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Critical Thinking Skills in Assessment Essays to Improve Motivation and Learning Outcomes: Bibliometric Analysis

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Abstrak: As the demands of the modern world increase, critical thinking skills become increasingly important for students to succeed in education and life. Therefore, assessment essays are a tool to assess students' critical thinking skills. This research aims to analyse trends and developments in research on critical thinking skills in assessment essays to increase motivation and learning outcomes. This type of research is bibliometric analysis. Bibliometric methods are used to analyse scientific publications related to this topic. Data were collected from various scientific databases, including Scopus, Web of Science, and Google Scholar. The analysis results show that research on critical thinking skills in assessment essays has continued to increase in recent years. This topic is becoming increasingly important for educational researchers and practitioners. The analysis also indicates that this research comes from various scientific disciplines, such as physics. The main finding of this research is that critical thinking skills in assessment essays can increase student motivation and learning outcomes. This can be achieved by implementing various strategies, such as providing appropriate essay prompts, using clear grading rubrics, and providing constructive feedback to students. This research has several important implications for educational practice. First, this research shows that critical thinking ability is an essential skill for students to develop. Second, this research indicates that assessment essays can improve students' critical thinking skills. Third, this research guides teachers and other educators on effectively implementing essay assessments to increase student motivation and learning outcomes.

Kata Kunci: Assessment Essay; Bibliometrics; Critical Thinking Skills; Learning Outcomes; Motivation.

Introduction

The development of Science and Technology is growing very rapidly. This impacts the increasingly complex problems faced by the world of education. Based on the results of the PISA (Program of International Student Assessment) in 2022, Indonesia is experiencing a decline in the quality of education. The average score of Indonesian students is still below the score of OECD (Organization for Economic Cooperation and Development) countries. This shows that Indonesian students' thinking abilities are still low [1]. Indonesia's low learning achievement can be caused by students not being used to solving PISA questions in the HOTS (Higher Order Thinking Skills) category [2]. Therefore, there is a need to improve the quality of education and develop critical thinking skills.

Critical thinking is needed to solve complex problems and produce interesting innovations [3]. Apart from that, critical thinking is a skill that is believed to play a central role in logical thinking [4]. By observing and communicating, you will get alternative problem solutions from various points of view to obtain information and arguments [5]. Everyone has high critical thinking skills in interpreting, analysing, evaluating, intervening and explaining. They can analyse data by relating it to concepts and material (analysis). Evaluate statements, opinions, or arguments that can be alternative solutions to problems (evaluation). Draw conclusions based on data and information that has been identified (interference). Explaining the results of problem-solving (explanation) [6].

A recent study conducted by the Educational Testing Service reaffirms the importance of critical thinking (ETS, 2013). The study interviewed provosts or vice presidents for academic affairs at more than 200 institutions about the general education skills most frequently assessed. Critical thinking is one of the most commonly mentioned skills considered essential for academic and professional success. The focus on critical thinking has extended to international institutions and organisations. For example, the Assessment of Higher Education Learning Outcomes (AHELO) project, sponsored by the Organization for Economic Co-operation and Development (OECD, 2012), teaches students to think critically as an essential skill in assessing their learning outcomes in general.

All scientific disciplines can be taught to improve critical thinking skills [7]. Students who think critically can analyse concepts, evaluate relevant evidence, and draw conclusions from problems [8]. However, current physics learning methods are limited to declarative knowledge using formulas to solve problems [9], so students only memorise if they understand the concept. Critical thinking is a logical process before making a decision [10]. Critical thinking includes finding errors in statements, assumptions, and

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information used to solve problems and make appropriate decisions [11].

Apart from critical thinking skills, student learning outcomes are influenced by three components, namely personality, age, and motivation [12]. One of the main components that determines student success is motivation [13]. Motivated students will be engaged in the learning process and can maintain it without constant encouragement or direction. Motivation is the fuel for a vehicle. This means it can provide energy or strength. This can increase the desire to achieve goals. The extent to which a person chooses a goal and their efforts to achieve it. Motivation can encourage someone to learn and participate directly in internal processes to achieve goals [14]. Motivated students will pay attention to lessons and study the subject.

Learning outcomes are evidence of learning success. Student learning outcomes include cognitive, affective and psychomotor aspects. Students' affective conditions influence the success of cognitive and psychomotor learning. Student learning outcome scores indicate the achievement and success of the learning process [15]. Students interested in and desire to learn will enjoy studying certain subjects to achieve optimal results [15].

The reality in the field shows that students' critical abilities are relatively low. This is supported by previous research showing that the indicators for formulating problems, deciding on actions, and analysing students' arguments are still low [12], [13]. Apart from that, the extrinsic factors of students not being motivated to learn are the inappropriate learning methods used by teachers, too much memorisation, and too many assignments. The intrinsic factor in the lack of motivation to learn is the students themselves.

Previous researchers have made various efforts to overcome these problems and improve students' abilities. The solution is to carry out an assessment [16]. Apart from that, assessment is the same as evaluation, a decision-making process based on information obtained from the learning process and other elements supporting educational activities [17]. According to assessment standards, the assessment method is class- or competency-based. Classroom-based assessment or competency-based assessment assesses how students learn and achieve their competencies. Class-based or competency-based assessment has various types of evaluation that can be applied.

As competency-based, essay assessment requires students to organise, formulate and present their answers. Students do not choose answers but provide answers in their own words freely based on their understanding. Essay assessment can be carried out in an integrated and continuous manner [18]. In addition, essay assessments measure the complex cognitive level of students who must be able to organise, interpret and synthesise knowledge and use information in solving new or original and innovative problems [19].

Assessment essays are used because they tend to encourage students to activate higher-order thinking skills in answering questions. [20].

Therefore, essay tests are suitable for measuring students' problem-solving abilities. In addition, essay assessment aims to avoid guessing students' answers or trial and error [21]. According to Valenti et al. (2003), essays are considered an appropriate method or tool for assessing the results of complex learning activities.

Research Methods

The author of this study used bibliometric analysis techniques. Bibliometric analysis assumes that a researcher conducts research and must communicate his findings to his colleagues. Bibliometric analysis, sometimes called scientometrics, is part of research evaluation methodology and helps researchers develop their knowledge about a particular research topic [22]. Bibliometric analysis, also known as the bibliometric method, is carried out using its process, per much of the literature written [23].

In this research, the Scholar database was chosen to search for documents because Scholar applies consistent standards in selecting documents for inclusion in its index. This research also uses the Publish or Perish application to collect data on studying mathematical creative thinking abilities from the Google Scholar database. Then, VOSViewer software was used to analyse bibliometrics. VOSViewer can visualise the relationship between subjects and citations, group articles, create publication maps, and depict existing article trends.

By analysing bibliometric data, we can better understand the intensity of research carried out on a topic in the various research fields studied by researchers [24]. In line with this research, this research analyses 200 Scholar-indexed articles from 2019 to 2024. This research examines the influence of critical thinking skills in assessment essays on student motivation and academic achievement.

Result and Discussion

Collecting essay assessment research with the help of the Publish or Perish (POP) application produced 200 articles published from 2019 to 2024. Publish or Perish helps search and collect articles or research related to essay assessment. Obtained from publications or can be saved in CSV and RIS formats. CSV format is used, and research data is grouped by year. Meanwhile, data in RIS format is used to group and view research distribution with the help of the Mendeley and VosViewer applications. Data on the distribution of assessment essay research for 2019-2024 can be seen in Table 1. The data in Table 1 can be visualised as a bar chart like Figure 1.

Table 1 . Essay Assessment Research Distribution Data

Year	Number of publications	Percentage (%)
2019	77	38.5
2020	44	22
2021	39	19.5
2022	20	10
2023	16	8
2024	4	2

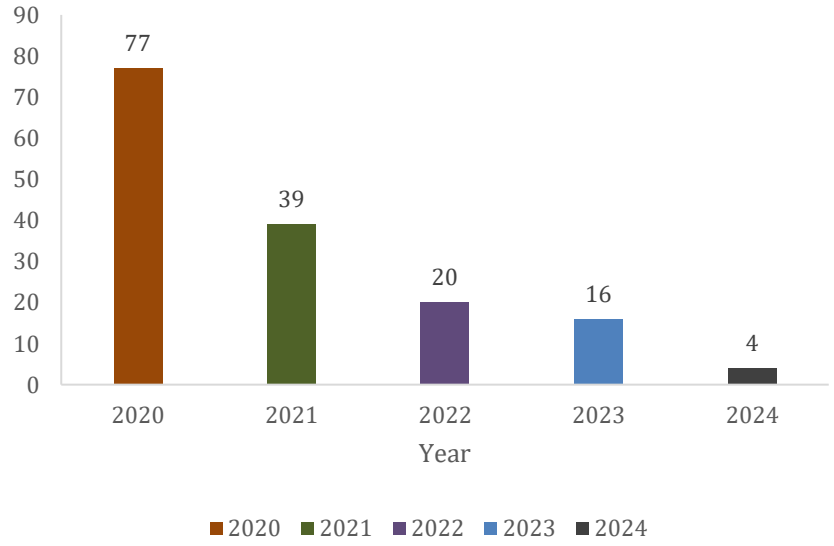

Figure 1. Research Dissemination

Figure 1 illustrates that the most extensive distribution of assessment essay research occurred in 2019, with 77 studies in total. Meanwhile, there will be at least four research essays on assessment by 2024. This shows that 2024 research on essay assessment will not be very popular.

Data is then analysed for distribution in Microsoft Excel using the VosViewer application. In the VosViewer application, researchers will see the distribution of assessment essay research using network, overlay, and density visualisation. The distribution of data in the network visualisation can be seen in Figure 2 below.

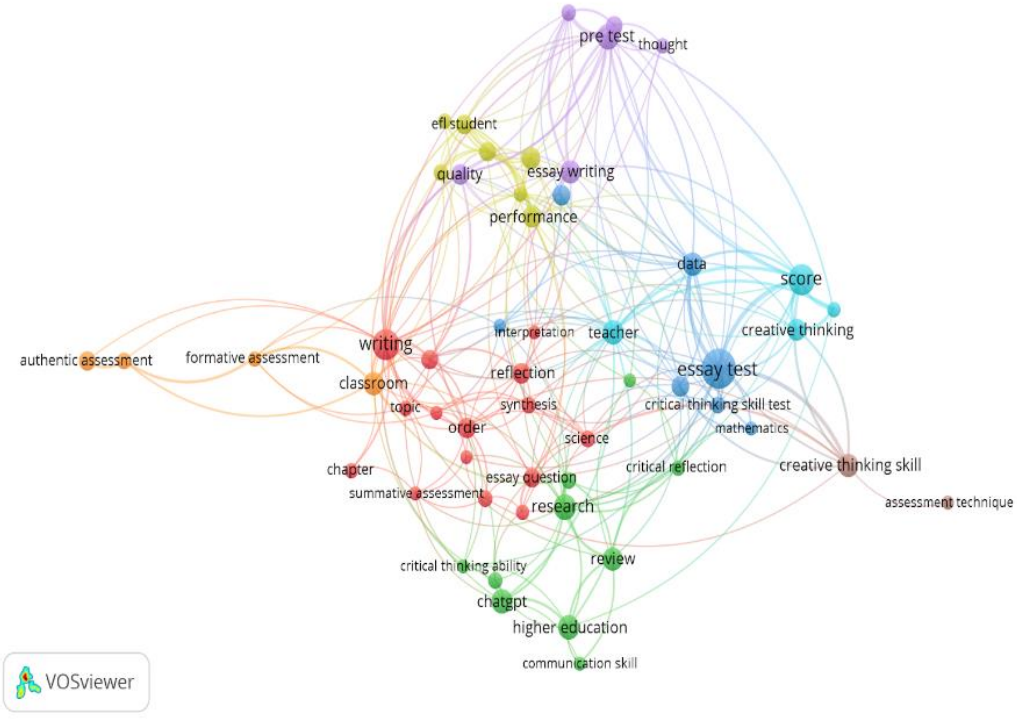

Figure 2. Overlay Visualization

The resulting visualisation displays keywords or terms in the data file based on the cluster technique presented by VosViewer [25]. The data in network visualisation describes the relationships between clusters. Where there is a relationship between research variables that have been studied by previous researchers [26]. In Figure 2, it can be seen that essay assessment is researched by connecting it with critical thinking skills, creative thinking skills, motivation, performance and grades. Mapping in the overlay visualisation is used to see the distribution of research based on the year of publication. On the visualisation overlay, we can see what research is currently trending. Overlay visualisation can be seen in Figure 3 below.

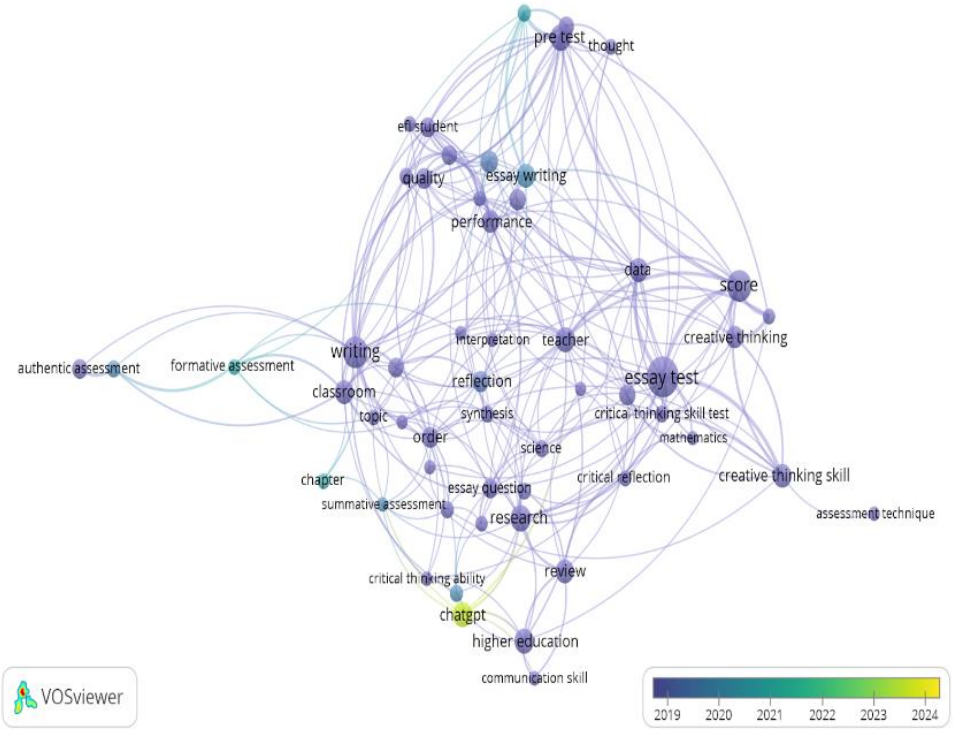

Figure 3 . Overlay Visualization

Figure 3 shows the trend from year to year regarding the distribution of research from 2019 to 2024 [27]. The 2019 study is depicted in slightly darker colours. In comparison, the latest research is coloured in brighter colours. In the picture, it can be seen that the research that is currently trending is about the relationship between essay assessment and critical thinking skills, motivation, and performance; even what is very trending is GPT chat because you can see there are lots of colours in the picture. Bright, namely yellow.

Mapping or describing data using density visualisation can be seen in Figure 4 below.

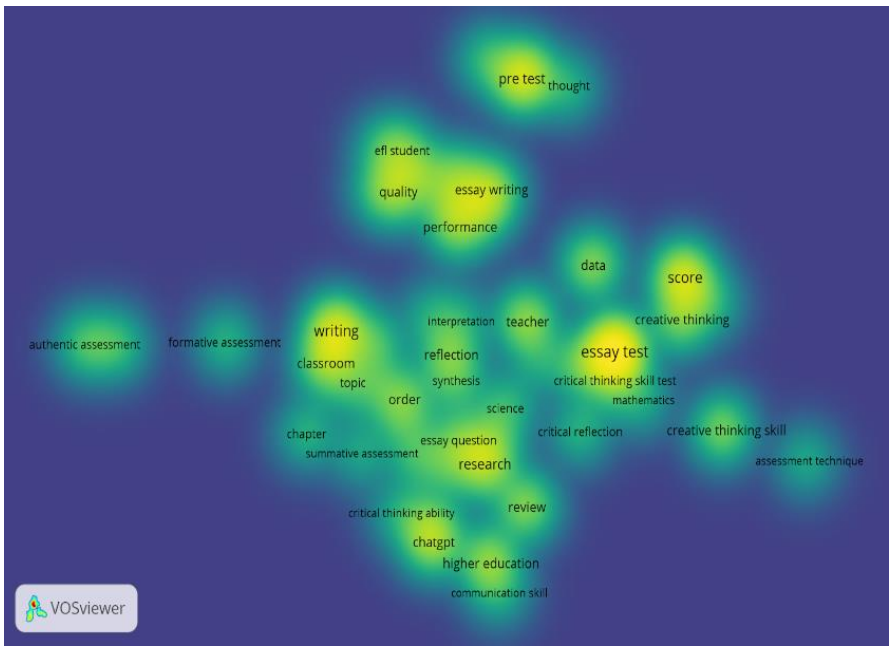

Figure 4. Density Visualization

Density visualisation is used to see the density of research. The yellower the colour with the largest circle diameter, the denser the keyword means, the more frequently it appears, and if the colour fades into the green background, the less regularly it seems [28]. This is useful for obtaining a general overview of the structure of a bibliometric map by indicating which colours are considered essential for analysis [29]. In Figure 4, it can be seen that researchers have widely studied assessment essays. This can be seen because the colour of the assessment circle is bright and bright yellow.

Findings suggest that research interest tends to focus on assessment essays due to the brightly coloured density

visualisations, which many studies have studied the issue with. However, only some researchers still combine the relationship between critical thinking skills in assessment essays to increase motivation and learning outcomes.

Essay assessment influences students' achievement of cognitive competence [30], [31]. Essay assessment provides learning direction towards comprehensive and in-depth mastery of concepts. Through essay assessments given to students in class, students must develop their cognition at all cognitive levels [18]. Therefore, Essay assessment is valid, efficient, and effective for improving critical thinking [32], [33].

Critical thinking is objectively and logically analysing information and ideas [34]. It is very appropriate if teachers use essay assessments to encourage students to examine questions and build an argument to conclude independently [35]. This process trains students to be more in-depth and critical about a topic, not just memorising information. Another benefit is that essays give students the freedom to express their thoughts. There are no “right” or “wrong” answers, so students can think creatively and find their solutions to problems.

This can increase self-confidence, thereby increasing students' learning motivation. In building student motivation, Sukadi (2006:37) stated, "Student motivation does not just appear, but must be generated or built." Therefore, motivation and essay assessment are mutually reinforcing [36]. Well-designed essay assessments can help build students' motivation, and high motivation levels can improve the answers they produce. Therefore, teachers need to understand how motivation works using essay assessment to improve student learning outcomes and achieve learning goals.

Conclusion

Research on integrated essay assessment of students' critical thinking needs to be improved to determine the level of student success and student motivation in mastering learning. Based on research that has been carried out, starting from data collection and data processing, bibliometric mapping using VOS Viewer software, analysing and describing it, The results of the bibliometric analysis show that the development of assessment essay research has experienced a trend from 2019 to 2024 with the latest variables.

References

[1] Sunarti, T., Wasis, W., Setyarsih, W., Zainudin, A., & Jauhariyah, M. N. (2021, December). Analysis of the development of critical thinking instruments test in physics. In *International Joint Conference on Science and Engineering 2021 (IJCSE 2021)* (pp. 627-634). Atlantis Press.

[2] Destiani, D., Ismet, I., Wiyono, K., & Murniati, M. (2017, October). Pengembangan bahan ajar IPA berorientasi framework science pisa untuk sekolah menengah pertama. In *Seminar Nasional Pendidikan IPA Tahun 2021* (Vol. 1, No. 1, pp. 654-663).

[3] Sulaiman, A., & Azizah, S. (2020). Problem-Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis Di Indonesia: Sebuah Tinjauan Literatur Sistematis. *PEDAGOGIK: Jurnal Pendidikan*, *7*(1), 107-152.

[4] Liu, O. L., Frankel, L., & Roohr, K. C. (2014). Assessing critical thinking in higher education: Current state and directions for next-generation assessment. *ETS Research Report Series*, *2014*(1), 1-23.

[5] Fatimah, N., Gunawan, G., & Wahyudi, W. (2016). Pembelajaran Berbasis Masalah Dengan Strategi Konflik Kognitif Terhadap Penguasaan Konsep Dan Kemampuan Berpikir Kritis Fisika Siswa Kelas XI SMKN 1 Lingsar Tahun Pelajaran 2015/2016. *Jurnal Pendidikan Fisika dan Teknologi*, *2*(4), 183-190.

[6] Facione, P. A. (2011). Critical thinking: What it is and why it counts. *Insight assessment*, *1*(1), 1-23.

[7] Wulandari, A. Y. R. (2018, September). Correlation between critical thinking and conceptual understanding of student’s learning outcome in mechanics concept. In *AIP Conference Proceedings* (Vol. 2014, No. 1). AIP Publishing.

[8] Puspita, I., Kaniawati, I., & Suwarma, I. R. (2017, September). Analysis of critical thinking skills on the topic of static fluid. In *Journal of Physics: Conference Series* (Vol. 895, No. 1, p. 012100). IOP Publishing.

[9] Desinta, F., Bukit, N., & Ginting, E. M. (2017). The Effect ofProject Based Learning (PjBL) andSelf Regulated Learningtoward Studentsâ€™ Critical Thinking Skill in Senior High School. *IOSR Journal of Research & Method in Education (IOSR-JRME)*, *7*(4), 59-63.

[10] Ennis, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research. *Educational researcher*, *18*(3), 4-10.

[11] Rabari, J. A., Indoshi, F. C., & Omusonga, T. O. (2011). Correlates of divergent thinking among secondary school physics students. *International Research Journals*, *2*(3), 982-996.

[12] Cook, V., & Cook, V. J. (1993). *Linguistics and second language acquisition*. London: Macmillan.

[13] Levpušček, M. P., & Zupančič, M. (2009). Math achievement in early adolescence: The role of parental involvement, teachers' behavior, and students' motivational beliefs about math. *The Journal of Early Adolescence*, doi: 10.1177/0272431608324189.

[14] Chang, I. Y., & Chang, W. Y. (2012). The effect of student learning motivation on learning satisfaction. *International Journal of Organizational Innovation*, *4*(3).

[15] Saputra, H. D., Ismet, F., & Andrizal, A. (2018). Pengaruh motivasi terhadap hasil belajar siswa SMK. *INVOTEK: Jurnal Inovasi Vokasional Dan Teknologi*, *18*(1), 25-30.

[16] Suyana, I., Nadaipah, S., Sinaga, P., & Feranie, S. (2019, April). Constructing essay questions to assess scientific creative and critical thinking simultaneously related to collision problem based on students responses. In *Journal of Physics: Conference Series* (Vol. 1204, No. 1, p. 012048). IOP Publishing, doi: 10.1088/1742-

6596/1204/1/012048.
[17] S. Uno, H., & Koni. 2012. *Assesment Pembelajaran*. Jakarta: Bumi Aksara.
[18] Festiyed, A. F., & Hidayat, S. (2012). Pengaruh Pemberian Assessment Essay terhadap Pencapaian Kompetensi Siswa dalam Pembelajaran Fisika Menggunakan Pendekatan Ekspositori dan Inkuiri di Kelas XI IA SMAN 1 Kecamatan Suliki Kabupaten Lima Puluh Kota. *Diunduh dari Http://ejournal. unp. ac. id*.
[19] Coutinho, M. J. (1999). Book Review: Educational testing and measurement: Classroom application and practice. *Journal of Psychoeducational Assessment*, *17*(3), 269-274.
[20] Baig, M., Ali, S. K., Ali, S., & Huda, N. (2014). Evaluation of multiple choice and short essay question items in basic medical sciences. *Pakistan journal of medical sciences*, *30*(1), 3.
[21] Ratnasari, D., Sukarmin, S., & Suparmi, S. (2017). The Implementation Of Essay Grading To Analyze Concept Understanding Profile Of Heat And Temperature. *Pancaran Pendidikan*, *6*(2).
[22] Lestary, V. S., Zulfah, Z., & Astuti, A. (2023). Analisis bibliometrik: fokus penelitian problem based learnig dalam pembelajaran matematika. *Jurnal Ilmiah Matematika Realistik*, *4*(1), 120-125.
[23] Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact?. *Scientometrics*, *105*, 1809-1831.
[24] Comarú, M. W., Lopes, R. M., Braga, L. A. M., Batista Mota, F., & Galvão, C. (2021). A bibliometric and descriptive analysis of inclusive education in science education. *Studies in Science Education*, *57*(2), 241-263.
[25] Waltman, L., Van Eck, N. J., & Noyons, E. C. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of informetrics*, *4*(4), 629-635.
[26] Bukar, U. A., Sayeed, M. S., Razak, S. F. A., Yogarayan, S., Amodu, O. A., & Mahmood, R. A. R. (2023). A method for analyzing text using VOSviewer. *MethodsX*, *11*, 102339. doi: 10.1016/j.mex.2023.102339.
[27] Nandiyanto, A. B. D., & Al Husaeni, D. F. (2021). A bibliometric analysis of materials research in Indonesian journal using VOSviewer. *Journal of Engineering Research*. doi: 10.36909/jer.ASSEEE.16037.
[28] Tupan, T. (2016). Pemetaan bibliometrik dengan VOSviewer terhadap perkembangan hasil penelitian bidang pertanian di Indonesia. *Visi Pustaka: Buletin Jaringan Informasi Antar Perpustakaan*, *18*(3), 217-230.
[29] Muñoz-Leiva, F., Viedma-del-Jesús, M. I., Sánchez-Fernández, J., & López-Herrera, A. G. (2012). An application of co-word analysis and bibliometric maps for detecting the most highlighting themes in the consumer behaviour research from a longitudinal perspective. *Quality & Quantity*, *46*, 1077-1095.
[30] Danili, E., & Reid, N. (2006). Cognitive factors that can potentially affect pupils' test performance. *Chemistry education research and practice*, *7*(2), 64-83.
[31] Raihan, M. A., Shamim, R. H., Clement, C. K., & Lock, H. S. (2013). A STUDY ON ASSESSMENT & EVALUATION OF ENGINEERING STUDENTS'LEARNING BY ESSAY TEST BASED ON THE COGNITIVE DOMAIN OF BLOOM'S. *International Journal of Advances in Engineering & Technology*, *6*(1), 1.
[32] Stavinibelia, S. (2022). Pengembangan Essay Assessment Berbasis Model Learning Cycle 7e Untuk Meningkatkan Keterampilan Berpikir Kritis Peserta Didik. *Innovative: Journal Of Social Science Research*, *2*(2), 84-94.
[33] Zubaidah, S., Corebima, A. D., & Mistianah, M. (2015, April). Assesmen Berpikir Kritis Terintegrasi Tes Essay. In *Proceeding Symposium on Biology Education hal* (Vol. 200).
[34] Sari, S. Y., Hirahmah, A., Hidayati, H., & Rahim, F. R. (2023). Validity of interactive learning media integrated critical and creative thinking skills aided by the lectora inspire application. *Jurnal Ilmiah Pendidikan Fisika*, *7*(2), 204-217.
[35] Lubis, S. S. W. (2017). Keterampilan menulis essai dalam pembentukan berpikir kritis mahasiswa prodi PGMI UIN Ar-Raniry Banda Aceh. *PIONIR: Jurnal Pendidikan*, *6*(2).
[36] Duijnhouwer, H., Prins, F. J., & Stokking, K. M. (2012). Feedback providing improvement strategies and reflection on feedback use: Effects on students' writing motivation, process, and performance. *Learning and Instruction*, *22*(3), 171-184.