

# Strengthening Digital Literacy Through Scientific Literacy For Indonesian Emas 2045 In Elementary School

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**Abstract.** The biggest obstacle in improving education is synchronize the grand design and the blueprint for education. The goal of national education does not run well without guidance. In realizing Indonesia Emas 2045, the development of technology and knowledge a must for creating creative industrial society. This study is a systematic review study for analyzing the influence of scientific literacy and digital literacy for Indonesia Emas 2045. The article searches through the Google Scholar database. It found 4590 journal articles. After inclusion and exclusion done, 12 journals obtained for systematic review. The results found that there is relationship between digital literacy and scientific literacy for Indonesia Emas 2045. The conclusion is the increase of digital literacy, born new learning methods and media that improve scientific literacy. By increasing scientific literacy, learners' creative thinking skills also increase so ability in one of Indonesia Emas 2045 achieved, the creative entrepreneurs.

**Keywords:** Digital Literacy, Scientific Literacy, Indonesia Emas 2045

## 1 Introduction

The states goals are the motivation for a country to develop and innovate. This goal will become a reference for a country to make various improvements in various main sectors of the country, such health, education, economy and social culture. Indonesia's goals and dreams for 2085 are sovereign, advanced, just and prosperous. To achieve this, a medium-term plan is needed. The medium-term plan that was launched was Indonesia Emas. In order to prepare for the rise of the golden generation in 2045, it is necessary to develop education in the future perspective, namely, to create a quality, advanced, independent, and modern Indonesian society and to increase the dignity of the nation. Success in building education will make a major contribution to the achievement of overall national development goals[11].

The achievement of Indonesia Emas be realized by various efforts, such increasing student literacy. However, based on data obtained from PISA data, the scientific literacy of Indonesian students is still less when compared to the international average score. This result supported by TIMSS (Trends in International Mathematical Science Study) which is coordinated by the Association for the Evaluation of Education Achievement (IEA) that Indonesia ranks 40 by 42 countries value of 402 students. To improve scientific literacy, various studies for scientific literacy of students at Elementary School. One of the studies that correlate is digital literacy.

In Covid 19, everyone is required to be able to understand digital literacy either by self-taught or the learning process. Digital literacy is needed so that people have a critical attitude in responding to any information and interactions that exist. Thus, it can be initiated that there is a link between scientific literacy and digital literacy in achieving Indonesia Emas 2045.

#### **Understanding Of Scientific Literacy**

PISA (Program for International Students Assessment) is a program initiated by the OECD which aims to evaluate the education system participated by more than 70 countries. Indonesia is one of participated in the PISA in 2008. One of the programs compiled by PISA is scientific literacy. Scientific literacy in board terms and argued that an open-ended approach, free of benchmarks and high-takes testing, allows teacher and students more freedom to choose form a wide variety of science content and methodologies.

This statement means that scientific literacy is an approach which is open, free from benchmarks and has high testing, allowing teachers and students to have more freedom to choose a variety of scientific content[5]. Scientific literacy is an element of life skills that must be the key outcome of the Education process up to the age of 15 years old. Therefore, students aged 15 years (towards the end of compulsory education) are deemed necessary to have an adequate level of scientific literacy, both for those who will continue their studies in the field of science or those who are not[11].

The importance of scientific literacy is to realize science-literate society, sciece learning also trains learner to mates and solve the problem using higher order thinking skill. It not only understanding the concepts, but also know how to apply the relevance of science learning in daily life and social problem[11].

#### **Understanding Of Literacy Digital**

The concept of literacy was born about 3000 years ago, when the ability of persuasive rhetoric played an important role in communication. In the Guttenberg printing era, literacy was redefined as the ability to read and write. Therefore, the invention of portable cameras made it easy to produce and distribute images which later introduced consoles for visual literacy. According to Mohammadyari and Singh[23], digital literacy is the ability to use digital devices and equipment to search, evaluate, use and create information.

Furthermore, Tang and Chaw [5] stated that digital literacy is a prerequisite skill that must be possessed learn effectively in distance learning. Hague and Payton[13] argue that digital literacy is ability to apply functional skills on digital devices to find and select information, think critically, be creative, collaborate with others, communicate effectively ,electronic security responsive and socio-cultural context.

Based on the various definitions and explanations above, digital literacy is the interest, attitude and ability of individuals to use digital technology and communication tools such as smartphones, tablets, laptops and desktop PCs to access, manage, integrate, analyze, evaluate information, build new knowledge, create and communicate with others in order to participate effectively in society. And with digital literacy, it can make it easier for educators to plan and prepare teaching materials so that the learning process is more active and creative.

There are five digital literacy competencies by Hobbs[15]:

- a. Access, the competence to search using media and technology and share appropriate and relevant information with others.
- b. Analyze & evaluate , understanding the message through critical thinking to analyze the quality of the message, honesty, credibility, and point of view, then consider the potential effects or consequences of the message.

- c. Create (content creation), the process of producing content using creativity and self-confidence to express oneself, supported by awareness of purpose, readership, and compositional techniques
- d. Reflect, applying social responsibility and ethical principles of own identity and life experience in their communication behavior.
- e. Act, is the process of working individually and collectively to share knowledge and solve problems in the family, workplace and community, and participate as members of society at local, regional, national and international levels.

### **Integration of Literacy with Indonesia Emas 2045 Program**

Indonesia's sustainable development in achieving Indonesia Emas 2045 is based on the Document Sustainable Development Goals (SDGs) with one of the focus goals in improving the quality of education. The agreement implementation Peraturan Presiden No. 59 of 2017 about the Achieving Sustainable Development Goals, managed global goal of Education, to ensure the quality of inclusive and equitable education and to increase lifelong learning opportunities. Obtained quality education, great progress has been made. one of basic literacy skills in literacy.

Various programs held to improve public literacy. In the aspect of digital literacy, the government has held a digital literacy webinar program to provide an understanding in social media. In elementary schools, online final exam socialized to students in Indonesia. In scientific literacy, implementing scientific literacy-based questions in various test questions. Both semester exams, national exams to CPNS exams. This program due to all citizens have well literate from an early age so that they are able to think critically in solving various problems that arise.

Based on all over statements, the relation of literacy and achievement of Indonesia Emas is by literacy, expected has skills in science and technology. Thus, the hope of Indonesia's golden generation is achieved: religious, intelligent, productive and comprehensive.

## **2 Research Methods**

The method used is a systematic review based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The search focuses Scientific Literacy, Digital Literacy in Elementary School journal in achieving Indonesia Emas 2045 published in 2021. The literature searched on 1 – 4 November 2021 through Google Scholar database. The keywords used "Digital Literacy in Primary School, Scientific and Digital Literacy in Elementary School, Integration Literacy and Indonesia Emas 2045", Journal articles filtered by title and abstract, then selected based on criteria, Scientific Literacy, Digital Literacy in Elementary School and relevance to Indonesia Emas 2045 Program. Irrelevant journals will be ejected, then evaluated based on inclusion criteria :

**Table 1. Selected Inclusion Article Criteria**

| <b>Criteria</b> | <b>Description</b>   |
|-----------------|--|
| Inclusion       | English<br>Indonesia<br>Keyword Accordance<br>Qualitative and Quantitative |
| Eksklusi        | Teaching Tools<br>Learning Method  |

The literature searched that 8199 journal articles based on the variables of digital literacy, scientific literacy and relationship to Indonesia Emas 2045. Then matched criteria literature obtained for a systematic review.

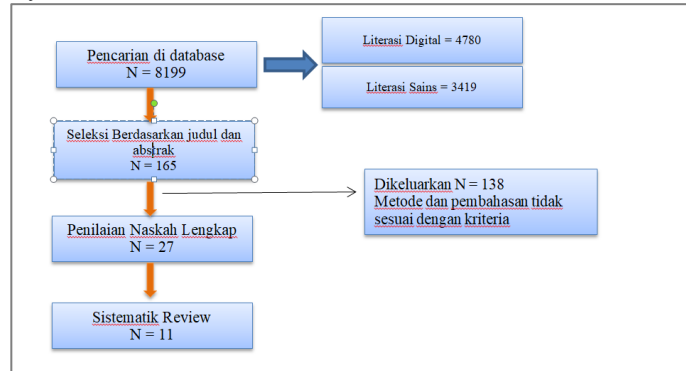


Fig 1. Roadmap Literature Research

### 3 Result and Discussion

Based on the research search results, obtained 11 quantitative and qualitative research with descriptive and comparative designs. The findings of articles that match presented in the form of a table below by including the title, author, year of publication, research location, research objectives, research methods, research samples, and research results.

Table 2. Results of Systematic Review

| No | Title (Author, Years)  | Country     | Purpose  | Research Design          | Sample   | Findings  |
|----|--|-------------|--|--------------------------|--|---|
| 1  | <b>Current Status and Development Direction of Digital Literacy Education in Elementary Schools</b> (Yang, Ji-Hye, Hyun, Yong-Chan, Park, Jung-Hwan, 2021) | South Korea | Describe the function of digital literacy in learning process in elementary schools                    | Qualitative, Survey      | Principal, 4 Elementary School Teachers, 775 Students, and Parents | The survey results of 775 students found that the use of digital media in learning not maximized. Internet access in finding teaching materials should be expanded. distance education in the spring can be held teachers anytime and anywhere using the right technology. Digital literacy education in primary schools through software education, not through education need for digital teaching aids that can develop logical thinking skills. needs a learning policy for digital media literacy education, such wireless internet available in classrooms, and 1 student used 1 laptop or 1 Smart Pad device |
| 2  | <b>Towards an inclusive digital literacy: An experimental intervention study in a rural area of Brazil</b> (Viviane Brito Nogueira, et al,                 | Brazil      | Investigate the impact of logic and mathematics through digital literacy in Elementary School students | Quantitative, Experiment | 5 <sup>th</sup> grade students for 1 semester                      | The students have interest in the class. Although some of the students unfamiliar with computer, but the progress was amazing. Digital literacy competence and technology skill increased in all semester. Students enhance the interaction with computers (eg touchpad and typing skills) and confidence in digital environments. Student scores on the  |

|   |   |           |  |  |  |  |
|---|---|-----------|--|--|--|--|
|   |   |           |  |  |  | logic/mathematics assessment showed a significant increase. This was not observed in the control group, indicating the importance of this type of intervention even with one provided by a 16-hour course.   |
| 3 | <b>Digital Literacy Curriculum in Elementary School</b> (Rizal Kailani, Rudi Susilana, rusman, 2021)  | Indonesia | find out the category of digital literacy in elementary schools                  | Literature Review  | 15 digital literacy article and 10 digital literacy articles | The digital literacy curriculum integrating to digital literacy in all school areas. In the learning implementation, elementary school students consider the teacher as the only source of information. Therefore, it is necessary to collaborate teachers, principals and parents in digital literacy learning. Digital Literacy in Elementary Schools takes more emphasis on Media Literacy in learning that impact on interactive and collaborative learning, such video, stop-motion and social media. Digital Literacy can improve student learning outcomes  |
| 4 | <b>Status of Digital Literacy among Elementary and Secondary Students in Punjab</b> (Farkhunda Rasheed Choudhary, Tariq Javed, Muhammad Hamid Nawaz Khan, 2021) | Pakistan  | To describe the digital literacy skills of elementary and middle school students | Quantitative Survey  | 200 students: 99 females dan 101 males                       | It found that students have a weakness in digital literacy skills. The students' understanding of computer was less. The reason of the less computer skills is the unavailability of computers and laptops in students' homes. It is suggested to make computers mandatory for the middle class as well so that students can handle computer gadgets and can equip themselves with digital literacy skills.  |
| 5 | <b>Developing Digital Literacy Based on Educational Games to Increase The Interest of Reading</b> (Dina Salsabella Utami1, Agustina Tyas, Asri Hardini2, 2021)  | Indonesia | Describe the reading habituation activities by innovating digital media.         | Research and Development , Qualitative and descriptive method. | 2 <sup>nd</sup> Grade Elementary School                      | The results indicate the development with a percentage of 100% and media with results of 84.2%, so both are classified as "Very high" with an interval of 81% to 100%, but the material still needs to be improved. The learning media developed by this researcher can be solution to overcome the low interest in reading for students, in this developed media the researcher makes students not only play and have fun, but also there is some knowledge that will be gained from the process of completing educational games. , students can also play and learn at the same time as other students. With this, the availability and use of learning media is not adequate and the media cannot be utilized optimally by teachers because teachers are still focused on books that are only available |

|    |  |              |   |                                     |                            |   |
|----|--|--------------|---|-------------------------------------|----------------------------|---|
| 6  | <b>Digital Literacy As A Solution To Improve The Quality Of Indonesia's Human Resources</b><br>(Danang Dwi Harmoko, 2021)                                  | Indonesia    | to provide an overview of the importance of digital literacy education to improve the quality of human resources to face the demographic bonus in 2030-2040   | Qualitative, Descriptive            | Electric and Print Media   | The research result stated that digital literacy education is very important to improve the quality of Indonesian human resources. Individuals' digital literacy characteristic are: 1) the ability to maximize digital potential, 2) digital resilience, 3) be positive and productive individuals, and 4) become part of the world community.   |
| 7  | <b>Citizenship Literacy of Primary Schools: An Effort For Indonesia's Future Challenges</b><br>(M Wahono, Dianasari, Y Hidayah, 2021)                      | Indonesia    | To initiate civic literacy for elementary schools to find solutions to Indonesia's future challenges  | Qualitative                         | Elementary School Students | The results showed that civic literacy for elementary schools using civic websites that were adapted to meet learning needs at the elementary school level. The understanding of civic literacy for elementary schools' accordance to Citizenship Education characteristic in the Indonesian context. In addition, the cooperation and efforts of various groups including families, government, communities, and schools are needed to achieve successful civic literacy for elementary schools in the future. |
| 8  | <b>Scientific Literacy: The Copceptual Framework Prevailing Over The First Decade of The Twenty First Century</b><br>Costa, Atonio Manuel, et al (2020)    | Columbia     | Due the need of the scientific community to see that the population validated its scientific and technological production   | Systematic review of the literature | 250 literatures            | The results suggest that scientific literacy embodies a construct that is deictic in nature, shaped by the social, political, cultural and scientific contexts prevailing int the society belongs to.   |
| 9  | <b>English Learners' Science-Literacy Practice Through Explicit Writing Instruction in Invention Based Learning</b><br>Kim, So lim and Kim, Deksoon (2021) | United State | Explore how three English learners, also referred as L2 learners, improve in science literacy in an invention-based learning (IBL) projects, IBL, a project-based learning invention, asks students to respond to problems by inventing | Qualitative                         | 3 English Learners         | Students' language skills and conceptual learning developed. In addition, students perceived writing as an essential sill for learning science.   |
| 10 | <b>Gadget Based Interactive Multimedia on Socio-Scientific Issue to Improve Elementary Students' Scientific Literacy</b><br>Suryanti, et. All (2021)       | Indonesia    | Develop Socio-scientific Issues (SSI) gadget based interactive multimedia (GMBIM) to improve elementary students' scientific literacy   | Quantitative                        | 25 suburban students       | GBIM is compatible as alternative learning media to improve elementary students 'scientific literacy  |

|   |  |           |   |             |            |   |
|---|--|-----------|---|-------------|------------|---|
| 1 | <b>Preparing Indonesian Gold Generation 2045 Through Quality Education</b> | Indonesia | Analyzing the components needed in preparation for the Indonesia Emas in 2045 | Qualitative | Literature | There are seven things in achieving Indonesia Emas, increasing the education budget, education management, make free schools from the business atmosphere, improving the curriculum, religious education, education training critical awareness, empowering teachers. |
|---|--|-----------|---|-------------|------------|---|

**Table 3.** Description scientific literacy and digital literacy in Indonesia Emas 2045

| Description scientific literacy and digital literacy in Indonesia Emas 2045   | Journal Article   |
|---|---|
| Digital literacy is very important to improve the quality of Indonesian human resources                                     | <b>Digital Literacy As A Solution To Improve The Quality Of Indonesia's Human Resources</b> (Danang Dwi Harmoko, 2021)  |
| Digital literacy plays an important role in improving the quality of education in Elementary School level                   | <b>Current Status and Development Direction of Digital Literacy Education in Elementary Schools</b> (Yang, Ji-Hye, Hyun, Yong-Chan, Park, Jung-Hwan, 2021)<br><b>Digital Literacy Curriculum in Elementary School</b> (Rizal Kailani, Rudi Susilana, rusman, 2021)<br><b>Citizenship Literacy of Primary Schools: An Effort For Indonesia's Future Challenges</b> (M Wahono, Dianasari, Y Hidayah, 2021)  |
| Scientific Literacy is a skill that must be mastered in the 21st Century  | <b>Scientific Literacy: The Copceptual Framework Prevailing Over The First Decade of The Twenty First Century</b><br>Costa, Atonio Manuel, et al (2020)<br><b>English Learners' Science-Lteracy Practice Through Explicit Writing Instruction in Invention Based Learning</b><br>Kim, So lim and Kim, Deksoon (2021)  |
| The use of digital literacy results in various learning administrations that support the improvement of scientific literacy | <b>Pengembangan Media Belajar Literasi <i>Digital</i> Berbasis <i>Game</i> Edukasi Dalam Meningkatkan Minat Baca Kelas 2 SD</b> (Dina Salsabella Utami1, Agustina Tyas, Asri Hardini2, 2021)<br><b>Status of Digital Literacy among Elementary and Secondary Students in Punjab</b><br>Farkhunda Rasheed Choudhary, Tariq Javed, Muhammad Hamid Nawaz Khan, 2021)<br><b>Towards an inclusive digital literacy: An experimental intervention study in a rural area of Brazil</b> (Viviane Brito Nogueira, et al, 2021)<br><b>Gadget Based Interactive Multimedia on Socio-Scientific Issue to Improve Elementary Students' Scientific Literacy</b><br>Suryanti, et. All (2021) |

Based on the results of a systematic review from table 2, it is known that literacy, especially digital literacy, has an important role in improving the quality of human resources. Danang Dwi H[6] stated that digital literacy education is very important to improve the quality of Indonesian human resources, expected characteristics, the ability to maximize digital potential, digital resilience, become positive and productive individuals, and being able to become part of the world community.

In addition, in basic education digital literacy also has an important role in improving the quality of learning to make it more interesting and able to increase children's interest in learning. In his research, Yang Ji-Hye, Hyun, Yong-Chan, Park, Jung-Hwan [10] suggested that digital literacy is important to be applied in elementary school because improve children's logical thinking competence and it requires the support of a good education system to be optimal.

It supported with M Wahono and Dianasari[13] that the application of civic literacy for elementary schools can be done by using civic websites that are adapted to meet learning needs at the elementary school level, the implementation requires good cooperation with various parties, namely family, government, communities, and schools of the future.

The results of the systematic review in table 2 also found 2 journals related to the importance of scientific literacy in life skills in the 21st century. The results suggest that scientific literacy embodies a construct that is deictic in nature, shaped by the social, political, cultural and scientific contexts prevailing in the society belongs to [3]. Kim, So lim and Kim, Deksoon[19] stated in learning English, students language skills and conceptual learning developed.

Students perceived writing as an essential for learning science. Furthermore, from table 2 there are also 4 of 11 journal articles which state that mastery of technology through digital literacy in educators has an influence on the readiness of learning administration that supports increasing scientific literacy. Suryanti[20] suggests that Gadget Based Interactive Multimedia is compatible as an alternative learning media to improve elementary students' scientific literacy. Viviane Brito N[26] stated that the use of digital literacy increases in learning and the presence of digital literacy competence has an effect on the behavior of using technology which increases significantly.

Based on the study results of 11 relevant journals, it can be seen that literacy is an important component in building the quality of human resources through the Indonesia Emas program in 2045, especially digital literacy and scientific literacy. In implementation, support from various parties is needed, especially a good education system and also the understanding in teaching materials at the basic education level.

Teachers expected to improve their skills, especially pedagogical and professional skills. Regina ade Darman[17] stated that there are seven things in achieving the Golden Indonesia, such increasing the education budget, education management management, make free schools from a business atmosphere, curriculum improvement, religious education, education training critical awareness, empowering teachers.

Based on the results of a systematic review research that literacy, namely digital literacy and scientific literacy, has an important role in improving the quality of human resources through the Indonesia Emas program in 2045. To be able to make this program a success, it requires the support of various parties, especially teachers as the nation's generation printers. innovative by integrating technology and pedagogical capabilities it has so that later it is able to produce outputs, namely superior human resources and are able to compete with the international community.



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