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Effectiveness of ADI-STEM to Improve Student's Science Literacy Skill

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ABSTRACT

Objective: This study aims to analyze the effectiveness of the Argument-Driven Inquiry (ADI)–Science, Technology, Engineering, and Mathematics (STEM) model in improving students' scientific literacy abilities. **Method:** The method used in this research is the literature review method. The literature review is a type of research used to collect data and information by collecting and reviewing various references. This study analyzes as many as 20 national and international articles that can be accounted for. The articles used were published in 2015-2022. The steps taken in this study were identifying topics, finding and selecting appropriate articles, analyzing and synthesizing the literature, and concluding. **Result**: Based on the results of the studies and analyses that have been carried out, it can be concluded that (1) the application of the ADI learning model can improve students' scientific literacy skills; (2) the ability to argumentation skills to increase students' scientific literacy; (3) integrating STEM into the learning process is also able to improve scientific literacy skills because STEM provides opportunities for students to identify real-life problems. **Novelty:** This study reveals that students' scientific literacy can be increased effectively by integrating ADI and STEM. These findings invite researchers, educators, and the government to develop learning that facilitates ADI-STEM learning.

INTRODUCTION

The 21st century is a century of globalization full of challenges. The transformation process of the 21st century is an era where science and technology, especially communication technology, are developing very rapidly, which impacts free competition that is so tight in all aspects of human life (Tomovic et al., 2017). The challenges faced by society require a paradigm shift in the education system that can provide a set of 21st-century skills that students need to face every aspect of global life. The World Economic Forum has identified 16 skills needed in the 21st century, one of which is scientific literacy (World Economic Forum, 2015)

Scientific literacy is engaging with science-related issues and scientific ideas as a reflective citizen (OECD, 2019). Scientific literacy is also defined as the need for society to solve problems that require understanding and applying science. The Organization for Economic Cooperation and Development (OECD) (2019) describes the characteristics of someone who is an expert in science, namely someone who can (1) explain phenomena scientifically, (2) evaluate and design scientific investigations, and (3) interpret data and evidence scientifically. Therefore, a person skilled in science uses scientific knowledge to identify questions and draw conclusions based on evidence to understand and help make decisions about the natural environment and changes due to human activities. By being skilled in science, one can engage with science-related issues and scientific ideas as a reflection of society.

Scientific literacy is one of the essential things that must be learned in Indonesia. OECD has announced the results of the 2018 Program for International Student Assessment (PISA) in the science category; Indonesia is ranked 71st with a score of 396, far below the OECD average score of 489. This result ranks Indonesia 74th or sixth from the bottom (Schleicher, 2018). Nofiana & Julianto (2018) concluded that the scientific literacy profile of junior high school students in Purwokerto City shows that students' scientific literacy in terms of content, context, and process still needs to be improved. Then, research conducted by Hasana et al. (2017), Fadila et al. (2020), Sabrina et al. (2021) also concluded that the average scientific literacy ability of high school students was still low, and according to Fadilah & Hidayah (2020) revealed that the use of media in the learning process was not maximized and did not guide students in mastering scientific literacy skills, causing the average high school student to have low scientific literacy skills. Several factors affect students' low scientific literacy. These factors include (1) learning habits that are still conventional where the teacher is the center of learning compared to students; (2) increasing students' desire to read and write less, causing scientific literacy skills to tend to be lacking; (3) students are not accustomed to working on scientific literacy test questions. According to students, the literacy test is more complex than the exam questions usually given by the teacher (Hasana et al., 2017), (4) students' ability to interpret the graphs/tables presented in the questions. Students are accustomed to only filling in the tables provided by the teacher. Hence, students' ability to interpret graphs/tables is also limited, and (5) learning tools based on scientific literacy are also not available,e so the learning process in class has not been able to optimize students' abilities in scientific literacy, even though teachers need learning tools based on scientific literacy in improving students' scientific literacy skills (Asyhari & Clara, 2017).

Science teaching is an inquiry into an inquiry that emphasizes the involvement of students in the discovery process through debate, experimentation in various methods, and interpretation of results rather than rhetorical conclusions. Student engagement in these core science practices can encourage student participation in the cognitive, social, and epistemic aspects of scientific thinking and reasoning to support their understanding of how knowledge is developed within the scientific community (Jiménez-Aleixandre & Crujeiras, 2017). The process of inquiry in learning can be applied to inquiry learning. The inquiry method is a series of learning activities that maximally involve all students' abilities to seek and investigate problems systematically, critically, logically, and analytically to formulate their findings confidently. Inquiry learning can require students to actively deliver scientific arguments (Børte et al., 2023; Cairns, 2019; Cooper, 2023; Gamage et al., 2020; Robinson et al., 2020).

Scientific arguments are considered a significant component of scientific literacy that supports student involvement in authentic science learning by constructing, evaluating, and refining scientific claims through various methods, practices, reasoning, and reflective participation. One of the essential aspects of scientific literacy is understanding and applying scientific argumentation skills. Argumentation is the main thing that underlies students in learning how to produce evidence, test and evaluate theories, and communicate like scientists. Someone who makes a claim is expected to provide support using evidence and reasons. Inquiry learning can require students to be actively involved in delivering scientific arguments. The inquiry method is defined as a series of learning activities that optimally involve all students' abilities to seek and investigate problems systematically, critically, logically, and analytically so that they can confidently formulate their findings. This aligns with efforts to improve students' scientific literacy skills by applying an inquiry approach (Arief & Utari, 2015).

Inquiry activities and scientific arguments can be applied using the Argument-Driven Inquiry (ADI) learning model. The Argument Based Inquiry Learning Model, according to Sampson et al. (2017), is a learning model designed to create laboratory activities that encourage the construction and validation of knowledge through scientific investigation activities, and Argument-Driven Inquiry is a learning model that can stimulate students' communicative abilities which are developed through scientific argumentation activities. The ADI model fosters scientific literacy and makes it possible to cultivate the habit of scientific thinking, providing explanatory evidence and thinking critically about suggested alternatives. Sampson et al. (2017) suggest that the learning steps of the Argument-Driven Inquiry learning model are: 1) task identification; 2) data collection; 3) argument development; 4) argumentation session; 5) reflective discussion; 6) report writing; 7) peer-reviewed; and 8) report revision.

ADI was developed by Sampson et al. (2009) as an integrated learning unit to encourage students to participate in interdisciplinary work to enhance students' understanding of essential and practical concepts. So, the ADI model can be integrated with the approach used in the society 4.0 era, namely the STEM approach. Hasana et al. (2017) also concluded that class XI students' average scientific literacy ability based on the PISA scientific literacy level category was at level 2 (low). STEM was introduced by the United States National Science Foundation (NSF) in 1990 as an acronym for Science, Technology, Engineering, and mathematics. The purpose of STEM education is for students to have scientific and technological literacy in the future; they can develop their competencies to apply them in dealing with everyday problems related to the STEM field of science. Scientific arguments are considered a significant component of scientific literacy that supports student involvement in authentic science learning by constructing, evaluating, and refining scientific claims through various methods, practices, reasoning, and reflective participation. One of the essential aspects of scientific literacy is understanding and applying scientific argumentation skills. According to Syahmani et al. (2021), the STEM approach can significantly influence students' scientific literacy abilities. Yuliati et al. (2019) also state the results of their research that STEM can increase students' scientific literacy because it can direct students in increasing their understanding of concepts, applying, analyzing, synthesizing, and concluding them according to the data obtained. Other studies found that to improve scientific literacy, namely the Argument-Driven Inquiry, Inquiry, and STEM learning models (Herlanti et al., 2019; Nurrahman et al., 2018).

Based on the description above, this learning can be integrated with the STEM approach to support the effectiveness of learning using the ADI model. This research has the novelty that learning that applies the ADI model prioritizes investigation and argumentation skills and STEM integration, which strengthens understanding based on solving real problems in everyday life and can improve scientific literacy competence. The relationship between ADI, STEM, and scientific literacy skills can be studied further using the literature review method from several previous research articles.

RESEARCH METHOD

This study uses a qualitative literature review method. The literature review research results from an analysis of various conceptual information and qualitative and quantitative data from various previously published scientific articles. Based on this, it can be said that to support the effectiveness of learning using the ADI model, this learning can be integrated with the STEM approach (Antonio & Prudente, 2021; Cahyono et al., 2021; Castro, 2023; Hikmah & Nasrudin, 2023; Pramesti et al., 2022; Supriyadi et al., 2023). The relationship between ADI, STEM, and scientific literacy skills can be studied further using the literature review method from several previous research articles. The method used in this research is a literature study that serves as a guide in studying a research problem (review of research). The type of data used is secondary data. Secondary data is data obtained by reading, studying, and understanding through other media sourced from literature, books, and documents (Creswell, 2012).

This literature review used international and national journals for the 2013-2023 publication range. The framework for the literature study on the effectiveness of ADI-STEM learning to increase students' scientific literacy from Petyko et al. (2021) includes identification, screening of titles and abstracts, full literature review, data extraction, analysis, and making conclusions as shown in Figure 1.

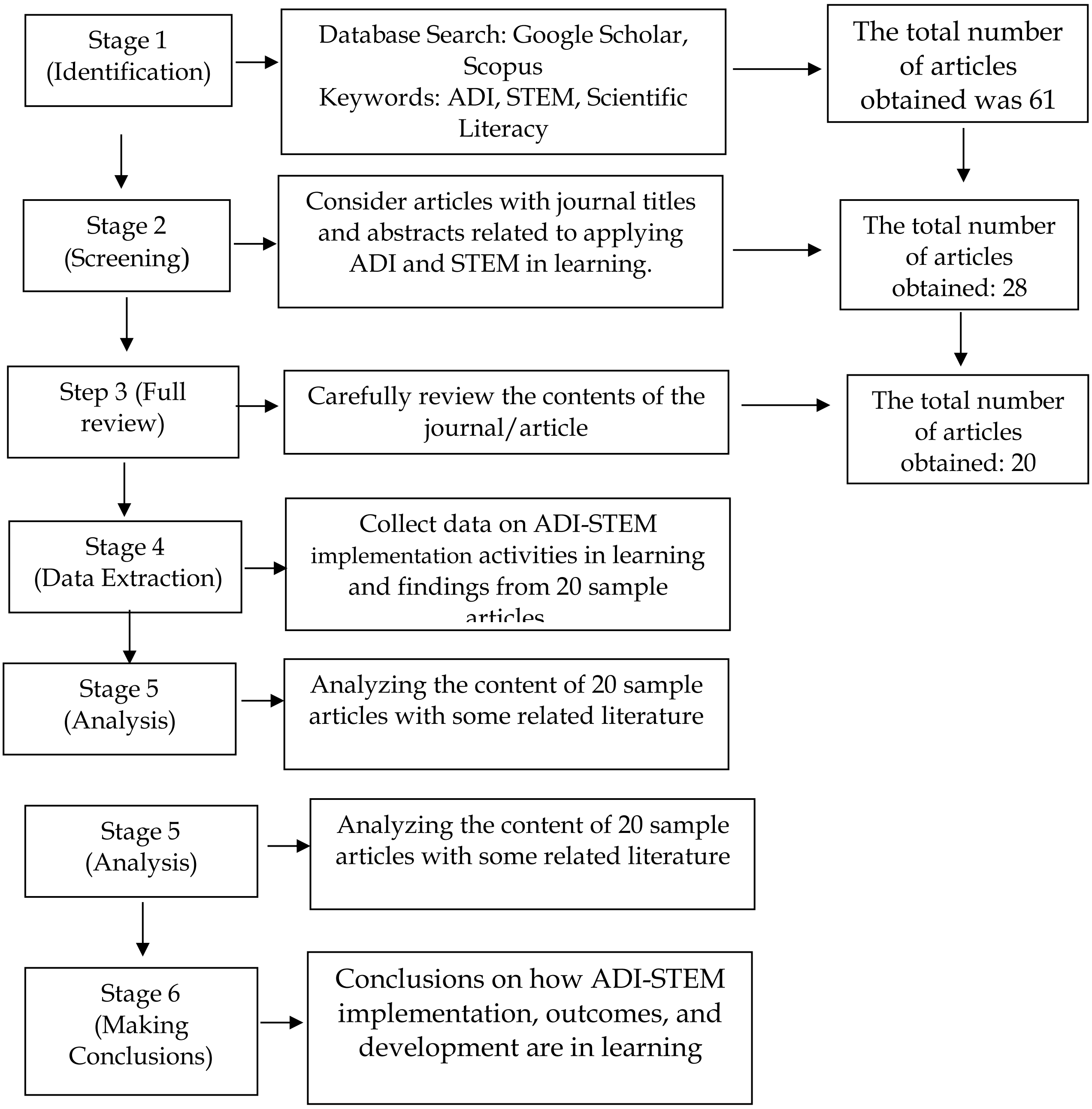

Figure 1. Research flowcharts to ADI-STEM increase students' scientific literacy (Petyko et al., 2021).

RESULTS AND DISCUSSION

Results

Based on the search results of 20 international and national articles that have been carried out, they are analyzed based on three interrelated discussions. The discussion that will be delivered is the effect of the ADI model on students' scientific literacy skills, the effect of argumentation skills on students' scientific literacy abilities, and the effect of Integration of STEM on students' scientific literacy abilities.

The Effect of The ADI Model on Students' Scientific Literacy Skills and Argumentation Skills

The results of research articles that have been found about the effect of ADI on students' scientific literacy skills and argumentation skills are presented in **Table 1.**

Table 1. The Results of an article study on the effect of ADI on students' scientific literacy and argumentation skills.

Author	Result
Hamzah et al., (2020)	The results showed that the argument-driven inquiry learning model had a significant effect on cognitive abilities and scientific literacy in the concept of plant tissue in the experimental class.
Novitasari & Admoko, (2022)	Based on the analysis results, the development of LKPD using Argument-Driven Inquiry learning obtains valid, effective, and practical categories in improving students' scientific literacy skills on Newton's law material.
Novitasariet al., (2022)	At the implementation stage using the ADDIE method, an N-gain score of 0.81 was obtained, which was included in the high category. Then, it can be concluded that the Argument-Driven Inquiry model LKPD meets valid, practical, and effective standards in improving students' scientific literacy skills.
Amelia (2018)	The pretest and posttest research designs with treatment and control class groups were used in the study. While the treatment group was taught using a module based on argument-driven inquiry, the control group was taught by a module commonly used at school. As the study concluded, using argument-driven inquiry-based modules in the learning process effectively enhances the quality of students' argumentation skills.
Utami et al., (2022)	Data analysis shows differences in students' scientific argumentation skills between the experimental and control groups.

The Effect of Argumentation Skill on Students' Science Literacy Skills

The results of an article study on the effect of Argumentation Skills on students' science literacy skills are presented in **Table 2.**

Table 2. The Results of an article study on the effect of argumentation skills on students' science literacy skills.

Author	Result
Delfita et al., (2021)	The results showed a significant positive relationship between argumentation and scientific literacy skills. In addition, argumentation skills have a statistically positive predictive effect on scientific literacy skills. It was revealed that argumentation skills acted as a partial mediating variable. As stated in the theory, argumentation skills and scientific literacy skills were found to be very closely related. Thus, students' argumentation skills can be used to predict students' scientific literacy skills.
Fadlika et al., (2022)	The results of the study concluded that there was a correlation between argumentation abilities and students' scientific literacy, with a correlation coefficient of 0.426 in the moderate category.
Mawaddah & Khairuna, (2022)	This study's results indicate a positive and significant linear effect between argumentation skills and students' scientific literacy and a significant increase in students' scientific literacy using argumentation skills.
Chin et al. (2016).	Interpretation of the qualitative data (interview and questionnaire responses) supported that argumentation as an instructional treatment focused on fundamental literacy could play a positive role in facilitating students' enhanced science understanding (derived literacy).
Hidayati, et al., (2023)	This study concludes that students' information literacy skills align with their argumentation skills.

The Effect of STEM Integration on Students' Scientific Literacy Skill

The results of an article study on the effect of STEM Integration on Students' Scientific Literacy Skills are presented in **Table 3.**

Table 3. The results of an article study on the effect of STEM on students' science literacy skills.

Author	Result
Ilma et al. (2022)	The results show that learning science with an integrated STEM can be designed and certainly can connect the disciplines.
Pujiati (2019)	Scientific literacy is a skill that must be mastered in the 21st century. So, learning is needed that can increase scientific literacy but is integrated with other skills, such as STEM learning. Many research results explain that STEM learning can improve skills and literacy.
Ismail et al. (2015).	The results of a preliminary investigation using a virtual lab related to STEM have a positive effect on increasing

Author	Result
	students' scientific literacy in the strong category. Through STEM learning, students with pseudo science and technology literacy can equip themselves to live in society and solve their problems and are ready to face the challenges of the 21st century. The results of this article's initial analysis and investigation can serve as a guide for teachers and researchers to develop models for teaching STEM learning to students. In addition, it can also be a reference for researchers in developing STEM-based virtual labs.
Sulistiyowati et al., (2018)	The results showed that applying STEM-based worksheets effectively increased scientific literacy with an N-gain of 0.43 (medium category). The highest increase was in the "explaining scientific phenomena" indicator, and the lowest was in the "concluding" indicator. The results of the student response questionnaire after using the LKS developed were 92.73 (very high category). This means that the developed LKS is effective in increasing scientific literacy.
Lestari et al., (2021)	The results of data analysis show that students' scientific literacy skills after the learning process increase significantly because each indicator of students' scientific literacy skills was developed through blended learning with a STEM approach.
Syahmani et al., (2021)	Based on the results of the research that has been done show that the STEM approach significantly affects students' scientific literacy, both viewed as a whole ($z=-4.731$; $pvalue=0.000<0.05$) or based on three aspects of scientific literacy separately ($p\text{-value}=0.000<0.05$). This study recommends that education practitioners consider using STEM in learning to train students in scientific literacy.
Sole (2021)	Based on the literature study, using STEM-based learning effectively increases students' scientific literacy. The results of the research analysis showed that the students' pretest scores had low concept understanding in the experimental and control classes. After being given treatment, the posttest scores showed a significant increase in the experimental class.
Astuti et al., (2023)	The results showed that applying the STEM approach could increase students' scientific literacy with an average N-gain of 0.74 in the high category. The average difference test results obtained a significance value of 0.000 <0.050, meaning there are differences in scientific literacy after applying the STEM approach. This proves that the STEM approach can increase students' scientific literacy and creativity as measured by three indicators. The three

Author	Result
	indicators measured are producing, planning, and producing, so the scores obtained are included in the high category. This study concludes that the STEM approach increases students' scientific literacy and creativity.

Discussion

The analysis carried out is the effectiveness of the ADI-STEM for increasing students' scientific literacy. Based on a review of the six articles in Table 1, it was found that the ADI model showed positive results in increasing students' scientific literacy skills (Hamzah et al., 2020; Novitasari et al., 2022; Novitasari & Admoko, 2022). The ADI model has two characteristics at the investigative and argumentation stages. Based on the research results, the increase in students' scientific literacy skills is due to the ADI model providing opportunities for students to develop critical thinking skills through inquiry to solve problems with scientific evidence. Authentic scientific practice requires students to engage in reasoning and practice coordinating theory and evidence to support explanations. Alternative epistemological approaches to science teaching and learning require instilling students into the practice of the scientific community so that they can design scientific investigations involving data collection, analysis, verification, and construction of evidence-based explanations. The ADI model fosters scientific literacy and enables cultivating scientific thinking habits, providing explanatory evidence, and thinking critically about suggested alternatives. In addition, the investigations carried out at the ADI model stage provide evidence that contains facts and conditions that can be observed objectively. The students can use the evidence and facts to develop their scientific arguments. Scientific literacy learning in the form of applied inquiry-based laboratory activities succeeded in increasing students' scientific literacy skills in both aspects of science content, science processes, and the context of science applications. Contextual learning by solving everyday problems is one aspect of scientific literacy competence. The investigation component of inquiry is expected to be able to increase students' scientific literacy (Setiawan & Saputri, 2020).

Next, the ADI model also provides opportunities for students to practice their scientific arguments. The ADI model provides opportunities to build explanations and various ideas while socializing in discussion groups, involving students with lower academic abilities (Safira et al., 2018). Scientific arguments are considered an important component of scientific literacy that supports student involvement in authentic science learning through the construction, evaluation, and refinement of scientific claims through various methods, practices, ways of reasoning, and reflective participation. The ADI model provides argumentation sessions for small groups to share arguments and critique the work of other groups to determine which claims are most valid or acceptable (Amelia, 2018; Utami & Dasna, 2022; Utami et al., 2022).

On the other hand, student responses to the implementation of learning are primarily students interested in the learning atmosphere and how to teach teachers to implement learning using the ADI learning model because, in general, it involves students actively in the learning process and practicum thereby increasing student interest in learning (Hamzah et al., 2020). In line with Nurhusna et al. (2018), students tend to be firm, intense, assertive, active, and confident in learning in identifying tasks, collecting data, and producing arguments. Based on the analysis of the six articles in Table 2 in the result, it is known that argumentation skills are effective in improving students' scientific literacy abilities (Chin et al., 2016; Delfita et al., 2021; Fadlika et al., 2022; Mawaddah & Khairuna, 2022; Sengul, 2019). Farida & Gusniarti (2015) define scientific argumentation as a human skill in compiling an opinion supported by evidence and real reasons and aims to defend an opinion. Meanwhile, according to Chen (2019), scientific argumentation is a communication skill that involves cognitive-individual development through tentative arguments against scientific phenomena, the validity of which can be determined by each individual through claims based on evidence and considered relevant to scientific theory.

As a significant component of scientific literacy, the scientific argument supports student involvement in authentic science learning through the construction, evaluation, and refinement of scientific claims through various methods, practices, ways of reasoning, and reflective reflection. Class discussion is a way that can be done to form argumentative learning. Students understand the epistemic goals of how and why nature works (Berland, & Hammer, 2016) and are closely related to scientific literacy competencies. Namely, explaining phenomena scientifically and strengthening science in practice can encourage student participation in the cognitive, social, and epistemic aspects of thinking and scientific reasoning to support understanding of how knowledge is developed within the scientific community. There are three reasons for the importance of argumentation in learning: (1) scientists use argumentation in developing and increasing their scientific knowledge, (2) society uses arguments in scientific debates, and (3) students in learning need arguments to strengthen their understanding.

Two meanings of argumentation from individual and social perspectives. From an individual perspective, argumentation refers to the process of reasoning regarding constructing conclusions. From a social perspective, argumentation refers to the interactive process of managing disagreements between people with differing opinions. The two perspectives are also known as the meaning of structural and dialogic argumentation. Scientific argumentation communication skills involve cognitive-individual development processes through tentative arguments against scientific phenomena, the validity of which can be determined by each individual through claims based on evidence and considered relevant scientific theories (Chen et al., 2019). Using scientific evidence in argumentation skills strengthens students' defenses and opinions on a given problem. Thus, if students have been able to use scientific evidence sequentially to strengthen their arguments, they have gone through the process of one of the scientific competencies in scientific literacy, namely data secrecy and scientific evidence. Knowledge discovered through hacking scientific evidence is used to support claims and opinions when discussing. Argumentation skills are critical in science education, so they must be taught and learned in science classes as part of scientific inquiry and literacy (Erduran & Yilmaz, 2015). Argumentation also involves a process of social interaction in which students offer, evaluate, criticize, challenge, and defend arguments through discourse. Someone with scientific argumentation skills will have communication skills, metacognitive awareness, critical thinking, cultural understanding and scientific practice, and scientific literacy. Thus, there is a very close relationship between argumentation skills and scientific literacy, and it even becomes a critical component of scientific literacy. That is, the higher the students' argumentation abilities, the higher the students' scientific literacy skills (Delfita et al., 2021). This is also in line with Kulisah et al. (2023), who stated in their research that if students' literacy skills increase, students' argumentation abilities will also increase.

In Toulmin's (2003) definition, an argument consists of elements of claims, data, warrants, and supporting evidence. In this structural definition of argument, a claim is an answer to a scientific question; evidence may be measurements and observations concerning claims, and warrants or justifications link claims and evidence to clarify why specific evidence supports the claim. These pieces are considered the components of the argument. To engage in argumentation, students must be able to put the components together meaningfully, debate or persuade peers, and critique other arguments like scientists do when engaging in academic debates (Erduran & Yilmaz, 2015). Engaging in argumentation can deepen students' conceptual understanding because when students try to persuade others, they are involved in organizing their thoughts and comparing and reconciling various other reasonable thoughts (Wang & Buck, 2016).

In Fadlika's research, Fadlika et al. (2022) found that the highest gain was obtained on the competency aspect, namely the indicator explaining phenomena scientifically, while the lowest score for each competency aspect indicator was the indicator of interpreting data and evidence scientifically. In explaining phenomena scientifically, especially in cell material, students can remember, identify, use, and apply their scientific knowledge. The indicator explaining phenomena scientifically aims to measure the extent to which students understand a material concept so that they can use their knowledge according to phenomena that occur in the surrounding environment (Adom et al., 2020; Adriyawati et al., 2020; Lestari et al., 2022; Mufit et al., 2020; Putranta & Supahar, 2019; Ramdani et al., 2021; Sunarsih et al., 2020). On indicators of scientifically interpreting data and evidence, especially cell material, students need to be more able to explain, evaluate, and provide conclusions from the data and evidence. The ability to interpret or interpret results or data needs to be improved. This indicates a need for more level in analyzing a result, which leads to the ability to argue.

Based on the analysis of the eight articles in Table 3 in the result. STEM education can improve math and science achievement, cultivate students' attitudes toward STEM subjects, and enhance higher-order thinking skills. STEM education can also develop 21st-century skills. The STEM approach is an integrated teaching and learning process approach that integrates content and skills in science, technology, engineering, and mathematics. Based on an analysis of six scientific articles, both national and international, it was found that the STEM approach can improve students' literacy skills (Astuti et al., 2023; Khaeroningtyas et al., 2016; Lestari et al., 2021; Pujiati 2019; Sole, 2021; Sulistiyowati et al., 2018; Syahmani et al., 2021) The goal of STEM education is for students to have scientific and technological literacy in the future, so they can develop their competencies to apply them in dealing with everyday life problems related to the field of STEM science.

Integrating STEM learning can increase student motivation in learning. Especially in the Engineer's step, it can be seen that students are more creative in designing. Following the research of Khaeroningtyas et al. (2016) that when students are more motivated to be able to design a thermometer scale and allowed to access information through Internet (technology) at this stage provides an increase in student knowledge literacy can occur There are several advantages in STEM learning, including creating students become better at solving problems, innovators, inventors, confident, logical thinking, and technological literacy; can also improve students creative thinking skills (Oktavia, 2015). Outside planning, Design engineering makes researchers have to be fast and responsive in designing the learning process to run smoothly. Learning by integrating STEM will bring a positive impact on students learning process (Aguilera & Ortiz-Revilla, 2021;

Baran et al., 2019; Kefalis & Drigas, 2019; Kencana et al., 2020; Struyf et al., 2019; Widya et al., 2019). Mastering multiple and interdisciplinary relationships increases scientific literacy, so STEM learning is very appropriate. The benefits of STEM education include integrated training in "topics," not subjects, using scientific and technical knowledge in real life, developing critical thinking and problem-solving skills, increasing self-confidence, active communication and teamwork, developing interest in technical disciplines, creative approaches, and innovative projects, bridges between education and careers, prepares children for technological innovation in their lives and is supported by adequate technology (Morze et al., 2018).

Based on an analysis of 20 articles that have been done opens a picture of the effectiveness of ADI-STEM learning to increase students' scientific literacy. This study reveals an urgent need to develop appropriate learning tools for implementing ADI STEM in learning. In addition, researchers and practitioners need to be more proactive in teaching content, and developing learning tools is an opportunity for ADI - ADI-STEM-related research. When learning can facilitate scientific literacy through ADI-STEM, this can have implications for student learning processes and outcomes as well as habits to improve scientific literacy competencies.

CONCLUSION

Fundamental Finding: Based on the results of the article analysis, several important points can be concluded, including the application of the Argument-driven Driven Inquiry learning model, which can improve scientific literacy skills and students' argumentation abilities. Scientific argumentation is an essential component of scientific literacy that supports student engagement in authentic science learning. In addition, integrating STEM into the learning process can also improve students' scientific literacy skills. **Implications**: This research is expected to be used as a basis for making learning tools that are per the characteristics of ADI-STEM for scientific literacy so that it is expected to produce quality learning tools. **Limitations**: This research is limited to more than just discussing the integration of ADI-STEM in increasing scientific literacy. **Future Research**: Therefore, it is hoped that there will be further research discussing the effect of ADI-STEM on other thinking skills, such as argumentation skills, so that there will be more literature.

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