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The Existence of Health Literacy in Science Education: A Systematic Literature Review

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Abstract: Health literacy is an interesting thing to study in science learning. The purpose of this *Systematic Literature Review* (SLR) is to determine the trend of health literacy publications in *scopus* indexed journals and the potential for empowering health literacy in science learning. The keywords used were "*health literacy*" and "*student*" on the search menu in the *scopus database* and met the criteria for further analysis as many as 22 articles. Researchers use the PRISMA model to include and exclude articles. The findings obtained are the trend of health literacy publications in science learning in the form of types of research, year distribution, keywords, researcher nationality and international collaboration. The potential for health literacy in science learning can enrich students' knowledge about disease prevention, the integration of science learning with technology can improve students' skills in obtaining health information, community involvement with science learning has the potential to increase student awareness and responsibility, innovative science learning supports the empowerment of student health literacy. The implication in this study is that health literacy can be empowered through innovative learning models in science learning.

Keywords: Health literacy; Research trends; Science learning; Systematic literature review students

Introduction

Education always adapts to the changing times (Suhandi & Robi'ah, 2022). Students in today's era need to have a thorough understanding to overcome various challenges that arise along with changing times. A challenge in the 21st century relates to aspects of public health (Sahoo, 2010). An important 21st century skill to develop is literacy skills. One of the important literacies to be empowered in learning is health literacy (Faradila et al., 2023).

Health literacy is an individual's cognitive and social skills to access, understand, assess and use health care information in making decisions related to health problems (Sørensen et al., 2012). A good understanding of health has a significant effect on the individual level and social level (Ismayati et al., 2023; Pelikan et al., 2018). The level of public health in Indonesia is still at a low level. Based on The Legatum Prosperity Index 2023 report, Indonesia is in 87th position out of 167 countries. The low global health literacy during the COVID-19 pandemic also indicates the need for individual health literacy development (Okan et al., 2021; Syah et al., 2020). Low health literacy is thought to be due to a curriculum that does not yet cover aspects of health literacy (Suwono et al., 2023). Education should provide students with the necessary information and encourage them to actively participate in maintaining their health (Inten & Permatasari, 2019).

The main focus in science education is to support students in making decisions, both on a personal and social level, related to science issues (Devi et al., 2024). Health literacy plays a role in developing health skills and can be facilitated through education (Rudianto, 2022). Efforts to empower individual health literacy can

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be done through educational programs or learning practices (Isnaini & Rahayu, 2023).

The productive age group predominates and plays a crucial role in improving health literacy (Yuniarti et al., 2024). Health literacy empowerment enables students to achieve a better understanding of the quality of health and well-being as well as increased motivation, skills, competencies, knowledge, and personal development (Rosas, 2015). Students with higher levels of health literacy can make decisions regarding disease prevention and improving their quality of life (Uysal et al., 2020).

The research results conducted by Sarnkhaowkhom et al. (2022) indicate that the integration of health literacy issues in learning has the potential to train students' health literacy. A good understanding of health literacy has been shown to be effective in improving communication between doctors and patients (Perdana & Herawati, 2018). The application of the Team Based Learning (TBL) model can also increase the awareness, attitude, and confidence of nursing students in interacting with patients (Chang et al., 2023; Wahyuningsih, 2019). In addition, research by Suwono et al. (2023) confirms that research on health integrated in science lessons in schools is still limited. This fact makes health literacy need to be integrated with learning because it covers topics related to disease and health.

Understanding the concept of science involves understanding complex material and its application in everyday situations (Kamal et al., 2024). The findings of Nurhaeni (2022) explained that science learning has the potential to be developed with health literacy because in science subjects there are many issues that can be developed from a health aspect. So that the potential possessed by health literacy becomes an interesting aspect to explore the extent to which science education introduces the concept of health literacy. The publication needs to be analyzed to explore crucial information about the application of keseatan literacy in the context of education fields from various categories. One of the recommended techniques for studying and analyzing is to perform SLR.

Therefore, this Systematic Literature Review aims to analyze research trends related to health literacy in scientific disciplines and the potential for health literacy in science learning. SLR provides a number of advantages for researchers, especially in presenting a comprehensive picture of the literature contained in the database that is interesting to research (Pratiwi & Ikhsan, 2024). In an effort to show novelty in research and provide solutions in science education, this study was conducted to examine trends in health literacy within the discipline of science, as it can serve as an informational map indicating the current position of health literacy in education.

Method

This study used the SLR method with the PRISMA model (Xiao & Watson, 2019). As used by Hardianto et al. (2024), this SLR is a systematic and explicit approach to identify, select, and critically evaluate related research based on formulated questions (Purssell & McCrae, 2020). SLR helps in synthesizing research findings to show evidence meta-and identify topics that require further research (Snyder, 2019). The formulation of research questions serves to determine the scope and focus of research. The research questions developed are as follows: RQ1: What are the publication trends related to health literacy in science learning in Scopus indexed journals? RQ2: How is the potential for empowering health literacy in science learning?

Search Articles and Inclusion Criteria

Researchers used the keyword "health literacy" on the search menu of the SCOPUS database. The data obtained is stored in the form of *CSV and *RIS which is then linked to the Reference Manager (Mendeley). VOS-viewer software is used to visualize data to make it more clear, interesting and communicative. As for our search history in SCOPUS, namely "TITLE (health literacy) then ("health literacy" + "student") AND (LIMIT-TO DOCTYPE, "ar")) AND (LIMIT-TO LANGUAGE, "English")) AND (OA, "all")) AND (LIMIT-TO (SUBJAREA, "SOCI")). The researchers found 53 articles that used terms and patterns on this search. We use preferred reporting items for systematic reviews and meta-analysis (PRISMA) for inclusion and exclusion. This PRISMA refers to Gallagher et al. (2016). The inclusion and exclusion processes used by researchers are shown in Figure 1.

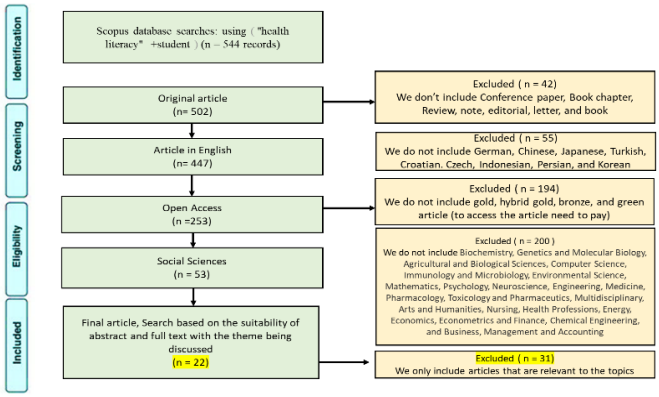

Figure 1. Systematic review flow diagram using the PRISMA model (Source: Results of researcher elaboration)

Figure 1 illustrates the author's initial search that found 544 articles using the keywords "health literacy" + "student". The author used the original article criteria and found 502 articles, with the exception of 42 articles.

The author only takes articles published in English to avoid misinterpretation. Articles that meet these criteria are 447 articles. Furthermore, the author uses the criteria of articles that can be accessed for free (open access), the result is 253 articles, resulting in the exception of 194 articles.

The author further provides criteria by specifying only select articles that belong to the field of social sciences (social sciences) and found 53 articles. Thus, there are 200 articles that are subject to exceptions. The author uses inclusion criteria in the field of social science in English, resulting in 53 articles that meet the criteria, meaning that there are 200 articles omitted by the author. In the last stage, the author re-examined 53 articles that had been filtered based on the research theme to be analyzed and the author obtained 22 articles that met the predetermined criteria.

Result and Discussion

RQ1: Health Literacy Publication Trends in Biology Learning Year Distribution

The results of a review of various articles based on year distribution are described in Figure 2. Figure 2 shows the number of articles published from 2016 to 2023. Based on Figure 2, it can be seen that the number of publications on health literacy in science learning varies. There is unique data where in 2022 and 2023 the number of articles published is the same and reaches the highest number. In addition, there was a decrease in article publications from 2017 to 2018 even only 1 article was found that discussed health literacy in science learning. Publications related to this theme, may not increase considering that this data search will be carried out at the end of December 2023. The number of articles will stagnate in the scopus database and it is possible that it will only be found in 2024. So, it can be said that research related to health literacy in science learning is still not in demand by researchers.

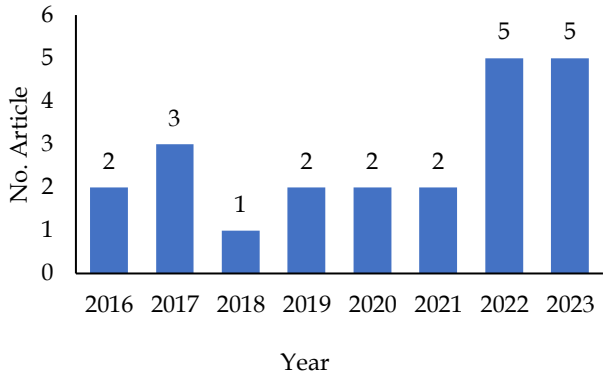

Figure 2. Distribution of article years

Research Method

The results of a review of 22 articles based on Research Methods on the theme of health literacy in science learning are described in Table 1.

The types of research commonly used related to the theme of "health literacy and student" are presented in Table 1. Studies on health literacy are more likely to use a quantitative approach (13 articles). Mixed method research is also fairly large, as can be seen from the discovery of six articles that use mixed method research types. Research related to health literacy is not only sufficiently approached using a quantitative approach but needs to be strengthened by qualitative approaches and data. There is an inequality where there is only 1 article that examines health literacy using a qualitative approach only. Then researchers also have an interest in using case studies (1 article) and development research (1 article).

Table 1. Types of Research on the Theme of Health Literacy

Types of Research	N	Reference
Quantitative	13	(Bayındır Çevik et al., 2022; Bouclaous et al., 2023; Budhathoki et al., 2019; Mather et al., 2018; Moretti et al., 2023; Mullan et al., 2017; Naveed & Shaukat, 2022; Panahi et al., 2020; Sarhan et al., 2021; Sharma et al., 2019; Suwono et al., 2023; Uysal et al., 2020; Yang et al., 2022)
Mixed Method Approach	6	(Abdoh, 2022; Chang et al., 2023; Milford et al., 2016; Mokmin & Ibrahim, 2021; Papa et al., 2023; Runk et al., 2016)
Qualitative	1	(Joseph et al., 2016)
Case Study	1	(Park et al., 2017)
Development research	1	(Sarnkhaowkhom & Suwathanpornkul, 2022)

Keywords

Figure 3 shows that keyword trends are generally used by authors in writing the theme "health literacy" + "student". Figure 4 also shows that there are three main keywords (health literacy, adolescent, human, and student) that appear most often and are related to each other.

Figure 4 also explains that the keyword health literacy also has a fairly strong relationship with humans and students. An adequate level of health literacy can be a strategy for students. Students can become agents of change in society by sharing health knowledge and skills with others. In addition, this keyword is a highlight that reinforces that researchers are trying to connect/apply

health literacy to students as individuals who want to be empowered in the learning process. This relationship needs to be reviewed so that it provides an in-depth picture to readers or researchers who have an interest in the field of health literacy in science learning.

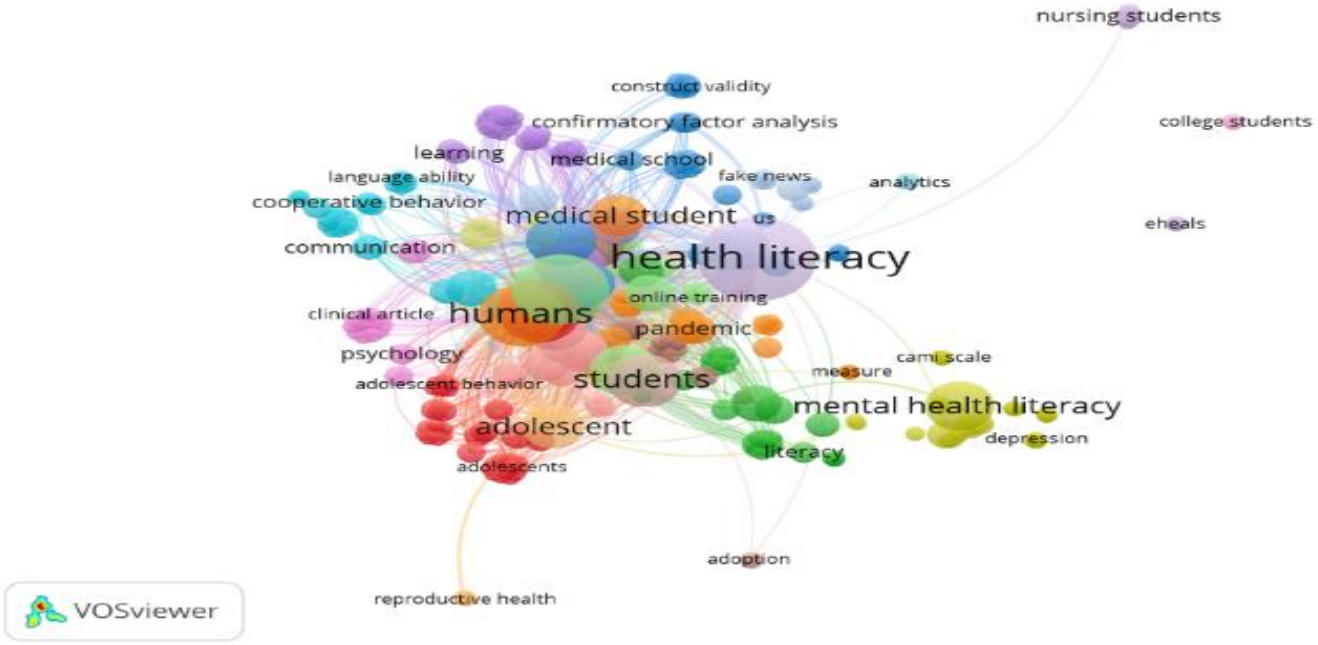

Figure 3. VOSviewer display for "co-occurrence →keyword" analysis type (Source: Results of researcher elaboration, using VOSviewer software)

Figure 4. VOSviewer display for analysis type "co-occurrence →keyword: CO" (Source: Results of researcher elaboration, using VOSviewer software)

Nationality of Researchers and International Collaborations

Research trends related to the author's nationality related to the theme "health literacy and student" are presented in Table 2. Based on Table 2, it is shown that there are 25 countries of origin of the author. If expressed as a percentage, the number is only 12.95% of the total 193 countries in the world. The six countries with the most authors publishing on health literacy are Taiwan (12.39%), Italy and Australia (10.62%) and Turkey, Nepal and Iran (6.19%). The results of a review of 22 articles based on the author's nationality and continent on the theme of health literacy in science learning are described in Table 2.

Table 2. Nationality and Continent of the Author on the Theme of Health Literacy in Science Learning

Country	Continent	n author	%
Taiwan	Asia	14	12.39
Italy	Europe	12	10.62
Australia	Australia-Oceania	12	10.62
Turkey	Eurasia	7	6.19
Nepal	Asia	7	6.19
Iran	Asia	7	6.19
Lebanon	Asia	5	4.42
Japan	Asia	5	4.42
New York	America	5	4.42
Indonesia	Asia	4	3.54
New Zealand	Australia-Oceania	4	3.54
Missouri	America	4	3.54
Pennsylvania	America	4	3.54
California	America	3	2.65
Rhode Island	America	3	2.65
Ireland	Europe	2	1.77
Palestine	Asia	2	1.77
Tasmania	Australia-Oceania	2	1.77
Malaysia	Asia	2	1.77
Laos	Asia	2	1.77
Pakistan	Asia	2	1.77
Thailand	Asia	2	1.77
Germany	Europe	1	0.88
The Netherlands	Europe	1	0.88
Saudi Arabia	Asia	1	0.88

The following figure 5 shows the collaboration of researchers in writing the article.

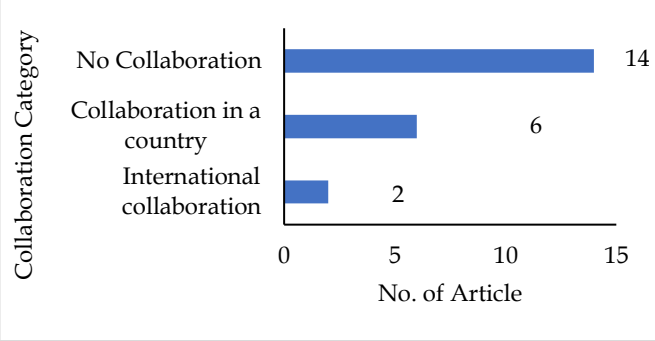

Figure 5. Collaboration of researchers in writing articles (Source: Results of researcher elaboration, using Ms. Excel)

Figure 5 shows the collaboration carried out by researchers in writing articles related to the theme of "health literacy and student", both cross-country collaboration, collaboration between universities in one country, and authors who conduct research/publication individually. Furthermore, the collaboration of researchers in writing articles is described in Figure 6.

Based on Figure 6, there are more articles published with non-collaborative status (14 articles). However, if it combines international collaboration (two articles) and collaboration within one country (six articles) the number is so significant that it cannot be ignored. If you analyze the 22 articles found (the results are presented in Figure 10), it can be concluded that it is rare to find articles published by one author only (only one article).

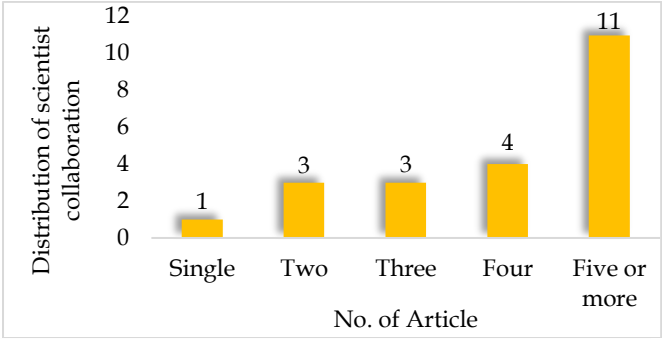

Figure 6. Collaboration of researchers in writing articles (Source: Results of researcher elaboration, using Ms. Excel)

RQ2: Potential Application of Health Literacy in Science Learning

Researchers analyzed 22 articles and tried to collect various information on the extent of the existence of the application of health literacy in science learning today. Table 3 presents important information obtained from the 22 articles reviewed. There are 4 things that can be formulated related to health literacy in science learning which are described in Table 3.

Discussion

RQ1: Publication Trends Related to Health Literacy in Science Learning

Year Distribution

There are 22 articles selected and analyzed in this systematic literature review. As shown in Figure 2, the number of articles published is fluctuating or tends to change in number erratically from year to year. However, trends in the past two years show that studies on health literacy in science learning have increased. Proving the interest of researchers in this theme is getting better. Other factors also stem from the COVID-19 pandemic. The importance of understanding health literacy is evident during the COVID-19 pandemic (Anisah et al., 2021).

The delivery of inaccurate information, disinformation, and harmful information through social media and mass media has further worsened the situation among the public amid the pandemic crisis (Ditiaharman et al., 2022; Naeem et al., 2021). Therefore, several innovations and research in health literacy, especially in the field of science learning, emerged as a step to survive in the midst of the COVID-19 pandemic crisis. One of them is the use of the web tool "dottoremaeveroche" (DMEVC) to help make it easier to get health information that has been tested for validity (Moretti et al., 2023). This support is based on the fact that health literacy has become a theme of world

attention, especially in the field of education (Batubara et al., 2020; Papa et al., 2023). Akhmad et al. (2021) and Naveed et al. (2022) also argues that improving the ability of individuals to cope with complex health situations such as global pandemics is more needed than ever, so health literacy needs to be integrated into school curricula to train students in responding to pandemics and infodemic circulating.

Table 3. Important Information from Each Article

The Relation of Important Information to Existence	The Relation of Important Information to Existence
Health literacy education helps students achieve more optimal health outcomes and provides support for the sustainability of health systems (Papa et al., 2023) Science biology material was chosen as a platform for health literacy development because it covers topics related to disease and health (Suwono et al., 2023) An understanding of emotional and social well-being can help students understand the impact of health aspects at the individual and community level (Sarhan et al., 2021) The development of health literacy in students is not only effective in increasing students' understanding of health information but also helps students to be responsive to complex disease issues (Budhathoki et al., 2019) Learning integrated with health literacy will prepare students to actively participate in society with deeper knowledge of health and disease prevention (Mather et al., 2018) The integration of health literacy concepts in science learning can equip students with skills in caring for themselves and those around them (Mullan et al., 2017) Learning related to health literacy can provide a solid foundation for students' understanding of osteoporosis prevention and preventive behaviors that can be adopted in daily life (Panahi et al., 2020) The application of health literacy concepts into science learning in schools can help students develop better health assessment skills and understand the impact of lifestyle behaviors on health (Uysal et al., 2020) Health literacy education to students can provide a basis for understanding the scientific aspects of disease and prevention, prevention and treatment of disease (Naveed & Shaukat, 2022) Learning combined with health literacy can increase students' scientific understanding of health and form positive habits early on (Park et al., 2017) The ability to seek health information from credible sources effectively increases students' digital health literacy (Bouclaous et al., 2023)	Science learning combined with health literacy can enrich students' knowledge about disease prevention and support students to adopt a healthy lifestyle physically and mentally
The integration of internet technology in the provision of health information can be an effective means of expanding students' understanding of health-related science concepts (Abdoh, 2022) The use of the "dottoremaeveroche" (DMEVC) web tool proved effective in improving students' digital health literacy skills (Moretti et al., 2023) The use of effective health chatbot technology can provide education to students and improve their health literacy (Mokmin & Ibrahim, 2021) The application of electronic health literacy (eHealth) can provide students with insight into how technological developments affect scientific understanding and health in the digital age (Sharma et al., 2019) Students' skills in accessing health services and information have an important role to play in health decision making (Runk et al., 2016)	The integration of science learning with technology can improve students' skills in accessing and assessing health information to make decisions related to health issues
Appropriate health literacy training programs can assist students in identifying the risks of irrational drug use and optimizing the correct use of medication (Bayındır Çevik et al., 2022) Science learning activities through direct practice collaboration with the community can provide significant benefits in improving students' understanding and skills related to health literacy (Milford et al., 2016) Training and instillation of health literacy issues in learning will train students to develop health literacy skills and awareness (Sarnkhaowkhom et al., 2022)	Science learning that involves collaboration with the community can increase awareness and responsibility for the health of themselves and those around them
The presentation of health information becomes more effective if it is integrated in the educational curriculum to prepare students as competent agents of change in supporting public health (Joseph et al., 2016) The use of innovative model approaches in learning can strengthen students' communication skills in conveying health information more effectively (Chang et al., 2023) The use of innovative instructional modules effectively equips students to better apply health information (Yang et al., 2022)	Science learning innovations can support the empowerment of students' health literacy

Type of Research / Method

Research related to health literacy in science learning is mostly carried out using a quantitative approach. The quantitative approach allows researchers to see the sustainability of the "effect of treatment" measured objectively through pattern analysis and statistically significant relationships between the variables being studied, so as to produce solid empirical evidence (Leedy et al., 2015). The quantitative approach also provides a solid basis for researchers to make generalizations to larger populations (Mat Roni et al., 2020). According to Naveed et al. (2022) quantitative research design survey methods on health literacy to conduct research are used to study larger and geographically dispersed populations by selecting small samples. Meanwhile Papa et al. (2023) used a mixed-method research design to test nine learning units from educational programs. The theme of health literacy in science learning can indeed use qualitative or quantitative or quantitative or a combination of mix methods, depending on the goals and needs of the researchers.

Keywords

Based on Figure 3 and Figure 4, there are three main keywords that are dominant and interrelated, namely humans, students and adolescents. Humans become important objects in this keyword. Health literacy has a powerful impact on health, both at the individual and community level (Pelikan et al., 2018; Prasanti & Fuady, 2017). Individuals who have low levels of health literacy tend to be more susceptible to disease, poor health conditions, and decreased quality of life (Rüegg & Abel, 2019). Healthy behaviors certainly do not develop on their own; various efforts are needed to cultivate healthy living habits in the community (Eny et al., 2023). Humans as part of society also play a role in health literacy. The amount of misinformation on the Internet, as well as the lack of critical judgment has had an alarming impact on the community, for example by panic shopping, hoarding supplies of medical devices or drugs, to the use of drugs without a prescription (Cuan-Baltazar et al., 2020; Hou et al., 2020). Therefore, health literacy and critical information become very important to form more responsive and intelligent behaviors.

Human buzzwords also pertain to teenagers and students. The adolescent stage of students is a crucial target in health literacy research as an effort to promote health, as adolescence is considered an important stage in the development of human health (Khairina et al., 2022; Nur-Rohmah et al., 2022). In addition, the most important goal in science learning is to help students make choices, both personal and social about science/health issues (Loho et al., 2021). Increasing health literacy levels also has the potential to develop health-supportive skills and behavior patterns (Farmani & Laksmini, 2023). These skills can be improved through education. Students can enhance knowledge, form attitudes, and hone skills through classroom learning processes specifically designed with curriculum focused on health topics or integrated into specific subjects, such as science or biology (Okan et al., 2018; Sulistyowati et al., 2024; Videto & Dake, 2019).

Author Nationality and Collaboration

Based on Figure 5, the Asian continent is the country that has the most publications on health literacy in science learning, especially Taiwan. However, the fact is that research projects on health literacy curriculum in medical education in Taiwan and around the world have not yet been fully introduced (Yang et al., 2022). Facts are also in line with the opinions of Chang et al., (2023) that the development of health literacy education still has not received full attention and research related to health literacy education is very rarely carried out. So, it is not surprising that as many as 51.6% of adults in Taiwan have inadequate or problematic health literacy (Wu et al., 2020).

Indonesia has only 1 publication related to health literacy in science learning. Like in Taiwan, Indonesia's public health level is still very low based on health data reported by the *Organization for Economic Cooperation and Development* (OECD) (OECD, 2014). Meanwhile, Indonesia faces malnutrition-related problems in various age groups of the population. For example, about 25% of adolescent girls and boys have stunted growth, while other groups (about 5% of women and 11% of men) are underweight, and about 11% of both sexes are obese (Maehara et al., 2019; Werdhani, 2019). Even though the potential for health literacy in science learning can be an alternative solution to this problem. Health literacy education plays an important role to support in raising awareness and understanding of nutrition-related health status (Hasanuddin et al., 2023; Murcittowati et al., 2023). This role can also be applied in science learning programs, especially through biology subjects because food and nutrient intake, as well as physiological processes are part of important themes in biology learning (Mukholid, 2024; Syarif et al., 2024; Tsui & Treagust, 2013).

Based on Figure 6 of collaboration status, only 6 articles were written from collaboration between countries and 1 article from international collaboration. Dominant articles are written by authors from the same country. The reason is likely because health systems differ from country to country and depend on several factors. This fact is in line with Mather et al. (2018) which argues that geographical location and population distribution play a role in determining the level of health, well-being and even the level of socioeconomic

status (SES) of a country. Judijanti et al. (2024), Runk et al. (2016) also argues that public health profiles and access to services and information are important considerations when measuring health literacy. In addition, although there are some articles written only by authors from one country or even one university, it seems that authors still collaborate between fields of knowledge.

RQ2: Potential Application of Health Literacy in Science Learning

The results of the analysis (seen in Table 4) show four important points in the existence of health literacy in science learning today. First, science learning with health literacy can increase students' understanding of disease prevention and support students to adopt a healthy lifestyle physically and mentally (Komala et al., 2023; Prasanti & Fuady, 2017). This fact is in line with the opinion of Schwartzberg et al. (2007) that individuals' inability to understand health information makes it difficult for them to manage health care needs effectively. Understanding health literacy is important in preventing disease and facilitating the use of available health services. If more people can apply health information appropriately, health inequalities can be minimized (Amini et al., 2024; Batterham et al., 2016). In addition, several studies have noted the negative impact of low health literacy in adults. However, the research conducted is still limited to the adolescent group. Though adolescence is an important stage in health development to prevent worse health effects in the future (Okan et al., 2021). The integration of health literacy into science learning allows students to gain a better understanding of disease prevention and support healthy lifestyles (Berkj et al., 2010; Mancuso, 2009).

Second, science learning that utilizes technology can empower students' skills in accessing and assessing health information to make decisions related to health issues. Adequate digital health literacy can enhance and empower individuals in making their own health decisions (Choukou et al., 2022; Riady, 2021). Based on research by Ghahramani et al. (2020) and Lestari et al. (2023) that the use of *smartphones* has a positive impact on the tendency to seek health information online, also has an impact on improving the quality of life, especially among adolescents. Furthermore, Okan et al. (2020) and Rosário et al. (2020) argues that students who frequently use social media are less likely to have sufficient health literacy in assessing the accuracy of information. Smartphones are recognized to have made access to health information almost easy. But misinformation is also easy to obtain, resulting in undesirable health outcomes (Chong et al., 2020; Leonita & Jalinus, 2018). Students during learning still need guidance in using information sources correctly, especially in terms of parsing and understanding the abundant information on the internet (Abdoh, 2022; Hidayatullaili et al., 2023). Therefore, it is important to associate learning with the help of appropriate technology to improve their skills in making health-related decisions.

Third, science learning that involves cooperation with the community can increase awareness and responsibility for the health of oneself and those around him. Schools are an optimal place to encourage and improve health literacy (Bayındır Çevik et al., 2022; Retmana, 2022). Students can become agents of change in society by raising awareness and correcting misperceptions related to circulating health information (Isni & Laila, 2022; Mostafa et al., 2021). A project conducted at Harvard also suggests one way to train health literacy skills to students is through building relationships with other students or communities to provide information nationally and effectively (Uysal et al., 2020).

The last point, empowered health literacy in science learning supported by innovative approaches has the potential to strengthen students' skills in conveying health information. Several studies have used various methods in teaching health literacy. In general, the didactic approach is accompanied by additional activities, such as case discussions, role-playing, and videos (Scott, 2016; Toronto & Weatherford, 2015) and teaching using game-based learning (Burgess et al., 2020). Research results by Chang et al. (2023) on health students also prove that health literacy courses with the Team Based-Learning model are effective in training health literacy and skills in communicating with patients. Therefore, health literacy materials can be integrated into science learning using innovative and meaningful teaching methods (Frantz, 2015).

Conclusion

Based on a systematic literature review, it can be concluded that there are fluctuations in the number of publications on health literacy in science learning over the years, and quantitative research is the most dominant, followed by mixed-method research, thus common keywords include health literacy, adolescent, human, and student, Furthermore Taiwan ranks highest in publications, and the authors found most of the published articles came from the same country and university. Researchers also have identified potential implementations of health literacy in science learning, such as expanding students' knowledge about disease prevention and healthy lifestyles, integrating science learning with technology to enhance health information skills, increasing student awareness and responsibility through community involvement, and supporting

student health literacy through innovative science learning.

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Conflicts of Interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

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