Self Regulated Learning Enhancing Scientific Literacy for Higher Educations in 21st Century Education: A Systematic Literature Review

by Rahmawati Anisa Jaya

Submission date: 20-Jun-2022 02:29PM (UTC+0700)
Submission ID: 1696522326
File name: Self_Regulated_Learning_Enhancing_Scientific_Literacy.docx (75.37K)
Word count: 4404
Character count: 27672

Al-Ishlah: Jurnal Pendidikan
Vol.14, 1 (April, 2022), pp. 61-70
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v14i1.973

Self Regulated Learning Enhancing Scientific Literacy for Higher Educations in 21st Century Education: A Systematic Literature Review

A.J. Rahmawati[1], Gunarhadi[2], M. Muchtarom[3]

[1] Universitas Sebelas Maret, Surakarta, Indonesia; anisarahmawati@student.uns.ac.id
[2] Universitas Sebelas Maret, Surakarta, Indonesia; gunarhadi@fkip.uns.ac.id
[3] Universitas Sebelas Maret, Surakarta, Indonesia; muhtarom1974@gmail.com

ARTICLE INFO

Keywords:

Self Regulated Learning;
Scientific Literacy;
Higher Education;
21st Century Education.

Article history:

Received
Revised
Accepted

ABSTRACT

This study explores the importance of self-regulated learning to overcome the low level of scientific literacy in 21st-century education. This study aims to: (1) identify problems in scientific literacy (2) explore the relationship between self-regulated learning to scientific literacy (3) explain the impact of self-regulated learning on scientific literacy. The research method uses qualitative research with a systematic literature review that focuses on analyzing literature on self-regulated learning and scientific literacy. The analysis uses Preferred Reporting Items for Systematic Review (PRISMA). The results of the study show that: (1) the problems in scientific literacy include: the relevance of the material in school to everyday life, a critical assessment of the credibility of research sources, scientific attitudes and scientific knowledge, and aspects of content, process, context and diversity of literacy (2) explores the relationship self-regulated learning in scientific literacy with self-efficacy, motivation, active learning, and engagement (3) this study finds that self-regulated learning has a positive impact on scientific literacy. This study illustrates the important role of self-regulated learning in overcoming the limitations of scientific literacy in universities.
.

This is an open access article under the CC BY-NC-SA license.

Corresponding Author:
A.J. Rahmawati
Universitas Sebelas Maret, Surakarta, Indonesia; anisarahmawati@student.uns.ac.id

1. INTRODUCTION

Scientific literacy is the basis of knowledge, the basis of critical thinking skills, and the basis of everyday decision-making (Crowell & Schunn, 2016). Scientific literacy is one part of the basic literacy needed to support 21st-century skills (Kemdikbud, 2017). 21st century skills include: critical thinking, collaboration, communication and creativity. (Trilling & Bernie, 2009). 21st-century skills also include

collaboration skills, communication, digital literacy, citizenship, *problem-solving*, critical thinking, creativity, and productivity (van Laar et al., 2017).

Conditions in the field state that scientific literacy is low (Thomson et al., 2013). The results of a survey related to scientific literacy among young people in America show that they do not understand enough about science and are not interested in knowledge related to science (Cook et al., 2011). The problem of scientific literacy in natural science bachelor degree students at the Comenius University in Bratislava Europe shows that the student success rate is lower than the average specified criteria, which is only 66.67%. The unsatisfactory success rate focuses on a critical assessment of the credibility of the literature sources as well as determining the elements of research design that have an impact on research results and conclusions (Čipková et al., 2018).

The results of research on December 20, 2021, at one of the universities in Indonesia showed that the scientific literacy competence of semester 2 students in *science* low with the following details: competence to explain scientific phenomena with an average of 20.14, competence to evaluate and design scientific investigations with an average of 20.14. an average of 25.97 and the competence to interpret data and evidence scientifically with an average of 19.58.

National Research Council (NRC) explains that scientific literacy is the ability to use evidence and data independently to evaluate the quality of scientific information and opinions conveyed by scientists. *The Program for International Student Assessment* (PISA) adds that scientific literacy includes the ability to use scientific knowledge to identify questions, conclude with evidence and make decisions about changes in nature made by humans (Gormally et al., 2012). Other specific skills include cognitive understanding of scientific research, design, and communication (Klucevsek, 2017). *National Science Education Standards* state that scientific literacy is needed for decision-making for individuals and society in cultural and economic aspects (Jarman & McClune, 2007).

Scientific literacy is an important competency and needs to be developed because it is a medium for developing curiosity, initiative, persistence, adaptability, leadership, and social and cultural awareness. (Kemdikbud, 2017). The importance of scientific literacy in 21st-century education according to Choi, Lee, Shin, and Kim, has five dimensions, namely: *content knowledge, habits of mind, character, and values, science as a human endeavor,* and metacognition and *self-direction*. Dimension *content knowledge* is centered on ideas related to science so that individuals can explain and predict various phenomena and problems. Dimension *habits of mind* include communication skills, collaboration, and information management skills such as determining learning resources and evaluating the quality of these resources critically. The science dimension includes understanding the collaborative and interdisciplinary nature of science. In addition, the affective domain is expanded in the dimensions of character, values and attitudes, and motivation towards science. Dimensions of metacognition and *self-direction* are the main dimensions of scientific literacy globally (Choi et al., 2011).

While the benefits of scientific literacy include: increasing critical thinking skills, increasing literacy related to quantitative, analyzing data appropriately, evaluating data, developing experimental designs, and increasing students' ability to argue (Krontiris-Litowitz, 2013).

Scientific literacy ability is strongly influenced by *self-efficacy* (Li et al., 2020). *Self-efficacy* is an important part of *self-regulated learning* (Peng, 2012). Thus, scientific literacy can be improved with *self-regulated learning* accompanied by *self-efficacy*. *Self-regulated learning* is a process in which students plan, pay attention and reflect on their thoughts, behaviors, motivations, and emotions independently to get goals in learning (Räisänen et al., 2020).

Self-regulated learning refers to Bandura's social cognitive theory which states that personal cognition is determined by behavior and environmental factors. This theory states that humans are proactive and self-regulating organisms that are formed by external environmental influences or indirectly stimulated by genetic factors. The effectiveness of the learning environment is influenced by the characteristics of students (Sha et al., 2012). *Self-regulated learning* is a student's proactive action to set goal setting abilities, self control, *managing time*, and one's efforts to achieve learning goals (Tabuenca et al., 2015).

The theory of *self-regulated learning* is divided into three basic assumptions (Zimmerman & Schunk, 2001), namely students can:

a. Improve their competence in learning through the use of appropriate metacognitive and motivational strategies.
b. Proactively able to choose, organize and be able to create a learning environment that is beneficial for them.
c. Able to control and choose the form and number of instructions they need significantly (Wang et al., 2019).

The advantage *of self-regulated learning* is that there is an active and constructive process for students in setting learning goals and then trying to observe, regulate and control their motivation and cognition behavior with contextual goal guidance in their environment (Schnell et al., 2015).

The results of Peters Burton's research entitled "*Self-Regulated Learning as a Method to Develop Scientific Thinking*" show that *self-regulated learning* in Biology students has great potential to improve scientific literacy, especially developing strategies for students to become more *science-minded,* especially for quiet students. Burton, 2013). This study intends to examine the role *of self-regulated learning* in scientific literacy.

This study aims to: (1) analyze problems in scientific literacy (2) explore the relationship *between self-regulated learning* to scientific literacy (3) see the impact of *self-regulated learning* on scientific literacy. The theoretical benefit of this research is to describe the important role of *self-regulated learning* in overcoming the limitations of scientific literacy in universities. Meanwhile, the practical benefits for students and lecturers are an effort to increase scientific literacy through *self-regulated learning*.

2. METHODS

This research is qualitative research with *a systematic literature review approach*. The analysis uses *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA). *A systematic literature review* is a systematic review by collecting some relevant and appropriate evidence with predetermined eligibility criteria to answer several research questions. *Systematic literature review* uses explicit and systematic methods that reduce bias in the process of identification, selection, synthesis, and study conclusions. The characteristics of *a systematic review* include: 1) a set of objectives that are conveyed using an explicit method and reproduced 2) a systematic search by identifying studies that meet the eligibility criteria 3) the validity assessment includes an assessment of the risk of bias 4) systematic presentation (Shamseer et al., 2015).

Search Terms

PRISMA are used to identify research sources using the following databases: Sage, Science Direct, Springer, Taylor and Francis, Wiley, and others. Search sources using several keywords including the following terms: *"self-regulated learning", "scientific literacy", "higher education", and "education for the 21st century"*.

Selection Criteria

Several criteria are set in selecting the most relevant sources. From the two databases, there are provisions for the type of document and language. The articles used must meet the following two criteria, namely:

a. Focusing on *self-regulated learning methods.*
b. Include conceptualizations related to scientific literacy for college students.

The following criteria were chosen for *self-regulated learning* that can increase scientific literacy for university students in the 21st-century education era based on academic literature.

Study Selection

The step-in study selection consists of three steps. First, all articles were selected according to these two criteria. Second, the abstracts of all articles were re-filtered according to these two criteria. Then, examine the entire text of the remaining articles. Based on existing articles, researchers classify information about the main concepts of *self-regulated learning*. Data classification is part of the content analysis process of the article. The final part of the content analysis process is to explain the scientific literacy competence (van Laar et al., 2017).

Analysis

The selected articles were then analyzed by meta-analysis to determine the strength between variables related to *self-regulated learning* to improve scientific literacy. The findings of the meta-analysis were then presented and discussed in this study (Hines et al., 1987).

3. FINDINGS AND DISCUSSION

The search results for articles related to "*Self Regulated Learning* to Improve Science Literacy for Students in the 21st Century Education Era" in the following databases: Sage, Science Direct, Springer, Wiley, and others show some findings which can be seen in table 1.

Table 1. Search Results

No.	Bibliographic Database	URL Database	Count
1.	Sage	https://journals.sagepub.com/	9 Article
2.	Science Direct	https://sciencedirect.com/	18 Article
3.	Springer	https://link.springer.com/	5 Article
4.	Wiley	https://onlinelibrary.wiley.com/	5 Article
5.	Google Scholar	https://scholar.google.com/	8 Article
6.	Taylor and Francis	https://www.tandfonline.com/	5 Article
7.	Others	-	19 Article
	Total		69 Article

Meanwhile, the search results for articles related to "*Self-Regulated Learning* to Improve Scientific Literacy for Students in the 21st Century Education Era" include the following keywords: scientific literacy, *self-regulated learning*, *self-regulated learning* to improve scientific literacy, PRISMA method, and 21st-century education are classified in Table 2.

Table 2. Search Results Based on Keywords

No.	Keyword	Number of
1.	Scientific Literacy	28 Article
2.	Self Regulated Learning	26 Article
3.	Self Regulated Learning Enhancing Scientific Literacy	6 Article
4.	PRISMA Method	4 Article
5.	21st Century Education	5 Article
	Total	69 Article

The search for these articles is expected to answer the two objectives of this research:

Problems Related to Scientific Literacy

Young people in America show that they are not sufficiently knowledgeable about science and are not interested in knowledge related to science (Cook et al., 2011). Young people who do not understand and are not interested in science are caused by the lack of relevance of school-based science to everyday life (Lawless & Brown, 2015).

Bachelor degree students at *natural science* the Comenius University in Bratislava, Europe, shows that the success rate of students in scientific literacy is lower than the average of the specified criteria, which is 66.67%. The unsatisfactory success rate focuses on a critical assessment of the credibility of the literature sources as well as determining the elements of research design that have an impact on research results and conclusions (Čipková et al., 2018). So, students' critical assessment of the credibility of literary sources and the determination of the elements of research design is still low.

The PISA assessment in China shows several aspects of scientific literacy that need to be evaluated including *scientific attitudes, scientific knowledge, scientific capabilities, and scientific scenarios* (Li et al., 2020).

The condition of scientific literacy in Indonesia can be seen in the results of the *Trend in International Mathematics and Science Study* (TIMSS). The results of the study show that in 2003 Indonesia was ranked 35th out of 46 countries with an average score of 411, while the average score for International was 467. TIMSS results in 2007 Indonesia was ranked 36th out of 49 countries with a mean of 397 and average score of International 500. In 2011 Indonesia was ranked 38 out of 42 countries with an average score of 386 and an average score of International 500 (Hadi & Novaliyosi, 2019). The year 2015 showed that Indonesia was ranked 44th out of 49 countries. (Nizam, 2016). These results can be seen in table 3.

Table 3. Indonesia TIMSS results

HASIL TIMSS				
Year	Rank	Participants	Average Indonesian Score	Average International Score
2003	35	46 Country	411	467
2007	36	49 Country	397	500
2011	38	42 Country	386	500
2015	44	49 Country	397	500

TIMSS divides the achievement of participants into four levels, namely: low 400, *intermediate* 475, *high* 550 and advanced 625. TIMSS in 2011 and 2015 showed students who got low scores by 54%. So, it is concluded that Indonesian scientific literacy is at a low level (Rosnawati, nd).

Table 4. Indonesia Achievements

	TIMSS 2011				TIMSS 2015			
	Low	Medium	High	Advanced	Low	Medium	High	Advanced
Science	54%	19%	3%	0%	54%	15%	6%	0%

The findings from TIMSS above show that Indonesian children's science is at a low level. Reinforced the findings of a comparison conducted by the *Organization for Economic Co-operation and Development* (OECD) through *Program for International Student Assessment* (PISA) in 2015 showed that the scientific literacy of Indonesian children was ranked 69th out of 76 countries (Novitasari, 2018). The results of the analysis show several findings, namely: the scientific literacy of Indonesian children is low with an average of 32% in overall aspects with details of 29% for content, 34% for process, and 32% for context and the diversity of scientific literacy between provinces in Indonesia is low (Ardianto & Rubini, 2016).

Thus, several problems were found in scientific literacy including 1) the relevance of the material in school to everyday life 2) a critical assessment of the credibility of research sources 3) *scientific attitudes, scientific knowledge, scientific capabilities, and scientific scenarios* 4) aspects of content, process, context and diversity of scientific literacy.

Relation Self Regulated Learning to Scientific Literacy

The study *of self-regulated learning* on scientific literacy is related to several factors. The first and second factors are *self-efficacy* and motivation (Lai et al., 2018) because they are based on individual beliefs in carrying out difficult tasks in science. Aspects of scientific literacy, namely: attitudes, beliefs, orientation, motivation, *self-efficacy*, and certain values (OECD, 2017). *Self-efficacy* helps students in managing their learning motivation so that they are able (Caprara et al., 2008) to learn knowledge independently related to science and take the initiative in finding evidence and data in scientific investigations and ultimately increasing scientific literacy. For example, when students get a scientific investigation task they will be motivated to carry it out and determine the goals to be achieved. Goal setting enables students to plan learning process initiatives and predict better academic performance. Students with *self-efficacy* will set higher research goals and have success in larger scientific investigations.

The third factor is *active learning which* includes the involvement of students in designing, guiding, and reflecting on their cognitive, affective, and psychomotor independence to achieve goals in the learning process (Räisänen et al., 2020). *Active learning strategies* affect scientific literacy through active intellectual inquiry abilities, reflection, and metacognition as well as independence in

understanding material actively and not only relying on directions from lecturers (Vu, 2015). For example, students who are active in a scientific investigation will set goals, research with active intellectual inquiry abilities and metacognition, and then reflect on the results of their investigations.

The fourth factor is *engagement* in helping students to understand knowledge contextually. Engagement in this strategy is also able to improve information retention, *application of knowledge, critical thinking skills,* and *communication skills* (Anderson et al., 2020). Thus, increasing *self capabilities, and self-knowledge* (Patrianingsih & Kaseng, 2016) and directing students to be more *science-minded* (Burton, 2013).

The Impact of Self Regulated Learning on Scientific Literacy

Self-regulated learning can improve scientific literacy as evidenced in the results of Peters Burton's research entitled "*Self Regulated Learning as a Method to Develop Scientific Thinking*" showing that *self-regulated learning* in students majoring in Biology has great potential in improving scientific literacy (Burton, 2013). *Self-regulated learning* has three phases of the learning cycle including *the forethought phase, performance phase, and self-reflection phase. The forethought phase* includes the task analysis process as well as process-oriented goal setting such as setting the material they already know. *The performance phase* is the process of implementing tasks and self-monitoring. *The self-reflection phase* includes the process of self-assessment about the performance that has been done. The three phases of the cycle if carried out continuously will improve *scientific thinking* in scientific literacy.

Scott Freeman et al's research entitled "*Active Learning Increases Student Performance in Science, Engineering and Mathematics*" shows that *self-regulated learning can* improve *Science, Technology, Engineering, and Mathematical* (STEM) abilities (Freeman et al., 2014). Their activities include active problem solving related to science through group discussions and worksheets. Learning activities in the classroom are also combined with exercises carried out outside formal classroom sessions such as research in the laboratory.

Yusuf Affandi et al's research entitled "The Effect of Student Self-Regulated Learning on Scientific Literacy through Guided Inquiry Learning" shows that *self-regulated learning* has a positive impact on scientific literacy (Affandi et al., 2015). Some skills in the science process include the process of observing, classifying, predicting, measuring, concluding, and communicating using space and time relationships (Turiman et al., 2012: 110). The increase in scientific literacy with *self-regulated learning* is due to the good arrangement of learning strategies, high learning motivation, and good learning effectiveness.

Rosman Sadat et al's research entitled "The Influence of *Self-Regulated Learning* on the Concept of Biodiversity on Scientific Literacy and Scientific Attitudes" shows that *self-regulated learning* can improve student scientific literacy (Rosman Sadat, 2019). *Self-regulated learning* directs to be actively involved in planning learning, following learning developments, and monitoring the learning process to increase learning independence. This process trains self-regulation and self-regulation so that you are aware of your potential and can use it in real life. This can improve scientific literacy because scientific literacy includes the ability to apply knowledge to the real world.

4. CONCLUSION

Some problems in scientific literacy include: 1) the relevance of the material in school to everyday life is not good 2) critical assessment of the credibility of research sources is not good 3) scientific attitudes, scientific knowledge, scientific capabilities, and scientific scenarios are not good 4) content aspects, process, context and diversity of scientific literacy is not good.

The study *of* self-regulated learning in scientific literacy is related to several domains, namely: self efficacy, motivation, active learning and engagement. Self-efficacy helps students in managing their learning motivation so that they can learn knowledge independently related to science and take the initiative in finding evidence and data in scientific investigations and ultimately increasing scientific literacy. Active learning strategies affect scientific literacy through active intellectual inquiry abilities, reflection, and metacognition as well as independence in understanding material actively and not only relying on directions from lecturers. Engagement in this strategy is also able to improve information retention, application of knowledge, critical thinking skills, and communication skills. Thus, increasing self capabilities, and self-knowledge and directing students to be more science-minded.

Self-regulated learning is proven to have a positive impact on increasing scientific literacy. This influence is related to the following factors: the learning cycle, learning strategies, problem-solving, and the application of knowledge to the real world.

Acknowledgments: The author would like to thank all the supervisors who have guided and directed this article to completion. Furthermore, this research has no conflict of interest and was not funded through any source.

REFERENCES

Affandi, Y., Abdurrahman, A., & Suana, W. (2015). Pengaruh Self Regulated Learning Siswa Terhadap Literasi Sains Melalui Pembelajaran Inkuiri Terbimbing. *Jurnal Pembelajaran Fisika Universitas Lampung*, *3*(2).

Anderson, A. E., Justement, L. B., & Bruns, H. A. (2020). Using real-world examples of the COVID-19 pandemic to increase student confidence in their scientific literacy skills. *Biochemistry and Molecular Biology Education*, *48*(6), 678–684. https://doi.org/https://doi.org/10.1002/bmb.21474

Ardianto, D., & Rubini, B. (2016). Comparison of students' scientific literacy in integrated science learning through model of guided discovery and problem based learning. *Jurnal Pendidikan IPA Indonesia*, *5*(1), 31–37. https://doi.org/10.15294/jpii.v5i1.5786

Burton, E. P. (2013). *Self-Regulated Learning as a Method to Develop Scientific Thinking*.

Caprara, G. V., Fida, R., Vecchione, M., Bove, G. Del, Vecchio, G. M., Barbaranelli, C., & Bandura, A. (2008). Longitudinal Analysis of the Role of Perceived Self-Efficacy for Self-Regulated Learning in Academic Continuance and Achievement. *Journal of Educational Psychology*, *100*, 525–534.

Choi, K., Lee, H., Shin, N., Kim, S.-W., & Krajcik, J. (2011). Re-conceptualization of scientific literacy in South Korea for the 21st century. *Journal of Research in Science Teaching*, *48*(6), 670–697. https://doi.org/10.1002/tea.20424

Čipková, E., Karolčík, Š., Sládková, K., & Ušáková, K. (2018). What is the level of scientific literacy among geography students studying bachelor's studies in natural sciences? *International Research in Geographical and Environmental Education*, *27*(4), 295–310. https://doi.org/10.1080/10382046.2017.1389044

Cook, S. B., Druger, M., & Ploutz-Snyder, L. L. (2011). Scientific literacy and attitudes towards American space exploration among college undergraduates. *Space Policy*, *27*(1), 48–52. https://doi.org/https://doi.org/10.1016/j.spacepol.2010.12.001

Crowell, A., & Schunn, C. (2016). Unpacking the Relationship Between Science Education and Applied Scientific Literacy. *Research in Science Education*, *46*(1), 129–140. https://doi.org/10.1007/s11165-015-9462-1

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics.

Proceedings of the National Academy of Sciences, *111*, 8410–8415.

Gormally, C., Brickman, P., & Lut, M. (2012). Developing a test of scientific literacy skills (TOSLS): Measuring undergraduates' evaluation of scientific information and arguments. *CBE Life Sciences Education*, *11*(4), 364–377. https://doi.org/10.1187/cbe.12-03-0026

Hadi, S., & Novaliyosi, N. (2019). *TIMSS INDONESIA (TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY)*.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis. *The Journal of Environmental Education*, *18*(2), 1–8. https://doi.org/10.1080/00958964.1987.9943482

Jarman, R., McClune, B. (2007). *Developing Scientific Literacy: Using News Media in the Classroom*. New York: Mc Graw Hill.

Kementrian Pendidikan dan Kebudayaan RI. (2017). *Konsep Literasi Sains dalam Kurikulum 2013*. Jakarta. *Citing Internet Sources* URL darihttp://kurikulum.kemdikbud.go.id/.

Kementrian Pendidikan dan Kebudayaan RI. (2016). Ringkasan Hasil-Hasil Asesmen Belajar dari Hasil UN, PISA, TIMSS, INAP. Jakarta.

Klucevsek, K. (2017). The intersection of information and science literacy. *Communications in Information Literacy*, *11*(2), 354–365. https://doi.org/10.15760/comminfolit.2017.11.2.7

Krontiris-Litowitz, J. (2013). Using Primary Literature to Teach Science Literacy to Introductory Biology Students. *Journal of Microbiology & Biology Education*, *14*(1). https://doi.org/10.1128/jmbe.v14i1.538

Lai, C.-L., Hwang, G.-J., & Tu, Y.-H. (2018). The effects of computer-supported self-regulation in science inquiry on learning outcomes, learning processes, and self-efficacy. *Educational Technology Research and Development*, *66*(4), 863–892. https://doi.org/10.1007/s11423-018-9585-y

Lawless, K. A., & Brown, S. W. (2015). Developing scientific literacy skills through interdisciplinary, technology-based global simulations: GlobalEd 2. *The Curriculum Journal*, *26*(2), 268–289. https://doi.org/https://doi.org/10.1080/09585176.2015.1009133

Li, L., Liu, Y., Peng, Z., Liao, M., Lu, L., Liao, H., & Li, H. (2020). Peer relationships, motivation, self-efficacy, and science literacy in ethnic minority adolescents in China: A moderated mediation model. *Children and Youth Services Review*, *119*, 105524. https://doi.org/https://doi.org/10.1016/j.childyouth.2020.105524

Novitasari, N. (2018). Profil kemampuan literasi sains mahasiswa calon guru biologi. *Biosfer: Jurnal Tadris Biologi*, *9*(1), 36–44.

Organisation for Economic Co-operation and Development. (2017). *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic, Financial Literacy and Collaborative Problem Solving, revised edition.* OECD Publishing. Paris.

Patrianingsih, E. A., & Kaseng, E. S. (2016). *Model Pembelajaran Discovery Learning, Pemahaman Konsep Biologi, dan Sikap Ilmiah Peserta Didik*.

Peng, C. (2012). Self-Regulated Learning Behavior of College Students of Science and Their Academic Achievement. *Physics Procedia*, *33*. https://doi.org/10.1016/j.phpro.2012.05.236

Räisänen, M., Postareff, L., Mattsson, M., & Lindblom-Ylänne, S. (2020). Study-related exhaustion: First-year students' use of self-regulation of learning and peer learning and perceived value of peer support. *Active Learning in Higher Education*, *21*(3), 173–188. https://doi.org/10.1177/1469787418798517

Rosnawati, R. (n.d.). *Kemampuan Penalaran Matematika Siswa Smp Indonesia Pada TIMSS 2011*.

Sadat, R., Jahidin & Amirullah. (2019). Pengaruh Model Pembelajaran *Self Regulated Learning* pada Konsep Biodiversitas terhadap Literasi Sains dan Sikap Ilmiah Siswa Kelas X Sman 5 Kendari Sulawesi Tenggara. Bioedusiana, 4 (1).

Schnell, K., Ringeisen, T., Raufelder, D., & Rohrmann, S. (2015). The impact of adolescents' self-efficacy and self-regulated goal attainment processes on school performance - Do gender and test anxiety matter? *Learning and Individual Differences*, *38*. https://doi.org/10.1016/j.lindif.2014.12.008

Sha, L., Looi, C. K., Chen, W., & Zhang, B. H. (2012). Understanding mobile learning from the perspective of self-regulated learning. *Journal of Computer Assisted Learning*, *28*(4). https://doi.org/10.1111/j.1365-2729.2011.00461.x

Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L. A., Altman, D. G., Booth, A., Chan, A. W., Chang, S., Clifford, T., Dickersin, K., Egger, M., Gøtzsche, P. C., Grimshaw, J. M., Groves, T., Helfand, M., … Whitlock, E. (2015). Preferred reporting items for systematic review and meta-analysis protocols (prisma-p) 2015: Elaboration and explanation. In *BMJ (Online)* (Vol. 349). https://doi.org/10.1136/bmj.g7647

Tabuenca, B., Kalz, M., Drachsler, H., & Specht, M. (2015). Time will tell: The role of mobile learning analytics in self-regulated learning. *Computers and Education*, *89*. https://doi.org/10.1016/j.compedu.2015.08.004

Thomson, S., Hillman, K., & Bortoli, L. De. (2013). *A Teacher's Guide to PISA Scientific Literacy*.

Turiman, P., Omar, J., Daud, A. M., & Osman, K. (2012). Fostering the 21st Century Trilling, B., Bernie, C. (2009). *21st Century Skills: Learning for Life in Our Times*.

Skills through Scientific Literacy and Science Process Skills. *Procedia - Social and Behavioral Sciences*, *59*, 110–116. https://doi.org/https://doi.org/10.1016/j.sbspro.2012.09.253

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, *72*. https://doi.org/10.1016/j.chb.2017.03.010

Vu, X. H. (2015). *Active learning in an ICT-enhanced blended learning environment: A case study of Vietnamese students in Australian higher education*.

Wang, C. K. J., Liu, W. C., Kee, Y. H., & Chian, L. K. (2019). Competence, autonomy, and relatedness in the classroom: understanding students' motivational processes using the self-determination theory. *Heliyon*, *5*(7), e01983. https://doi.org/https://doi.org/10.1016/j.heliyon.2019.e01983

Zimmerman, B., & Schunk, D. (2001). *Self-regulated learning and academic achievement : theoretical perspectives*.

Self Regulated Learning Enhancing Scientific Literacy for Higher Educations in 21st Century Education: A Systematic Literature Review

ORIGINALITY REPORT

25%	18%	19%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Konsorsium Perguruan Tinggi Swasta Indonesia II Student Paper	3%
2	eudl.eu Internet Source	1%
3	journal.staihubbulwathan.id Internet Source	1%
4	onlinelibrary.wiley.com Internet Source	1%
5	Denti Nanda Effendi, Irwandani, Welly Anggraini, Agus Jatmiko, Henita Rahmayanti, Ilmi Zajuli Ichsan, Md. Mehadi Rahman. "Bibliometric analysis of scientific literacy using VOS viewer: Analysis of science education", Journal of Physics: Conference Series, 2021 Publication	1%
6	www.tandfonline.com Internet Source	1%

7	Ling Li, Yutian Liu, Zhenfei Peng, Meiqin Liao, Liucun Lu, Huan Liao, Hui Li. "Peer relationships, motivation, self-efficacy, and science literacy in ethnic minority adolescents in China: A moderated mediation model", Children and Youth Services Review, 2020 Publication	1 %
8	Lucy Asri Purwasi. "THE DEVELOPMENT OF HIGHER-ORDER THINKING SKILLS ON JUNIOR HIGH SCHOOL STUDENTS THROUGH GUIDED INQUIRY-BASED LEARNING APPROACH", Jurnal Pendidikan Matematika dan IPA, 2020 Publication	1 %
9	Elena Čipková, Štefan Karolčík, Klára Sládková, Katarína Ušáková. "What is the level of scientific literacy among geography students studying bachelor's studies in natural sciences?", International Research in Geographical and Environmental Education, 2017 Publication	1 %
10	scholarworks.waldenu.edu Internet Source	1 %
11	L. Shamseer, D. Moher, M. Clarke, D. Ghersi, A. Liberati, M. Petticrew, P. Shekelle, L. A. Stewart. "Preferred reporting items for systematic review and meta-analysis	1 %

protocols (PRISMA-P) 2015: elaboration and explanation", BMJ, 2015
Publication

12	Submitted to Liverpool Hope Student Paper	1 %
13	repository.iaincurup.ac.id Internet Source	1 %
14	Li Sha, Chee-Kit Looi, Wenli Chen, Peter Seow, Lung-Hsiang Wong. "Recognizing and measuring self-regulated learning in a mobile learning environment", Computers in Human Behavior, 2012 Publication	1 %
15	www.igi-global.com Internet Source	1 %
16	Ashlyn E. Anderson, Louis B. Justement, Heather A. Bruns. " Using real - world examples of the - 19 pandemic to increase student confidence in their scientific literacy skills ", Biochemistry and Molecular Biology Education, 2020 Publication	1 %
17	www.frontiersin.org Internet Source	1 %
18	Naja Nusaibah, I Pramudya, S Subanti. "Geometric Thinking Skills of Seventh Grade Students on the Topic of Triangle and	<1 %

Quadrilateral Based on Van Hiele Geometry Learning Theory", Journal of Physics: Conference Series, 2021
Publication

19	media.neliti.com Internet Source	<1 %
20	Submitted to Avondale College of Higher Education Student Paper	<1 %
21	Submitted to University of Sydney Student Paper	<1 %
22	ijsrcseit.com Internet Source	<1 %
23	link.springer.com Internet Source	<1 %
24	www.nemisa.co.za Internet Source	<1 %
25	Kongju Mun, Namsoo Shin, Hyunju Lee, Sung-Won Kim, Kyunghee Choi, Sung-Youn Choi, Joseph S. Krajcik. "Korean Secondary Students' Perception of Scientific Literacy as Global Citizens: Using Global Scientific Literacy Questionnaire", International Journal of Science Education, 2015 Publication	<1 %
26	Submitted to University of Exeter Student Paper	

		<1%
27	drvinceknight.blogspot.com Internet Source	<1%
28	jea.org Internet Source	<1%
29	Hernani, Saefulloh, Ahmad Mudzakir. "The first year pre-service teachers' chemical literacy in individual learning case using the fuel cell technology based-chemical enrichment book", AIP Publishing, 2017 Publication	<1%
30	Kimberly A. Lawless, Scott W. Brown. "Developing scientific literacy skills through interdisciplinary, technology - based global simulations: GlobalEd 2", The Curriculum Journal, 2015 Publication	<1%
31	Lucy Barnard-Brak, Valerie Osland Paton, William Y. Lan. "Self-regulation across time of first-generation online learners", ALT-J, 2016 Publication	<1%
32	d-nb.info Internet Source	<1%
33	ejurnal.unisri.ac.id Internet Source	<1%

34	Wilis Wisnu Murti, Titin Sunarti. "PENGEMBANGAN INSTRUMEN TES LITERASI SAINS BERBASIS KEARIFAN LOKAL DI TRENGGALEK", ORBITA: Jurnal Kajian, Inovasi dan Aplikasi Pendidikan Fisika, 2021 Publication	<1 %
35	e-journal.undikma.ac.id Internet Source	<1 %
36	repository.upi.edu Internet Source	<1 %
37	www.iiass.com Internet Source	<1 %
38	Alejandro Peña-Ayala. "Learning analytics: A glance of evolution, status, and trends according to a proposed taxonomy", Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 2018 Publication	<1 %
39	Anggoro Yugo Pamungkas, Sugiman Sugiman, Nining Setyaningsih. "MATHEMATICS LEARNING ACHIEVEMENT: DISCOVERY LEARNING COLLABORATION THINK PAIR SHARE VIEWED FROM REASONING", AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 2021 Publication	<1 %
	ejournal.undiksha.ac.id	

40	Internet Source	<1%
41	eprints.leedsbeckett.ac.uk Internet Source	<1%
42	files.eric.ed.gov Internet Source	<1%
43	journal.unj.ac.id Internet Source	<1%
44	journal.unnes.ac.id Internet Source	<1%
45	journal.uny.ac.id Internet Source	<1%
46	journals.sagepub.com Internet Source	<1%
47	mafiadoc.com Internet Source	<1%
48	Dragan Novkovic, Ilija Cosic, Nebojsa Petrovic, Olja Jovanovic. "The influence of multi-frontal teaching method on the effectiveness of the teaching process in the applied studies in technical sciences", Nastava i vaspitanje, 2015 Publication	<1%
49	Indah Komsiyah. "Students' E-Learning Management at Home During Covid-19	<1%

Pandemic", AL-ISHLAH: Jurnal Pendidikan, 2022
Publication

50	Ivayuni Listiani, Herawati Susilo, Sueb Sueb. "Relationship between Scientific Literacy and Critical Thinking of Prospective Teachers", AL-ISHLAH: Jurnal Pendidikan, 2022 Publication	<1 %
51	Mei-Hung Chiu. "Re-conceptualization of scientific literacy in South Korea for the 21st century", Journal of Research in Science Teaching, 08/2011 Publication	<1 %
52	N S Rahmayani, M Arifin, Y Sunarya. "Profile of senior high school students' scientific literacy in Banda Aceh", Journal of Physics: Conference Series, 2019 Publication	<1 %
53	Zeni Fadlila Agustina, Titin Masfingatin, Swasti Maharani. "Analysis of Mathematics Communication Capabilities in Linear Program Problem Solving during the Covid-19 Pandemic", AL-ISHLAH: Jurnal Pendidikan, 2022 Publication	<1 %

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	On		