Rotation Route learning model based on Problem-based Learning has an effect on critical thinking skills and also the Islamic character of students. This is because this learning model is included in an innovative learning model because students are required to be active and will feel a different learning process at one



time. One of the keys to improving critical thinking skills is the application of an innovative learning model where students are actively involved in the learning process and the teacher is only a facilitator, the learning process is fun so that students do not feel bored, and students do not feel pressured or afraid (Komara, 2014). in conveying their responses or opinions during the learning process. In the application of the Individual Rotation Route learning model based on Problem-based Learning students are given the opportunity to communicate with group friends, are given the opportunity to find information on their own, are given the opportunity to convey the results found and are given the opportunity to provide solutions to the problems at hand so as to make students to develop critical thinking skills and in this learning model students are given intensive guidance.

That in order for a learning model to be successful, several student characteristics are needed, including independence, willingness to self-actualize, and high initiative. This is what makes the interaction between the learning model and the results of students' critical thinking skills (Stein & Graham, 2020). So it is very important for a teacher to make considerations before determining the learning model that will be used to suit the ability level of the students. When using the right model, learning will be more effective and the objectives of learning can be achieved. That there are several factors that influence the success of a learning model, namely: the different abilities of each student, different goals in each material being taught, situations and conditions in the classroom, the facilities available both in quality and quantity a teacher (Djamarah & Zain, 2002). So to use a learning model must require creative thinking so that the learning model is able to improve students' critical thinking skills.

Based on the results obtained, the Individual Rotation Route learning model based on Problem-based Learning not only affects students' critical thinking skills but also affects students' Islamic character. To form Islamic character in students, in the learning process there must be several stages, namely first, moral Knowing, which is where the teacher must always explain the value of goodness after studying a material so that students will know good things and every learning activity does a good habit. which will make the student have a good character because it is often done continuously. The second is Loving morals, namely the teacher exemplifies a good attitude to students, for example the teacher acts fairly so that it will form students to be fair, then in learning the teacher conveys everything correctly does not scare students so that students will also say something correctly and the teacher teaches how to be person in charge. The third moral Doing is where the student applies what he has learned, what he knows, and what has become a habit (Wahab & Umiarso, 2017).

According to Moqowim (2012) said that an important factor that can affect students' character is internal factors. Internal factors are factors from within, one of which is the initial personality of students who are unable to communicate or relate well to other people. Therefore, the Problem-based Learning-based Individual Rotation Route learning model provides an opportunity at one station for group work, this aims for students to collaborate with other friends so that students are trained to be open and be nice to their friends.

CONCLUSION

From the results of data analysis and discussion, it can be concluded that there is a significant change after being given the Individual Rotation Route learning model based on Problem-based Learning on students' critical thinking skills and significant changes to the Islamic character of seventh grade students at SMP Aisyiyah Muhammadiyah 3 Malang. The results of this study illustrate that a teacher must be able to think of appropriate learning models and be able to design innovative learning models so that students are actively involved in the learning process that can stimulate critical thinking skills and student character. However, before applying the learning model, it is better to make adjustments or



introductions first to students so that the learning model can run optimally and get good results.

ACKNOWLEDGMENT

The researcher would like to thank the University of Muhammadiyah Malang for supporting this research activity. The researchers also thank the Biology Education Study Program, which held the research umbrella. Finally, the researcher also thanked SMP Aisyiyah Muhammadiyah 3 Malang is the place for this research activity.

REFERENCES

- Ambarli, S., Syahrial, Z., & Sukardjo, M. (2020). Pengaruh model blended learning rotasi dan kecerdasan intrapersonal terhadap hasil belajar IPA di SMP. *Jurnal Visipena*, 11(1), 16–32. <https://doi.org/10.46244/visipena.v11i1.1089>
- Djamarah, & Zain, A. (2002). *Strategi Belajar Mengajar*. Rineka Cipta.
- Duron, R., Limbach, B., & Waugh, W. (2006). Critical thinking framework for any discipline. *Internasional Journal of Teaching and Learning in Higher Education*, 17(2), 160–166. <https://www.isetl.org/ijtlhe/pdf/IJTLHE55.pdf>
- Karim, K., & Normaya, N. (2015). Kemampuan berpikir kritis siswa dalam pembelajaran matematika dengan menggunakan model jucama di sekolah menengah pertama. *Jurnal Pendidikan Matematika (EDU-MAT)*, 3(1). <https://doi.org/10.20527/edumat.v3i1.634>
- Khoiroh, N. (2017). Pengaruh model pembelajaran blended learning dan motivasi belajar terhadap hasil belajar siswa kelas VIII SMPN 1 Gumukmas. *Jurnal Penelitian Ilmu Pendidikan*, 10(2). <https://doi.org/10.21831/jpipfip.v10i2.13986>
- Koesoema, D. A. (2010). *Pendidikan karakter di zaman keblinger*. Grasindo. <https://ebooks.gramedia.com/books/pendidikan-karakter-di-zaman-keblinger>
- Komara, E. (2014). *Belajar dan pembelajaran interaktif*. Refika Aditama. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=1223584>
- Lase, D. (2019). Pendidikan di era revolusi industri 4.0. *Sunderman : Jurnal Ilmiah Teologi, Pendidikan, Sains, Humaniora, Dan Kebudayaan.*, 12(2). <https://doi.org/10.36588/sundermann.v1i1.18>
- Mardhiyah, R. H., Aldriani, S. N. F., Chitta, F., & Zulfikar, M. R. (2021). Pentingnya ketrampilan belajar di abad 21 sebagai tuntutan dalam pengembangan sumber daya manusia. *Lectura Jurnal Pendidikan*, 12(1). <https://doi.org/10.31849/lectura.v12i1.5813>
- Moqowim. (2012). *Pengembangan soft skills guru*. Pedagogia.
- Muhali, M. (2019). Pembelajaran inovatif abad ke-21. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan : E-Saintika*, 3(2). <https://doi.org/10.36312/e-saintika.v3i2.126>
- Munzadi, M. (2018). Pengaruh blended learning berbasis rotation model terhadap motivasi dan hasil belajar geografi siswa MA Matholiul Anwar Lamongan. *Jurnal Pendidikan Geografi Undiksha*, 6(3). <https://doi.org/10.23887/jjpg.v6i3.20699>
- Muthmainnah, A., & Suswandari, M. (2020). Implementasi station rotation blended learning terhadap motivasi belajar dan pendidikan karakter peserta didik. *International Journal Of Public Devotion*, 3(2). <https://doi.org/10.26737/ijpd.v3i2.2069>
- Omeri, N. (2015). Pentingnya pendidikan karakter dalam dunia pendidikan. *Nopan Omeri*, 9, 464–468.
- Redhana, I. W. (2012). Model pembelajaran berbasis masalah dan pertanyaan socratik untuk meningkatkan keterampilan berpikir kritis siswa. *Jurnal Cakrawala Pendidikan*, 3(1). <https://doi.org/10.21831/cp.v0i3.1136>
- Shofiyah, N., & Wulandari, fitria eka. (2018). Model problem based learning (PBL) dalam



melatih scientific reasoning siswa. *Jurnal Penelitian Pendidikan IPA*, 3(1).
<https://doi.org/10.26740/jppipa.v3n1.p33-38>

Stein, J., & Graham, C. R. (2020). *Essentials for blended learning: a standards-based guide*. Routledge. <https://www.routledge.com/Essentials-for-Blended-Learning-2nd-Edition-A-Standards-Based-Guide/Stein-Graham/p/book/9781138486324>

Syahputra. (2018). Pembelajaran abad 21 dan penerapannya di Indonesia. *Prosiding Seminar Nasional SINASTEKMAPAN*, 1276–1283.

Wahab, A., & Umiarso, U. (2017). *Kepemimpinan pendidikan dan kecerdasan spiritual*. Ar-Ruzz Media. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=1137863>

