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Digital Literacy of Generation Z: Challenges for Teachers in the Era of Demographic Bonus

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ABSTRACT: The demographic bonus presents a strategic opportunity to enhance the quality of human resources, particularly through digital literacy education for Generation Z as digital natives. In 21st-century education, digital literacy has become essential, including technical skills, critical thinking, digital ethics, collaboration, and online communication. This study aims to analyze teacher readiness in teaching, the challenges and strategies involved, and supporting policies for classroom management that emphasize digital literacy for Generation Z in the era of the 2030 demographic bonus. Using a qualitative case study method, the research involved three informants, one principal and two teachers, through semi-structured interviews at Hidayatullah Secondary School in Balikpapan. The findings reveal that teachers' understanding of digital literacy varies, with significant challenges including limited technological access and low student motivation in critical thinking. The study also found that a POAC-based classroom management strategy effectively fosters digital literacy among Generation Z students. This strategy includes teacher training planning, establishing a school digital team, implementing project-based learning and interactive media, and conducting regular evaluations. Supporting policies identified include integrating digital literacy into the school curriculum, providing digital classrooms, online discussion forums, and digital learning communities. A key implication of this study is the need for localized digital literacy certification programs for teachers and government policy support to ensure equitable access to technology in schools.

Keywords: 21st-century competencies, demographic bonus, digital literacy, Generation Z.

ABSTRAK: *Bonus demografi membuka peluang strategis bagi peningkatan kualitas sumber daya manusia, khususnya melalui pendidikan literasi digital bagi generasi Z sebagai digital natives. Dalam konteks pendidikan abad ke-21, literasi digital menjadi kompetensi esensial yang tidak hanya mencakup keterampilan teknis, tetapi juga berpikir kritis, etika digital, kolaborasi, dan komunikasi daring. Penelitian ini bertujuan untuk menganalisis kesiapan guru dalam pembelajaran, tantangan dan strategi, serta kebijakan pendukung dalam manajemen kelas yang menekankan pada literasi digital kepada generasi Z di era bonus demografi 2030. Metode penelitian kualitatif, studi kasus dengan melibatkan 3 informan melalui wawancara semi-terstruktur yang terdiri dari kepala sekolah dan dua guru di Sekolah Menengah Hidayatullah Balikpapan. Hasil penelitian menunjukkan bahwa pemahaman guru terhadap literasi digital beragam, dan tantangan utama meliputi akses teknologi yang terbatas dan rendahnya motivasi siswa dalam berpikir kritis. Ditemukan pula bahwa strategi manajemen kelas berbasis POAC efektif dalam membangun literasi digital generasi Z di sekolah. Strategi ini mencakup perencanaan pelatihan guru, pembentukan tim digital sekolah, penerapan pembelajaran berbasis proyek dan media interaktif, serta evaluasi berkala. Kebijakan pendukung yang ditemukan meliputi pengintegrasian literasi digital dalam kurikulum, penyediaan kelas digital, forum diskusi daring, dan komunitas belajar digital. Implikasi langsung dari temuan ini adalah perlunya program sertifikasi literasi digital bagi guru yang disesuaikan dengan kebutuhan lokal, serta dukungan kebijakan pemerintah untuk pemerataan akses teknologi di sekolah.*

***Keywords**: 21st-century competencies, bonus demografi, generasi Z, literasi digital.*

INTRODUCTION

Demographic bonus is a condition when the proportion of the productive age population (15–64 years) is greater than the non-productive population (aged under 15 years and over 64 years), resulting in a low dependency ratio (Arum et al., 2023). Indonesia is projected to reach the peak of the demographic bonus in the 2020–2030 range, with the working-age population reaching 140 million out of a total population of 273.5 million in 2020 (Central Statistics Agency [BPS], 2023). This phenomenon provides an excellent prospect for the educational environment to prepare the younger generation as human resources with relevant competencies in the modern work era that demands critical, innovative, and adaptive thinking skills to change (Ahmad et al., 2013; Carnevale & Smith, 2013).

One of the dominant groups in Indonesia's productive age population structure is Generation Z, i.e., individuals born between 1997 and 2012. This generation is identified as digital natives because they have been intensively exposed to digital technology since birth. They possess wide access to information via the Internet and social media, so digital literacy becomes an essential competency (Novitra & Festiyed, 2020). Nonetheless, mastery of technological devices is not always accompanied by adequate critical thinking skills or digital literacy. Based on a survey by the Ministry of Communication and Information (Kominfo, 2022), as many as 45% of high school students admitted having difficulty sorting out correct information, and 52.2% did not verify the truth of the news before sharing it. This denotes that even though Generation Z is familiar with technology, they still face serious challenges in responsibly filtering and managing digital information.

In the context of learning, Generation Z tends to learn independently, is project-oriented, and prefers visual materials and fast feedback (Prismanata & Sari, 2022; Ussolikhah & Nafi'a, 2024). Their ability to access and use digital learning resources provides excellent opportunities for self-development. However, dependence on technology can also hinder critical thinking skills and essential complex problem-solving (Novitra & Festiyed, 2020). This is where the role of teachers becomes crucial. Teachers are required not only to master technology but also to guide students in developing digital literacy that includes cognitive, technical, ethical, and social aspects. Adapting to the dynamics of digital learning and virtual classroom management is a challenge for teachers in this era (Santosa, 2021).

Digital literacy is closely related to 21st-century competencies, which include creativity, critical thinking, communication, and collaboration (Partnership for 21st Century, 2019). Creativity encompasses generating original ideas and applying them in a social context. Critical thinking emphasizes the process of analyzing, evaluating, and synthesizing information. Communication and collaboration refer to the ability to convey ideas and work effectively in teams (Boyaci & Atalay, 2016; Donovan et al., 2014; Van Laar et al., 2017). In this framework, digital literacy is understood as the ability to use devices and the capacity to understand, evaluate, and create meaningful digital content (Cynthia

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& Sihotang, 2023). Research indicates strong digital literacy significantly develops students' 21st-century competencies (Ahonen & Kinnunen, 2015; Bernhardt, 2015).

Although digital literacy has become a global concern, there remains a gap in research on the readiness of Indonesian teachers to integrate digital literacy into learning, especially in dealing with Generation Z's unique characteristics and the demographic bonus challenges. Local research examining the relationship between digital-based classroom management, teacher pedagogical capacity, and adaptive learning strategies to students' digital needs is still limited. To maximize the potential of the demographic bonus, the education system needs to prepare teachers who can form a generation that is not only technologically literate but also has holistic and ethical digital literacy.

Based on this background, this study aims to (1) analyze teacher readiness in integrating digital literacy with Generation Z, (2) identify challenges faced in digital-based classroom management, and (3) formulate strategic policies that support the development of digital literacy as part of preparations to face the peak demographic bonus in 2030.

RESEARCH METHODS

This study used a qualitative approach with a case study method (Yin, 2009). Case studies were chosen because they allow researchers to explore a deep and comprehensive understanding of the ongoing phenomenon, namely teacher readiness and the challenges faced in implementing digital literacy-based learning for Generation Z students in a secondary school environment. This study is ideographic, focusing on a specific unit, namely individuals and teacher learning programs in the context of digital literacy, rather than on a statistically broad population (Creswell & Poth, 2016).

The study subjects comprised principals and teachers actively teaching at Hidayatullah Balikpapan Secondary School. Generation Z students in this context were not recruited as the main participants but rather as the social background of the phenomenon being studied. The selection of principals and teachers as informants was based on the consideration that they were parties who played a direct role in planning and implementing learning and had experience in facing the challenges of integrating digital technology in the classroom. The criteria for selecting informants included a minimum of five years of teaching experience, active involvement in using digital devices in learning, and openness to in-depth interviews. The number of informants in this study was three, consisting of one principal and two teachers from different fields of study.

This research was conducted in Balikpapan City, East Kalimantan, which was chosen purposively because it has a strategic role as a buffer city for the Indonesian Capital City (IKN). The relocation of the nation's capital city to East Kalimantan directly impacts improving infrastructure, population mobility, and the development of the digital ecosystem in Balikpapan. In the context of education, Balikpapan is faced with the challenge of preparing educational human resources that are adaptive to digital transformation and the demands of the 21st century,

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especially in welcoming the surge in the number of productive-age students and teachers who must be responsive to technological developments (Arum et al., 2023; Statistik, 2023).

Data collection was conducted through semi-structured interviews, which allowed for an in-depth exploration of teachers' perceptions, experiences, and strategies for implementing digital literacy in the classroom. Interviews were conducted in December 2024, with each session lasting between 45 and 75 minutes. The interview process was based on a guideline developed on 21st-century digital literacy and digital classroom management theories. The data obtained were analyzed using a thematic approach with the help of ATLAS.ti 9 software. The analysis stages were carried out through an open coding process to identify initial categories based on informant narratives, followed by axial coding to connect these categories into central themes, and finally, selective coding to formulate core findings that represent the phenomenon as a whole (Saldaña, 2021). Data validity was strengthened through triangulation of sources and techniques, member checking of key informants, and peer debriefing with fellow researchers in digital literacy and classroom management to avoid interpretive bias.

The results of the data analysis were grouped into four main topics, namely: (1) teacher readiness in learning and classroom management that emphasizes digital literacy in the aspect of 21st-century competencies, (2) challenges faced by teachers in the context of digital learning, (3) strategies implemented by teachers to answer digital literacy challenges, and (4) the need for training and policy support for Generation Z teachers and students in facing the demographic bonus in 2030.

RESEARCH RESULTS AND DISCUSSION

Results

This study examines Generation Z's digital literacy in the demographic bonus era by grouping findings into four main themes, namely: (1) understanding and readiness, (2) challenges and obstacles, (3) digital literacy management strategies, and (4) supporting policies. The research results obtained from the principal as the first informant (P1) and the teacher as the second informant (P2) are as follows:

Understanding and Readiness

Research revealed various variations in teachers' understanding of digital literacy. Most teachers still consider digital literacy limited to technical skills in using devices, while others have understood the importance of critical thinking skills in sorting digital information. P1 conveyed this:

> "Some fellow teachers still interpret digital literacy as limited to technical skills, such as operating basic devices and applications." (P1:1:5)

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However, some teachers also have an understanding of digital skills related to processing information by adapting to the digital environment, which is a significant concern, as stated by P2:

> "In my opinion, digital literacy is not only about the use of technology but also includes the ability to understand, process, and critically evaluate information." (P2:2:1)

> "I try to instill the habit of verifying information in students before they share it because it is an important part of digital literacy." (P2:2:24)

> "Students must be able to adapt in a digital environment. If students do not get guidance, they can get caught in hoaxes." (P1:1:3)

This difference in understanding reflects the unequal distribution of digital literacy among teachers. The existence of purely technical understanding indicates the need for instrumental and conceptual training. This is vital so teachers can guide students to critically and ethically understand digital content.

Schools support this readiness by facilitating training and development with discipline, taking action, and participating. Teachers participating in the training are also encouraged to share their experiences with colleagues. P1 stated this:

> "The school is quite active in facilitating digital literacy training for teachers" (P1:1:8)

> "We hope that the digitalization capabilities of teachers will be evenly distributed; therefore, teachers must follow training more routinely and with focus." (P1:1:10)

> "Teachers who have attended training usually share their experiences and materials with their colleagues." (P1:1:9)

This strategy indicates the school's awareness of the importance of building a collaborative learning ecosystem. However, the absence of specific and routine training denotes that strengthening digital literacy is still in its early stages and needs to be improved comprehensively.

Obstacles and Challenges

The informants said that in implementing Generation Z digital literacy in the demographic bonus era, several obstacles and challenges must be faced, such as the very rapid development of technology, which causes teacher demotivation. P2 admitted this:

> "I feel a bit left behind because technological developments are speedy and very dynamic (P2:2:13)

> "Young teachers adapt more quickly, while some senior teachers find it difficult." (P2:2:17)

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Agreeing with P2's statement, P1 also confirmed this.

> "Some senior teachers show a tendency to feel bored and stressed when having to keep up with the ever-changing digital developments." (P1:1:25)

These findings reinforce the idea that digital literacy is influenced not only by access to technology but also by attitudes and age. Different generations of teachers have different levels of adaptation, so an inclusive and responsive training approach to the needs of each age group is required. In addition, the mindset of teachers is a challenge that must be changed regarding digital literacy, as asserted by P2:

> "There are still teachers who think that digital literacy is just about using devices." (P2:2:16)

Additionally, boarding school regulations cause device limitations or only school-provided devices can be accessed by students. This was explained by P1:

> "Because it is a boarding school, students are not allowed to bring mobile phones. They can only use the devices available in the computer lab in turns." (P1:1:14, 1:15)

These limitations only allow students to have a limited digital experience. Although security and supervision reasons can be justified, this has the potential to hinder the development of digital literacy if not accompanied by adequate alternative facilities. The gap in technological skills is also a significant challenge that contradicts the rapid development of technology. P1 expressed this: "*Generation Z is mastering technology faster than their teachers."* (P1:1:23). P1 also said that Gen-Z's dependence on visual information has resulted in low student motivation to think critically.

> "Gen Z's reliance on visual information makes them less interested in verifying information, thus risking spreading hoaxes." (P1:1:27)

> "Limited access to technology also contributes to students' low motivation to think critically." (P1:1:26)

P1 also emphasized that Generation Z is a digital native adept at using technology, making it challenging for teachers to guide them to become technology-savvy.

> "Generation Z is already familiar with technology, but the challenge is how they can use it wisely." (P1:1:2)

This confirms that digital skills alone are insufficient; students must also be equipped with critical literacy skills and digital ethics. A curriculum that focuses

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only on skills without instilling ethical values will not be enough to answer today's digital literacy challenges.

Digital Literacy Management Strategy

To overcome these obstacles and challenges, the research subjects designed managerial strategies such as POAC (Planning, Organizing, Actuating, and Controlling) as expressed by P1:

> "If there is no strong control, children can go too far in surfing the digital world." (P1:1:17)

> “We strengthen digital awareness and manners so that students understand the limits of information that can be accessed.” (P1:1:20)

> “I also monitor their activities directly.” (P2:2:9)

Another strategy is to hold a discussion forum between teachers to standardize teacher abilities, then implement digital class rules and feedback, because Generation Z appreciates fast feedback. This was expressed by P1 and supported by P2:

> “We held a discussion forum between teachers to share solutions.” (P1:1:22)

> “A skilled teacher helps a friend who is not yet confident.” (P2:2:18)

> “I set a rule that students are only allowed to open sites relevant to learning.” (P2:2:8)

> “I always give direct feedback.” (P2:2:12)

Teachers also address the challenges of Generation Z digital literacy by applying the theory of 21st-century competencies, including creativity, communication, critical thinking, and collaboration. P1 conveyed this: “*Children absorb quickly; their creativity is very high*.” (P1:1:19). Then, this opinion is supported by P2:

> “I invite them to create content such as videos, infographics, or digital simulations.” (P2:2:10)

> “I use project-based assignments to encourage critical thinking and collaboration.” (P2:2:5)

21st-century competencies can be designed through a learning model by creating projects so that they can understand real digital ethics education. This was expressed by P2 and reinforced by P1:

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> "Students must understand that what they upload online has consequences." (P2:2:11)

> "We are designing an integrated digital literacy program with a focus on digital ethics and cybersecurity." (P1:1:34)

This strategy demonstrates great potential in meaningfully building digital literacy. Students involved in content production are passive consumers and active learners who think critically about information. Collaborative strategies are also carried out through teacher discussions. The teacher community can be a catalyst in accelerating the distribution of digital literacy. However, the success of this collaboration is highly dependent on a school culture that supports professionalism and good digital ethics.

Supporting Policies

Supporting policies are needed to provide facilities, infrastructure, and long-term strategic plans to improve the implementation of Generation Z digital literacy in the demographic bonus era.

> "Every class is equipped with an LCD or television, and this year, we started running a digital library." (P1:1:6)

> "We have a strategic plan based on SWOT analysis to anticipate the needs of the next four years." (P1:1:2)

This indicates an institutional commitment to digital transformation. Nevertheless, this policy needs to be monitored with continuous evaluation so that it does not stop at the infrastructure aspect alone, but also impacts changing the learning paradigm. P1 and P2 also expressed the hope for curriculum integration, guidance modules in developing digital literacy, and support and assistance from external parties. This is consistent with the statements in P1 and P2:

> "We hope that in the future digital literacy will be integrated into the learning curriculum." (P1:1:31)

> "A digital literacy guidebook would be invaluable." (P2:2:23)

> "We need financial assistance and training." (P1:1:33)

Sustainable digital literacy requires a balance between internal school policies and external support from the government and education partners. The risk of implementation failure is high when policies are only formalities without

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sustainability. The four aspects of Generation Z digital literacy in the demographic bonus era are illustrated as a network using the ATLAS.ti9 application as follows:

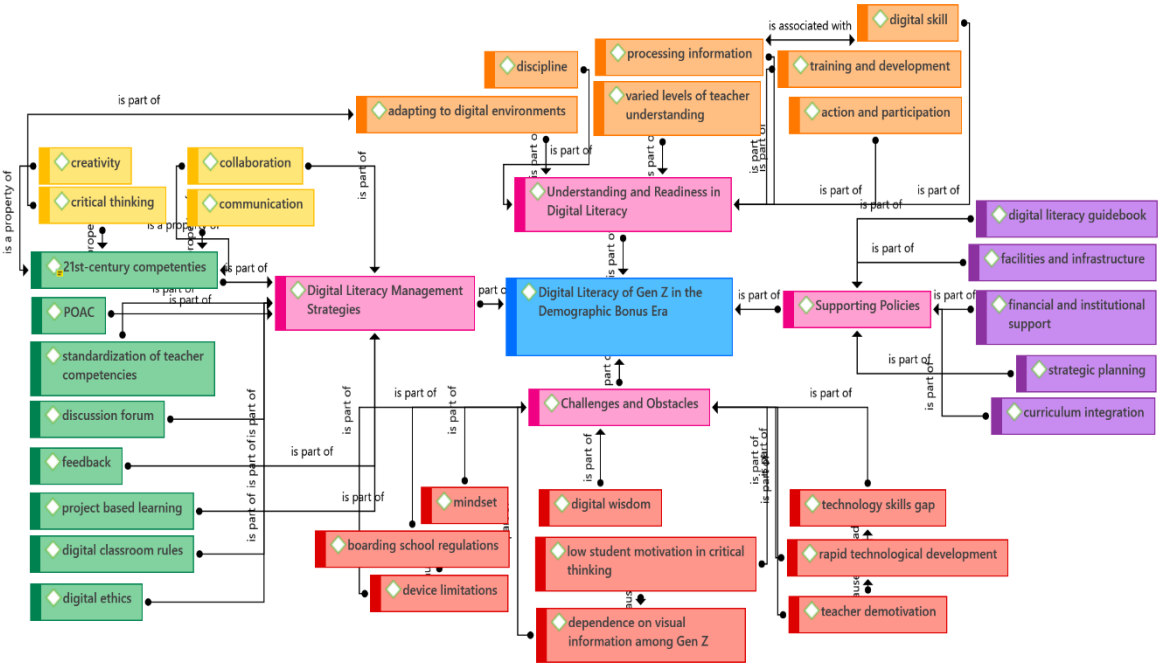

Figure 1. Aspects of Generation Z's Digital Literacy in the Demographic Bonus Era Analyzed Using Atlas.ti9

Discussion

This study provides a comprehensive overview of Generation Z digital literacy in the demographic bonus era and the challenges teachers face in implementing it. The research results group the findings into four main topics: (1) understanding and readiness, (2) obstacles and challenges, (3) digital literacy management strategies, and (4) supporting policies.

Understanding and Readiness: *Teachers' Understanding of Digital Literacy*

This study indicates that teachers' understanding of digital literacy varies widely. Some teachers consider digital literacy limited to technical skills operating digital devices (Uddin et al., 2024). Teachers in Indonesia understand digital literacy as the ability to use digital media, but they have not yet reached the stage of critical thinking, ethics, and digital responsibility (Astuti, 2021; Haerani & Subali, 2023). This denotes a conceptual gap in the understanding of digital literacy among educators. A strategy is required to improve teachers' digital literacy (Rochmah et al., 2023)

In contrast, some teachers showed a more profound understanding, including the ability to think critically about digital information. This is consistent with the definition of digital literacy, which includes cognitive, technical, ethical, and social aspects (Ng, 2012). In addition, digital literacy includes technical skills in using digital devices and the ability to access, evaluate, and create information using digital technology critically and ethically (Gomez-Galan, 2018; Nguyen &

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Habók, 2024). Teachers who stated the importance of verifying information before disseminating it reflected digital literacy's cognitive and ethical aspects, which, according to Helsper & Eynon (2010), are very important for the digital native generation.

This difference in understanding indicates the inequality of digital literacy among teachers, which has the potential to create gaps in the quality of digital learning. Teachers who only understand the technical aspects tend to be less able to guide students in developing critical thinking skills and digital ethics, making students vulnerable to hoaxes and invalid information (Lesasunanda & Malik, 2024). The importance of digital literacy training among teachers can be used as an alternative solution to this problem. Teacher training must include critical thinking, problem-solving, and digital ethics dimensions. Thus, training that is redesigned holistically and in stages is essential to equalize teachers' understanding of digital literacy (Darmayasa et al., 2025).

Teacher Readiness in Implementing Digital Literacy

Teacher and student readiness is an important aspect of digital literacy-based learning. Teacher training is one of the main factors that can improve students' understanding and skills. In addition, awareness of the school's responsibility in facilitating teacher training and competency development is the primary key to realizing effective digital literacy learning (Farid, 2023). As in the research of Vira (2022) and Akbar et al. (2024), the need for teacher training and supportive policies to improve digital literacy among Generation Z is highlighted. The blended learning training model that combines online and face-to-face learning and a mentoring community between teachers can increase training effectiveness (Novia et al., 2025). Hidayatullah Balikpapan Secondary School conducts training with two schemes: (1) internal training organized by the school and (2) external training through collaboration with the Education Office and educational digital platforms.

This training includes using digital learning platforms or ethics in their use, such as Quizziz, Canva, Google Classroom, Artificial Intelligence (AI), Websites, or social media. These interactive tools have been shown to strengthen student engagement in the learning process and create a more dynamic learning environment (Fajriati et al., 2024). Although there has been a significant increase in teacher readiness and learning outcomes, several teachers at Hidayatullah Secondary School stated they were not yet confident in designing digital learning independently. The obstacles include time constraints, rapid adaptation to new technology, and minimal follow-up assistance. To overcome this, Hidayatullah Secondary School developed a teacher-learning community as a forum for collaboration and mentoring between teachers. The teacher-learning community is an important strategy for improving teacher competence (Setyasari et al., 2025).

Obstacles and Challenges: *Digital Skills Gap between Teachers and Students*

The main challenges teachers face in implementing digital literacy are systemic and individual. One of the main obstacles is the gap in technological skills

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between teachers and students. Senior teachers tend to experience demotivation or difficulty adapting to rapid technological developments (Smith, 2012). Meanwhile, Generation Z students become highly adaptive digital natives (Sinambela et al., 2024). One informant stated that young teachers adapted more quickly, while some senior teachers struggled to keep up with digital developments. This aligns with the findings of Nindya (2022) that older teachers show lower confidence levels in using technology.

Moreover, the mindset of some teachers who view digital literacy as only covering technical skills also becomes an obstacle. Many educators still consider digital literacy as only technical, which limits the potential for developing critical thinking in students, even though digital literacy includes critical thinking skills, ethics of use, and awareness of the social impacts of media (Lindstrom et al., 2016; Rukmiati, 2022). Integrating digital pedagogical training in teacher professional development is an alternative solution so teachers can use technology and develop it for critical and collaborative learning (Nasrul et al., 2025).

Limited Access to Technology in Boarding Schools

On the other hand, internal school regulations, such as prohibiting personal devices from boarding schools, are also obstacles. Students' access to digital devices is limited to computer laboratory facilities that are used in turn. Although limited access to digital devices can be an obstacle to learning, this condition can also encourage students to be more aware and careful in using digital technology, thereby improving their abilities in terms of digital security (Niyu & Purba, 2021). Also, the advantages of Generation Z, who grew up in the digital era, make them faster in mastering digital devices and applications than previous generations in a very short time (Wulandari et al., 2023). This ability allows them to access information easily and learn independently. However, their dependence on visual information often reduces their motivation to think critically and verify information. This increases the risk of spreading misinformation. This finding is reinforced by research by Ulya et al. (2025), who found that students are more interested in visual content and rarely cross-check information sources. Therefore, a learning approach is needed that focuses on technology and guides students to use technology wisely and responsibly. As in the study (Rumba et al., 2023), Google search engines have created dependency among Generation Z, which affects their critical thinking skills.

Digital Literacy Management Strategy: *Implementation of the POAC Model in the Development of Digital Literacy*

This study identified that the POAC (Planning, Organizing, Actuating, Controlling) management-based strategy effectively overcame obstacles and challenges of digital literacy. Hidayatullah Secondary School implemented the POAC managerial strategy to manage digital literacy. These steps include planning a digital literacy program, organizing resources, implementing literacy training and activities, and controlling through monitoring and evaluation. This approach is consistent with the strategies proposed by Lian (2020) and Narindro et al. (2020),

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who stated that implementing POAC can be a practical framework for improving teacher professionalism through digital literacy.

Integrating 21st-Century Competencies in Learning

Teachers can integrate elements of 21st-century competencies, such as creativity, communication, critical thinking, and collaboration, into learning activities. Applying 21st-century competencies such as creativity, communication, critical thinking, and collaboration in effective learning increases student participation and engagement (Utari & Muadin, 2023). One example of a strategy includes using project-based learning to encourage students to be active in the learning process through real projects that require problem-solving and collaboration (Khauzanah & Wardani, 2023). By utilizing technology, students can develop digital literacy skills practically. Using technology in independent learning can also encourage students to use it through e-learning platforms and educational applications to improve their digital literacy skills (Zahroh & Sholeh, 2021). The application of digital class rules is an effort to improve students' character and responsibility in using digital media as a learning tool. This is also an effective strategy for implementing digital literacy in learning (Pambudi, 2022).

Teacher Study Group

Discussion forums between teachers are also important in equalizing digital literacy skills standards and sharing experiences to face common challenges. Teachers who have participated in digital literacy training are expected to be able to share knowledge with colleagues, creating a more inclusive and collaborative learning environment (Situmorang & Naibaho, 2025). This approach helps students understand digital ethics and encourages them to think critically and creatively when utilizing technology. This is supported by research (Vinh, 2020), which emphasizes collaborative learning, namely forums between teachers and project-based assignments that can facilitate knowledge sharing and improve digital literacy standards.

Supporting Policies: *Procurement of Facilities and Technology Infrastructure*

Supporting policies is a crucial element in improving the implementation of digital literacy in the demographic bonus era. The results of the study revealed that schools have shown an initial commitment to providing technological facilities to support the digital literacy of Generation Z students, such as providing LCDs, televisions in the classroom, and library digitization efforts. This aligns with Belshaw's theory of digital literacy infrastructure, which emphasizes the importance of the physical environment and digital devices as prerequisites for effective digital literacy practices. However, providing infrastructure alone is not enough. A comprehensive and ongoing evaluation is needed so digital transformation does not stop at the symbolic or administrative level (UNICEF, 2020). Therefore, it is recommended that schools and the government set annual evaluation indicators for digital facilities, provide routine maintenance plans and upgrading systems to ensure that devices do not become dead goods, allocate a

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special budget in the school work plan sourced from BOS funds, or other partnerships, for the procurement of devices that are adaptive to the latest technological developments. These steps can support digital literacy based on real practices and strengthen an inclusive and sustainable digital learning ecosystem. This initial step supports digital literacy learning (Fatimah & Hidayati, 2023).

Integration of Digital Literacy in the Curriculum

Integrating digital literacy into the curriculum is a long-term strategy to ensure that digital literacy becomes integral to learning. Interview findings show that principals and teachers convey the urgency of integrating digital literacy into the current curriculum. This denotes an awareness that strengthening digital competencies cannot just be an additional program but must be an inherent part of all subjects. The theory of digital literacy (Ng, 2012) states that digital literacy includes three main dimensions: (1) technical (ability to use technology), (2) cognitive (ability to think critically in the digital world), and (3) social-emotional (ethics, security, and digital responsibility), each of which can be developed in various lesson contexts. To support this, it is necessary to develop an integrated digital literacy curriculum in each cross-subject, compile digital literacy modules based on local contexts and youth digital culture, and strengthen digital-based integrative curriculum training for teachers through tiered training and digital learning communities. This policy expands the digital learning space and ensures the relevance between lesson content and the digital world that students face every day.

External Support and Partnerships

The need for training, funding, and synergy with external parties is an important finding in this study. Digital literacy is a school assignment and a collective responsibility between the government, community, and business. In the context of Miller's (1980) theory of educational ecology, collaboration between system layers (schools, families, communities, and national policies) is crucial in forming complete and adaptive digital capabilities. As (Rumba, 2023) in his research, it is emphasized that adequate resources and continuous professional development for teachers are significant for the effective implementation of digital literacy. Policy recommendations that researchers can propose are that digital security training and personal data protection by external parties (such as government agencies or NGOs) can strengthen the digital competence of students and teachers (Syafuddin, 2023). Incentives should be provided for teachers who actively participate in digital literacy training and integrate it into classroom practices (for example, through annual awards, increased credit points, or additional honoraria) (Niyu & Purba, 2021). This comprehensive policy will support the creation of an inclusive and adaptive education ecosystem that meets the needs of the digital era.

Based on the results and discussion above, research findings were obtained in the form of significant implications in the development of Generation

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Z digital literacy in the demographic bonus era. As the primary facilitators, teachers must improve their digital competence through continuous training supported by policies that strengthen infrastructure and curriculum development. Learning strategies based on 21st-century competencies must also be applied consistently to guide students to become wise, creative, critical, and responsible technology users.

CONCLUSION

This study highlights the importance of digital literacy as a key element in preparing Generation Z to face the digital era and demographic bonus. Implementing the POAC (Planning, Organizing, Actuating, Controlling) managerial strategy has proven effective in framing digital literacy programs systematically and sustainably. Through training planning, organizing school digital teams, implementing digital-based learning, and controlling through periodic monitoring and evaluation, POAC can become a strong foundation for improving digital literacy for teachers and students. Integrating 21st-century competencies, including critical thinking, creativity, collaboration, and communication, is the core of transformative digital literacy teaching practices. Its implementation can be realized through a project-based learning approach, the use of interactive digital media, the implementation of digital classroom management, and the formation of discussion forums between teachers and students. This encourages students to think critically, work together across groups, and build ethical and productive digital communication.

However, the role of students as the leading actors in digital literacy needs to be further strengthened. Generation Z students have extraordinary potential as digital natives, but still need guidance in developing critical awareness, digital ethics, and cybersecurity. Schools must provide safe and meaningful digital exploration spaces, such as interest-based projects, digital creative classes, and two-way feedback platforms between teachers and students. Digital literacy is a technical skill and a 21st-century life competency that shapes students' character and independence in the information age.

Responding to the challenges of the demographic bonus, digital literacy is key to ensuring that the younger generation is not only a consumer of technology but also a producer of knowledge and innovation. The demographic bonus will only positively impact if accompanied by the quality of adaptive, creative, and digitally literate human resources. Therefore, digital literacy must be managed as a strategic investment in national education. To support the development of digital literacy as a whole, this study recommends the following policies: 1) Standardization of national digital literacy training for teachers, 2) Integration of digital literacy into the school curriculum, 3) Provision of equitable access to digital infrastructure, and 4) Formation of a digital learning community for teachers and students.

With the synergy between managerial strategies, teacher roles, active student participation, and policy support, digital literacy can develop as the foundation for educational transformation in Indonesia. The demographic bonus

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is not just a statistical figure but a golden opportunity that can only be realized through a digitally literate, critical, and globally competitive generation.

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