KnE Social Sciences
ICMScE
International Conference On Mathematics And Science Education
Volume 2024

Research Article

The Improvement of Students' Information Literacy Through the Remap-TTW Learning Model

Nanda Bhekti Fadilla* and Siti Zubaidah

Department of Biology, Faculty of Mathematics and Sciences, Universitas Negeri Malang, Jl. Semarang 5 Malang 65145, Indonesia

ORCID
Nanda Bhekti Fadilla: https://orcid.org/0000-0003-1355-9316
Siti Zubaidah: https://orcid.org/0000-0002-0718-6392

Abstract.
Information literacy is an essential skill in the 21st century. This skill is required for students to find, select, evaluate, and use information they have gathered effectively. The implementation of a specific learning model aids students in developing their information literacy. One of the learning models expected to enhance students' information literacy is the Reading Concept Mapping-Think, Talk, Write (Remap-TTW). This study aimed to discover the effects of the Remap-TTW learning model on students' information literacy. This quasi-experiment study used a non-randomized control group pretest-posttest design. The study was carried out in the State Senior High School 1 Kencong, Jember, Indonesia, in the even semester of 2021/2022. The test instrument was in the form of an essay test. Students' information literacy was measured using numerous indicators: determining the extent of information needed, accessing the needed information, evaluating information and its sources critically, using information effectively to accomplish a specific purpose, and accessing and using information ethically and legally. The scores were analyzed using the normality and homogeneity test, followed by One-Way ANCOVA. The analysis results showed a significance value of 0.000 (P-$value$ $<$ 0.05), signifying different information literacy between students attending learning with three different learning models. The obtained scores were considered significant, indicating that the learning model significantly influences students' information literacy. Thus, Remap-TTW can be used as an alternative learning model to improve students' information literacy.

Keywords: improvement, students, information literacy, remap-TTW, learning

Corresponding Author: Nanda Bhekti Fadilla; email: nandafadilla45@gmail.com

Published: 26 April 2024

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the ICMScE Conference Committee.

1. INTRODUCTION

Biology is a branch of science that focuses on the study of human living [1, 2]. Consequently, biological expertise is required for the solvency of human life-related issues, such as the issues of the environment and human health [3]. Plentiful discussion of health issues can be found in the biology materials, primarily on the topic of the human body system taught in the XI grade of senior high school. However, the body system materials that are mostly perceived as challenging by the students are the respiration

and excretory system. These two materials can be classified as complex materials with continuous adjustment to the speedily developing new relevant research finding [4, 5]. Besides, the respiratory and excretory materials are abstract, complex, and always follow the latest research finding [6, 7]. These two biology materials guide students to enlarge their knowledge and expertise through excellent information literacy [8]. positioning information literacy as one of the essential skills for students in the 21^{st} century [9].

In the current 21^{st} century, significant transformations have occurred in almost every aspect of human life [10], especially in the field of knowledge and technology [11]. One of the colossal transformations in the educational field is the significant increasing information circulating on the Internet [12]. Meanwhile, information literacy is someone's ability to look for data and information, select the proper sources, evaluate the information, filter or investigate the obtained information, as well as utilize the information effectively [13]. This information literacy determines students success rate in learning science [14]. The rapid development of science learning, primarily on the biology materials, requires students to widen their source of information by using excellent information literacy. With excellent information literacy, students can resolve particular issues using the latest accountable information [15]. The adoption of the conventional model in information literacy learning mostly brings non-significant results as traditional learning leads students to receive information throughout the lecturing process passively [16]. Therefore, information literacy learning should use an active learning model that trains students to solve abstract and complex issues using accountable information [16, 17]. Thus, information literacy is required in biology learning, especially in the respiratory and excretory systems.

The initial study involving 100 students at State Senior High School 1 Kencong, Jember, Indonesia in January 2022 showed an average students information literacy score of 29.80, classified as less satisfactory. The less satisfactory information literacy score was also observed in the students at Senior High School of Kartika XIX-1 Bandung, Indonesia. The less satisfactory result is induced by students habit of finding the answer through the Internet without considering the source and materials from their textbook [18]. In another study carried out in the high schools located in Serang, Indonesia, students' ability to decide the information searching strategy was also classified as less satisfactory, with the obtained score of 54.50 (the lowest score). The result is caused by students' mere focus on finding information to finish their assignments without considering the proper strategy to find information [19]. Thus, the development of students' information literacy, primarily on the biology materials, is essential [20]. Information literacy can be expanded using a proper learning model [21].

An innovative learning model should be implemented to enhance students' learning model [22]. Information literacy can be improved through the learning model, offering learning chances and opportunities for students to participate in the learning model actively [23]. One of the innovative learning models that provide active learning chances and opportunities for students is Remap-Coople (Reading Concept Mapping-Cooperative Learning). The learning stages of Remap-Coople require students to read, create a concept map, and use a cooperative learning model. This Remap-Coople learning method combines Reading, Concept Mapping, and Cooperative Learning [24]. The Cooperative Learning model involves a small-group discussion process influencing students information literacy [22].

In addition, Think Talk Write (TTW) is one of the Cooperative Learning models that prioritize small-group discussion over independent learning. TTW carries the potential to enhance students' information literacy as it facilitates students to find and exchange information through communication actively. The provision of opportunities to think, talk, and write also influences students information literacy [23]. However, in using TTW, students have low confidence in discussing the material and low material understanding, while TTW also requires a long time, especially when the students have no sufficient background material [25]. Thus, Remap can be the alternative solution to help students prepare better background material before learning in the classroom [26]. Finally, a combination of Remap-TTW can be a potential learning model to develop students' information literacy.

The Remap-TTW model refers to Remap Coople developed by Zubaidah [27]. In the first stage of Remap-TTW, students are asked to focus on reading, followed by determining the main ideas. Reading can train the student to analyze the concept and determine the strategy used to find information, enhancing students information literacy [28]. The next step is Concept Mapping. The students who have established a concept map attain a more in-depth learning experience than memorizing [29]. By creating a concept map, students illustrate their conceptual understanding obtained through reading the relevant information [30], enhancing their information literacy. The last stage is a discussion of ideas in the elaboration stage. The Reading and Concept Mapping stages enable students to understand the materials in detail and prepare themselves to follow the learning process in the classroom properly.

Previous studies have confirmed that Remap Coople improves most the 21^{st}-century skills. It is effective in enhancing students learning motivation, learning results [24], metacognitive [31], critical thinking skills [32], and creative thinking skills [33]. However, the potential of Remap-TTW to improve students information literacy has not been

investigated. Therefore, this study aims to examine the effects of the Remap-TTW learning model on students' information literacy.

2. RESEARCH METHOD

This study used a quasi-experiment with a non-randomized control group pretest-posttest design. It was carried out from January to March 2022 at the State Senior High School 1 Kencong, Jember, Indonesia. The research population was all the eleventh-grade students. The classes used as research samples were selected randomly after the class equivalent class. In the end, three classes were selected as research samples, namely XI Science 7 (N=33) as the experiment class using the Remap-TTW model, XI Science 6 (N=32) as the positive control group using the TTW learning model, and XI Science 8 (N=35) as negative control group using conventional learning.

The experiment class used the Remap-TTW learning model through several learning stages. In the first stage (Reading), students were asked to read the learning material they would learn from various sources of information. After the Reading stage, the students were asked to create a concept map based on the materials they had obtained through the reading process. Both the Reading and Concept Mapping processes were carried out prior to the learning process at their home. The next stages were Think, Talk, and Write. In the Think phase, students took notes and completed the exercise independently. In the Talk stage, students exchanged information from their notes and answers they formulated in the thinking stage to determine the correct answer. In the last step, Write, students made a concise conclusion from the materials they had learned.

The positive control class learned using the TTW method using numerous learning phases. The learning stages of the TTW method consisted of Think, Talk, and Write. In the Talk phase, students took notes and completed the exercise independently. In the Talk stage, students exchanged information from their notes and answers they formulated in the Think stage to determine the correct answer. In the last step, Write, students made a concise conclusion from the materials they had learned.

In addition, the conventional learning method used in the negative control class was like the standard learning method used by the teachers, which mainly consisted of lecturing. After the lecture, the students were asked to work on assignments. In contrast, in the experiment (Remap-TTW*)* and positive control group (TTW), students were provided with student worksheets completed in groups. Meanwhile, in conventional learning, the assignment was completed independently.

The research instrument used in this study was treatment and assessment instruments. The treatment instrument consisted of a syllabus, lesson plan, and student worksheet. Meanwhile, the assessment instrument consisted of an essay test covering five indicators, according to AACU (The American Association of Colleges and Universities) (2017), namely determining the extent of information needed, accessing the needed information, evaluating information and its sources critically, using information effectively to accomplish a specific purpose, accessing, and using information ethically and legally. The obtained information literacy scores were classified into five categories, namely 0-20 classified as very poor, 21-40 poor, 41-60 sufficient, 61-80 good, and 81-100 excellent.

All the instruments had been tested for their validity and reliability. The results of validity results showed an average r count of 0.86, showing that the instruments were valid. Meanwhile, the results of the reliability test showed Cronbach's Alpha score of 0.91, indicating the high reliability of the instruments. The learning material used in this study was respiratory and excretory systems. The obtained pretest and posttest were analyzed using normality and homogeneity tests using the One-Sample Kolmogorov-Smirnov test and Levene's Test of Equality of Error Variances, followed by one way-ANCOVA. After the significant hypothesis test results were obtained, the data were analyzed using Least Significant Different (LSD) to identify real differences in the obtained results.

3. RESULTS AND DISCUSSION

The results of the one-way ANCOVA analysis on the students' information literacy are presented in Table 1. Table 2 shows an F count of 32.53, with a significant level of 0.000 < 0.05. The students information literacy who attained the experiment class had a substantial value of 0.000 (*P-value* < 0,05).

TABLE 1: The ANCOVA results on students' information literacy.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14740.233[a]	3	4913.411	24.672	.000	.435
Intercept	11508.884	1	11508.884	57.791	.000	.376
X	53.720	1	53.720	.270	.605	.003
LernModel	12955.862	2	6477.931	32.528	.000	.404
Error	19118.099	96	199.147			
Total	375414.343	100				
Corrected Total	33858.331	99				

As presented in Table 1, there are different students' average information literacy scores. This result signifies that different learning models significantly affect students' information literacy. Meanwhile, the obtained significant results of the hypothesis test were tested using the LSD test to identify the real differences in results obtained from different methods. The results of LSD analysis are shown in Table 2.

TABLE 2: The LSD test results on students' information literacy.

Group	XInf	YInf	Difference	InfLit.Cor	LSD Notation
Remap-TTW	29.340	71.829	42.489	71.707	a
TTW	30.450	61.631	31.181	61.364	b
Convention	25.631	42.907	17.276	43.265	c

The LSD analysis results presented in Table 2 showed different notations between the results of the three learning models. This finding signifies significantly different information literacy between students who had learned using Remap-TTW, TTW, and conventional learning. Therefore, the learning model carries effects on students' information literacy. These findings are also linear, with a previous study discovering that different learning model affects students information literacy [34].

The student's average information literacy is different. The experiment class using Remap-TTW attained a higher average score than the positive control (TTW) and negative control (conventional) classes. The increase in students' information literacy, from pretest to posttest, is illustrated in Figure 1.

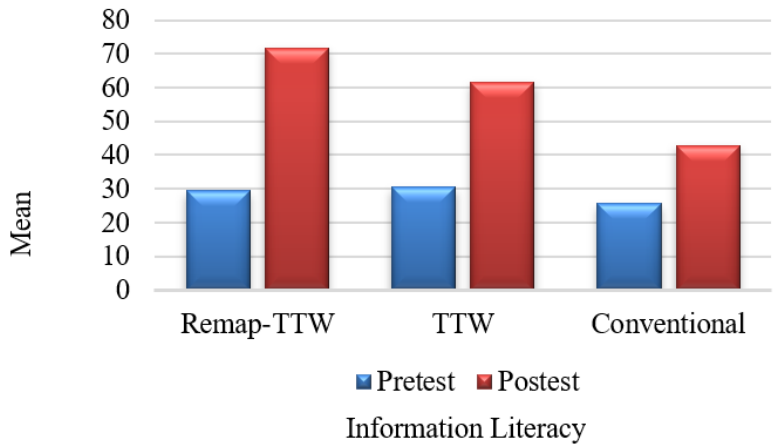

Figure 1: Increase of students' information literacy average score.

Figure 1 presents the increasing students' information literacy scores, from the pretest to the posttest, showing different average scores from each learning model. The highest increase in students' average information literacy score was observed in the experiment

class (Remap-TTW*),* with a 42.49 increase. Meanwhile, the increased student's information literacy average scores in the positive (TTW) and negative (conventional) classes are 31.19 and 17. 28, respectively. Before the students learned using Remap-TTW*,* their information literacy was classified as poor with a score of 29.40, but after they learned using Remap-TTW*,* their information literacy score increased to 71.82, categorized as high.

Information literacy is essential in science learning since it is one of the fundamental skills required in the education process [35, 36]. It helps students to analyze and use the obtained information properly [37]. Thus, information literacy determines students' success in science learning. Throughout the learning process, the students are expected to be independent in finding and using the source of information to solve a particular issue. A previous study discovered that in biology learning, students are given assignments that require them to identify new and valid research topics to answer the specific problem [38].

After attending classes with different learning models, students presented varying information literacy levels. The learning stages in the Remap-TTW model hold essential roles in enhancing students' information literacy. Those stages consist of reading, concept mapping, and independent thinking, followed by discussion and conclusion. The reading activity offers an opportunity for students to gather relevant, trustworthy, and valid information through the process of searching on the Internet, textbook, and other learning resources.

Students who had completed the reading activity presented better preparedness for attending the classroom learning activities compared to the students in the TTW and conventional classes. Their better preparedness was observed through their enthusiasm and eagerness to respond to the teachers' questions during the learning process. Students who attended the Remap-TTW class also provided better answers to the questions in their worksheets since they had read the materials from numerous valid and relevant resources before the learning was started. Reading offers different benefits for students. It enhances student's conceptual understanding so that they can establish structured and understandable conceptual maps. A similar finding was also revealed in a previous study, describing that students who have read their own beneficial information help them identify and select useful information for their conceptual map [39]. The example of students' conceptual map is shown in Figure 2.

Figure 2 illustrates the correlation between students' conceptual understanding obtained through the reading process and the excretory materials in the subtopic of the kidney. The students could place the main concept at the center of the map and branch

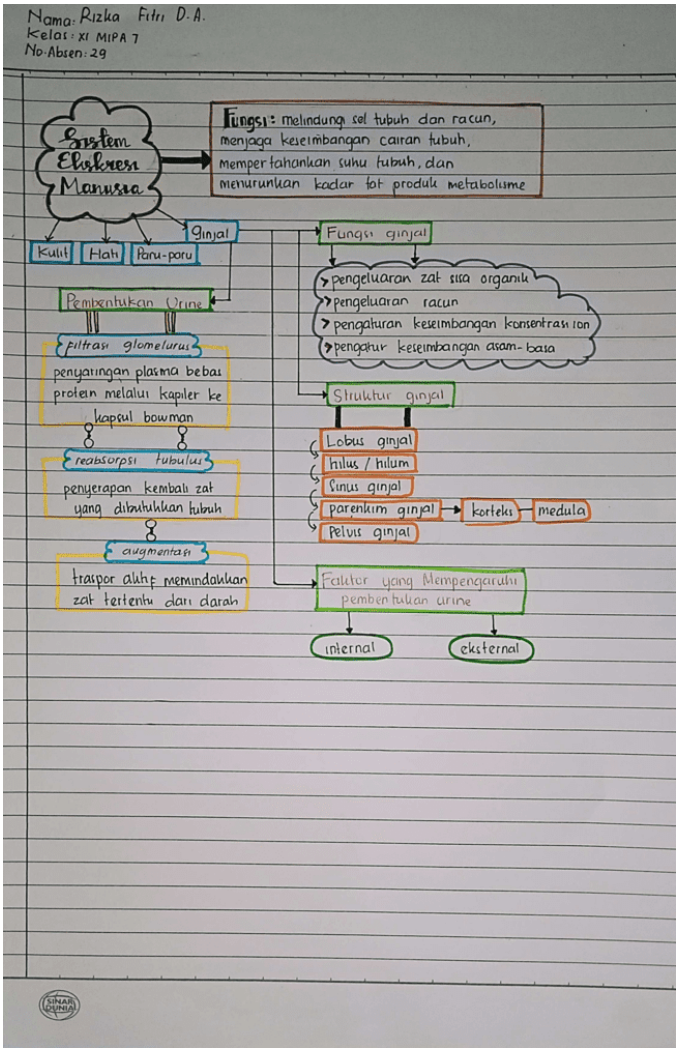

Figure 2: Concept map on excretory system (Kidney).

TABLE 3: English translation for Figure 2.

Sistem ekskresi manusia: human excretory system	*Melindungi sel tubuh: protect body cells*	*Proses pembentukan urine: urine formation process*
Kulit: skin	*Metabolisme: metabolism*	*Kapsul bowman: bowman's capsule*
Hati: liver	*Konsentrasi ion: ion concentration*	*Tubuh: body*
Paru-paru: lungs	*Asam: acid*	*Zat: substance*
Ginjal: kidney	*Basa: base*	*Dibutuhkan: needed*
Fungsi: function	*Filtrasi: filtration*	*Transpor aktif: active transport*
Menjaga: protect	*Reabsorbsi: reabsorption*	*Memindahkan: move*
Keseimbangan: balance	*Augmentasi: augmentation*	*Darah: blood*
Cairan tubuh: body fluids	*Racun: toxins*	*Mempengaruhi: affect*
Suhu tubuh: body temperature	*Kapiler: capillary*	*Struktur: structure*

it into a more specific concept. The primary concepts explain the general function of the excretory system. The next divarication presents the four central organs in the excretory system, and the kidney becomes the focus of the construction of the concept map. The kidney concepts have been presented with lines that properly connect concepts, from the inclusive concept to the less inclusive one.

The construction of the concept map in the Remap-TTW learning model has been confirmed to enhance students' understanding of the learning material. Students who have developed a concept map show better performance in completing the assignments. Besides, the establishment of the concept map also improves students' information literacy because before they create the concept map, they find information from relevant sources. Also, the creation of concept map aids students in better understanding a particular concept and the correlation among concepts [40]. The previous study also states that the establishment of a concept map involves understanding a text, analysis, information synthesis, and information representation, improving students' information literacy [41].

The Cooperative TTW learning model implemented in the positive control group consisted of some stages, namely taking notes, or formulating quick answers for a problem or assignment independently (Think), discussing (Talk), and concluding (Write). The thinking activity provides the opportunity for students to read, process, and use numerous types of information. After the Reading and Concept Mapping stage, students can complete the thinking stage better than the students who have not attended the Reading and Concept Mapping stages. In the TTW class, the students were not provided with Reading and Concept Mapping activities, so they faced challenges in looking for information and note-taking activities before the talking stage. As confirmed in a previous study, students with great reading habits can attend the TTW class better than those with poor reading habits [42]. The second stage of the TTW model is Talk (talking or discussing). In the Remap-TTW group, the students can actively join the discussion activities because they have sufficient material mastery obtained from Reading and Concept Mapping activities. The students in the TTW class tend to be passive during the discussion, requiring teachers to facilitate their discussion.

The third activity in the TTW model is Write (concluding or writing). This activity bolsters students' ability to write their information literacy process. Writing is the estuary of reading, evaluating, and using the obtained information. Learning that facilitates students to write carries effects on their information literacy development. Writing activity strongly correlates with information literacy as a previous study suggests that someone with great writing skills is capable of recognizing the required information, properly

evaluating the information, and constructing new knowledge using their existing information [23]. The students in the Remap-TTW group have more excellent concluding and writing skills than the students in the TTW and conventional groups. Conventional learning frequently provides students with broad scientific content without considering the students' learning process in obtaining the learning purposes.

In this study, conventional learning referred to the learning model that is frequently adopted by the teacher. In this model, the teacher provides learning materials to the students through the lecturing method. However, the lecturing method possesses weaknesses. Our findings showed that the lecturing process caused students to be passive throughout the learning activity. Students only receive limited information delivered by their teachers. Besides, students' information literacy also remains undeveloped since they only listen to the teacher's explanation without actively finding relevant information. In the last stage of conventional learning, students were asked to complete exercises on their student worksheets or textbook. The ability of students who learned through conventional learning is lower than the students in the Remap-TTW and TTW classes.

However, this study has a limitation, primarily on the reading activity. The reading activity was carried out at home so that students' resources were not ensured to be varied and valid. Valid and varied reading resources affect students' information literacy. Additionally, this study used no instrument to identify the students' sources of information, leaving students reading resources unrecorded.

4. CONCLUSION

The implementation of the Remap-TTW learning model improves students' information literacy. The analysis results showed significantly different information literacy among students in the Remap-TTW, TTW, and conventional learning groups. The obtained different results indicate that the learning model substantially affects students' information literacy. Therefore, the Remap-TTW model can be one of the alternative learning models to enhance students' information literacy. Further, the adoption of Remap-TTW should involve a specific instrument to measure students' reading activity. Reading is one of the activities that sharpen students' information literacy, so students reading resources should be ensured to be valid and varied.

Acknowledgments

We addressed our gratitude toward all the parties who have helped the completion of this study. We also thank the LPDP that has funded this research.

References

[1] Kervinen A, Uitto A, Juuti K. Kervinen 2020 how fieldwork-oriented biology teachers establish formal outdoor education practices enhanced reader. J Biol Educ. 2018;54(2):115–28.

[2] Schumacher F, Wilde M. When prospective biology teachers visualize their beliefs about teaching and learning by drawing it, is it more than a reproduction of their experienced school lessons? European Journal of Educational Research. 2021;10(2):799–811.

[3] Lantz C, Dempsey PR. Information literacy strategies used by second-and third-year biology students. Issues in Science and Technology Librarianship. 2019;1(92). https://doi.org/10.29173/istl13.

[4] Nesse RM, Bergstrom CT, Ellison PT, et al. “Making evolutionary biology a basic science for medicine. Proceedings of the National Academy of Sciences of the United States of America. 2010;107:1800–1807.

[5] Kurt H, Ekici G, Aksu Ö, Aktaş M. Determining cognitive structures and alternative conceptions on the concept of reproduction (the case of pre-service biology teachers). Creat Educ. 2013;04(09):572–87.

[6] Fauzi A, Rosyida AM, Rohma M, Khoiroh D. The difficulty index of biology topics in Indonesian senior high school: biology undergraduate students’ perspectives. Jurnal Pendidikan Biologi Indonesia. 2021;7(2):149–58.

[7] Choi J, Lee SE, Bae J, Kang S, Choi S, Tate JA, et al. Undergraduate nursing students’ experience of learning respiratory system assessment using flipped classroom: A mixed methods study. Nurse Educ Today. 2021 Mar;98(October):104664.

[8] Podgornik BB, Dolničar D, Glažar SA. Does the information literacy of university students depend on their scientific literacy? Eurasia J Math Sci Technol Educ. 2017;13(7):3869–91.

[9] Denison DR, Montgomery D. Annoyance or delight? College students’ perspectives on looking for information. J Acad Librariansh. 2012;38(6):380–90.

[10] Arslangilay AS. 21st century skills of CEIT teacher candidates and the prominence of these skills in the CEIT undergraduate curriculum. Educational Policy Analysis and Strategic Research. 2019;14(3):330–46.

[11] Gu Y. Enhancement of college english teachers' information literacy in information environment. Int Educ Stud. 2020;13(4):106.

[12] Pieterse E, Greenberg R, Santo Z. A multicultural approach to digital information literacy skills evaluation in an Israel college. Commun Inf Lit. 2018;12(2):107–27.

[13] The Association of College and Research Libraries. Information literacy for higher education. 2016.

[14] Naimpally A, Ramachandran H, Smith C. Information literacy and lifelong learning. Lifelong Learning for Engineers and Scientists in the Information Age; 2012. pp. 21–4.

[15] Saptasari M, Sunarmi S, Sulasmi ES, Wicaksono RS, Sudrajat AK. Information literacy skill: An alternative to support Biology student's learning outcomes. Jurnal Pendidikan Biologi Indonesia. 2019;5(3).

[16] Lwehabura MJ. An assessment of information literacy skills among first-year postgraduate students at Sokoine University of Agriculture Tanzania. J Librarian Inform Sci. 2018;50(4):427–34.

[17] Bayram H, Comek A. Examining the relations between science attitudes, logical thinking ability, information literacy and academic achievement through internet assisted chemistry education. Procedia Soc Behav Sci. 2009;1(1):1526–32.

[18] Mulyati OE, Tarunasena D. Method of using in the news to improve student's information literature ability in history learning (classroom action research in class XI MIIA 2 SMA Kartika XIX-1 Bandung). Factum. 2017;6(1).

[19] Rifqiawati II, Hendriyani ME, Hayati. Profile of high school students' information literacy skills. Senidusa. 2020;46–53.

[20] Schiffl I. How information literate are junior and senior class biology students? Res Sci Educ. 2020;50(2):773–89.

[21] Dunne S, Sheridan. Vera. Developing first year student information literacy: Reflections on the learning process. AISHE-J. 2012;4(1):1–15.

[22] Narahaubun SS, Rehena JF, Rumahlatu D. Empowering students' critical thinking skills, information literacy and cognitive learning outcome through RBL-TPS model [Jurnal Pendidikan Biologi Indonesia]. JPBI. 2020;6(2):243–56.

[23] Kurniaman O, Yuliani T, Mansur M. Investigating Think Talk Write (TTW) learning model to enhance primary students' writing skill. Journal of Teaching and Learning in Elementary Education (Jtlee). 2018;1(1):52–9.

[24] Adawiyah R, Zubaidah S, Listyorini D, Astriani M. The potential of remap STAD in improving motivation and academic achievement. AIP Conference Proceedings. 2021. https://doi.org/10.1063/5.0043280.

[25] Afandi M, Nisa DA, Kusumadewi RF. The importance of think talk write learning model on the mathematical connection ability and self-confidence. Jurnal Ilmiah Sekolah Dasar. 2021;5(1):25–32.

[26] Zahra F, Zubaidah S, Mahanal S, Astriani M. The improvement of students' argumentation skills through remap-NHT learning model. AIP Conference Proceedings. 2021. https://doi.org/10.1063/5.0043291.

[27] Zubaidah S. The empowerment of discovery skills in scientific approach through remap coople based learning. XI National Seminar on Biology Education FKIP UNS. 2014;1000–1010.

[28] Genlott AA, Grönlund Å. Improving literacy skills through learning reading by writing: the iWTR method presented and tested. Comput Educ. 2013;67:98–104.

[29] Novak JD. Meaningful learning: the essential factor for conceptual change in limited or inappropriate propositional hierarchies leading to empowerment of learners. Sci Educ. 2002;86(4):548–71.

[30] Carr-Lopez SM, Galal SM, Vyas D, Patel RA, Gnesa EH. The utility of concept maps to facilitate higher-level learning in a large classroom setting. Am J Pharm Educ. 2014 Nov;78(9):170.

[31] Sholihah M, Zubaidah S, Mahanal S. REMAP RT (Reading Concept Map Reciprocal Teaching) untuk meningkatkan keterampilan berpikir kritis siswa. Proceeding Biology Education Conference: Biology, Science, Enviromental, and Learning; 2016.

[32] Wanah HN, Zubaidah S, Susanto H, Astriani M. Using remap-NHT to enhance students' critical thinking skills in Biology. AIP Conference Proceedings. 2021. https://doi.org/10.1063/5.0043289.

[33] Irawan F, Sulisetijono ZS, Astriani M.Does remap-STAD have the potential to promote students' creative thinking skills. AIP Conference Proceedings. 2021.

[34] Odede I. Models for teaching information literacy: A comparative review of the top six models. Mousaion: South African Journal of Information Studies. 2020;38(2):1–19.

[35] Eisenberg MB. Information literacy: essential skills for the information age. DESIDOC J Libr Inf Technol. 2008;28(2):39–47.

[36] Kozikoglu I, Onur Z. Predictors of lifelong learning: information literacy and academic self-efficacy. Cypriot Journal of Educational Sciences. 2019;14(4):492–506.

[37] Tosuncuoglu I, Küçükler H. The perceptions of information literacy by students in English Language Departments: A Comparative Study. World Journal of Education. 2019;9(1):125.

[38] Porter JR. Information literacy in biology education: An example from an advanced cell biology course. Cell Biology Education. 2005;4(Winter):335-343.

[39] Choy SC, Cheah PK. Teacher perceptions of critical thinking among students and its influence on higher education. International Journal of Research in Science and Technology. 2020;10(4):198–206.

[40] Aydoğdu S, Güyer T. The effect of digital concept maps in online learning environments on students' success and disorientation. Malaysian Online Journal of Educational Technology. 2019;7(1). https://doi.org/10.17220/mojet.2019.01.006.

[41] Pinto M, Doucet AV, Fernández-Ramos A. Measuring students' information skills through concept mapping. J Inf Sci. 2010;36(4):464–80.

[42] Ambarsari H, Syarif H. The Effect of Think Talk Write (TTW) strategy and students' reading habit toward students' writing ability. Proceedings of the Sixth International Conference on English Language and Teaching; 2018