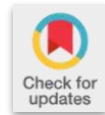




JEGYS





Research Article

The effectiveness of content and language integrated learning-based teaching material in the topic of the nature of matter on scientific literacy

Leny Heliawati^{1*}, Bibin Rubini², and Rudi Firmayanto³

Science Education Study Program, Graduate School, Pakuan University, Bogor Indonesia

Article Info

Received: 14 April 2020
Revised: 27 June 2020
Accepted: 16 August 2020
Available online: 15 Sept 2020

Keywords:

Teaching material
CLIL
Scientific literacy
Nature of matter

2149-360X/ © 2020 The Authors
Published by Young Wise Pub. Lt
This is an open access article under
the CC BY-NC-ND license



Abstract

This study aimed to examine the effectiveness of teaching materials based on Content and Language Integrated Learning (CLIL) on scientific literacy on the topic of The Nature of Matter. Teaching material on this topic integrated the 4 pillars in CLIL, namely Content, Cognition, Communication and Culture. The Scientific Literacy Skills Scale (SLSS) measured in this study consisted of three aspects, namely explaining scientific phenomena, evaluating and designing scientific investigations, conducting data interpretation and scientific experiments. This study used an experimental method that was tested on 100 students in 3 schools that use English in chemistry learning. Student selection was done by purposive sampling. Data was collected through tests on students' scientific literacy and students' feedback questionnaires. The result of the analysis of N-Gain literacy percentage was 57%, it meant that this teaching material is quite effective in increasing student scientific literacy. Students' responses to teaching materials were in the very good category. From this study, it can be concluded that CLIL-based teaching material in the topic of the nature of matter is effective on students' scientific literacy.

To cite this article:

Heliawati, L., Rubini, B., Firmayanto, R. (2020). The Effectiveness of Content and Language Integrated Learning-Based Teaching Material in the Topic of The Nature of Matter on Scientific Literacy. *Journal for the Education of Gifted Young Scientists*, 8(3), 1061-1070. DOI: <http://dx.doi.org/10.17478/jegys.736654>

Introduction

The results of quality measurements of student's scientific literacy in Indonesia by the PISA (Program for International Student Assessment) in 2018 indicate that in general the scientific literacy scores of students in Indonesia are still below the average international literacy score (OECD, 2019). Indonesian scientific literacy score is 396, while international average is 489. The results of Indonesian scientific literacy are also below that of neighbor countries such as Malaysia with 438, Singapore with 551, and Brunei Darussalam with 431. This is certainly a great challenge for Indonesian education to find the right solution to improve the literacy of Indonesian students. Apart from the PISA results, many studies confirm that student literacy in Indonesia is still low (Ratini et al. 2018; Faisal & Martin, 2019). The problem of scientific literacy is a major obstacle in improving the quality of learning in Indonesia. Furthermore, El Islami et al. (2018) tell that literacy help people make a better live.

In line with the results of Indonesian scientific literacy in general, the results of scientific literacy, especially chemical literacy that have been examined in a preliminary study of this research in Cahaya Rancamaya High School, showed low results. The low scientific literacy, especially in the aspect of explaining scientific phenomena by 32%, evaluating and designing scientific investigations by 42.5%, and interpreting scientific data and experiments by 28.3%. An initial study of research conducted at the school which had demands for learning to use English as the language of instruction in chemistry subjects, found the fact that the low scientific literacy of students is caused by the low language skills of students, especially English. This causes students difficulty in learning teaching material

¹ Science Education Study Program, Graduate School, Pakuan University, Bogor Indonesia. Email: leny_heliawati@yahoo.co.id. ORCID ID: 0000-0003-3734-6745

² Science Education Study Program, Graduate School, Pakuan University, Bogor Indonesia. Email: bibinrubini@unpak.ac.id. ORCID ID: 0000-0001-5923-3501

³ Cahaya Rancamaya Senior High School, Bogor Indonesia. Email: rudifirma@gmail.com. ORCID ID: 0000-0002-5048-5777

which is also written in English. Language skills are needed to support the understanding of concepts so that they can improve scientific literacy.

One way to improve language skills, especially English, is to use these languages in learning (Brevik & Moe, 2012; Roiha & Sommier, 2018; Martínez Agudo, 2019; Deswila et al. 2020). Learning that integrates content and language in learning is known as Integrated Learning and Content Learning (CLIL) (Dalton-Puffer, 2011; Baneges, 2012; Dale & Tanner, 2012; Coyle et al. 2013). So, content and language are an inseparable unity. Language is not just an introduction to learning but also targets learned besides the content itself. At present CLIL has been widely implemented in Europe and some Asia such as Singapore, Malaysia and Hong Kong (Lin et al. 2019). This approach can have a positive impact on learning outcomes (Gulyas et al. 2015). Such positive impacts can for example increase interest (Lasagabaster & Sierra, 2009), motivation (Van de Craen et al. 2007; Lasagabaster, 2019) conceptual knowledge (Zarobe & Zenotz, 2017; Huang, 2020), literacy reading (Admiraal et al. 2006; Prieto-Arranz et al. 2015). The above studies should be a reference for us, especially schools that implement bilingual programs to implement CLIL learning that has been proven to have a positive impact.

The positive impact is also expected to increase students' scientific literacy. It has already been mentioned that the initial findings indicate the low literacy of students in Cahaya Rancamaya High School. Therefore, this CLIL becomes a solution to the problem of low literacy of students in the school; it can even be a solution that is applied in Indonesia. Research by Lo et al. (2018) concluded that CLIL can increase student literacy. Morton (2020) further explains the positive relationship between content, language and literacy. While Coyle (2008) explained that CLIL consists of 4 pillars namely Content (the content of material), Cognition (thinking process), Communication (linguistics) and Culture. These pillars can improve the quality of learning, one of which is student scientific literacy.

Scientific Literacy on CLIL learning certainly requires a teaching material. The availability of teaching materials that are appropriate to the level of ability possessed by students becomes important (Mehisto, 2012). The role of teaching materials in learning cannot be denied (Vojř & Rusek, 2019). Teaching materials have a key role in fostering scientific literacy, choosing strategies that are oriented towards science literacy is a necessary way. But the facts on the ground show the lack of teaching materials. Ball (2018) says one of the biggest obstacles faced in CLIL implementation is the provision and design of teaching materials. Purnama et al. (2019), Vithanapathirana and Nettikumara (2020) explained the difficulty in finding learning resources in bilingual schools. These difficulties and challenges become the main foundation in this research.

In accordance with the findings of problems that have been found about the low literacy of chemical science due to low language skills and the lack of teaching materials suitable for students, the purpose of this study is to test CLIL-based chemical teaching materials that can improve student scientific literacy. The scientific literacy that will be investigated in relation to aspects of explaining scientific phenomena, evaluating and designing scientific investigations, and interpreting data and scientific experiments. This aspect of scientific literacy is in line with PISA's findings that only 40% of students can reach level 2 and above. Level 2 indicates that students can recognize correct explanations related to general scientific phenomena, and use that knowledge to identify conclusions through the data provided.

Problem of Research

According to the background that has outlined, the research problem is examining the effectiveness of teaching materials based on Content and Language Integrated Learning (CLIL) on scientific literacy on the topic of The Nature of Matter. The research questions are as follows:

- Is there an effect of teaching materials based on Content and Language Integrated Learning (CLIL) on students's scientific literacy?
- Is there an effect of teaching materials based on Content and Language Integrated Learning (CLIL) on students's respond and interest in learning chemistry?

Method

Research Design

The research method used in this study is an experimental method that aims to produce and test the effectiveness of the products produced. The product is in the form of teaching materials based on Content and Language Integrated Learning (CLIL) on the topic of the nature of matter. These test questions are tested with one-group pretest-

posttest design technique, which measures the level of understanding (literacy) of students before and after learning (Fraenkel et al. 2012) with the schemes shown in Table 1.

Table 1.

The Scheme of the One Group Pretest-Posttest Design

<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
T ₁	X	T ₂

T₁ as a pretest is done before students are given treatment; X as a treatment is given through the use of teaching materials produced; and T₂ as a posttest is done after the sample is given treatment. With the One Group Pretest-Posttest Design, the treatment results can be known more accurately because it removes the bias from the research results

Participants

The subjects of this study were 100 students from 3 different schools. The school that was targeted by this study with different clusters is based on the similarity in the use of English in learning chemistry. There are 100 students in total; 40 students from Cahaya Rancamaya High School, 30 students from Kharisma Bangsa School, and 30 students from Depok Private School. Student selection is done by purposive sampling referring to Creswell (2012).

Data Collection Tools

Data is collected through tests to measure student scientific literacy and student feedback questionnaires.

Scientific Literacy Skills Scale (SLSS)

The test of student literacy is in the form of multiple-choice tests consisting of 25 questions and 4 choices in each question. The problem tests literacy on the topic of the nature of matter. This topic consists of 4 question indicators, namely state of matter, kinetic particle theory, changes of state, and diffusion. The 25 questions test literacy in the aspects of explaining scientific phenomena with a total of 6 questions, the aspect of evaluating and designing a scientific investigation of 9 questions, and the aspect of interpreting data and scientific experiments of 10 questions. Those aspects of literacy referring to OECD (2019). The test instrument used were tested for reliability with the method of Kuder Richardson (KR) 20 with a value 0.75 which means the instrument is reliable (Arikunto, 2017).

Data Analysis

Data analysis of test results uses points, where the correct answer of one question is given point 4, whereas if it is wrong it does not get points. Thus, the maximum value for this literacy result is 100 points.

To find out if there is a significant difference in the average between the results of the pretest and posttest literacy, it will be tested through paired sample t-test. This test is used for two samples or paired data. Paired sample t-test test was processed using SPSS version 23. The basis for the research decision is if the Sig. (2-tailed) $p < 0.05$, then there is a significant difference between the Literacy values in the pretest and posttest data. If the Sig. (2-tailed) $p > 0.05$, it means there is no significant difference between the literacy values in the pretest and posttest data. Paired sample t-test test is part of parametric statistics. Therefore, as a rule in parametric statistics, research data must be normally distributed.

Data normality was tested through the Kolmogorov Smirnov test with SPSS version 23. The normality test aims to determine whether the residual value (not on each of the research variables) is normally distributed or not. The interpretation of the Kolmogorov Smirnov normality test is as follows: If the significance value is in the Asymp column. Sig (2-tailed) or probability > 0.05 , then the data is said to be normally distributed. In addition, the data will also be tested for data homogeneity. Homogeneity test (F) is a statistical test to find out whether or not the variances of two or more data distributions are the same. Homogeneity test used is Levene homogeneity test with SPSS version 23. The interpretation of homogeneity test results is as follows: If the significance value in the Sig column or probability > 0.05 then the data distribution is homogeneous.

Questionnaire is intended to determine student responses to teaching materials used. Student responses consist of responses to appearance, presentation of material and language used in teaching materials. The questionnaire is also used to determine students' interest in learning chemistry using English by using these teaching materials. The questionnaire was filled in using a Likert scale. Students put a checklist on each questionnaire indicator with guidelines 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. This questionnaire is filled out by

students at the end of learning. The results of the questionnaire were then converted into a percentage (%) and then classified as very good (80-100%) good (66-79%), sufficient (56-65%), not good (41-55%) and not good (<40%).

Procedure

CLIL Teaching materials are implemented for students in 3 meetings for 3 weeks. The first meeting discussed indicators of state of matter and kinetic particle theory, the second meeting discussed indicators of changes of state, and the third meeting discussed indicators of diffusion. Pretest is done before the implementation of CLIL teaching materials and posttest and student responses are done at the end of learning.



Figure 1.
Implementation of CLIL Teaching materials

Results

Teaching material developed to improve scientific literacy on the topic of the nature of matter uses the 4 pillars of CLIL, namely Content, Cognition, Communication and Culture. The specifications of these teaching materials and their effects on scientific literacy are explained in Table 2.

Table 2.
Specifications of CLIL-based Nature of Matter Teaching Materials

Aspects of Teaching Materials based on CLIL	Teaching Material Specifications	Effect on Literacy
Content (the content of material)	State of matter, kinetic particle theory, changes of state, and diffusion.	Increasing literacy through content or material that is closely related to everyday phenomena, from simple phenomena to abstract explanations.
Cognition (thinking process)	Distinguishing the form of matter and its properties, describing the kinetic theory of particles, identifying changes in the form of matter, and examining the process of diffusion.	Directing students towards the process of thinking about science phenomena, so students are able to build scientific explanations, interpret data, to conclude a scientific phenomenon.
Communication (linguistics)	Scientific terms, reading skills of scientific texts, expressing scientific ideas, and explaining the procedure of a scientific phenomenon.	Increasing scientific literacy through the acquisition of scientific language skills ranging from synthetic terms, to the ability to understand a science text.
Culture	Group discussion, respect for other people's ideas, interest in science, working in the lab according to the rules.	Improving scientific literacy through building scientific attitudes and character.

The effect of CLIL teaching materials on scientific literacy was measured through 25 multiple choice questions. The influence is seen by comparing the initial test scores (pretest) and final scores (posttest). The results obtained are explained in Table 3.

Table 3.

Analysis Result of Pretest and Posttest on Scientific Literacy of Topic the Nature of Matter

Implementation data	Pretest	Posttest
Total Students	100	100
Lowest score	20	40
Highest score	70	95
Average score	44,75	72,25
% N-Gain	57% (medium)	

Besides seeing the results of N-gain in general, an analysis of each literacy indicator tested is conducted. Indicator analysis of each issue of scientific literacy is important to know the ability of students to answer each indicator of scientific literacy. The following results are in table 4.

Table 4.

The Results of the Pretest and Posttest Analysis Per Indicator

Aspect of scientific literacy	Indicator	% N-Gain	Criteria
Explaining phenomena scientifically	Remembering and applying appropriate scientific knowledge	72	High
	Identifying, using and producing clear models and representations	40	Medium
	Making and justifying predictions appropriately	58	Medium
Designing and evaluating scientific investigations	Identifying scientific questions that can be explored through a given study	63	Medium
	Distinguishing questions that can be scientifically investigated	60	Medium
Interpret data and scientific evidence	Changing data from one representation to another	48	Medium
	Analyzing and interpreting the data, also drawing the right conclusions	75	High
	Identifying assumptions, evidence and reasoning in the text	65	Medium

The results of the pretest and posttest analysis per indicator show that the percentage of N-gain obtained is in the medium to high criteria. Table 3 shows the differences between the pretest results of students before getting treatment (average = 44.75) and posttest (average = 72.25), which means there is an increase in N-Gain by 57%. The N-Gain value is in the medium category (Hake, 1998). Comparison of pretest, posttest and N-Gain values is presented in Figure 1.

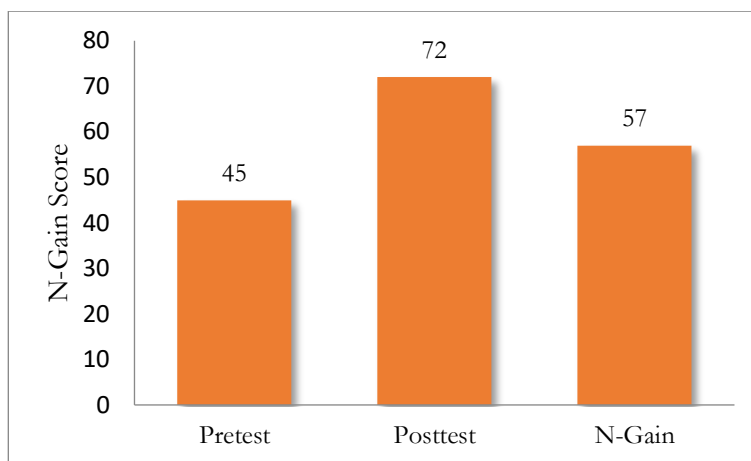


Figure 2.

Comparison of Pretest, Posttest and N-Gain

Data prerequisite tests consisting of the Normality and Homogeneity test were also carried out in this study. The results of normality and homogeneity tests on the scores of the pretest-posttest literacy are presented in Table 5.

Table 5.

The Results of Normality and Homogeneity Tests

Data	Sig. Value	Additional Information
Pretest - Posttest	Normality test = 0,701	Data is normally distributed
	Homogeneity tests = 0,863	Data is homogeneous

After the prerequisite tests are carried out on normality and homogeneity, then the data is tested to determine the difference in values before and after learning with the Pair sample T-test, which is presented in Table 6.

Table 6.

Paired Sample T-test Results

	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std.deviation	Std.error mean			
Pair Pre-post	27,500	11,528	2,578	10,668	99	0,000

In this table, the Sig. (2-tailed) = 0.00 means <0.05, so it can be concluded that there is a significant difference between the students' pretest and posttest scores after learning using CLIL-based chemistry teaching materials on the nature of matter topic.

After learning using CLIL-based chemical teaching materials, students are asked to provide a response or response to the teaching material. In addition, students are also asked to respond whether this teaching material can increase their interest in learning chemistry. The results of the student questionnaire analysis are shown in Figure 2.

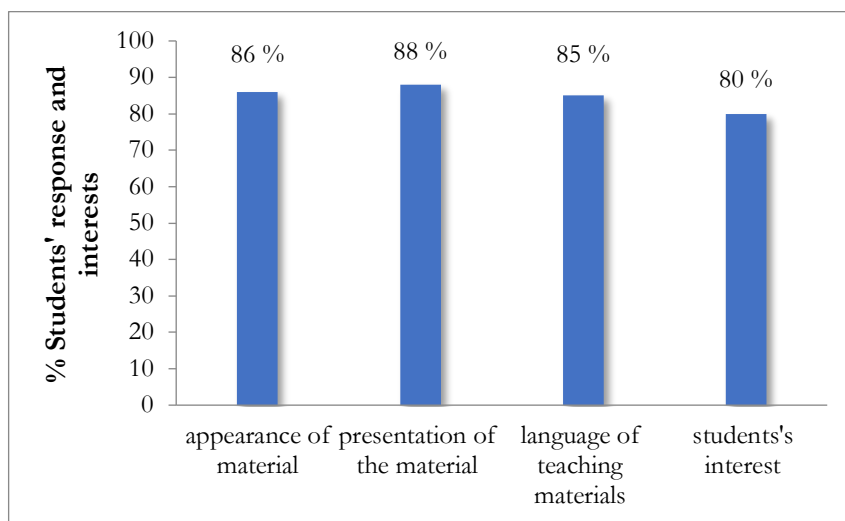


Figure 3.

Students' Response and Interests to Teaching Material

From the graph above, it appears that students' responses to the appearance, presentation of the material and language of teaching materials are in the very good category, which is above 80%. Likewise, an increase in interest of 80% is in the good category.

Discussion and Conclusion

CLIL-based teaching materials integrate science content and language that is used to improve student scientific literacy. Besides this teaching material integrates 4 pillars called 4C CLIL which consists of Content (the content of the material), Cognition (Thinking process), Communication (linguistics) and Culture. These four aspects distinguish this teaching material from other teaching materials as well as being the key in increasing students' scientific literacy.

The content chosen in this research is the nature of matter. The nature of matter is a fundamental and important topic in chemistry and is very contextual to everyday life. It is a fundamental aspect, in which there is a particle theory which is the basis of explanation for many topics such as atomic structure, bonds, molecules, chemical reactions, chemical equilibrium, and chemical energy (Harrison & Treagust, 2002). A good understanding of this topic is the key to understanding the next concept. Parmin et al. (2016) stated that science learning is presented integratedly because it relates to everyday life. Through this topic, during the learning process in this study, students have explained phenomena through observation, investigation and conclusion of things they often encounter. Not only the basic phenomenon, learning this topic found facts of learning that challenge students to think more abstractly by studying the behavior of particles of a substance when undergoing a change in form. The diffusion process described in this teaching material has also been shown to have an impact on students' understanding of the nature and characteristics of gases present in their environment.

In the cognition aspect of this CLIL teaching material, learning has been carried out through a series of scientific activities that direct students towards thinking processes of science phenomena, so students are able to build scientific explanations, interpret data, and conclude a scientific phenomenon. This teaching material has demanded students to be able to distinguish material forms and their properties, describe the kinetic theory of particles, identify changes in the form of matter, and examine the process of diffusion. These thinking activities can increase students' scientific literacy. This finding is reinforced by Coyle et al. (2013) who have found that the CLIL approach encourages students to use various cognitive skills in the use of target languages ranging from low ones such as understanding and remembering vocabulary to high cognitive skills such as creative thinking.

Communication aspects (linguistics) are proven to play an important role in increasing scientific literacy. This aspect enhances scientific literacy through the learning of language learning skills, for example understanding of scientific terms such as matter, solid, liquid, particle, volume, pressure; understanding of scientific processes such as melting, evaporation, freezing; use of scientific language to explain the nature and process of science such as solid has fixed shape, mercury is liquid at room temperature, gas particle move rapidly in all directions. This is in line with the findings of Heras and Lasagabaster (2015) about the effects of CLIL on improving learning vocabulary, and Várkuti's (2010) findings on the impact of CLIL on improving lexical language. In the end, the understanding of scientific language is able to bring students to understand a scientific text that explains various scientific phenomena

in everyday life. The ability to read is very important especially as one aspect of PISA literacy that is not yet entrenched in Indonesian society.

Culture increases the literacy of science through the development of scientific attitudes and character. This aspect is reflected in the material only reflected during the group discussion process, respecting other people's ideas, showing interest in science, working in the lab according to the rules and collaborative learning. Yamazaki (2019) writes that the purpose of CLIL lessons with collaborative learning is so that students can achieve competence to utilize content knowledge in their daily lives. Students are able to express their own ideas in creative ways based on the knowledge they have learned rather than just explaining the knowledge of the subject they are remembering.

This CLIL teaching material is proven effective in increasing students' scientific literacy that has been measured through knowledge tests. From the three aspects of science measured, namely explaining scientific phenomena, evaluating and designing scientific investigations, also interpreting data and scientific experiments, reinforced the results of the analysis of N-Gain values in this study which reinforces that teaching materials are effective for student scientific literacy. The specifications of teaching materials used in this study using operational languages encourage students to want to read texts. Integrating examples of science ideas that are integrated with the presentation of material provides new experiences for students because of contextual learning resources. The various scientific procedures explained in teaching materials about science phenomena have given students confidence about the importance of a process in learning science.

The aspect of scientific literacy explaining scientific phenomena is increasing. This can be seen from each literacy indicator that has moderate to high N-Gain. The teaching materials of the nature of matter explain a lot of scientific phenomena that exist in our daily environment. Through this teaching material, for example students are required to be able to explain the process of freezing, melting, yawning using particle theory; explain the phenomenon of the diffusion process, and so on. The literacy aspect of evaluating and designing scientific investigations also increased. This teaching material has features that facilitate students to explore and investigate scientific phenomena, for example in answering questions about ice, water and water vapor that have the same formula but what makes these substances different. The aspect of interpreting data and scientific experiments is enhanced by for example students conducting experiments on gas pressure, what happens if the gas is heated and the volume is reduced. Students are also required to interpret data, for example, data on boiling and melting points, interpretation of data on the molecular mass of a gas in relation to the speed of diffusion.

CLIL-based teaching materials on the topic of the nature of matter are effective in increasing student scientific literacy with the achievement of N-Gain literacy by 57%. The four aspects of CLIL that exist in this teaching material are Content, Cognition, Communication and Culture proved to be able to significantly increase literacy scores measured by pretest and posttest. The significance can be seen by Sig. (2-tailed) = 0.00 less than 0.05 which means very significant. From the value of student responses to teaching materials is very positive, and student interest in learning chemistry increases.

Recommendations

Recommendation for applicants to implement and create CLIL based material. Considering the importance of mastering English as an international language, especially in this era of globalization, learning English is not enough to be learned in English subjects only. English needs to be integrated and used directly in lessons like science, this is what is called the dual focus in the CLIL approach.

CLIL-based teaching materials effectively improve students' scientific literacy and language skills. Therefore recommendation for further studies are necessary to study and analyze the effect of CLIL teaching materials on other things such as creativity, science process skills and so on.

Limitations of Study

Some data in this study were taken online because of the covid-19 pandemic. Therefore some students' answers may be less valid due to dishonesty in answering the questions given.

Acknowledgment

Conflict of Interest; Authors declare that there is no conflict of interest within this research, publication paper, and funding support. This research was funded by Ministry of Research and Technology of Republic Indonesia.

Biodata of the Authors

Leny Heliawati is a chemistry lecturer at Graduate school of pakuan university in integrated science education department. She Completed her master's and doctoral on chemistry in University of Padjajaran, Indonesia. **Affiliation** : Integrated Science Education, Graduate School of Pakuan University, Bogor, Indonesia **E-mail**: leny_heliawati@yahoo.co.id
Phone: +6285216150330 **Scopus ID**: 56509643200 **WoS Researcher ID** : -



Bibin Rubini is a professor. He holds a Dr on Integrated Science Education from Indonesia University of Education. **Affiliation** : Integrated Science Education, Graduate School of Pakuan University, Bogor, Indonesia. **E-mail**: bibinrubini@unpak.ac.id
Phone: +6281511560912 **Scopus ID**: 57194711960 **WoS Researcher ID** : -



Rudi Firmayanto is a chemistry teacher. He holds a Master of Education in Integrated Science Education from Pakuan University. **Affiliation** : Cahaya Rancamaya School, Bogor, Indonesia. **E-mail** : rudifirma@gmail.com **Phone**: +6285277794364 **Scopus ID**: - **WoS Researcher ID** : -

References

- Admiraal, W., G. Westhoff and K. de Bot. (2006). Evaluation of bilingual secondary education in the Netherlands: students' language proficiency in English. *Educational Research and Evaluation*, 12, no. 1: 75–93.
- Arikunto, S. (2017). *Prosedur Penelitian: Suatu Pendekatan Praktik*. Edisi Revisi VI, Jakarta: PT Rineka Cipta
- Ball, P. (2018). Innovations and Challenges in CLIL Materials Design. Retrieved from <https://doi.org/10.1080/00405841.2018.1484036>
- Banegas, D. L. (2012). Integrating content and language in English language teaching in secondary education : Models , benefits , and challenges. *Studies in Second Language Learning and Teaching*, 2(1), 111–136.
- Brevik, L.M. and E. Moe. 2012. Effects of CLIL teaching on language outcomes. In Collaboration in Language Testing and Assessment, ed. Ildikó D. C. Tsagari, 213–227. Bern: Peter Lang.
- Coyle, D. O. (2008). Do Coyle CLIL - A Pedagogical Approach from the European Perspective. *Second And Foreign Language Education*, 4, 97–111.
- Coyle, D. O., Hood, P., & Marsh, D. (2013). *CLIL: Content and Language Integrated Learning*. Cambridge University Press.
- Creswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed.). Boston, MA: Pearson
- Dale, L., & Tanner, R. (2012). CLIL Activities: A resource for subject and language teachers. Cambridge: Cambridge University Press.
- Dalton-Puffer, C. (2011). CLIL: Content and Language Integrated Learning: From practice principle? *Annual Review of Applied Linguistics*, 31, 182–204. <https://doi.org/10.1017/S0267190511000092>
- Deswila, N., Kustati, M., Besral, B., & Sukandi, S.S. (2020). Content and Language Integrated Learning (CLIL) Approach across Curriculum in Science Classrooms : Are the English Language Use and Learning Reveal? .*Journal of Innovation Educational and Cultural Research*, 1(1), 15-21. DOI: <http://dx.doi.org/10.46843/jiecr.v1i1.4>
- El Islami, R.A.Z., Nuangchalerm, P., & Sjaifuddin, S. (2018). Science process of environmental conservation: a cross national study of Thai and Indonesian pre-service science teachers. *Journal for the Education of Gifted Young Scientists*, 6(4), 36-71. DOI: <http://dx.doi.org/10.17478/JEGYS.2018.84>
- Faisal, F. & Martin, S.N. (2019) Science education in Indonesia: past, present, and future. *Asia Pac. Sci. Educ.* 5, 4. <https://doi.org/10.1186/s41029-019-0032-0>
- Fraenkel, Jack. R., and Norman E. Wallen. (2012). How to Design and Evaluate Research in Education 8th Edition. Boston: McGraw-Hill Higher Education.
- Gulyas, A., Pfefferle, J., Wolf, K., & Waitz, T. (2015). A Model for CLIL in School Chemistry Classes : Combining the Aims of CLIL and Chemistry Teaching. *Eurasian Journal of Physics & Chemistry Education*, 7(2), 75–82. <https://doi.org/10.12973/ejpc.2015.00002a>
- 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*, 66 (1) : 64-74
- Harrison A.G., Treagust D.F. (2002) The Particulate Nature of Matter: Challenges in Understanding the Submicroscopic World. In: Gilbert J.K., De Jong O., Justi R., Treagust D.F., Van Driel J.H. (eds) Chemical Education: Towards Research-based Practice. Science & Technology Education Library, vol 17. Springer, Dordrecht
- Heras, A., & Lasagabaster, D. (2015). The impact of CLIL on affective factors and vocabulary learning. *Language Teaching Research*, 19(1), 70–88. <https://doi.org/10.1177/1362168814541736>.

- Huang, Y. (2020). The Effects of Elementary Students' Science Learning in CLIL. *English Language Teaching*, Vol. 13, No. 2. URL: <https://doi.org/10.5539/elt.v13n2p1>
- Lasagabaster, D. & Sierra, J.M. (2009). Language attitudes in CLIL and traditional EFL classes. *International CLIL Research Journal*, 1(2), 3-17.
- Lasagabaster, D. (2019). Motivation in Content and Language Integrated Learning (CLIL) Research. The Palgrave Handbook of Motivation for Language Learning. <https://doi.org/10.1007/978-3-030-28380-3>
- Lin, T.-Y., Shih, W.-H., & Lee, M.-S. (2019). The Effectiveness of Tailor-Made Content and Language Integrated Learning Materials for Taiwanese Primary School Students' Literacy Development. *English Literacy Instruction for Chinese Speakers*, 75–93. doi:10.1007/978-981-13-6653-6_5
- Lo, Y. Y., Lin, A. M. Y., & Cheung, T. C. L. (2018). *Supporting English-as-a-Foreign-Language (EFL) Learners' Science Literacy Development in CLIL: A Genre-Based Approach*. *Global Developments in Literacy Research for Science Education*, 79–95. doi:10.1007/978-3-319-69197-8_6
- Martínez Agudo, J. D (2019): The impact of CLIL on English language competence in monolingual context: a longitudinal perspective, *The Language Learning Journal*, DOI: 10.1080/09571736.2019.1610030
- Mehisto, P. (2012). Criteria for Producing CLIL Learning Material. *Encuentro 21*, pp 15-33
- Morton, T. (2020). Cognitive Discourse Functions: A Bridge between Content, Literacy and Language for Teaching and Assessment in CLIL. *CLIL Journal of Innovation and Research in Plurilingual and Pluricultural Education*, 3(1), 7-17. <https://doi.org/10.5565/rev/clil.33>
- OECD. (2019). PISA 2018 assessment and analytical framework. Retrieved from <http://www.oecd.org/pisa>.
- Parmin, P., Sajidan, S., Ashadi, A., Sutikno, S., & Maretta, Y. (2016). Preparing Prospective Teachers in Integrating Science and Local Wisdom through Practicing Open Inquiry. *Journal of Turkish Science Education*. 13(2), 3-14.
- Prieto-Arranz, J. I., L. Rallo Fabra, C. Calafat-Ripoll and M. Catrain González. (2015). Testing progress on receptive skills in CLIL and -CLIL contexts. In *Content-based Language Learning in Multilingual Educational Environments*, ed. M. Juan-Garau and J. Salazar Noguera, 123–137. Amsterdam: Springer.
- Purnama, S., Farikah, F, Purwanto, B. Wardhani, S., Kholid, I., Huda, S., Joemsittiprasert, W. (2019). The Impact of Listening Phonological Errors on Speaking: A Case Study on English Education. *Journal for the Education of Gifted Young Scientists*, 7 (4) , 899-913. DOI: 10.17478/jegys.622005.
- Ratini, R., Muchtar, H., Suparman, M.A., Tamuri, A.H., & Susanto, E. (2018). The Influence Of Learning Models And Learning Reliance On Students' Scientific Literacy. *Indonesian Journal of Science Education* , 7(4): 458–466
- Roiha, A. & Sommier, M. (2018): Viewing CLIL through the eyes of former pupils: insights into foreign language and intercultural attitudes. *Language and Intercultural Communication*, DOI: 10.1080/14708477.2018.1465069.
- Van de Craen, P., Mondt, K., Allain, L., & Gao, Y. (2007). Why and how CLIL works. An outline for a CLIL theory. *VIEWS*, 16, 70-78.
- Várkuti, A. (2010). Linguistic benefits of the CLIL approach: Measuring linguistic competences. *International CLIL Research Journal*, 1, no. 3: 67–79.
- Vithanapathirana, M., & Nettikumara, L. (2020). Improving secondary science instruction through content and language integrated learning (CLIL) in Sri Lanka. *International Online Journal of Education and Teaching (IOJET)*, 7(1). 141-148. <http://iojet.org/index.php/IOJET/article/view/684>
- Vojtř, K., & Rusek, M. (2019) Science education textbook research trends: a systematic literature review. *International Journal of Science Education*, 41:11, 1496-1516, DOI: 10.1080/09500693.2019.1613584
- Yamazaki M. (2019). Collaborative Learning Through CLIL in Secondary English Classrooms in Japan. In: Tsuchiya K., Pérez Murillo M. (eds) *Content and Language Integrated Learning in Spanish and Japanese Contexts*. Palgrave Macmillan, Cham
- Zarobe, Y. R., & Zenotz, V. (2017). Learning strategies in CLIL classrooms: how does strategy instruction affect reading competence over time? *International Journal of Bilingual Education and Bilingualism*, 21(3), 319–331. <https://doi.org/10.1080/13670050.2017.1391745>.

The effectiveness of content and language integrated learning-based teaching material in the topic of the nature of matter on scientific literacy

by Leny Heliawati, Bibin Rubini, And Rudi Firmaya

Submission date: 25-Jul-2021 05:04PM (UTC+0700)

Submission ID: 1623694657

File name: ss_of_content_and_language_integrated_learning-based_teachin.pdf (375.45K)

Word count: 5767

Character count: 32850



Research Article

The effectiveness of content and language integrated learning-based teaching material in the topic of the nature of matter on scientific literacy

Leny Heliawati ^{1*}, Bibin Rubini², and Rudi Firmayanto³

Science Education Study Program, Graduate School, Pakuan University, Bogor Indonesia

Article Info

Received: 14 April 2020
Revised: 27 June 2020
Accepted: 16 August 2020
Available online: 15 Sept 2020

Keywords:

Teaching material
CLIL
Scientific literacy
Nature of matter

2149-360X/ © 2020 The Authors
Published by Young Wise Pub. Lt
This is an open access article under
the CC BY-NC-ND license



Abstract

This study aimed to examine the effectiveness of teaching materials based on Content and Language Integrated Learning (CLIL) on scientific literacy on the topic of The Nature of Matter. Teaching material on this topic integrated the 4 pillars in CLIL, namely Content, Cognition, Communication and Culture. The Scientific Literacy Skills Scale (SLSS) measured in this study consisted of three aspects, namely explaining scientific phenomena, evaluating and designing scientific investigations, conducting data interpretation and scientific experiments. This study used an experimental method that was tested on 100 students in 3 schools that use English in chemistry learning. Student selection was done by purposive sampling. Data was collected through tests on students' scientific literacy and students' feedback questionnaires. The result of the analysis of N-Gain literacy percentage was 57%, it meant that this teaching material is quite effective in increasing student scientific literacy. Students' responses to teaching materials were in the very good category. From this study, it can be concluded that CLIL-based teaching material in the topic of the nature of matter is effective on students' scientific literacy.

To cite this article:

Heliawati, L., Rubini, B., Firmayanto, R. (2020). The Effectiveness of Content and Language Integrated Learning-Based Teaching Material in the Topic of The Nature of Matter on Scientific Literacy. *Journal for the Education of Gifted Young Scientists*, 8(3), 1061-1070. DOI: <http://dx.doi.org/10.17478/jegys.736654>

Introduction

The results of quality measurements of student's scientific literacy in Indonesia by the PISA (Program for International Student Assessment) in 2018 indicate that in general the scientific literacy scores of students in Indonesia are still below the average international literacy score (OECD, 2019). Indonesian scientific literacy score is 396, while international average is 489. The results of Indonesian scientific literacy are also below that of neighbor countries such as Malaysia with 438, Singapore with 551, and Brunei Darussalam with 431. This is certainly a great challenge for Indonesian education to find the right solution to improve the literacy of Indonesian students. Apart from the PISA results, many studies confirm that student literacy in Indonesia is still low (Ratini et al. 2018; Faisal & Martin, 2019). The problem of scientific literacy is a major obstacle in improving the quality of learning in Indonesia. Furthermore, El Islami et al. (2018) tell that literacy help people make a better live.

In line with the results of Indonesian scientific literacy in general, the results of scientific literacy, especially chemical literacy that have been examined in a preliminary study of this research in Cahaya Rancamaya High School, showed low results. The low scientific literacy, especially in the aspect of explaining scientific phenomena by 32%, evaluating and designing scientific investigations by 42.5%, and interpreting scientific data and experiments by 28.3%. An initial study of research conducted at the school which had demands for learning to use English as the language of instruction in chemistry subjects, found the fact that the low scientific literacy of students is caused by the low language skills of students, especially English. This causes students difficulty in learning teaching material

¹ Science Education Study Program, Graduate School, Pakuan University, Bogor Indonesia. Email: leny_heliawati@yahoo.co.id. ORCID ID: 0000-0003-3734-6745

² Science Education Study Program, Graduate School, Pakuan University, Bogor Indonesia. Email: bibinrubini@unpak.ac.id. ORCID ID: 0000-0001-5923-3501

³ Cahaya Rancamaya Senior High School, Bogor Indonesia. Email: rudifirma@gmail.com. ORCID ID: 0000-0002-5048-5777

which is also written in English. Language skills are needed to support the understanding of concepts so that they can improve scientific literacy.

One way to improve language skills, especially English, is to use these languages in learning (Brook & Moe, 2012; Roiha & Sommier, 2018; Martínez Agudo, 2019; Deswila et al. 2020). Learning that integrates content and language in learning is known as Integrated Learning and Content Learning (CLIL) (Dalton-Puffer, 2011; Banegas, 2012; Dale & Tanner, 2012; Coyle et al. 2013). So, content and language are an inseparable unity. Language is not just an introduction to learning but also targets learned besides the content itself. At present CLIL has been widely implemented in Europe and some Asia such as Singapore, Malaysia and Hong Kong (Lin et al. 2019). This approach can have a positive impact on learning outcomes (Gulyas et al. 2015). Such positive impacts can for example increase interest (Lasagabaster & Sierra, 2009), motivation (Van de Craen et al. 2007; Lasagabaster, 2019) conceptual knowledge (Zarobe & Zenotz, 2017; Huang, 2020), literacy reading (Admiraal et al. 2006; Prieto-Arranz et al. 2015). The above studies should be a reference for us, especially schools that implement bilingual programs to implement CLIL learning that has been proven to have a positive impact.

The positive impact is also expected to increase students' scientific literacy. It has already been mentioned that the initial findings indicate the low literacy of students in Cahaya Rancamaya High School. Therefore, this CLIL becomes a solution to the problem of low literacy of students in the school; it can even be a solution that is applied in Indonesia. Research by Lo et al. (2018) concluded that CLIL can increase student literacy. Morton (2020) further explains the positive relationship between content, language and literacy. While Coyle (2008) explained that CLIL consists of 4 pillars namely Content (the content of material), Cognition (thinking process), Communication (linguistics) and Culture. These pillars can improve the quality of learning, one of which is student scientific literacy.

Scientific Literacy on CLIL learning certainly requires a teaching material. The availability of teaching materials that are appropriate to the level of ability possessed by students becomes important (Mehisto, 2012). The role of teaching materials in learning cannot be denied (Vojfir & Rusek, 2019). Teaching materials have a key role in fostering scientific literacy, choosing strategies that are oriented towards science literacy is a necessary way. But the facts on the ground show the lack of teaching materials. Ball (2018) says one of the biggest obstacles faced in CLIL implementation is the provision and design of teaching materials. Purnama et al. (2019), Vithanapathirana and Nettikumara (2020) explained the difficulty in finding learning resources in bilingual schools. These difficulties and challenges become the main foundation in this research.

In accordance with the findings of problems that have been found about the low literacy of chemical science due to low language skills and the lack of teaching materials suitable for students, the purpose of this study is to test CLIL-based chemical teaching materials that can improve student scientific literacy. The scientific literacy that will be investigated in relation to aspects of explaining scientific phenomena, evaluating and designing scientific investigations, and interpreting data and scientific experiments. This aspect of scientific literacy is in line with PISA's findings that only 40% of students can reach level 2 and above. Level 2 indicates that students can recognize correct explanations related to general scientific phenomena, and use that knowledge to identify conclusions through the data provided.

Problem of Research

According to the background that has outlined, the research problem is examining the effectiveness of teaching materials based on Content and Language Integrated Learning (CLIL) on scientific literacy on the topic of The Nature of Matter. The research questions are as follows:

- Is there an effect of teaching materials based on Content and Language Integrated Learning (CLIL) on students's scientific literacy?
- Is there an effect of teaching materials based on Content and Language Integrated Learning (CLIL) on students's respond and interest in learning chemistry?

Method

Research Design

The research method used in this study is an experimental method that aims to produce and test the effectiveness of the products produced. The product is in the form of teaching materials based on Content and Language Integrated Learning (CLIL) on the topic of the nature of matter. These test questions are tested with one-group pretest-

posttest design technique, which measures the level of understanding (literacy) of students before and after learning (Fraenkel et al. 2012) with the schemes shown in Table 1.

Table 1.

The Scheme of the One Group Pretest-Posttest Design

<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
T ₁	X	T ₂

T₁ as a pretest is done before students are given treatment; X as a treatment is given through the use of teaching materials produced; and T₂ as a posttest is done after the sample is given treatment. With the One Group Pretest-Posttest Design, the treatment results can be known more accurately because it removes the bias from the research results

Participants

The subjects of this study were 100 students from 3 different schools. The school that was targeted by this study with different clusters is based on the similarity in the use of English in learning chemistry. There are 100 students in total; 40 students from Cahaya Rancamaya High School, 30 students from Kharisma Bangsa School, and 30 students from Depok Private School. Student selection is done by purposive sampling referring to Creswell (2012).

Data Collection Tools

Data is collected through tests to measure student scientific literacy and student feedback questionnaires.

Scientific Literacy Skills Scale (SLSS)

The test of student literacy is in the form of multiple-choice tests consisting of 25 questions and 4 choices in each question. The problem tests literacy on the topic of the nature of matter. This topic consists of 4 question indicators, namely state of matter, kinetic particle theory, changes of state, and diffusion. The 25 questions test literacy in the aspects of explaining scientific phenomena with a total of 6 questions, the aspect of evaluating and designing a scientific investigation of 9 questions, and the aspect of interpreting data and scientific experiments of 10 questions. Those aspects of literacy referring to OECD (2019). The test instrument used were tested for reliability with the method of Kuder Richardson (KR) 20 with a value 0.75 which means the instrument is reliable (Arikunto, 2017).

Data Analysis

Data analysis of test results uses points, where the correct answer of one question is given point 4, whereas if it is wrong it does not get 4 points. Thus, the maximum value for this literacy result is 100 points.

To find out if there is a significant difference in the average between the results of the pretest and posttest literacy, it will be tested through paired sample t-test. This test is used for two samples or paired data. Paired sample t-test test was processed using SPSS version 23. The basis for the research decision is if the Sig. (2-tailed) $p < 0.05$, there is a significant difference between the Literacy values in the pretest and posttest data. If the Sig. (2-tailed) $p > 0.05$, it means there is no significant difference between the literacy values in the pretest and posttest data. Paired sample t-test test is part of parametric statistics. Therefore, as a rule in parametric statistics, research data must be normally distributed.

Data normality was tested through the Kolmogorov Smirnov test with SPSS version 23. The normality test aims to determine whether the residual value (not on each of the research variables) is normally distributed or not. The interpretation of the Kolmogorov Smirnov normality test is as follows: If the significance value is in the Asymp column. Sig (2-tailed) or probability > 0.05 , then the data is said to be normally distributed. In addition, the data will also be tested for data homogeneity. Homogeneity test (F) is a statistical test to find out whether or not the variances of two or more data distributions are the same. Homogeneity test used is Levene homogeneity test with SPSS version 23. The interpretation of homogeneity test results is as follows: If the significance value in the Sig column or probability > 0.05 then the data distribution is homogeneous.

Questionnaire is intended to determine student responses to teaching materials used. Student responses consist of responses to appearance, presentation of material and language used in teaching materials. The questionnaire is also used to determine students' interest in learning chemistry using English by using these teaching materials. The questionnaire was filled in using a Likert scale. Students put a checklist on each questionnaire indicator with guidelines 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. This questionnaire is filled out by

students at the end of learning. The results of the questionnaire were then converted into a percentage (%) and then classified as very good (80-100%) good (66-79%), sufficient (56-65%), not good (41-55%) and not good (<40%).

Procedure

CLIL Teaching materials are implemented for students in 3 meetings for 3 weeks. The first meeting discussed indicators of state of matter and kinetic particle theory, the second meeting discussed indicators of changes of state, and the third meeting discussed indicators of diffusion. Pretest is done before the implementation of CLIL teaching materials and posttest and student responses are done at the end of learning.



Figure 1.
Implementation of CLIL Teaching materials

Results

Teaching material developed to improve scientific literacy on the topic of the nature of matter uses the 4 pillars of CLIL, namely Content, Cognition, Communication and Culture. The specifications of these teaching materials and their effects on scientific literacy are explained in Table 2.

Table 2.

Specifications of CLIL-based Nature of Matter Teaching Materials

Aspects of Teaching Materials based on CLIL	Teaching Material Specifications	Effect on Literacy
Content (the content of material)	State of matter, kinetic particle theory, changes of state, and diffusion.	Increasing literacy through content or material that is closely related to everyday phenomena, from simple phenomena to abstract explanations.
Cognition (thinking process)	Distinguishing the form of matter and its properties, describing the kinetic theory of particles, identifying changes in the form of matter, and examining the process of diffusion.	Directing students towards the process of thinking about science phenomena, so students are able to build scientific explanations, interpret data, to conclude a scientific phenomenon.
Communication (linguistics)	Scientific terms, reading skills of scientific texts, expressing scientific ideas, and explaining the procedure of a scientific phenomenon.	Increasing scientific literacy through the acquisition of scientific language skills ranging from synthetic terms, to the ability to understand a science text.
Culture	Group discussion, respect for other people's ideas, interest in science, working in the lab according to the rules.	Improving scientific literacy through building scientific attitudes and character.

The effect of CLIL teaching materials on scientific literacy was measured through 25 multiple choice questions. The influence is seen by comparing the initial test scores (pretest) and final scores (posttest). The results obtained are explained in Table 3.

Table 3.

Analysis Result of Pretest and Posttest on Scientific Literacy of Topic the Nature of Matter

Implementation data	Pretest	Posttest
Total Students	100	100
Lowest score	20	40
Highest score	70	95
Average score	44,75	72,25
% N-Gain	57% (medium)	

Besides seeing the results of N-gain in general, an analysis of each literacy indicator tested is conducted. Indicator analysis of each issue of scientific literacy is important to know the ability of students to answer each indicator of scientific literacy. The following results are in table 4.

Table 4.

The Results of the Pretest and Posttest Analysis Per Indicator

Aspect of scientific literacy	Indicator	% N-Gain	Criteria
Explaining phenomena scientifically	Remembering and applying appropriate scientific knowledge	72	High
	Identifying, using and producing clear models and representations	40	Medium
	Making and justifying predictions appropriately	58	Medium
Designing and evaluating scientific investigations	Identifying scientific questions that can be explored through a given study	63	Medium
	Distinguishing questions that can be scientifically investigated	60	Medium
Interpret data and scientific evidence	Changing data from one representation to another	48	Medium
	Analyzing and interpreting the data, also drawing the right conclusions	75	High
	Identifying assumptions, evidence and reasoning in the text	65	Medium

The results of the pretest and posttest analysis per indicator show that the percentage of N-gain obtained is in the medium to high criteria. Table 3 shows the differences between the pretest results of students before getting treatment (average = 44.75) and posttest (average = 72.25), which means there is an increase in N-Gain by 57%. The N-Gain value is in the medium category (Hake, 1998). Comparison of pretest, posttest and N-Gain values is presented in Figure 1.

**Figure 2.**

Comparison of Pretest, Posttest and N-Gain

Data prerequisite tests consisting of the Normality and Homogeneity test were also carried out in this study. The results of normality and homogeneity tests on the scores of the pretest-posttest literacy are presented in Table 5.

Table 5.

The Results of Normality and Homogeneity Tests

Data	Sig. Value	Additional Information
Pretest - Posttest	Normality test = 0,701	Data is normally distributed
	Homogeneity tests =0,863	Data is homogeneous

After the prerequisite tests are carried out on normality and homogeneity, then the data is tested to determine the difference in values before and after learning with the Pair sample T-test, which is presented in Table 6.

Table 6.

Paired Sample T-test Results

	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std.deviation	Std.error mean			
Pair Pre-post	27,500	11,528	2,578	10,668	99	0,000

In this table, the Sig. (2-tailed) = 0.00 means <0.05 , so it can be concluded that there is a significant difference between the students' pretest and posttest scores after learning using CLIL-based chemistry teaching materials on the nature of matter topic.

After learning using CLIL-based chemical teaching materials, students are asked to provide a response or response to the teaching material. In addition, students are also asked to respond whether this teaching material can increase their interest in learning chemistry. The results of the student questionnaire analysis are shown in Figure 2.

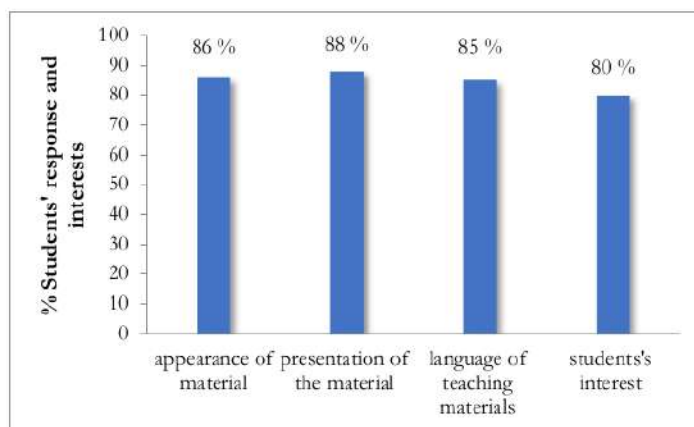


Figure 3.

Students' Response and Interests to Teaching Material

From the graph above, it appears that students' responses to the appearance, presentation of the material and language of teaching materials are in the very good category, which is above 80%. Likewise, an increase in interest of 80% is in the good category.

Discussion and Conclusion

CLIL-based teaching materials integrate science content and language that is used to improve student scientific literacy. Besides this teaching material integrates 4 pillars called 4C CLIL which consists of Content (the content of the material), Cognition (Thinking process), Communication (linguistics) and Culture. These four aspects distinguish this teaching material from other teaching materials as well as being the key in increasing students' scientific literacy.

The content chosen in this research is the nature of matter. The nature of matter is a fundamental and important topic in chemistry and is very contextual to everyday life. It is a fundamental aspect, in which there is a particle theory which is the basis of explanation for many topics such as atomic structure, bonds, molecules, chemical reactions, chemical equilibrium, and chemical energy (Harrison & Treagust, 2002). A good understanding of this topic is the key to understanding the next concept. Parmin et al. (2016) stated that science learning is presented integrately because it relates to everyday life. Through this topic, during the learning process in this study, students have explained phenomena through observation, investigation and conclusion of things they often encounter. Not only the basic phenomenon, learning this topic found facts of learning that challenge students to think more abstractly by studying the behavior of particles of a substance when undergoing a change in form. The diffusion process described in this teaching material has also been shown to have an impact on students' understanding of the nature and characteristics of gases present in their environment.

In the cognition aspect of this CLIL teaching material, learning has been carried out through a series of scientific activities that direct students towards thinking processes of science phenomena, so students are able to build scientific explanations, interpret data, and conclude a scientific phenomenon. This teaching material has demanded students to be able to distinguish material forms and their properties, describe the kinetic theory of particles, identify changes in the form of matter, and examine the process of diffusion. These thinking activities can increase students' scientific literacy. This finding is reinforced by Coyle et al. (2013) who have found that the CLIL approach encourages students to use various cognitive skills in the use of target languages ranging from low ones such as understanding and remembering vocabulary to high cognitive skills such as creative thinking.

Communication aspects (linguistics) are proven to play an important role in increasing scientific literacy. This aspect enhances scientific literacy through the learning of language learning skills, for example understanding of scientific terms such as matter, solid, liquid, particle, volume, pressure; understanding of scientific processes such as melting, evaporation, freezing; use of scientific language to explain the nature and process of science such as solid has fixed shape, mercury is liquid at room temperature, gas particle move rapidly in all directions. This is in line with the findings of Heras and Lasagabaster (2015) about the effects of CLIL on improving learning vocabulary, and Várkuu's (2010) findings on the impact of CLIL on improving lexical language. In the end, the understanding of scientific language is able to bring students to understand a scientific text that explains various scientific phenomena

in everyday life. The ability to read is very important especially as one aspect of PISA literacy that is not yet entrenched in Indonesian society.

Culture increases the literacy of science through the development of scientific attitudes and character. This aspect is reflected in the material only reflected during the group discussion process, respecting other people's ideas, showing interest in science, working in the lab according to the rules and collaborative learning. Yamazaki (2019) writes that the purpose of CLIL lessons with collaborative learning is so that students can achieve competence to utilize content knowledge in their daily lives. Students are able to express their own ideas in creative ways based on the knowledge they have learned rather than just explaining the knowledge of the subject they are remembering.

This CLIL teaching material is proven effective in increasing students' scientific literacy that has been measured through knowledge tests. From the three aspects of science measured, namely explaining scientific phenomena, evaluating and designing scientific investigations, also interpreting data and scientific experiments, reinforced the results of the analysis of N-Gain values in this study which reinforces that teaching materials are effective for student scientific literacy. The specifications of teaching materials used in this study using operational languages encourage students to want to read texts. Integrating examples of science ideas that are integrated with the presentation of material provides new experiences for students because of contextual learning resources. The various scientific procedures explained in teaching materials about science phenomena have given students confidence about the importance of a process in learning science.

The aspect of scientific literacy explaining scientific phenomena is increasing. This can be seen from each literacy indicator that has moderate to high N-Gain. The teaching materials of the nature of matter explain a lot of scientific phenomena that exist in our daily environment. Through this teaching material, for example students are required to be able to explain the process of freezing, melting, yawning using particle theory; explain the phenomenon of the diffusion process, and so on. The literacy aspect of evaluating and designing scientific investigations also increased. This teaching material has features that facilitate students to explore and investigate scientific phenomena, for example in answering questions about ice, water and water vapor that have the same formula but what makes these substances different. The aspect of interpreting data and scientific experiments is enhanced by for example students conducting experiments on gas pressure, what happens if the gas is heated and the volume is reduced. Students are also required to interpret data, for example, data on boiling and melting points, interpretation of data on the molecular mass of a gas in relation to the speed of diffusion.

CLIL-based teaching materials on the topic of the nature of matter are effective in increasing student scientific literacy with the achievement of N-Gain literacy by 57%. The four aspects of CLIL that exist in this teaching material are Content, Cognition, Communication and Culture proved to be able to significantly increase literacy scores measured by pretest and posttest. The significance can be seen by Sig. (2-tailed) = 0.00 less than 0.05 which means very significant. From the value of student responses to teaching materials is very positive, and student interest in learning chemistry increases.

Recommendations

Recommendation for applicants to implement and create CLIL based material. Considering the importance of mastering English as an international language, especially in this era of globalization, learning English is not enough to be learned in English subjects only. English needs to be integrated and used directly in lessons like science, this is what is called the dual focus in the CLIL approach.

CLIL-based teaching materials effectively improve students' scientific literacy and language skills. Therefore recommendation for further studies are necessary to study and analyze the effect of CLIL teaching materials on other things such as creativity, science process skills and so on.

Limitations of Study

Some data in this study were taken online because of the covid-19 pandemic. Therefore some students' answers may be less valid due to dishonesty in answering the questions given.

Acknowledgment

1
Conflict of Interest; Authors declare that there is no conflict of interest within this research, publication paper, and funding support. This research was funded by Ministry of Research and Technology of Republic Indonesia.

Biodata of the Authors



Leny Heliawati is a chemistry lecturer at Graduate school of Pakuan University in integrated science education department. She Completed her master's and doctoral on chemistry in University of Padjajaran, Indonesia. **Affiliation** : Integrated Science Education, Graduate School of Pakuan University, Bogor, Indonesia **E-mail**: leny_heliawati@yahoo.co.id
Phone: +6285216150330 **Scopus ID**: 56509643200 **WoS Researcher ID** : -



Bibin Rubini is a professor. He holds a Dr on Integrated Science Education from Indonesia University of Education. **Affiliation** : Integrated Science Education, Graduate School of Pakuan University, Bogor, Indonesia. **E-mail**: bibinrubini@unpak.ac.id
Phone: +6281511560912 **Scopus ID**: 57194711960 **WoS Researcher ID** : -



Rudi Firmayanto is a chemistry teacher. He holds a Master of Education in Integrated Science Education from Pakuan University. **Affiliation** : Cahaya Rancamaya School, Bogor, Indonesia. **E-mail** : rudifirma@gmail.com **Phone**: +6285277794364 **Scopus ID**: - **WoS Researcher ID** : -

References

- Admiraal, W., G. Westhoff and K. de Bot. (2006). Evaluation of bilingual secondary education in the Netherlands: students' language proficiency in English. *Educational Research and Evaluation*, 12, no. 1: 75–93.
- Anikunto, S. (2017). *Prosedur Penelitian: Suatu Pendekatan dan Teknik*. Edisi Revisi VI, Jakarta: PT Rineka Cipta
- Ball, P. (2018). Innovations and Challenges in CLIL Materials Design. Retrieved from <https://doi.org/10.1080/00405841.2018.1484036>
- Banegas, D. L. (2012). Integrating content and language in English language teaching in secondary education : Models , benefits , and challenges. *Studies in Second Language Learning and Teaching*, 2(1), 111–136.
- Brevik, L.M. and E. Moe. 2012. Effects of CLIL teaching on language outcomes. In Collaboration in Language Testing and Assessment, ed. Ildikó D. C. Tsagari, 213–227. Bern: Peter Lang.
- Coyle, D. O. (2008). Do Coyle CLIL - A Pedagogical Approach from the European Perspective. *Second And Foreign Language Education*, 4, 97–111.
- Coyle, D. O., Hood, P., & Marsh, D. (2013). *CLIL: Content and Language Integrated Learning*. Cambridge University Press.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson
- Dale, L., & Tanner, R. (2012). *CLIL Activities: A resource for subject and language teachers*. Cambridge: Cambridge University Press.
- Dalton-Puffer, C. (2011). CLIL: Content and Language Integrated Learning: From practice principle? *Annual Review of Applied Linguistics*, 31, 182–204. <https://doi.org/10.1017/S0267190511000092>
- Deswila, N., Kustati, M., Besral, B., & Sukandi, S.S. (2020). Content and Language Integrated Learning (CLIL) Approach across Curriculum in Science Classrooms : Are the English Language Use and Learning Revealed? *Journal of Innovation Educational and Cultural Research*, 1(1), 15-21. DOI: <http://dx.doi.org/10.46843/jiecr.v1i1.4>
- El Islami, R.A.Z., Nuangchalem, P., & Sjaifuddin, S. (2018). Science process of environmental conservation: a cross national study of Thai and Indonesian pre-service science teachers. *Journal for the Education of Gifted Young Scientists*, 6(4), 36-71. DOI: <http://dx.doi.org/10.17478/JEGYS.2018.84>
- Faisal, F. & Martin, S.N. (2019) Science education in Indonesia: past, present, and future. *Asia Pac. Sci. Educ.* 5, 4. <https://doi.org/10.1186/s41029-019-0032-0>
- Fraenkel, Jack. R., and Norman E. Wallen. (2012). *How to Design and Evaluate Research in Education* 8th Edition. Boston: McGraw-Hill Higher Education.
- Gulyas, A., Pfefferle, J., Wolf, K., & Waitz, T. (2015). A Model for CLIL in School Chemistry Classes: Combining the Aims of CLIL and Chemistry Teaching. *Eurasian Journal of Physics & Chemistry Education*, 7(2), 75–82. <https://doi.org/10.12973/ejpc.2015.00002a>
- 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*, 66 (1) : 64-74
- Harrison A.G., Treagust D.F. (2002) The Particulate Nature of Matter: Challenges in Understanding the Submicroscopic World. In: Gilbert J.K., De Jong O., Justi R., Treagust D.F., Van Driel J.H. (eds) *Chemical Education: Towards Research-based Practice*. Science & Technology Education Library, vol 17. Springer, Dordrecht
- Heras, A., & Lasagabaster, D. (2015). The impact of CLIL on affective factors and vocabulary learning. *Language Teaching Research*, 19(1), 70–88. <https://doi.org/10.1177/1362168814541736>

- Huang, Y. (2020). The Effects of Elementary Students' Science Learning in CLIL. *English Language Teaching*, Vol. 13, No. 2. URL: <https://doi.org/10.5539/elt.v13n2p1>
- Lasagabaster, D. & Sierra, J.M. (2009). Language attitudes in CLIL and traditional EFL classes. *International CLIL Research Journal*, 1(2), 3-17.
- Lasagabaster, D. (2019). Motivation in Content and Language Integrated Learning (CLIL) Research. The Palgrave Handbook of Motivation for Language Learning. <https://doi.org/10.1007/978-3-030-28380-3>
- Lin, T.-Y., Shih, W.-H., & Lee, M.-S. (2019). The Effectiveness of Tailor-Made Content and Language Integrated Learning Materials for Taiwanese Primary School Students' Literacy Development. *English Literacy Instruction for Chinese Speakers*, 75-93. doi:10.1007/978-981-13-6653-6_5
- Lo, Y. Y., Lin, A. M. Y., & Cheung, T. C. L. (2018). Supporting English-as-a-Foreign-Language (EFL) Learners' Science Literacy Development in CLIL: A Genre-Based Approach. *Global Developments in Literacy Research for Science Education*, 79-95. doi:10.1007/978-3-319-69197-8_6
- Martínez Agudo, J. D (2019): The impact of CLIL on English language competence in monolingual context: a longitudinal perspective, *The Language Learning Journal*, DOI: 10.1080/09571736.2019.1610030
- Mehisto, P. (2012). Criteria for Producing CLIL Learning Material. *Encuentro 21*, pp 15-33
- Morton, T. (2020). Cognitive Discourse Functions: A Bridge between Content, Literacy and Language for Teaching and Assessment in CLIL. *CLIL Journal of Innovation and Research in Plurilingual and Pluricultural Education*, 3(1), 7-17. <https://doi.org/10.5565/rev/clil.33>
- OECD. (2019). PISA 2018 assessment and analytical framework. Retrieved from <http://www.oecd.org/pisa>.
- Parmian, P., Sajidan, S., Ashadi, A., Sutikno, S., & Maretta, Y. (2016). Preparing Prospective Teachers in Integrating Science and Local Wisdom through Practicing Open Inquiry. *Journal of Turkish Science Education*. 13(2), 3-14.
- Prieto-Arranz, J. I., L. Rallo Fabra, C. Calafat-Ripoll and M. Catraín González. (2015). Testing progress on receptive skills in CLIL and -CLIL contexts. In Content-based Language Learning in Multilingual Educational Environments, ed. M. Juan-Garau and J. Salazar Noguera, 123-137. Amsterdam: Springer.
- Purnama, S., Farikah, F., Purwanto, B. Wardhani, S., Kholid, I., Huda, S., Joemsitiprasert, W. (2019). The Impact of Listening Phonological Errors on Speaking: A Case Study on English Education. *Journal for the Education of Gifted Young Scientists*, 7 (4) , 899-913. DOI: 10.17478/jegys.622005.
- Ratini, R., Muchtar, H., Suparman, M.A., Tamuri, A.H., & Susanto, E. (2018). The Influence Of Learning Models And Learning Reliance On Students' Scientific Literacy. *Indonesian Journal of Science Education* , 7(4): 458-466
- Roiha, A. & Sommier, M. (2018): Viewing CLIL through the eyes of former pupils: insights into foreign language and intercultural attitudes. *Language and Intercultural Communication*, DOI: 10.1080/14708477.2018.1465069.
- Van de Craen, P., Mondt, K., Allain, L., & Gao, Y. (2007). Why and how CLIL works. An outline for a CLIL theory. *VIEWS*, 16, 70-78.
- Várkuti, A. (2010). Linguistic benefits of the CLIL approach: Measuring linguistic competences. *International CLIL Research Journal*, 1, no. 3: 67-79.
- Vithanapathirana, M., & Nettikumara, L. (2020). Improving secondary science instruction through content and language integrated learning (CLIL) in Sri Lanka. *International Online Journal of Education and Teaching (IOJET)*, 7(1). 141-148. <http://iojet.org/index.php/IOJET/article/view/684>
- Vojtř, K., & Rusek, M. (2019) Science education textbook research trends: a systematic literature review. *International Journal of Science Education*, 41:11, 1496-1516, DOI: 10.1080/09500693.2019.1613584
- Yamazaki M. (2019). Collaborative Learning Through CLIL in Secondary English Classrooms in Japan. In: Tsuchiya K., Pérez Murillo M. (eds) Content and Language Integrated Learning in Spanish and Japanese Contexts. Palgrave Macmillan, Cham
- Zarobe, Y. R., & Zenotz, V. (2017). Learning strategies in CLIL classrooms: how does strategy instruction affect reading competence over time? *International Journal of Bilingual Education and Bilingualism*, 21(3), 319-331. <https://doi.org/10.1080/13670050.2017.1391745>.

The effectiveness of content and language integrated learning-based teaching material in the topic of the nature of matter on scientific literacy

ORIGINALITY REPORT

7%

SIMILARITY INDEX

7%

INTERNET SOURCES

5%

PUBLICATIONS

2%

STUDENT PAPERS

PRIMARY SOURCES

1	repository.uin-malang.ac.id Internet Source	2%
2	ijisrt.com Internet Source	1%
3	ejournal.radenintan.ac.id Internet Source	1%
4	www.ijicc.net Internet Source	1%
5	D Suryanti, P Sinaga, W Surakusumah. "Improvement of Students' Environmental Literacy by Using Integrated Science Teaching Materials", IOP Conference Series: Materials Science and Engineering, 2018 Publication	1%
6	asian-efl-journal.com Internet Source	1%
7	pdfs.semanticscholar.org Internet Source	1%

8

I Ariska, D Rosana. "Analysis of Junior High School scientific literacy skills: domain competence on vibrations, waves and sound materials", Journal of Physics: Conference Series, 2020

Publication

1 %

Exclude quotes Off

Exclude matches < 1%

Exclude bibliography On



Scimago Journal & Country Rank

Enter Journal Title, ISSN or Publisher Name

- Home
- Journal Rankings
- Country Rankings
- Viz Tools
- Help
- About Us



Journal for the Education of Gifted Young Scientists

Discontinued in Scopus as of 2020

COUNTRY

Turkey

Universities and research institutions in Turkey

SUBJECT AREA AND CATEGORY

Social Sciences
Education

PUBLISHER

Journal for the Education of
Gifted Young Scientists

H-INDEX

11



PUBLICATION TYPE

ISSN

COVERAGE

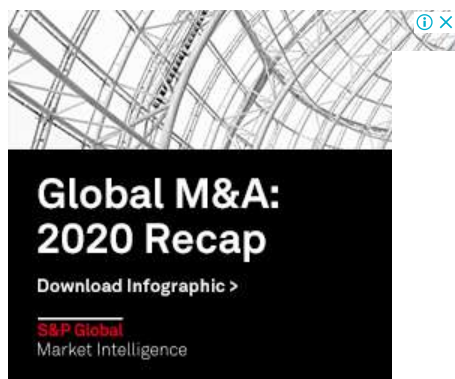
INFORMATION

Journals

2149360X

2015-2020

- [Homepage](#)
- [How to publish in this journal](#)
- hasansaidfen@gmail.com



SCOPE

Journal for the Education of Gifted Young Scientists (JEGYS) ISSN: 2149-360X covers issues such as science education, differentiated instruction in mathematics, science and social sciences for gifted students, education and training of the young scientist, giftedness, gifted education, scientific creativity, educational policy on science and math education for gifted

students, teaching of the history and philosophy of science, STEM education for gifted, teaching techniques and activities in the education of the gifted young scientist, is a scientific and academic journal. JEGYS aims to be a scientific media sharing scientific research, practices, theories and ideas about gifted education and education of the gifted young scientists. STEM education for gifted, teaching techniques and activities in the education of the gifted young scientist, is a scientific and academic journal. JEGYS aims to be a scientific media sharing scientific research, practices, theories and ideas about gifted education and education of the gifted young scientists.

 Join the conversation about this journal




Best Minecraft Server Hosting

Highly Rated And Backed By Our Money-Back Guarantee.

Shockbyte



 Quartiles



FIND SIMILAR JOURNALS 

options 

International Journal

Submit Paper for Publication in Peer Reviewed Widely Indexed Academic Journal

IJIRMP5
Open

- 1
Jurnal Pendidikan IPA Indonesia
IDN

20%

similarity

2
Roeper Review
GBR

14%

similarity

3
High Ability Studies
GBR

13%

similarity

4
Journal for the Education of the Gifted
USA

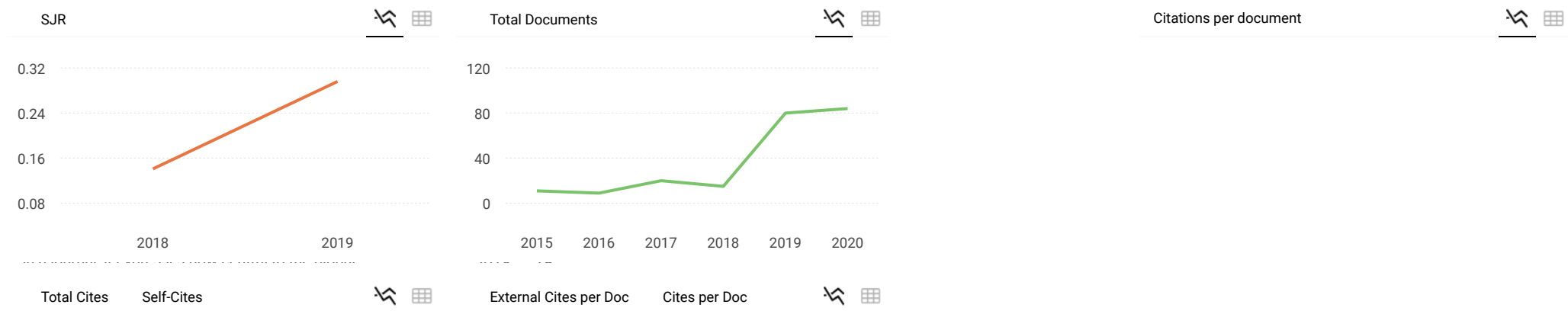
13%

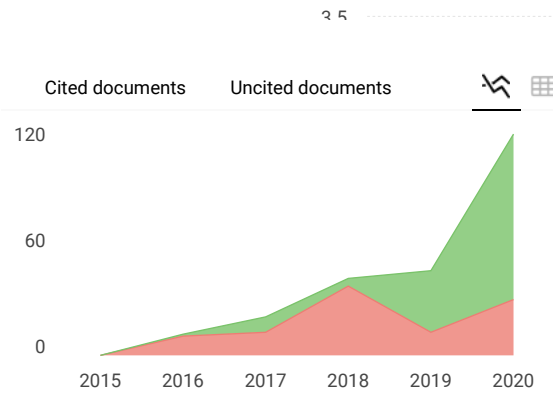
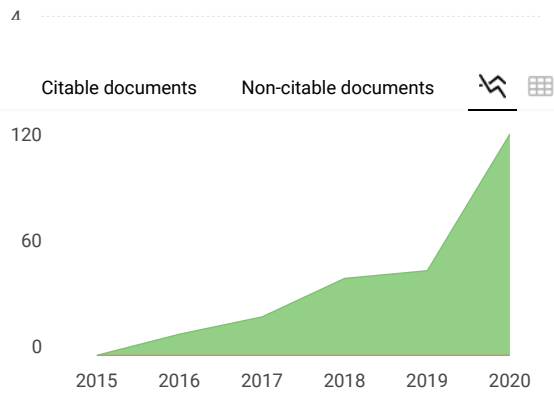
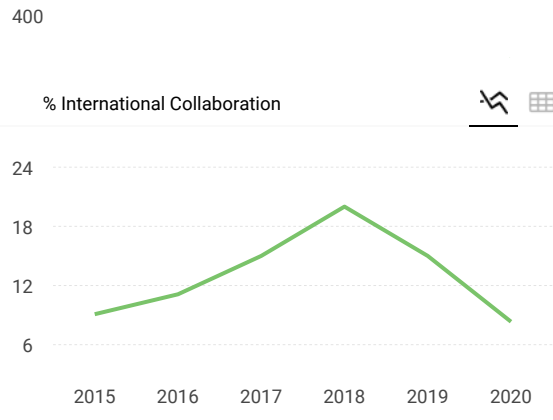
similarity

5
Asia-Pacific Forum on Science Learning and
HKG

13%

similarity





Journal for the Education of Gifted Young Scientists

Not yet assigned quartile

SJR 2020
0

powered by scimagojr.com

← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scima
```

SCImago Graphica

Explore, visually communicate and make sense of data with our **new free tool.**

Get it



Metrics based on Scopus® data as of April 2021

A **Asmaa Mohammed** 3 months ago

I'd like to publish my manuscript in your esteemed journal

reply



Melanie Ortiz 3 months ago

SCImago Team

Dear Asmaa, thank you very much for your comment, we suggest you look for the author's instructions/submission guidelines in the journal's website. Best Regards, SCImago Team

Leave a comment

Name

Email

(will not be published)

I'm not a robot reCAPTCHA
Privacy - Terms

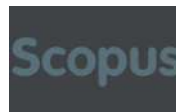
Submit

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

Developed by:



Powered by:



Follow us on @ScimagoJR

Scimago Lab, Copyright 2007-2020. Data Source: Scopus®

EST MODUS IN REBUS

Horatio (Satire 1.1.106)



Source details

Journal for the Education of Gifted Young Scientists

CiteScore 2019

1.5



Open Access ⓘ

Scopus coverage years: from 2015 to 2020

(coverage discontinued in Scopus)

SJR 2019

0.296



Publisher: Journal for the Education of Gifted Young Scientists

E-ISSN: 2149-360X

Subject area: Social Sciences: Education

SNIP 2020

1.885



Source type: Journal

[View all documents >](#)

[Set document alert](#)

[Save to source list](#) [Source Homepage](#)

[CiteScore](#) [CiteScore rank & trend](#) [Scopus content coverage](#)

Improved CiteScore methodology



CiteScore 2019 counts the citations received in 2016-2019 to articles, reviews, conference papers, book chapters and data papers published in 2016-2019, and divides this by the number of publications published in 2016-2019. [Learn more >](#)

CiteScore 2019

1.5

192 Citations 2016 - 2019

124 Documents 2016 - 2019

Calculated on 06 May, 2020



CiteScore rank 2019 ⓘ

Category	Rank	Percentile
Social Sciences		
Education	#514/1254	59th

[View CiteScore methodology >](#) [CiteScore FAQ >](#) [Add CiteScore to your site](#)

About Scopus

- [What is Scopus](#)
- [Content coverage](#)
- [Scopus blog](#)
- [Scopus API](#)
- [Privacy matters](#)

Language

- [日本語に切り替える](#)
- [切换到简体中文](#)
- [切换到繁體中文](#)
- [Русский язык](#)

Customer Service

- [Help](#)
- [Contact us](#)



Journal for the Education of Gifted Young Scientists (JEGYS)



Journal for the Education of Gifted Young Scientists (JEGYS)

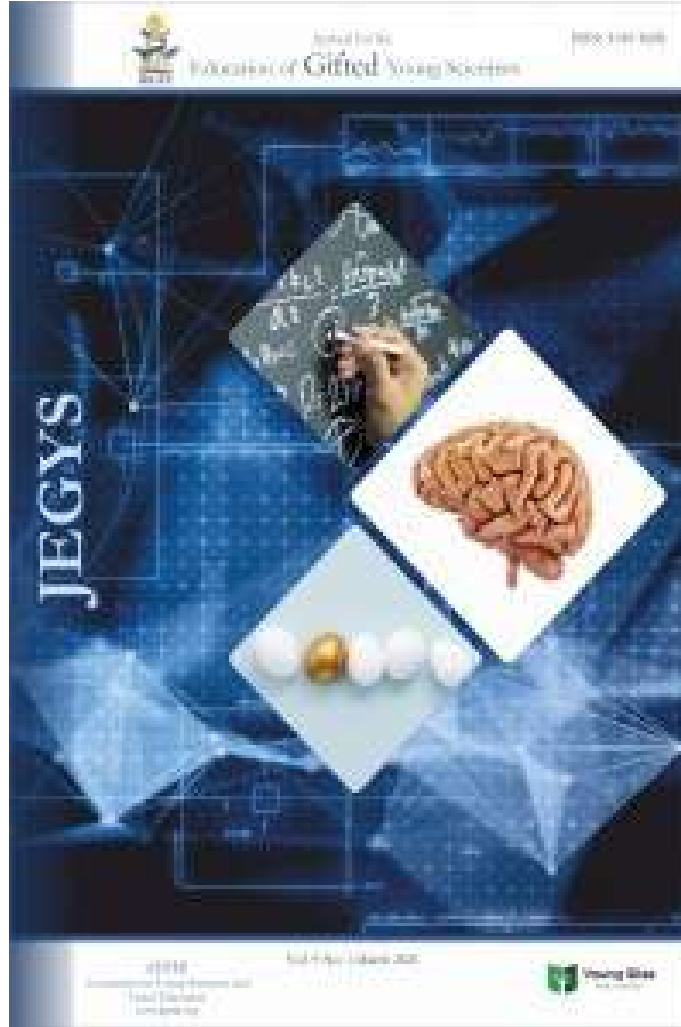


Journal for the Education of Gifted Young Scientists



EN ▾

[Submit Article](#)[Send Reviewer Request](#)[Aim & Scope](#)[Author Guidelines](#)

[Ethical Principles and Publication Policy](#)[Last Issue](#)[Editorial Board](#)[Contact](#)[Archive](#)[Login](#)

e-ISSN 2149-360X | **Period** Quarterly | **Founded:** 2013 | **Publisher** Genç Bilge Yayıncılık | <http://jegys.org/>



74.828



170.375

Journal for the Education of Gifted Young Scientists (JEGYS) covers issues such as differentiated instruction in mathematics, science and social sciences for gifted students, education and training of the young scientist, giftedness,

gifted education, scientific creativity, educational policy on science and math education for gifted students, the teaching of the history and philosophy of science, STEM education for gifted, teaching techniques and activities in the education of the gifted young scientist, is a scientific and academic journal. JEGYS aims to be a scientific media sharing scientific research, practices, theories and ideas about gifted education and education of the gifted young scientists. The JEGYS is an international refereed scientific journal which publishes review and research article, teaching techniques and activities for the education of the gifted young scientist, book reviews and interviews in English. Submitted articles are evaluated in a double-blinded peer-reviewed fashion. The JEGYS is open access and a nonprofit journal published 4 issues a year. JEGYS holds copyrights for all articles published in the journal.

[Accepted Submissions](#)

[Special Issue Call \(STEM for Gifted\) October 15, 2021](#)

[Open Access Policy](#)

[Peer Review Policy of JEGYS](#)

[Plagiarism Policy of JEGYS](#)

[Association for Young Scientists and Talent Education](#)

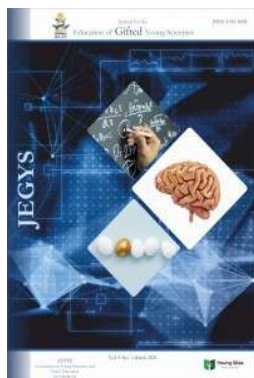
[JEGYS Review Guide Form](#)

[Copyright Transfer Agreement Form](#)

[Article Template of JEGYS](#)

Journal for the Education of Gifted Young Scientists

e-ISSN 2149-360X | Period Quarterly | Founded: 2013 | Publisher Genç Bilge Yayıncılık | <http://jegys.org/>



74.828



170.375

Journal for the Education of Gifted Young Scientists (JEGYS) covers issues such as differentiated instruction in mathematics, science and social sciences for gifted students, education and training of the young scientist, giftedness, gifted education, scientific creativity, educational policy on science and math education for gifted students, the teaching of the history and philosophy of science, STEM education for gifted, teaching techniques and activities in the education of the gifted young scientist, is a scientific and academic journal. JEGYS aims to be a scientific media sharing scientific research, practices, theories and ideas about gifted education and education of the gifted young scientists. The JEGYS is an international refereed scientific journal which publishes review and research article, teaching techniques and activities for the education of the gifted young scientist, book reviews and interviews in English. Submitted articles are evaluated in a double-blinded peer-reviewed fashion. The JEGYS is open access and a nonprofit journal published 4 issues a year. JEGYS holds copyrights for all articles published in the journal.

Issues

- ▼ 2021
 - Volume: 9 Issue: 2
 - Volume: 9 Issue: 1
- ▼ 2020
 - Volume: 8 Issue: 4
 - Volume: 8 Issue: 3

Volume 9 - Issue 2 - Jun 15, 2021

Last Issue

1. [Novelties to academia from JEGYS](#)
Pages 1 - 1
 Hasan Said TORTOP
2. [The analysis of research about gifted and talented children at early childhood in Turkey: a study of meta – synthesis](#)
Pages 107 - 121
 Gamze İNCİ



RS

S



English



Search in the jourr

Login

Submit Article

Send Reviewer Request

Aim & Scope

Author Guidelines

Ethical Principles and Publication Policy

Accepted Submissions

Archive

- Volume: 8
Issue: 2
 - Volume: 8
Issue: 1
 - ▼ 2019
 - Volume: 7
Issue: 4
 - Volume: 7
Issue: 3
 - Volume: 7
Issue: 2
 - Volume: 7
Issue: 1
 - ▼ 2018
 - Volume: 6
Issue: 4
 - Volume: 6
Issue: 3
 - Volume: 6
Issue: 2
 - Volume: 6
Issue: 1
 - ▼ 2017
 - Volume: 5
Issue: 4
 - Volume: 5
Issue: 3
 - Volume: 5
Issue: 2
 - Volume: 5
Issue: 1
3. The schoolwide enrichment model for reading (SEM-R) framework
Pages 133 - 138
👤 Mashael ALHİBS
 4. The effects of using games on teaching vocabulary in reading comprehension: a case of gifted students
Pages 151 - 160
👤 Aminuddin HASHEMI
 5. Greening the school for sustainable development: a case of Tshwane North District
Pages 161 - 180
👤 Johannah BOPAPE, Awelani V MUDAU, Sikhulile Bonginkosi MSEZANE
 6. Factors bolstering the implementation of environment and sustainability education: A South African case study
Pages 181 - 191
👤 Headman HEBE
 7. Examining the stress, depressive thoughts, and working memory capacities of the university students
Pages 91 - 105
👤 Eid ABO HAMZA, Ahmed HELAL
 8. Toys for children with the concept of STEM: study of the result from children's playing activities
Pages 77 - 90
👤 Songwut EGWUTVONGSA
 9. The parenting attitudes and effects on their gifted children: a literature review
Pages 123 - 132
👤 Sümeyye YILDIZ, Naime ALTAY

[Archive](#)

[LOCKSS](#)

[Editorial Board](#)

[Contact](#)

[Special Issue Call
\(STEM for Gifted\)
October 15, 2021](#)

[Open Access
Policy](#)

[Peer Review
Policy of JEGYS](#)


[Plagiarism Policy
of JEGYS](#)

[Association for
Young Scientists
and Talent
Education](#)

[JEGYS Review
Guide Form](#)

[Copyright
Transfer
Agreement Form](#)

Pages 139 - 149

 Oğuzhan YAVUZ, Müge YUKAY YÜKSEL[Article Template
of JEGYS](#)**SOBIAD Impact
Factor**

2020 IF: 0.885

**Index
Copernicus ICV**

ICV 2019: 120.71

Journal for the Education of Gifted Young Scientists indexed from SCOPUS June 2018- December 2020. SOBIAD Impact Factor Score (1,171) Top One of Turkey at SOBIAD Index at 2019. Thanks for the contributions. [2nd International Congress on Gifted Youth and Sustainability of the Education \(ICGYSE\) 20-21 November 2021 \(Please click for attendance\).](#)



JEGYS NOT INDEXED citefactor



POPULARITY OF THE JEGYS OVER THE WORLD



Note: Counter started on 28 February, 2021

[Genç Bilge Yayıncılık © Contact](#)

[ULAKBİM Dergi Sistemleri](#)

[Genç Bilge Yayıncılık © Contact](#)

[ULAKBİM Dergi Sistemleri](#)



Ads by Google

Stop seeing this ad

Why this ad? 

Journal for the Education of Gifted Young Scientists

Discontinued in Scopus as of 2020

COUNTRY

Turkey



Universities and research institutions in Turkey

SUBJECT AREA AND CATEGORY

Social Sciences
Education

PUBLISHER

Journal for the Education of Gifted Young Scientists



Ads by Google

Stop seeing this ad

Why this ad

PUBLICATION TYPE

Journals

ISSN

2149360X

COVERAGE

2015-2020



Ads by Google

Stop seeing this ad

Why this ad? 



SCOPE

Journal for the Education of Gifted Young Scientists (JEGYS) ISSN: 2149-360X covers issues such as science education, different mathematics, science and social sciences for gifted students, education and training of the young scientist, giftedness, gifted education, creativity, educational policy on science and math education for gifted students, teaching of the history and philosophy of science, for gifted, teaching techniques and activities in the education of the gifted young scientist, is a scientific and academic journal. JEGYS scientific media sharing scientific research, practices, theories and ideas about gifted education and education of the gifted young scientist, is a scientific and academic journal. JEGYS aims to be a scientific media sharing scientific research, practices, theories and ideas about gifted education and education of the scientists.

Join the conversation about this journal

PowerDVD® Best Blu-ray Player

Playback 4K, 8K UHD Blu-ray DVD on your TV & PC. Enjoy movie in 4K color & sound.

Cyberlink®

[Lea](#)

Quartiles



FIND SIMILAR JOURNALS



Ads by Google

Stop seeing this ad

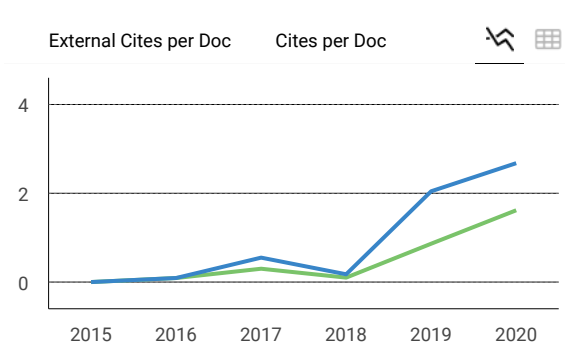
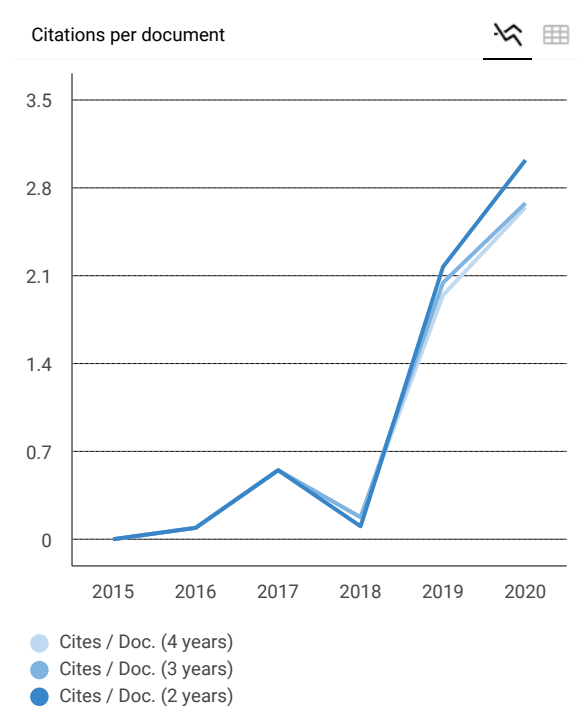
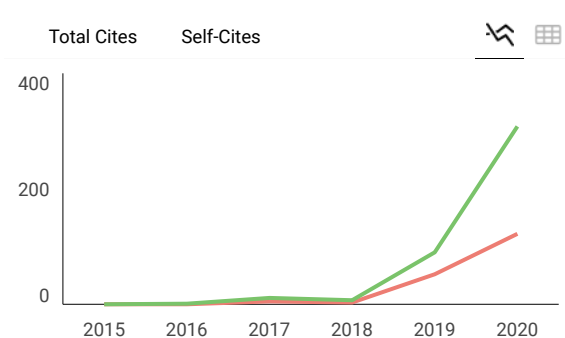
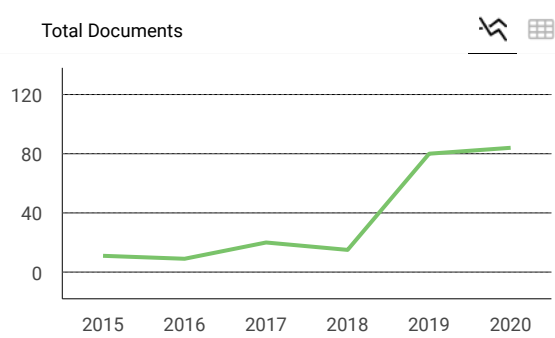
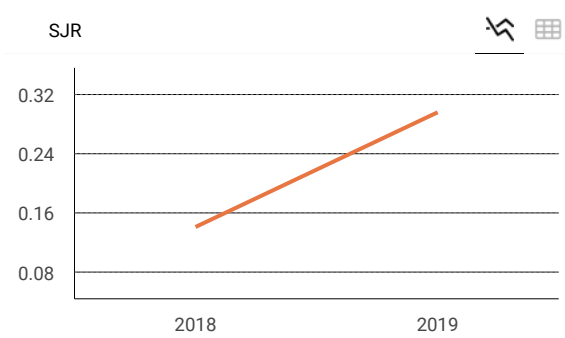
Why this ad?

PowerDVD® Now Support 8K Video

2021 must-have player software, best choice for DVD & Blu-r

Cyberlink®

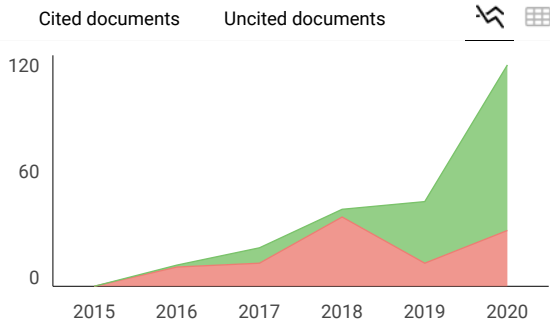
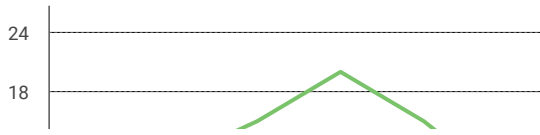
<p>1 Jurnal Pendidikan IPA Indonesia IDN</p> <p>20% similarity</p>	<p>2 Roeper Review GBR</p> <p>14% similarity</p>	<p>3 High Ability Studies GBR</p> <p>13% similarity</p>	<p>4 Journal for the Gifted USA</p> <p>1 s</p>
--	--	---	--



% International Collaboration
 Citable documents
 Non-citable documents

Ads by Google

Stop seeing this ad Why this ad? ⓘ



Journal for the Education of Gifted Young Scientists

Not yet assigned quartile

SJR 2020
0

powered by scimagojr.com

Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimagojr.com">
```

SCImago Graphica

Explore, visually communicate and make sense of data with our **new free tool**.



Get it

Discover your IQ

Answer 20 questions to find out

test-iq.org

Metrics based on Scopus® data as of April 2021

A **Asmaa Mohammed** 2 months ago

I'd like to publish my manuscript in your esteemed journal

reply



Melanie Ortiz 2 months ago

SCImago Team

Ads by Google

Stop seeing this ad

Why this ad? ⓘ