Independent Curriculum Learning Management to Improve Students' Literacy and Numerical Competence in Schools

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Article Info	Abstract
	This study aims to describe: 1) students' perceptions of the efforts that must be made to improve literacy and numeracy competencies and 2) significant differences regarding the efforts that must be made to improve literacy and numeracy competencies when viewed from gender and numeracy differences-school status. The descriptive approach was followed in this study. The research sample consisted of 160 students from public and private schools in North Sumatra, which implemented an independent curriculum—a questionnaire of 67 valid and reliable items. The study results prove that students' literacy and numeracy competencies are in good categories, especially in literacy, literacy and numeracy, scientific, digital, financial, cultural, and citizenship. If viewed from the status of the school, there is no difference in the perception of the efforts that must be made to improve literacy and numeracy competencies. However, there are differences in terms of gender differences. The analysis of the research results recommends that educator training is needed to improve student's literacy and numeracy through activities: 1) doing simple research with friends in the numeration group, 2) reasoning systematically in solving problems, 3) drawing conclusions based on facts, 4) getting used to using ICT properly and correctly to improve knowledge, attitudes, and skills, 5) distinguish between needs and desires and 6) can take attitudes in a social environment as part of a culture.

Introduction

In today's complex and rapidly changing world, literacy, and numeracy skills are of fundamental importance to students. Literacy is the ability to understand, interpret and communicate information effectively, while numerical skills include thinking mathematically, solving problems, and analyzing data (Zwart et al., 2017). Both literacy and numeracy skills deeply affect students' academic success, as well as their personal development and daily life (Duckworth & Schoon, 2010).

The Program for International Student Assessment (PISA) has conducted measurement programs for literacy, numeracy, and science students aged 15. The measurement analysis results for Indonesian students' literacy,

numeracy, and science did not show a significant increase from 2009 to 2015. The survey results show that students' competence in numeracy literacy in Indonesia can be categorized as very low compared to students from other PISA countries. The low result of the measurement of student numeracy literacy in Indonesia results from the habit of students who permanently solve routine questions. In addition, not all math teachers teach PISA-model problems. As a result, PISA results in 2018 show that Indonesian students' literacy, numeracy, and science competencies are categorized as unsatisfactory compared to students from other PISA participants.

Indonesian Students' PISA Performance

In 2018, Indonesian students' average PISA reading literacy score was 377, considerably lower than China's average score 555. Meanwhile, Indonesian students' average mathematical ability (numbering) of Indonesian students is 371, which is also far below the highest average score obtained by Chinese students, 591. Indonesian students' average science score was 396, while China's was 590 (Ayuningtyas & Sukriyah, 2020). (Ayuningtyas & Sukriyah, 2020). Meanwhile, the results of research by Siahaan et al. (2020), Pakpahan (2016), and Inawati (2022) show that students' literacy and numeracy competencies are also still categorized as low. Therefore, comprehensive learning management is needed to improve student's literacy and numeracy competence.

The results of a PISA-like test to test students' literacy and numeracy skills in 2021 in Indonesia by the Ministry of Education and Culture, namely through the Minimum Competency Assessment (AKM), show that student literacy and numeracy competency data are still relatively low. The study shows that Indonesian students' literacy is weak. (Utami, 2021; Wahyuni et al., 2013; Wardhani & Rumiati, 2011). Students' low numeracy literacy results from not being used to solving real context-based problems (Cooper, 2000; Simalango et al., 2018; Mahmud & Pertiwi, 2019).

Importance of the Literacy and Numeracy Skills

Literacy is the ability and skills to understand, process, and use the information received for various conditions. Literacy is related to student life in the home, school, or community. Good literacy can also develop a noble character (Admin, 2020). In addition, literacy can educate humans to function optimally in society because they have the skills to solve their problems. Students can acquire problem-solving skills through critical and analytical thinking activities (Lamada et al., 2019). Wardhani and Rumiati (2011) indicated that mathematical literacy is a person's ability to form, use, and interpret mathematical ideas in different situations. This includes thinking and using ideas, procedures, and facts to describe and explain it.

Numerical literacy uses various kinds of numbers and symbols to solve problems in everyday life so that students can reason systematically and critically in solving problems, making informed decisions in the form of numbers and data (Hermiyanty, 2017). Numerical literacy for using various numbers and symbols can be realized through training students, such as visiting and finding information on using numbers in the school environment.

Science Literacy helps students to choose the correct scientific information, to understand pictures, charts, and

tables on scientific knowledge, judge the truth of a scientific information finding, explain scientific phenomena, draw conclusions based on facts, understand the characteristics of science, and be aware of how science and technology affect humans and the environment (Fananta, 2017). Scientific literacy can be developed by training students to create and collaborate their abilities with their environment, using pictures, charts, and tables as sources of scientific information, and developing themselves to make decisions based on images, charts, and tables as sources of scientific knowledge. Use data in everyday life and train students to acquire and interpret information with a variety of educational tools and technologies (Noroozi & Sahin, 2022a, 2022b).

Digital Literacy is the cognitive and technical ability to search for, locate, evaluate, use, and communicate content/information-based IT (Alkali & Amichai-Hamburger, 2004). Students can master Digital Literacy through activities providing students with an understanding of the ethics of digital information, providing facilities and internet access for students, introduce and familiarize students with using ICT properly and correctly, providing training in the use and operation of computers and other digital media, submitting websites sites accessible to students;

Financial literacy is the knowledge and skills necessary to understand concepts and risks to make effective economic decisions to enhance individual and social financial well-being and community participation. Students can achieve financial literacy through activities providing financial literacy training to students in understanding the importance of saving, the difference between needs and wants, familiarizing students with shopping in school cooperatives, and organizing basic-level entrepreneurship training.

Cultural Literacy and Citizenship deal with increasingly global solid cultural flows, as well as connecting between generations, so that they can take a stand in the social environment as part of a culture and nation (Banks, 2017). Students can achieve cultural literacy and citizenship through organizing or participating in workshops related to cultural literacy and citizenship, participating in extracurricular activities related to regional arts/culture, visiting museums, tourist attractions, historical relics, sub-district offices, urban village offices, police stations, and DPR offices.

How to Improve Literacy and Numeracy Skills?

Alfian (2016) explains that in learning management, educators can organize their classes and develop the desired student behavior, eliminate unwanted behavior, and develop interpersonal relationships and a positive socio-emotional climate in the classroom. Marlina's (2021) research shows that learning management is an educational activity colored by teacher-student interaction to achieve goals. Educative learning management starts with planning, implementation, and evaluation activities. Learning management needs optimal support regarding student management, teacher management, learning procedures, classroom environment management, variations in instructional materials usage, and teaching media. Learning management cannot be separated from the role of educators: All activities are directed toward improving the quality of education in reaching the goals for learning that has been set (Magdalena et al., 2020; Sipayung et al., 2021).

The implementation of an independent curriculum provides flexibility for teachers to manage the learning process. Teachers can also choose a form of numeracy literacy assessment closely related to learning materials and help students improve literacy and numeracy competencies so that students are accustomed to positive thinking through the application of numbers in solving problems.

Pakpahan (2016) indicated that an independent curriculum could improve student numeracy and literacy. Learning mathematics assists students in explaining concept relationships and applying concepts or algorithms in a flexible, accurate, efficient, and precise manner when solving problems. Students who can design mathematical models, complete models, interpret solutions, and communicate them well can interpret ideas with symbols, tables, diagrams, or other media to study situations or problems (Rosnelli, 2022).

Strengthening facilitators' capacity, creating a culture of quality reading sources, and expanding access to learning resources and coverage of learning participants can improve student literacy (Inawati. 2022). Also, the school library can help students enjoy reading. School libraries help promote student literacy. Teachers and library staff must work better together to encourage students to visit the library often. Literacy, reading, and writing can be achieved by writing to solve community problems. Literacy can be promoted through audible, guided, shared, and independent reading and writing. Saryono et al. (2017) say literacy activities include forming groups to read and analyze books and writing book notes. Young writer conferences, inviting parents and writers, and creating literacy corners in the classroom are all excellent ideas.

Acquiring numeracy means being comfortable, capable, and eager to use numerical and spatial data in making decisions across a wide range of contexts (Mahmud & Pertiwi, 2019). Numeracy literacy is the ability to use reasoning to describe, explain, and predict everyday phenomena (Ekowati et al., 2019). In addition, it is necessary to increase cooperation between teachers and library managers in developing a culture of student literacy. If a collection of books is developed according to the needs of students, teachers, and education personnel, they can improve numeracy literacy (Azis, 2018). The results suggest increasing numeracy literacy by developing a collection of books according to the needs of students, teachers, and education staff.

Factors Affecting to Literacy, and Numeracy Skills

Bettri (2021) suggests that male and female students struggle to understand the problem, formulate solutions, implement solutions, and review answers. Numerical literacy is closely related to problem-solving (Tyas & Pangesti, 2018). In solving problems, there are stages of completion that can be used, namely the stages of solving the Polya problem (Aini & Mukhlis, 2020). Polya (1985) states four stages in solving a problem: understanding the problem, formulating solutions, implementing solutions, and reviewing answers. Sepriyanti and Julisra's research (2019) suggests differences in numeracy literacy abilities based on gender. Furthermore, Safitri (2016) stated that the difference in math skills based on gender tends to be small. However, the condition of male students is better at calculating related to science and sports than female students. Yurt (2022) indicated that the results mathematical reasoning skills of female students were higher than male students. Yurt indicated that the gender-based difference may be of metacognitive origin.

School conditions implementing numeracy literacy improve students' reading and writing abilities (Peng, 2016). Increasing students' numeracy skills must be supported by the school environment, family environment, and community environment (Purpura & Lonigan, 2013). Increasing students' numeracy literacy needs the support of teachers and parents in understanding mathematical concepts as a whole and comprehensively from the material to be conveyed to students. Meanwhile, increasing students' numeracy literacy can be done through the provision of several different numeracy learning videos so that participants can distinguish and draw conclusions from the lessons presented (Mulyati, 2009; Sulianto, 2008; Jayanti et al., 2020; Batubara & Ariani, 2016).

The Campus Teaching Program encourages students to read, write, speak, tell, listen, and do the math; according to Firdaus and Septiady (2021), YouTube channels can be used as asynchronous learning media that trains students to study independently by allowing them to watch and listen to the teacher's audiovisual explanations whenever and wherever they like. This improves students' social skills, verbal abilities, focus power, and ability to string words together and write (Setiyana & Kusuma, 2021; Nurdiyanti, 2010; Sevima Admin, 2020).

According to Kadek et al. (2022), e-Modules successfully enhanced numeracy, literacy, and character education via ethnomathematical content that makes learning more contextual and meaningful. By incorporating mathematical problems related to ethnomathematics-based daily life, numeracy, and character literacy can be enhanced (Rosa & Orey, 2013; Putri, 2017; Wahyuni et al., 2013; Rizki & Priatna, 2019). According to Puspaningtyas and Ulfa (2020), numerical literacy-based question training can significantly impact student learning outcomes. Literacy is a fundamental skill that every individual must possess to survive in the future (Lamada et al., 2019). Rosnelli (2022) and Putra et al. (2016) concur that mathematical numeracy literacy is crucial because it enables individuals to comprehend the role or utility of mathematics in everyday life. Simalango et al. (2018) explain that mathematical literacy enables an individual to comprehend the role or application of mathematics in everyday life.

Fiangga et al. (2019) found that teachers had not familiarised students with literacy-based questions, which prevented them from solving numeracy and literacy problems. Mansur (2018) said students' mathematical numeracy literacy skills should be trained with questions. Finally, Darwanto and Putri (2021), Suharwoto (2021), and Utami (2021) say distance learning information technology needs to be improved so students can use basic math numbers and symbols to analyze information in tables, graphs, charts, and other formats, then interpret it into a hypothesis and make a decision.

The World Economic Forum 2015 stated that the ability to six basic literacy is the knowledge that must be mastered (Ni, 2022). The six literacy skills must be learned following the Minimum Competency Assessment program as a form of evaluation through implementing literacy, numeracy, and character surveys (Wahyuni et al., 2013). Minimum Competency Assessment is a necessary form of assessment for Indonesian education in facing the development of science, the flow of world information, and communication in the 21st century. This follows the objectives of the character education program: to create the next generation with noble character, literacy skills, and competent competence in competition in this 21st-century era.

Purpose of the Research

This study aims to describe: 1) students' perceptions of the efforts that must be made to improve literacy and numeracy competencies and 2) significant differences regarding the efforts that must be made to improve literacy and numeracy competencies when viewed from gender and numeracy differences—school status. This study answers the following questions:

1. How are students' efforts to improve literacy and numeracy competence?
2. Is there a statistically significant difference (0.05) between gender and school status in student perceptions of efforts to improve literacy and numeracy in schools?

Method

This study is descriptive. The instrument developed refers to previous research such as Saryono et al. (2017), Hermiyanti (2017), Fananta (2017), Mu (2017), Aziz (2018), Lamada et al. (2019), Mahmud & Pratiwi (2019), Admin (2020), Ayuningtyas (2020). Inawati (2022) and Rosnelli (2022). The 67-item instrument meets the validity and reliability requirements for this study. The final version of the instrument on students' efforts to improve literacy and numeracy competence consists of 67 items which are distributed into the domains: 1) literacy 1-11; 2) numeracy literacy 12-21; 3) scientific literacy 22-32; 4) digital literacy 33-41: 5) financial literacy 42-55; 6) cultural literacy and citizenship 56-67. Therefore, 67 items on the instrument meet the validity and reliability requirements for this study.

All questionnaires used to correct the study instrument were scored on a four-point Likert scale (often, sometimes, rarely, never) or (4, 3, 2, 1). 1.00-2.00 was low, 2.01-3.00 was moderate, and 3.01-4.00 was high. This study includes 548 high school students from 20 independent schools in North Sumatra, Indonesia, for the 2021/2022 school year. Table l shows that the sample included (68) male and (92) female students. Table 1 shows the research's variables, both gender and school status.

Table 1. Variables' Frequencies and Percentages

Variable	Category	Frequency	Percentage
Gender	Male	68	42.5
	Female	92	57.5
Schools Status	State	7	35
	Private	13	65

Results

The first research question: How are students' efforts to improve literacy and numeracy competence?

Domain 1: Literacy Read Write.

As extracted, student responses to the first research question specifically for the literacy domain are illustrated in

Table 2.

Table 2. Student Responses Average and Standard Deviation (SD) on Efforts to Improve Literacy

Rank	No	Indicator	Means	SD	Level
1	3	Reading and writing independently	3.79	.846	High
2	5	Write down interesting things from the books you read,	3.62	.740	High
3	6	Guided reading and writing,	3.50	.878	High
4	4	.Read and write together,	3.12	.878	High
5	7	Create discussion groups to read and analyze the contents of the book,	3.00	.759	High
6	1	Reading and writing aloud,	2.67	.846	Medium
7	2	Pouring ideas or ideas into writing systematically to overcome problems that have been observed in the community.	2.57	.846	Medium
8	8	Invite parents, writers, or literacy activists to read books at school,	2.47	.740	Medium
9	9	Choose books according to interests in the literacy corner in the class	2.35	.975	Medium
10	11	Listening to writers or writers to tell about the process of writing experiences.	2.22	.914	Medium
11	10	Attending a young writers conference.	2.00	.916	Low

The study shows that student responses about improving literacy range from (3.79-2.00). Reading and writing independently ranks highest (3.79) while attending a young writers' conference ranks lowest (2.00).

Domain 2: Numerical Literacy

Student responses to the first research question specifically in Table 3 show the Numerical Literacy domain.

Table 3. Average and Standard Deviation (SD) of Student Responses on Efforts to Improve Numerical Literacy

Rank	No	Indicator	Means	SD	Level
1	12	Think rationally, systematically and critically in solving problems	3.73	.878	High
2	15	Making informed decisions in the form of numbers and data	3.57	.878	High
3	21	Visiting and looking for information on the use of numbers in the school environment.	3.50	.937	High
4	13	Using various symbols to solve problems in everyday life	3.20	.759	High
5	14	Work on simple numeracy projects in the classroom.	3.02	.876	High
6	20	Make a miniature house or bridge,	2.77	.846	Medium
7	16	Make a school or village plan,	2.67	.740	Medium
8	17	Calculate the distance and length of time students travel to school,	2.65	.975	Medium
9	18	Do simple research with friends in the numeration group.	2.00	.914	Low
10	19	Make a survey about the talents and interests of students	2.00	.918	Low

The study shows that student responses about improving numeracy literacy range from (3.73-2.00). Occupying the highest order (3.73) is Reasoning, systematically and critically in solving problems while surveying the talents

and interests of students, in the last order (2.00).

Domain 3: Scientific Literacy.

As extracted, student responses to the first research question specific to the scientific literacy domain are illustrated in Table 4.

Table 4. Average and Standard Deviation (SD) of Student Responses on Efforts to Improve Scientific Literacy

Rank	No	Indicator	Means	SD	Level
1	23	Assess the veracity of scientific information finding,	3.62	.790	High
2	26	explain scientific phenomena	3.49	.794	High
3	27	Drawing conclusions based on facts,	3.23	.789	High
4	29	Understanding the characteristics of science,	3.10	.799	High
5	24	Realizing that science and technology affect people and the environment	3.05	.731	High
6	28	Develop self to make decisions based on images,	2.11	.976	Medium
7	25	Develop yourself to make decisions based on charts	2.32	.804	Medium
8	30	Develop yourself to make decisions based on tables	2.00	.966	Low
9	22	Using the information in daily life,	1.85	.914	Low
10	31	Choose the right scientific information to understand pictures, charts and tables	1.85	.983	Low
11	32	Train yourself to acquire information and interpret it,	1.83	.722	Low

The results of the study prove that the average student's responses about the efforts that must be made to improve numeracy literacy competence range between (3.62-1.83). Occupying the highest order (3.62) is reasoning, systematically, and critically in solving problems, while surveying students' talents and interests is in the last place (1.83).

Domain 4: Digital Literacy.

As extracted, student responses to the first research question specifically for the Digital literacy domain are illustrated in Table 5.

Table 5. Average and Standard Deviation (SD) of Student Responses on Efforts to Improve Digital Literacy

Rank	No	Indicator	Means	SD	Level
1	36	Using information and communication technology to browse and find content/information with cognitive skills	3.78	.754	High
2	35	Using information and communication technology to evaluate, and utilize, content/information with technical skills.	3.69	.794	High
3	37	Using information and communication technology to	3.64	.821	High

Rank	No	Indicator	Means	SD	Level
		communicate content/information with cognitive skills.			
4	38	Using information and communication technology to communicate content/information with technical skills.	3.62	.747	High
5	33	Understanding of digital information ethics,	2.68	.769	Medium
6	39	Utilize internet facilities and access to increase knowledge.	2.67	.769	Medium
7	34	Familiarize yourself with using ICT properly and correctly,	2.67	.769	Medium
8	40	Utilize and operate computers and other digital media to improve numeracy literacy competencies.	2.56	.846	Medium
9	41	The teacher introduces accessible websites to improve literacy and numeracy competencies.	2.51	.740	Medium

The results of the study prove that the average student response about the efforts that must be made to improve digital literacy competence ranges from (3.78-2.51). Occupying the highest order (3.78) is using information and communication technology to browse and find content/information with cognitive skills, while for teachers to introduce websites that can be accessed to improve literacy and numeracy competence in the last place (2.51).

Domain 5: Financial Literacy.

Student responses to answer the first research question specifically for the Financial literacy domain, as extracted, are illustrated in Table 6.

Table 6. Average and Standard Deviation (SD) of Student Responses on Efforts to Improve Financial Literacy

Rank	No	Indicator	Means	SD	Level
1	42	Apply an understanding of concepts and risks,	3.25	.967	High
2	43	Make effective decisions in a financial context to improve financial well-being,	3.25	.987	High
3	46	Participate in the community environment in a financial context.	3.15	.759	High
4	45	Understand the importance of saving	3.15	.709	High
5	44	Distinguishing between needs and wants,	3.15	.789	High
6	49	Familiarize students to shop at school cooperatives,	3.04	.989	High
7	50	Participate in basic level entrepreneurship training	3.04	.899	High
8	51	Understand the payment methods available in the market in cash, credit, or debit,	3.02	.871	High
9	52	Active in selling goods and services organized by schools at entrepreneurship week events	2.21	.881	Medium
10	47	Conduct shopping visits to traditional markets and supermarkets,	2.11	.779	Medium
11	53	Develop a plan regarding the maximum amount of money that	2.00	.759	Low

Rank	No	Indicator	Means	SD	Level
		can be spent,			
12	54	If you have brought a note to the market of the goods to be purchased,	1.87	.804	Low
13	48	Compare prices and check shopping receipts after the transaction is complete,	1.82	.986	Low
14	55	Conduct visits to banks, pawnshops, and cooperatives through school activities.	1.81	.966	Low

The results of the study prove that the average student's responses about the efforts that must be made to improve numeracy literacy competence range between (3.25-1.81). Occupying the highest order (3.25) is applying an understanding of concepts and risks while visiting banks, pawnshops, and cooperatives through school activities is in the last place (1.81).

Domain 6: Cultural Literacy and Citizenship

As extracted, student responses to answer the first research question specifically for the literacy domain of Culture and Citizenship are illustrated in Table 7.

Table 7. Average and Standard Deviation (SD) of Student Responses on Efforts to Improve Cultural Literacy and Citizenship

Rank	No	Indicator	Means	SD	Level
1	58	Recognizing that cultural literacy and citizenship are needed to deal with the increasingly strong global cultural currents,	3.32	.898	High
2	58	Recognizing that cultural literacy and citizenship are needed as a link between generations,	3.28	.977	High
3	56	Can take a stand in a social environment as part of a culture	3.17	.788	High
4	57	Can take a stand in the social environment as part of a nation	3.04	.896	High
5	60	Participate in workshops related to cultural literacy and citizenship.	3.03	.770	High
6	61	Participate in extracurricular activities related to regional arts/culture,	3.01	.978	High
7	64	Visiting museums, tourist attractions, historical relics, sub-district offices, urban village offices, police stations, DPR offices, etc., through school activities	2.57	.917	Medium
8	62	Active in art festival activities at school	2.53	.987	Medium
9	63	Listening to sources from the police,	2.00	.998	Low
10	65	Listening to the sources of TNI members,	2.00	.969	Low
11	66	Listening to the members of the public prosecutor's office,	2.00	.989	Low

12	67	Listening to speakers for DPR members	2.00	.997	Low

The study shows that student responses about improving numeracy and literacy range from (3.32-2.00). Reasoning, systematizing, and critically solving problems ranks highest (3.32) while surveying students' talents and interests ranks last (2.00).

Second, is there a statistically significant difference (0.05) in students' perceptions of the efforts needed to improve literacy and numeracy by gender and school status?

The average was calculated using a t-test, as shown in Table 8.

Table 8. Mean, Standard Deviation, and t-Test Results for the Effect of Student Responses on Efforts to Improve Literacy and Numeracy Competencies according to Gender and School Status

Variable	Category	f	%	Means	SD	t	df	t_{tabel}
Gender	Male	68	42.5	2.96	.979	2.040	158	1.967
	Female	92	57.5	2.15	.988			
Schools Status	State	7	35	2.98	.898	1.749	18	2.101
	Private	13	65	2.12	.976			

Table 8 proves a statistically significant difference ($\alpha = 0.05$) for students' perceptions by gender. However, there is no difference in school status regarding students' perceptions of improving literacy and numeracy competencies in schools.

Discussion

The objective of this study was twofold: 1) to explore students' perceptions regarding the necessary efforts to enhance their literacy and numeracy competencies, and 2) to examine significant differences in these perceptions based on gender and school status in terms of numeracy differences. The study adopted a descriptive approach. The research sample comprised 160 students from public and private North Sumatra schools, which implemented an independent curriculum. A validated and reliable questionnaire consisting of 67 items was employed. The study's findings indicate that student's literacy and numeracy competencies fall within satisfactory categories, particularly in the literacy domain. Interestingly, there were no discernible differences in students' perceptions of the efforts required to enhance their literacy and numeracy competencies when considering school status. However, notable distinctions emerged concerning gender differences.

The results of the analysis of the survey data demonstrate that some students can generalize, compile evidence, and explain concepts in depth. In addition, some students can analyze the problem, formulate proposed solutions, and solve the problem. When students can find solutions to problems, it indicates that they have grasped the relevant concepts. However, not all students can do this, so the study's conclusion indicates that students' efforts to improve their iteration and numeracy skills are sufficient. These results are in line with the PISA performance

results of Indonesian students. According to the PISA 2008 results, the overall academic performance of Indonesian students was rated as low. Related reports report that Indonesia lags behind other countries in reading, mathematics, and science. For example, according to the PISA 2018 report, Indonesian students' reading skills were lower than average. Likewise, Indonesian students' performance in mathematics and science was rated as poor (Avvisati, 2020). These results provide essential information about Indonesia's education system and factors affecting student achievement. However, PISA results alone do not adequately assess a country's education system. These results can be a starting point for developing education policies and practices. Using data from PISA results, Indonesia and other countries can work to improve their education systems and increase students' academic achievement.

According to Ayuningtyas and Sukriyah (2020), Indonesian students' average PISA reading literacy score in 2018 was 377, significantly lower than China's average score of 555. Similarly, Indonesian students' average mathematical ability was reported to be 371, which falls far below the highest average score achieved by Chinese students at 591. The use of digital technology helps in several aspects of learning and practice (Priyambada et al., 2022). Furthermore, the average science score of Indonesian students was 396, while China's score stood at 590. These findings highlight the substantial performance gaps between Indonesian and Chinese students regarding PISA assessments (Ayuningtyas & Sukriyah, 2020). Moreover, various studies conducted by Siahaan et al. (2020), Pakpahan (2016), and Inawati (2022) further support the notion that Indonesian students' literacy and numeracy competencies remain relatively low. These findings underscore the need for comprehensive learning management strategies to enhance students' literacy and numeracy skills.

The second study aimed to determine if there were statistically significant differences in how students felt about what needed to be done to improve literacy and math skills in schools based on gender and school status. The analysis of the survey data shows that students do not have different ideas about what needs to be done to improve literacy and math skills in schools based on the status of their schools. Characteristics that stand out for female students' perceptions about the efforts that must be made to improve literacy and numeracy competence are terms 1) reading and writing independently. 2) doing simple research with friends. In the numeracy group. 3) using the information daily, 4) using facilities and internet access to increase knowledge. 5) understand the importance of saving, and 6) if the market has brought a record of the goods to be purchased. In contrast, male students stand out for the following reasons: 1) write engagingly about the books they have read; 2) solve problems methodically; 3) draw conclusions based on evidence; 4) use ICT effectively and correctly; 5) distinguish between needs and desires; and 6) take a stand in the social environment as a member of a culture.

According to Bettri (2021), male and female students encounter challenges during problem-solving, particularly in understanding the problem, formulating solutions, implementing them, and reviewing answers. Numerical literacy is crucial in problem-solving (Tyas & Pangesti, 2018). Aini and Mukhlis (2020) suggest that the stages of solving a problem, as Polya (1985) outlined, include understanding the problem, formulating solutions, implementing solutions, and reviewing answers. Furthermore, Sepriyanti and Julisra's (2019) research highlights gender-based differences in numeracy literacy abilities. Meanwhile, Safitri (2016) notes that gender-based disparities in mathematical skills tend to be relatively minor. However, male students demonstrate a comparative

advantage in calculations related to science and sports compared to their female counterparts. Studies in the literature and current research results support the claim that there is a gender-related difference in numeracy literacy skills. Yurt (2022) reported that female students exhibited superior mathematical reasoning skills compared to their male counterparts. The author further suggested that the observed gender-based difference may stem from metacognitive factors. Also literature has suggested that not only the numeracy skills of males and females are different but also the way in which students analyze, discuss, reason, and argue their ideas while solving complex problems (see Banihashem et al., 2023; Noroozi et al., 2020, 2022).

Studies in the literature indicate that there may be gender-related differences in students' literacy and numeracy skills. Barham et al. Teacher teaching variations are an effort to maintain a consistent learning atmosphere (Ritonga et al., 2022). (2019) found that male first-grade students had better literacy and numeracy skills than female students. Below et al. (2010) found that girls scored slightly higher than boys on kindergarten literacy measures, but there were no significant differences in first-grade measures. However, Begum et al. (2021) found no gender differences in the mediating role of self-efficacy on middle school students' literacy and numeracy expectations and performance. The studies suggest that gender-related differences in literacy and numeracy skills may exist. However, the extent and nature of these differences may vary depending on the age group and specific skills being measured.

Conclusion

The results of the study prove that students' literacy and numeracy competencies are in good categories, especially in the domains of literacy, literacy and numeracy, scientific literacy, digital literacy, financial literacy, and cultural literacy and citizenship. The results of other studies prove that there is no difference in student perceptions when viewed from the status of the school regarding the efforts that must be made to improve literacy and numeracy competencies. However, there are differences regarding gender differences regarding student perceptions of the actions that must be made to improve students' literacy and numeracy competencies.

Recommendations

Based on the findings, teachers should be trained on how to help students develop reading, writing, and math skills through:1) informal research conducted with peers in the numeration group, 2) utilizing rational thought to solve problems, 3) evidence-based inferences, 4) acquiring a habit of using ICT effectively to enhance learning, behavior, and performance, 5. recognizing the difference between needs and wants, and 6) the cultural significance of one's social environment and attitudes.

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