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Enhancing inclusion in the national digital literacy index: From measurement to empowerment

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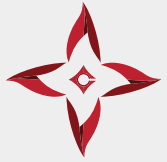
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Policy Brief No. 19

Enhancing Inclusion in the National Digital Literacy Index: From Measurement to Empowerment

by Natasya Zahra



Key Messages

- The Directorate General of Informatics Application (DGIA) of the Indonesian Ministry of Communication and Informatics (MOCI) has developed a digital literacy index to assess the state of national digital literacy, map the digital competencies of Indonesians, and develop a framework for measuring digital literacy across Indonesia's 34 provinces. This will assist the DGIA in achieving its objective of providing digital literacy training to 50 million Indonesians by 2024.
- The index uses a self-assessment tool to measure key digital literacy competencies, such as the knowledge and ability to operate digital tools. However, this assessment method suffers from technical and operational inaccuracy. Consequently, the DGIA cannot identify the specific skill sets that Indonesians struggle with or the segments of society that require greater digital literacy support. This hinders the development of an effective and targeted digital literacy training program.
- Given the limitations of self-assessment, the DGIA should use performance-based assessment to evaluate the technical and operational competencies under digital skills and knowledge of other aspects of digital literacy like digital safety, digital culture, and digital ethics. Performance-based assessment should evaluate users' completion of various simulated tasks using software to evaluate ability to operate hardware (computer) and software (i.e., web browsers, email, virus/privacy settings), and knowledge of other digital literacy components (i.e., digital safety). The DGIA should consider the iSkills Assessment for ICT Literacy developed by the Educational Testing Service (ETS), since the scenarios assessed correspond to the tasks set as indicators for the index's digital skills pillar.

- To accurately evaluate the ability to detect fake news, the DGIA should have users categorize which news headlines are false from a set of both true and false news headlines distributed in randomized order. This will help the DGIA improve the reliability of their assessment and reduce the likelihood of guessing from the users. The discernment ability test developed by Benjamin A. Lyons can serve as a reference.
- The DGIA should provide paper-based assessment options for the evaluation of both digital skills and the ability to identify fake news in anticipation of poor access to hardware and the internet in some parts of Indonesia. The DGIA can refer to the Test of Technological and Information Literacy (TILT), which examines the seven components of ICT literacy encompassed in the ETS's iSkills Assessment, to develop this paper-based assessment.
- Evaluation of soft skills like digital culture and ethics is compatible with self-assessment. A data quality technique such as the overclaiming technique should be employed to improve the self-assessment methodology used by the DGIA.
- The DGIA should develop differentiated analysis for rural village communities and school-aged children that identifies the unique challenges, skills, and capacities of each target demographic. This information would inform the development of targeted digital literacy training and support programs to meet the digital literacy needs of diverse and vulnerable segments of the population.
- The DGIA can leverage insights from the index by using index data to assess the annual performance of local governments in improving digital literacy, which will determine their budget disbursement. This will encourage the development of innovative and targeted digital literacy initiatives and strategies as well as motivate stakeholders to maintain an adequate performance on the index.

Overview of the Digital Literacy Index

The Directorate General of Informatics Application (DGIA) of the Indonesian Ministry of Communication and Informatics (MOCI) has emphasized the critical role of digital literacy among Indonesians in driving the country's digital transformation (MOCI, 2021a). Under the MOCI 2020-2024 Strategic Plan, MOCI designated digital literacy as a priority program and tasked the DGIA with providing digital literacy programs to 50 million Indonesians by 2024 (MOCI, 2021b; DGIA, 2021). To achieve this goal, the DGIA developed a digital literacy index in 2020 to assess the state of national digital literacy, map the digital competencies of Indonesians, and develop a framework for measuring digital literacy across Indonesia's 34 provinces (MOCI & Katadata Insight Center, 2020). A nationwide survey was conducted in August 2020 to fulfill these tasks and convert these findings into the 2020 index score. This survey was repeated in 2021 and 2022 to monitor the development of digital literacy every year.

The index targets Indonesian citizens aged 13 to 70 years old that are internet users. The 2021 and 2022 index further specified that respondents must have accessed the internet in the past three months to be eligible for the survey. Each year, the survey results reflect a similar profile of respondents: mostly adults aged between 18 and 70 years old with nearly equal proportions of male and female respondents. The 2020 and 2021 surveys demonstrated nearly equal shares of urban and rural respondents with the exception of the 2022 survey, which included a separate analysis section for frontier regions (*Wilayah 3T*) but did not provide information on the percentage of urban and rural respondents surveyed.¹

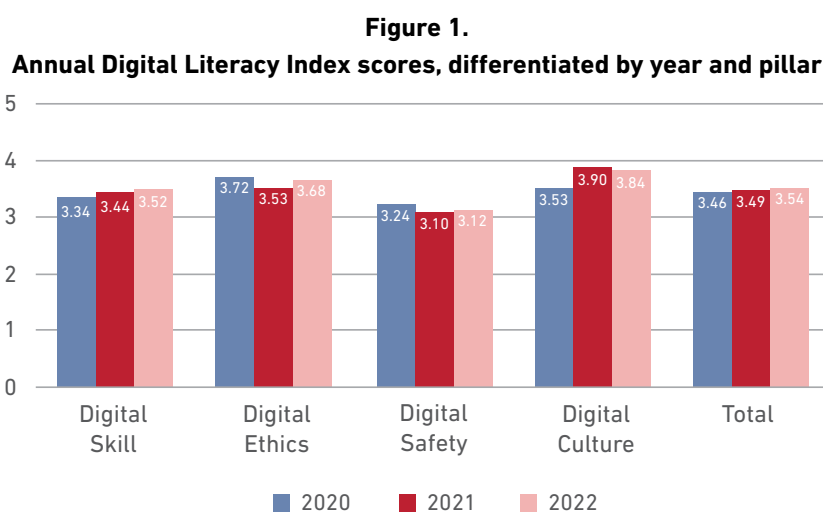
¹ Frontier regions (*wilayah 3T, tertinggal, terdepan, terluar*) consist of 62 regencies that have been identified as remote, frontier, and underdeveloped compared to the national average. The 2022 index covers all 62 regencies in its analysis section for frontier regions.

The index uses a multistage random sampling method to select respondents from individual households, where the proportion of respondents per province is determined using the Village and City Classification (*Klasifikasi Perdesaan dan Perkotaan*) system issued by Statistics Indonesia (*Badan Pusat Statistik* or BPS). The survey is conducted through face-to-face interviews using a questionnaire that measures four pillars of digital literacy: digital ethics (netiquette), digital safety (data protection and internet safety), digital skill (digital competencies), and digital culture (citizenship on the internet) on a scale of 1 to 5 (see footnote for definition).² Measurement indicators for the pillars are based on UNESCO's *A Global Framework of Reference on Digital Literacy Skills*, with the 2022 index also incorporating the *G20 Toolkit for Measuring Digital Skills and Digital Literacy: Framework and Approach*.³

While the digital literacy index has undergone changes in terms of scope, methodology, and framework over its first three years (see Appendix A), the index maintains as its primary goal covering the digital literacy of Indonesians indiscriminately as per the DGIA's mandate of ensuring digital literacy for all Indonesians (Interview with Coordinator for the National Digital Literacy Program, 2023).

Examining and interpreting current index scores - Describing the state of digital literacy in Indonesia

Comparing digital literacy scores from the three surveys, the overall digital literacy score has increased incrementally each year with some fluctuation in individual digital literacy pillars. According to the DGIA, the 2022 Index score of 3.54 indicates that Indonesians possess a “moderate” level of digital literacy (*kategori sedang*) with a score of 4.0 or above qualifying as “good” (*kategori baik*) (MOCI & Katadata Insight Center, 2020; DGIA, 2023). This suggests that progress in improving digital literacy has been gradual (Figure 1). However, a breakdown of scores in each pillar reveal that Indonesians continue to struggle in key indicators of digital literacy.



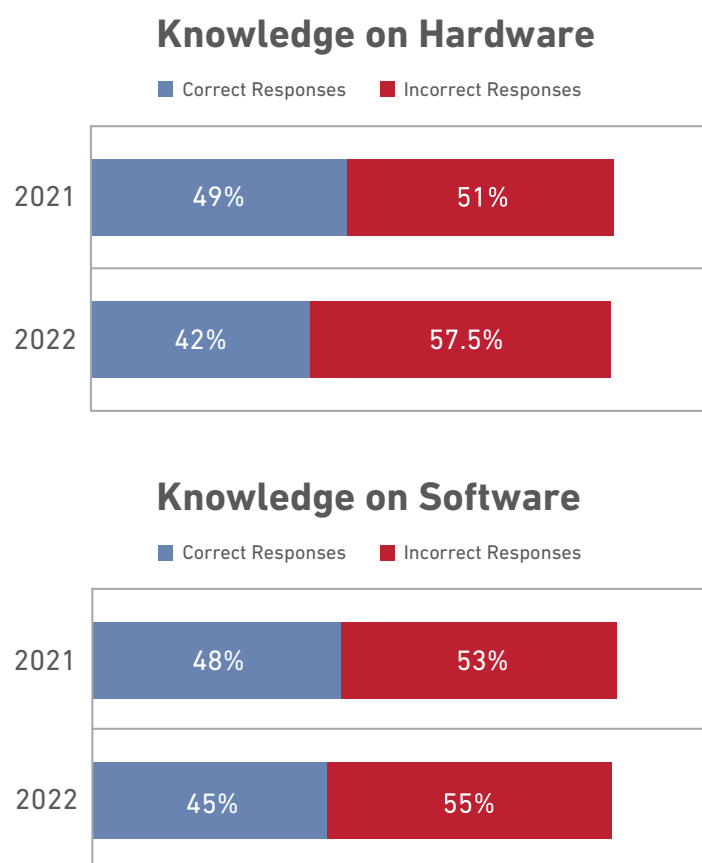
Despite the improving digital skill score, a breakdown of survey responses reveals that respondents continue to perform poorly in key competencies such as the technical operation and knowledge of hardware and software, as evidenced by declining scores on this assessment compared to 2021 (Figure 2).⁴

² Digital skill refers to the competencies regarding the awareness, familiarity, and ability to use hardware, software, and digital information systems. Digital ethics is defined by an individual's awareness and ability to apply netiquette in their daily lives. Digital safety refers to the user's ability to recognize, analyze, and consider the various digital safety components and awareness of personal data protection and apply them in their daily lives. Digital culture considers the individual's ability to read, recognize, and build their understanding of national values embedded in the Pancasila and Bhinneka Tunggal Ika in their digital activities and contribute to the digitalization of culture through ICT use.

³ The G20 Toolkit was added to enhance the digital skills pillar by including aspects of empowerment (ability to use digital finance and marketplace) while the Toolkit's Literacy indicator of communication and critical thinking, behavior and habit towards digital tools, and safety (personal data protection) have been added to supplement the digital culture, digital safety, and digital skill indicators.

⁴ The breakdown of correct and incorrect responses for knowledge on software for 2021 adds up to 101%. While this is statistically incorrect, this is the data included in the 2022 report published by MOCI and Katadata (MOCI & Katadata Insight Center, 2023).

Figure 2.
Assessment of Respondents' Knowledge on Digital Tools (Index 2022)

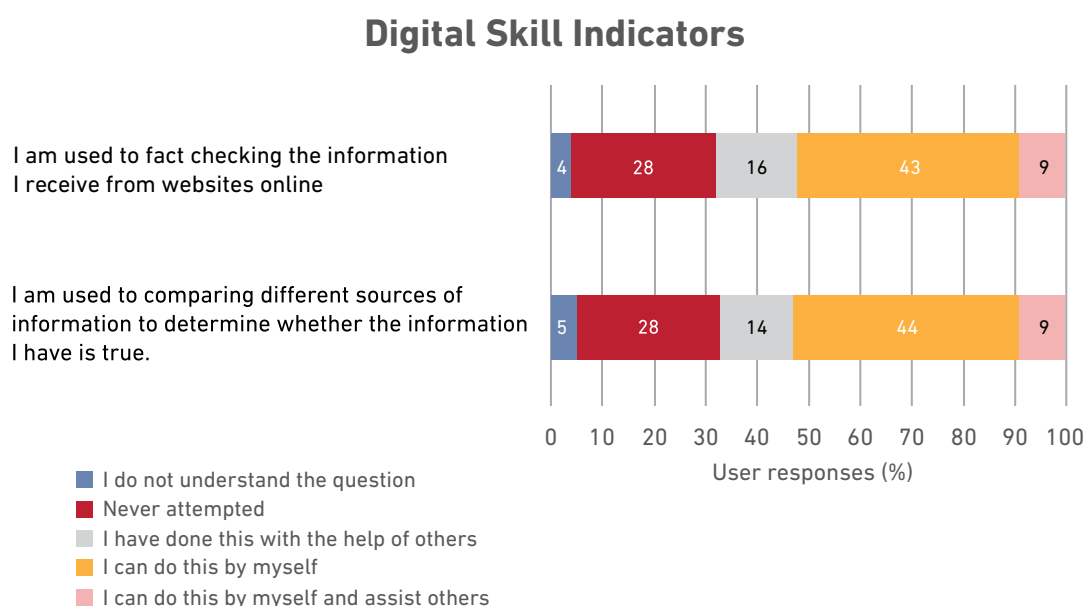


The index assessment of digital skill also found that practices required to critically engage with digital information and data such as fact-checking and evaluation of news/information sources have not been widely adopted in Indonesia. Specifically, 28% of respondents have never attempted to fact-check information they receive online and 16% require assistance to do so, while 28% have never compared various sources of information to determine the validity of the information they receive and 14% require assistance to do so (Figure 3). These results highlight the potential susceptibility of Indonesians to misinformation, especially when considering the risks present in Indonesia's digital landscape. In 2017 alone, MOCI identified 800,000 active sites in Indonesia that disseminate false information and hoaxes, further underscoring the heightened risk of misinformation among Indonesians (MOCI, 2017).

This is cause for concern, given the increasing demand for digital skills in Indonesia's workforce to effectively leverage digital economic platforms and tools and to support Indonesia's economic growth (MOCI, 2022; Negara & Meilasari-Sugiana, 2022; SMERU Research Institute, 2022; Tinmaz et al. 2022). To further prepare for the digitization of Indonesia's manufacturing sector, MOCI estimates that Indonesia needs an additional 9 million "digital talents"⁵ (workers with sufficient digital literacy) by 2030 and must produce 600 thousand digital talents on average per year through training and upskilling (MOCI, 2020). However, an analysis from the SMERU Research Institute based on the latest National Labor Force Survey (*Survei Angkatan Kerja Nasional*) found that less than 1% of Indonesia's workforce possess advanced digital skills, while 50% only have basic to intermediate digital skills (Statistics Indonesia as cited in SMERU Research Institute, 2022). Low levels of digital literacy exacerbate the shortage of digitally literate and digitally competent workers, undermining the sustainable development of Indonesia's digital economy (Center for Strategic and International Studies (CSIS) Indonesia, 2022; Sapulette & Muchtar, 2023; SMERU Research Institute, 2022).

⁵ MOCI's Digital Talent Scholarship (n.d.) program defines digital talent as members of the workforce who possess the knowledge and skills to leverage digital technologies and possess expertise in the ICT field to support Indonesia's digital transformation and the transition of its digital economy towards Industry 4.0 (See MOCI, 2019 for discussion on Industry 4.0).

Figure 3.
Digital Skill Indicators below the national score (2022 Index)⁶



Among Southeast Asian countries, Indonesia ranks in the bottom three for internet safety and trust, and ranks 83rd out of 100 countries for its level of trust in information from social media, suggesting a persistent concern for digital safety (The Economist, 2022). Over half of the indicators in digital safety received an index score of below 3 compared to the national digital safety index score of 3.12.⁷ According to Katadata’s categorization, these digital safety scores indicate “poor” digital literacy (*kategori buruk*)(MOCI & Katadata Insight Center, 2020). Nearly 50% of respondents lack awareness of basic digital safety practices like virus protection (Figure 3 & Figure 4). This lack of awareness and insufficient adoption of basic digital safety practices among survey respondents suggests that Indonesians are vulnerable to risks in the digital space such as malware and cybercrime.⁸

⁶ Digital skill indicators that scored above the national Digital Skill index score of 3.52, include the ability to download files/applications, the ability to connect digital tools to the internet, the ability to upload files, and the ability to search and access data, information, and content on digital media. Other indicators that scored below the national score include the ability to interact using various digital communication technologies and the familiarity with using e-commerce platforms. The two indicators on Graph 3 were included to illustrate how the poorly performing indicators of digital skill relate to basic digital safety practices and information literacy.

⁷ All the digital safety indicators mentioned in Graph 3 and Graph 4 (in order, from top to bottom) scored 2.99, 2.96, 2.91 and 2.66 respectively compared to the overall digital safety index score of 3.12.

⁸ Discussed further along with digital literacy in rural communities.

Figure 4.
Digital Safety Indicators scoring below the national score (2022 Index)⁹

Digital Skill Indicators

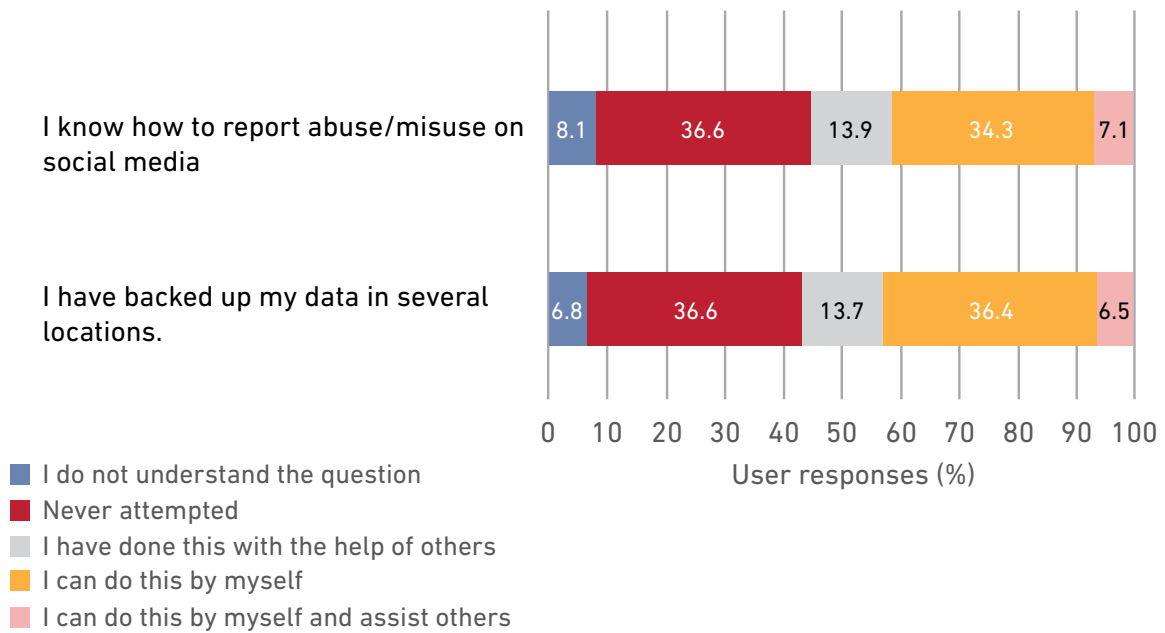
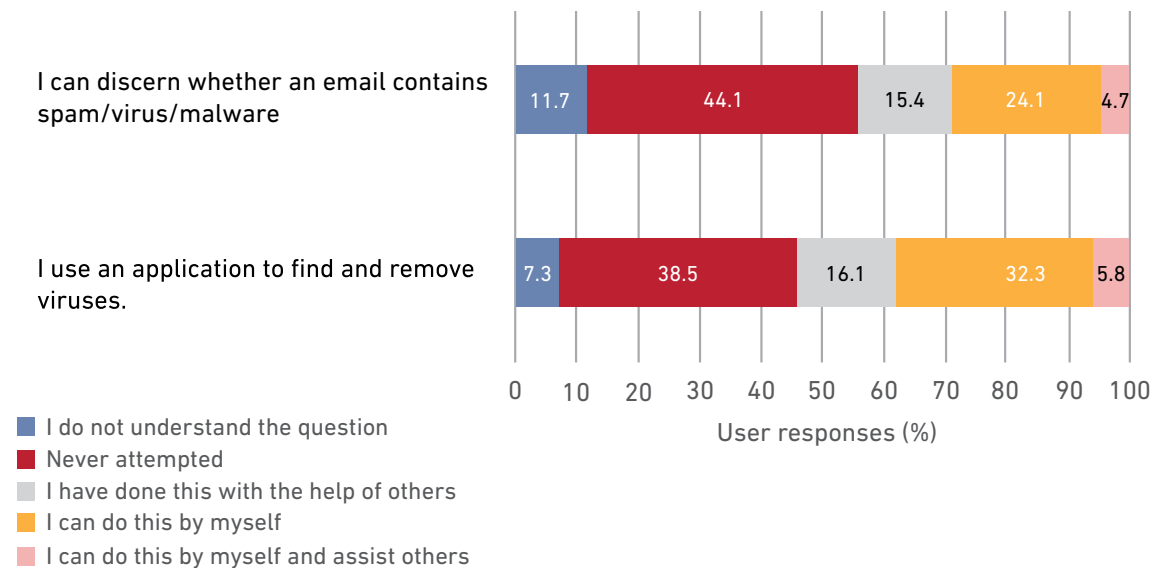


Figure 5.
Digital Safety Indicators scoring below the national score (2022 Index) (cont.)

Digital Safety Indicators



⁹ Digital safety indicators that scored above the national Digital Safety index score of 3.12, include the ability to deactivate the geolocation option on digital tools, the ability to control who views their social media post, and the use of a combination of numbers, letters, and special characters or punctuation marks. The indicators scoring below the national index score are all included in Graph 4 and 5.

Representation of vulnerable groups - Implications for DGIA's digital literacy programs

The digital literacy index has revealed both improvements and ongoing challenges in the development of digital literacy in Indonesia, indicating the need for continuous efforts to improve digital literacy.

The DGIA aims to expand the reach of their digital literacy programs and the index is used to evaluate the program's effectiveness and identify the barriers to achieving nationwide digital literacy for future program development. (MOCI & Katadata Insight Center, 2021; Interview with Coordinator for the National Digital Literacy Program, 2023). However, the analysis presented in the index does not distinguish enough between segments of society, even those who have been identified as needing more digital literacy support.

Children are among the most vulnerable groups in the Indonesian digital space at risk of exposure to negative content, which makes them an important demographic to target (Wendratama et.al., 2021). However, the index's methodology combines school-aged children, adult higher education students, teachers, and higher education lecturers into one "education sector" group with a single digital literacy index score.¹⁰ This lack of differentiation between the respondents in the analysis of the index overlooks the specific needs and cognitive abilities that differentiate children's digital literacy from that of adults (Soon et al., 2022). As a result, the index cannot meaningfully assess the digital competencies of children.

Indonesia's rural population has also been identified as requiring additional attention, but the index only compares digital literacy scores for the western, central, and eastern regions of Indonesia, as well as the digital literacy scores for each province. There are no significant differences in scores on this basis, so an assessment based on scores alone cannot provide insight specific to the challenges, needs, and performance of rural populations with regards to digital literacy. The latest index does not specify the percentage of urban and rural survey respondents while the breakdown of respondents' performance in the individual digital literacy pillar also does not differentiate between urban and rural communities.

Compared to their urban counterparts, rural communities face lower levels of digital connectivity. They make up 58% of Indonesians without internet access (UNICEF, 2021) even though they make up only 43% of the total population (Statistics Indonesia, 2022; World Bank, 2021). Case studies of rural schools and at the village level in Indonesia highlight the lack of access to essential hardware (i.e., computers, smartphones) and the lack of digital skills and familiarity with digital technologies. These deficiencies act as barriers for rural communities to benefit from the digital transformation (UNICEF, 2021; Nababan & Imron, 2022; Onitsuka et.al., 2018; Zulvia & Harahap, 2022). Altogether, the lack of access to digital tools and connectivity, in combination with lower levels of digital skills, exacerbates the digital literacy gap in Indonesia's rural areas (Jayanthi & Dinaseviani, 2022).

Rural communities also face digital safety concerns such as cybercrime, fraud, and hoaxes. There has been a strong push for measures to combat these negative effects of internet use (MOVDRT, 2021; Nababan & Imron, 2022; Rosyidah & Warisaji, 2022). The Ministry of Village, Disadvantaged Regions, and Transmigration (MOVDRT) also expressed concerns about the lack of digital literacy skills and information on digital literacy at the village level. These deficiencies have impeded the process of digitization and adoption of technology by village chiefs (*Kepala Desa*) (Event with Katadata Insight Center & MOCI, 2023). The World Bank (2021) reports that only around 10% of the total 74,957 villages in Indonesia have been registered in the MOVDRT's information system (Sistem Informasi Desa dan Kawasan or SIDeKa), demonstrating the urgency of developing digital literacy to support digitization in rural areas.

¹⁰ Students and teachers are provided with different survey questions and respond with dramatically different levels of satisfaction with technology adoption. Students are also only asked about their level of comfort in using digital tools at school and not on their overall level of competency in using these tools (MOCI & Katadata, 2023, p.46-9).



The 2021 and 2022 index survey criteria for participants excludes those who have not accessed the internet in the past three months. This exclusion can further obscure a comprehensive assessment of the digital literacy and challenges facing rural and remote communities in Indonesia.

The Center for Strategic and International Studies (CSIS) made similar remarks on its “ICT access and use” indicator developed for the *G20 Toolkit for Measuring Digital Skills and Digital Literacy* and argued that the indicator does not sufficiently account for digital inequalities that exist between regions. Urban households are nearly twice as likely to access digital tools and the internet as rural households (CSIS Indonesia, 2022). The World Bank similarly highlights the unique challenges faced by Indonesia’s rural communities. Poor digital skills and barriers to internet and hardware access limit the expansion of e-logistics services, the adoption of digital financial payments, and the development and delivery of crucial services including digitalized government, EdTech, and HealthTech initiatives outside Indonesia’s urban areas (World Bank, 2021).

The index includes a special analysis of the frontier region that provides a breakdown of competency and performance on aspects of digital literacy, but this analysis is only applied to the 62 regencies identified as frontier. Relying solely on the frontier neglects rural communities in other regions. Indonesia has a sizable rural population at 43% of the total population (Statistics Indonesia, 2022; World Bank, 2021).

Measures must be taken to differentiate rural communities in the index’s assessment, improving capacity for targeted digital literacy training programs and further expanding the relevance of the index. Digital literacy and digitalization must be supported at the village level to encourage stronger rural economic development and resilience in the local community (Cao et. al., 2022). Digitizing rural governance will also lead to more efficient and wider delivery of vital public services and goods (e.g., lifesaving healthcare, education) (ibid).

Using the index data: Steps to achieve long-term impacts

The previous section explored how the index combines the analysis of results and index scores of various segments of society, which overlooks the specific needs and context of digital literacy among children and rural communities. In order for governments to effectively develop, provide, and manage digital skills training, they need accurate and representative data on the state of digital literacy.

An improved methodology is necessary to extract this information by comprehensively measuring the extent of the community's skills gap and identifying its location (Chetty et. al., 2018). This will allow the DGIA to fulfill its commitment to develop an evidence-based digital literacy program (Interview with Coordinator for the National Digital Literacy Program, 2023).

To have greater and longer-lasting impact, the DGIA must take further steps to incorporate the findings generated by the digital literacy index's improved methodology into its digital literacy training programs.

Two of MOCI's digital literacy initiatives *SiBerkreasi (Gerakan Nasional Literasi Digital)*¹¹ and Digital Literacy Program (*Program Literasi Digital*) targets a broad segment of society across all sectors from education, agriculture, fishery, village, to micro- small- and medium-sized enterprises (MSMEs). These programs are conducted using a range of formats on both offline and online platforms, including seminars, coaching clinics, workshops, and film screenings (Interview with Coordinator for the National Digital Literacy Program, 2023; DGIA, 2022).

The broad targeting of Indonesia's digital literacy support programs has been criticized before, with digital literacy experts recommending a more targeted approach that ensures Indonesia's most vulnerable communities are included in the digital literacy effort (Wendratama et.al., 2021). For example, research on digital literacy intervention programs have shown that seniors, who are less familiar with the digital space and may experience cognitive decline, benefit from self-directed learning, while youth prefer more advanced, practical, and interactive forms of training to navigate the increasingly complex digital environment (Soon et al., 2022; UNICEF, 2021).

In addition, the assessment methodology used by the index should be improved to accurately measure the digital competencies of Indonesians. All three nationwide surveys relied on self-assessment questions (Katadata & MOCI, 2023, p.11–2). This approach is cost-effective and easy to implement, but is limited by its dependence on an individual's subjective evaluation of their competence, which may not necessarily reflect their ability (CSIS Indonesia, 2022; UNESCO, 2019).

Improving the index's methodology for measuring digital skills and the ability to recognize hoaxes would allow DGIA to more accurately identify with which skill sets respondents struggle the most, with what specific scenarios or problems respondents struggle, which segments of society require greater digital literacy support, and which digital tools respondents find most challenging to operate.

¹¹ SiBerkreasi (Gerakan Nasional Literasi Digital) emerged in 2019 as a national movement to address the spread of negative content on the internet via hoax, cyber bullying, and online radicalism. The movement advocates for the incorporation of digital literacy into the formal curriculum and develops various training modules on digital literacy (MOCI, 2019).

Gathering additional data from a more extensive breakdown of survey results from school-aged children and communities at the village level can also help the DGIA identify specific challenges in the classroom and village settings to improve digital literacy efforts there. These findings could then be used to determine which digital literacy education tools and pedagogy would be most effective for improving digital literacy for different segments of the population. Policymakers and digital trainers could then develop training programs that address the gaps in digital skills and align with the needs of the labor market, enabling these groups to meet the demands of the growing digital economy (Chetty et. al., 2018).

The DGIA recognizes the need for collaboration to expand the impact of the national digital literacy program (Interview with Coordinator for the National Digital Literacy Program, 2023; MOCI, 2023). Making differentiated assessments of the digital literacy of various population groups available would allow other government ministries and digital literacy actors to develop more focused programs, leading to greater collaboration by DGIA with stakeholders.

For instance, the DGIA can help the Ministry of Education, Culture, Research, and Technology (MOECRT) strengthen its existing digital literacy training programs by integrating findings on the state of digital literacy affecting the education sector (i.e., school-aged children, university students, teachers, lecturers) into their program plan. This integration would enable MOECRT to target its support for the digitization of schools and promote children's digital literacy at various education levels in both formal and non-formal education sectors. It would also support the DGIA in developing more targeted digital literacy programs at the village level with MOVDRT.

The index can also have a greater long-term impact if it is used to assess the annual performance of local governments in addressing digital literacy in order to determine the disbursement of their budgets. This policy would incentivize local governments to continue addressing the issue in order to stay above a certain position on the index.

Improving the index: Examining the Self-Assessment Methodology

Problem identification

Studies on ICT-related skill tests and internet skills surveys show that self-assessments do not accurately reflect differences in performance and tend to both overestimate and underestimate skills (Palczyńska & Rynko, 2020; van Deursen, van Dijk, & Peters, 2012). Self-assessments rely on respondents' personal norms and beliefs about what is satisfactory, as well as their level of confidence and self-insight. This can prevent them from accurately evaluating their own skills and knowledge (Aesart et al., 2017; Helsper et al., 2020; Herde et al., 2019).¹² Research on self-assessments suggests that approximately 30% of respondents overestimate their performance, while 10% to 15% tend to underestimate it (Muszyński et al., 2022; Robins & Beer, 2001). Male respondents are more likely to overestimate their ICT and internet skills compared to women (Hargittai & Shafer, 2006; Palczyńska & Rynko, 2020; van Deursen, van Dijk, & Peters, 2011).

¹² Respondents in self-assessment surveys can be prone to social desirability bias, where individuals may be reluctant to acknowledge that they are not good at something (Helsper et al., 2020).

These potential biases were realized in the 2022 digital literacy index. A representative from MOCI and its research partner, Katadata Insight Center, were concerned that respondents underestimating their competencies was contributing to a declining index score (particularly digital culture) (Event with Katadata Insight Center & MOCI, 2023). They argue that accurate self-assessment based on the digital culture questions requires the necessary capacity for critical thinking skills that some respondents may not possess (ibid). In addition, male respondents in the 2023 digital literacy index outperform their female counterparts across all digital pillars save for the digital culture. Since the tendency for men to overestimate in self-assessments has been well-documented in many ICT and internet skill assessments, these findings suggest an urgency to reevaluate the self-assessment methodology (Hargittai & Shafer, 2006; Palczyńska & Rynko, 2020; van Deursen, van Dijk, & Peters, 2011).

Recommendations

The DGIA should implement a performance-based assessment to validate the self-reported digital literacy skills (OECD, 2013; UNESCO, 2019).¹³ The DGIA should consider the Educational Testing Service (ETS)'s iSkills Assessment for ICT literacy, a scenario-based and performance-based assessment that evaluates students' ICT literacy skills by having the students perform various ICT literacy simulations, such as scenarios using email or a web browser (Katz, 2007). This scenario-based assessment has strong relevance to the digital literacy index, as many of the scenarios used in the assessment correspond to the tasks listed in the index's digital skill section.

For instance, the index asks respondents about their ability to download and upload files/applications and compare information sources to determine their validity, all of which are included in ETS's iSkills Assessment tasks. Compared to self-assessments, this format is more effective in measuring digital skill, particularly hard skills, because it directly measures both the knowledge of the respondent (theoretical application of digital skill) and the technical capabilities of the respondent in operating digital hardware and software (e.g., using a computer, navigating a web browser, etc.) in a problem-solving context (Hargittai, 2005; Helsper & Van Deursen, 2015; Muszyński et al., 2022; Senkbeil et al., 2013; van Laar et al., 2020). Additionally, the scenario-based performance task is a cost-effective and practical option to implement, as it can be conducted online and by a larger sample compared to other ICT competency tests that require in-person testing (van Laar et al., 2020).

The DGIA should also provide a paper-based option in anticipation of challenges using or accessing hardware and internet-based assessments. Low levels of internet and mobile access in frontier regions of Indonesia have previously hindered the implementation of internet-based and software-based digital literacy programs (Center for Financial Accountability of the House of Representatives [*Pusat Kajian Akuntabilitas Negara DPR*], 2022). The DGIA should refer to the Test of Technological and Information Literacy (TILT), a paper-based assessment acknowledged by UNESCO that uses multiple-choice questions to measure the seven components of ICT literacy assessed in the ETS iSkills test (2007) (Senkbeil et al., 2013; UNESCO, 2019).¹⁴ The DGIA should also refer to the OECD's PIAAC Survey of Adult Skills in 2016 for a successful case study of delivering a paper-based version of a computer-based performance assessment in Indonesia (OECD, 2016).¹⁵

¹² Respondents in self-assessment surveys can be prone to social desirability bias, where individuals may be reluctant to acknowledge that they are not good at something (Helsper et al., 2020).

¹³ CSIS also recommends the use of a test-based survey to complement the analysis of the G20 Toolkit (CSIS Indonesia, 2022).

¹⁴ The ETS iSkills identifies and measures seven process components of ICT literacy: (1) Define, which covers basic knowledge of operating hardware and software; (2) The ability to access and retrieve information in an internet browser; (3) Manage and process information; (4) Create and edit documents/files; (5) Integrate or the ability to retrieve and compare information; (6) Evaluate or assessing the credibility of the information received; (7) The ability to communicate information meaningfully (appropriately and in an understandable form).

¹⁵ The OECD provided a paper-based option for the literacy and numeracy components of the computer-based assessment. It did not provide a paper-based option for the operational assessment of skills.

Measurement of the ability to recognize “fake news” (hoaxes) will also benefit from using observation and performance-based assessment in lieu of respondents’ self-assessment.¹⁶ Many respondents overestimate their ability to recognize fake news in self-assessments and perform poorly when these skills are measured through performance-based assessments, as evidenced by research conducted in North America and Southeast Asia (Lyons et al., 2020; TrustedWeb, 2021). Observation and performance-based assessments should be used to measure competency and media literacy in addition to a self-assessment measure (Bühler et al., 2020).

The DGIA should use the discernment ability test as a performance-based assessment to measure the ability to recognize hoaxes/fake news (Lyons et al., 2020).¹⁸ In this performance-based assessment, the DGIA must also include both true mainstream and false news headlines in a randomized order. The existing index assessment asks respondents to evaluate topical news issues to discern false news by only providing false news headlines. This can lead to hypothesis guessing, where respondents assume that all the headlines provided are false simply because they are only being asked about false news (Choi & Pak, 2005).¹⁹ By including both true and false news headlines in randomized order, the DGIA can improve the reliability of the question items and reduce the likelihood of response bias generated from guessing (Goodhue & Loiacono, 2002).

Performance-based assessments are more effective measures of hard skills like digital skill and the ability to recognize hoaxes. This technique requires questions that have a single correct response or solution, and such questions have less relevance in evaluating soft skills that involve creativity and critical thinking (van Laar et al., 2020). This makes performance-based assessments less appropriate for evaluating digital ethics and digital culture. Therefore, the DGIA should maintain self-assessments if steps are taken to address the response bias mentioned previously.

The DGIA should use the overclaiming technique to address overestimation of self-reported skills. This technique distributes five foil questions,²⁰ which ask a respondent to evaluate their competence in a non-existent skillset, in the self-assessment process. The overclaiming technique is used by the European Commission’s The Digital Framework for Citizens (DigComp 2.1), which demonstrated that the reliability of results improved significantly when respondents with high overclaiming scores were excluded (Muszyński et al., 2022).²¹ The overclaiming technique is practical and cost-effective because it can be implemented simultaneously with the index’s regular data collection and processing. This relatively unobtrusive method also avoids potential noncooperation from respondents as it does not require informing the respondents about the foil questions nor is there time-pressure (Paulhus et al., 2003).

¹⁴ The ETS iSkills identifies and measures seven process components of ICT literacy: (1) Define, which covers basic knowledge of operating hardware and software; (2) The ability to access and retrieve information in an internet browser; (3) Manage and process information; (4) Create and edit documents/ files; (5) Integrate or the ability to retrieve and compare information; (6) Evaluate or assessing the credibility of the information received; (7) The ability to communicate information meaningfully (appropriately and in an understandable form).

¹⁵ The OECD provided a paper-based option for the literacy and numeracy components of the computer-based assessment. It did not provide a paper-based option for the operational assessment of skills.

¹⁶ The digital literacy index measures the ability to recognize hoaxes by distributing self-assessment statements such as “How confident are you in your ability to identify/recognize misinformation/ factually incorrect news/hoaxes?”, to which respondents can respond with “Very Confident”, “Confident”, “In Between confident and not confident”, “not confident”.

¹⁷ The survey showed that 90% of respondents were very or somewhat confident that they could identify fake news. However, 37% of respondents had still inadvertently circulated false or misleading content online (TrustedWeb, 2021).

¹⁸ The assessment presents respondents with 12 news headlines (a combination of both mainstream and false news) and asks them to evaluate the accuracy of each headline on a four-point scale (“Not at all accurate” to “very accurate”). The difference score between the number of accurately identified mainstream and false news headlines can then be calculated and compared to the respondent’s self-reported ability to recognize false news (Lyons et al., 2020).

¹⁹ Hypothesis guessing is a bias commonly found in questionnaires where respondents may systematically alter their survey response when they become aware of the study hypothesis during the process (Choi & Pak, 2005).

²⁰ Foil questions are intentionally designed to be false and refer to nonexistent tools and services. Therefore, if respondents claimed understanding of these made-up terms, this would signify that the respondents have exhibited overconfidence or bias, to which they would be excluded from the self-assessment tool.

²¹ Similar to MOCI’s digital literacy index, DigComp 2.1 aims to measure digital competencies and literacy in domains such as safety, communication and collaboration (netiquette, digital ethics, digital culture), and information and data literacy (digital skill) through several self-assessment questions that measure the knowledge (ie. “I have knowledge of this”), skills (“I can perform this task”), and attitude (“Yes/Not much/Not at all”) of respondents regarding digital literacy.

Improving the index: Differentiating the analysis of survey results to ensure vulnerable communities are represented

Problem identification

Best practices from several reputable literacy tests, including the Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS), strongly recommend conducting rigorous sampling to provide an accurate estimate of skills by ensuring that the sample group is representative of the target population (Chetty et. al., 2018; Joncas & Foy, 2012).

Prior digital literacy measures have aimed to conduct rigorous sampling by ensuring that their samples encompassed all age ranges (Ali et al., 2023; Hargittai et al., 2018), but a majority of these studies were carried out in developed countries (mainly Europe), where age was the key predictor of digital literacy (Ali et al., 2023; Hargittai et al., 2018). Developing countries possess a larger set of demographic attributes linked to digital literacy (i.e., education, gender, and income level), because they have different barriers to internet access and training (Thies, 2015; Vashistha et al. 2019, Qazi et al. 2021 as cited in Ali et al., 2023). As a result, an accurate assessment of digital literacy in developing countries requires a sample group that captures more than age groups.

The digital literacy index has been shown to underrepresent various demographic segments in its analysis, particularly school-aged children and rural respondents. This prevents the index from generating an accurate estimate of skills across the demographic attributes that affect digital literacy and undermines the ability of the DGIA to develop targeted and suitable digital literacy training.

Recommendations

To ensure that the index provides a complete overview of digital literacy, the DGIA should develop the rural village unit as a specific demographic segment for the digital literacy index, in the same way that sectors like education and government are differentiated (MOCI & Katadata, 2023).²² This analysis will be supported further if the survey participant criteria of having accessed the internet in the past three months is waived for rural participants with the understanding that this criteria further excludes too many rural and remote communities in Indonesia to provide an accurate assessment of digital literacy in this population.

The index's analysis section of digital literacy in the education sector must also differentiate between students and teachers and further distinguish students that are children from those who are adults to ensure that the distinct strengths and challenges facing these groups are adequately represented in the index. Students must also be provided with self-assessment questionnaires and a performance-based test to assess their digital competencies. These measures will not only address the gaps in data but provide valuable insight into the factors that contribute to digital literacy disparities in these underrepresented communities. This will help the government to adjust and enhance their digital literacy programs to be more targeted and effective for different segments of society.

²² Section 4.4 of the 2023 *Indeks Literasi Digital* Report looks at the digital literacy status of various segments, categorized based on their occupation.

Summary of Policy Recommendations

- **Enhance the analysis of survey results to distinguish between various segments of society, particularly those in need of greater digital literacy support**

The DGIA should dedicate analysis sections for rural village communities, teachers, adult students, and school-aged children in order to understand the specific needs and challenges of these groups with regards to digital literacy.

The DGIA should refer to their existing analysis section on the frontier region and the occupation-based analysis for the structure of this dedicated analysis.

Analysis for these groups should use both self-assessment and performance-based assessment. Insight from this more granular analysis should be used by MOCI and MOVDRT to develop appropriate digital literacy support for these at-risk populations. These should include supporting technology adoption by local village governments, and technology adoption in classrooms to support both students and teachers.

- **Ensure that the assessment methods can accurately measure digital competencies**

The DGIA must integrate performance-based assessments into their evaluation process to accurately measure hard skills such as digital skill and the ability to detect fake news.

To evaluate ability to detect fake news, the performance-based test must provide questions in randomized order to prevent guessing.

The DGIA should conduct these assessments through software-based tests, with the option of a paper-based alternative to accommodate regions in Indonesia with limited digital infrastructure or internet connectivity issues.

For soft skills, such as digital ethics and culture, the DGIA must improve the reliability of their self-assessment methodology through data quality techniques such as the overclaiming technique to address the tendency of respondents to overestimate their skills in these areas.

- **Integrate the index findings into the program design for digital literacy**

The DGIA must use the insights from its improved assessment to inform the design of its digital literacy training programs, tailoring them to consider the unique challenges, skills, and capacities of each target demographic. These programs should be designed with a both delivery format and content that caters to the distinct needs of each group.

The DGIA should establish collaborative partnerships to provide targeted and effective digital literacy training programs that equip individuals and communities with the skills and knowledge they need to succeed in the digital age.

Index data should be utilized to evaluate the yearly progress of local governments in improving digital literacy and their progress should determine their budget allocation.

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Interview

Interview 1: MOCI's Coordinator for the National Digital Literacy Program (2023). Personal Communication.

Appendix A.
Changes and continuities of the 2020, 2021, and 2022 Digital Literacy Index

Criteria	2020 Digital Literacy Index	2021 Digital Literacy Index	2022 Digital Literacy Index
Research Purpose	Assess the state of national digital literacy of all Indonesians indiscriminately.		
	Develop a framework for measuring digital literacy across Indonesia's 34 provinces	Align the index's framework for measuring digital literacy with the DGIA's 2020–2024 Digital Literacy Roadmap Gain insight into the attitudes and habits of Indonesians towards technology and digital media	Assess Indonesia's readiness to implement the Personal Data Protection law Assess the adequacy of digital infrastructure level of digital competencies in the East Kalimantan province in the context of establishing the Nusantara Capital (Ibu Kota Nusantara or IKN) Evaluate the digital literacy status of frontier regions (3T) Document the effects of digital literacy on the work and learning productivity of Indonesians
Target demographic	All Indonesians aged 13–70 years old that have accessed the internet. The survey sample covers 34 provinces.	All Indonesians aged 13–70 years old that have accessed the internet in the past three months . The survey sample covers 34 provinces.	
Data Collection Method	The survey is conducted through a face-to-face interview. Respondents are selected through a multi-stage random sampling from the provincial to the household level. Respondents from each household unit are then selected using the Kish grid method.		
Research Framework	"A Global Framework of Reference on Digital Literacy Skills" (UNESCO, 2018)	<ol style="list-style-type: none"> 1. A Global Framework of Reference on Digital Literacy Skills (UNESCO, 2018) 2. The DGIA's 2020–2024 Digital Literacy Roadmap 	<ol style="list-style-type: none"> 1. A Global Framework of Reference on Digital Literacy Skills (UNESCO, 2018) 2. The DGIA's 2020–2024 Digital Literacy Roadmap 3. G20 Toolkit for Measuring Digital Skills and Digital Literacy: Framework and Approach (CSIS, 2022)

<p>Digital Literacy Indicators</p>	<p>Measures four sub-indices:</p> <ol style="list-style-type: none"> 1. Information and Data Literacy <ul style="list-style-type: none"> • Information and Data Literacy • Critical Thinking 2. Communication and Collaboration <ul style="list-style-type: none"> • Communication skills • Ethics in technology use 3. Safety <ul style="list-style-type: none"> • Protecting personal data and privacy • Protecting devices 4. Technology-related competency <ul style="list-style-type: none"> • Using digital technologies 	<p>Measures four pillars:</p> <ol style="list-style-type: none"> 1. Digital Skill (formerly the Information and digital literacy sub-index and Technology-related competency sub-index) 2. Digital Culture (formerly communication skills) 3. Digital Ethics (formerly Ethics in technology use) 4. Digital Safety (formerly the Safety sub-index) 	<p>Measures four pillars:</p> <ol style="list-style-type: none"> 1. Digital Skill <ul style="list-style-type: none"> • Incorporates the G20 Toolkit’s Empowerment pillar on ability to use digital finance and marketplace tools, • Incorporates the G20 Toolkit’s Literacy pillar on communication and critical thinking 2. Digital Culture <ul style="list-style-type: none"> • Incorporates the G20 toolkit Literacy pillar on respondent’s use of data and ICT tools 3. Digital Ethics 4. Digital Safety <ul style="list-style-type: none"> • Incorporates the G20 Toolkit’s Literacy pillar on respondent’s behavior and habit towards digital tools, and safety (personal data protection).
<p>Assessment methodology</p>	<p>Self-assessment in a questionnaire format. Respondents must assess their digital competencies and rate them on a Likert scale (1 to 5).</p> <p>Respondents must also complete a set of question items to assess their level of exposure to hoaxes, their ability to recognize hoaxes, and how they consume online news.</p>		

ABOUT THE AUTHOR

Natasya Zahra holds a Bachelor of Arts degree from the University of Sydney where she double-majored in Government - International Relations and Asian Studies. Prior to joining CIPS, she was a student representative advocating for disability-inclusive public facilities and she was an active member of her university's student association. At CIPS she first completed the Emerging Policy Leaders Program in 2022 before joining as a junior researcher.

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