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Implementation of Digital Leadership of Principals and Teacher in Preparing Students to Become the Golden Generation of 2045 at East Jakarta Senior High School

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Abstract

Digital transformation in education is a key factor in improving the quality of learning and preparing students to face global challenges. The problem in this study is the lack of digital understanding of teachers and students. This study aims to analyze the role of school principals and teachers in the implementation of digital leadership, the implementation of education digitalization, and the results of students' digital mastery in technological development at Cahaya Sakti Jakarta Senior High School. This study uses a qualitative descriptive method. Data was obtained through in-depth interviews, observations, and documentation of school principals, teachers, and students. The results of the study show that school principals play the role of transformational leaders who drive the adoption of technology in learning. Teachers play a role as facilitators in building students' digital literacy through the use of various digital learning platforms. The implementation of digitalization of education in schools is carried out through the development of technology-based curriculum, the use of digital-based school administration systems, and the integration of technological devices in teaching and learning activities. The results of students' digital mastery showed a significant increase in critical thinking skills, creativity, and adaptation to technology. However, challenges are still faced in equitable access and understanding of technology among students and educators. The conclusion of this study confirms that effective digital leadership, adequate infrastructure support, and continuous training for teachers and students are key factors in creating a golden generation 2045 that is ready to compete in the digital era.

Keywords: *Implementation, Leadership, Digital, Student*

INTRODUCTION

Digital transformation has become a very important topic in various sectors, including education. In recent years, the adoption of digital technology in schools has become increasingly urgent due to rapid technological advances and the need

to prepare students to face future challenges. According to a report from UNESCO (2019), many schools in the world have begun to implement various forms of digital technology in the learning process. In Indonesia, the government has also issued various policies to support the adoption of digital technology in schools, including the "Digital School" initiative which encourages the use of digital devices and applications as learning aids (Kemendikbud, 2019).

Data from the Indonesian Internet Service Providers Association (APJII) in Hadiningrat et al. (2024), shows that by 2023 as many as 78.2% of the Indonesian population has internet access. The world of technology continues to grow rapidly, providing convenience in storing and accessing data (Sutaryanti, 2023). Increasing storage capacity allows large amounts of data to be stored and processed, both on individual devices and in the cloud. However, this progress raises challenges in data security. With the increasing amount of personal information stored, the risk of data theft also increases. Organizations and users are required to be more vigilant, implementing encryption, and double authentication to protect their data (Putri et al., 2024).

Artificial intelligence (AI) also plays a big role. On the positive side, AI can increase productivity and efficiency, such as in the health sector with disease detection, or in the education sector for adaptive learning. However, AI also raises concerns, especially related to privacy, job security, and the potential for bias in the AI system itself (Jobin et al., 2019). In addition, AI used in social media can encourage "echo chambers," where users only see content that reinforces their own views, reducing the quality of the information received (Nadeak & Juwita, 2020). Social media is rapidly growing as a means of communication and a source of information. On the positive side, social media connects people around the world, helps businesses and provides a platform for individuals to express themselves. However, social media is also often a place for negative outpourings, fake news, and inaccurate information. Moreover, there are negative psychological impacts such as social anxiety, *FOMO (fear of missing out),* and privacy issues due to the unwanted spread of personal data (Haes et al., 2023).

Indonesia's vision to become a developed country, especially for the younger generation or generation Z who master the world of technology, can also be called the "Golden Generation 2045", exactly 100 years after independence. To achieve this goal, Indonesia must prepare quality human resources that are able to compete globally. According to the National Development Planning Agency (Bappenas), one of the key components to realizing the "Golden Generation 2045" is through improving the quality of education. Quality education must be able to produce graduates who not only have strong academic knowledge but also 21st century skills, such as digital literacy, critical thinking, creativity, and the ability to collaborate (Bappenas, 2019).

The implementation of digital leadership in schools is very relevant to both principals and teachers who must not only understand and implement digital

technology in school management and learning processes, but must also be agents of change that encourage the entire school community to adopt a digital culture. Based on a study by Meranti (2023), schools led by principals and teachers who have strong digital competencies tend to be more successful in integrating technology into learning and improving students' digital skills.

The Indonesian government has introduced several policies to support digital transformation in schools (Hariharasudan & Kot, 2018). One of them is the "Merdeka Belajar" program launched by the Ministry of Education, Culture, Research and Technology in 2019. This program emphasizes more flexible and technology-based learning, with the aim of improving the quality of education and making it more relevant to future needs (Kemendikbud, 2024). Within the framework of this program, principals and teachers are expected to take an active role in encouraging innovation and the implementation of digital technology in their schools (Lee & Meng, 2021).

Furthermore, digital transformation in education is also seen as an important tool to address some of the educational challenges in Indonesia, such as the varying quality of teaching and unequal access to education (Ma'arif & Nursikin, 2024). By using digital technology, schools can provide more diverse learning resources and easier access to information and teaching materials. For example, through online learning platforms, students from remote areas can access the same materials as students in big cities, thereby narrowing the educational gap. However, the success of digital transformation in schools depends not only on the availability of technology, but also on the ability of principals and teachers to lead this change (Berkovich & Hassan, 2023). According to research from Prayuda (2022), a key factor in the success of digital transformation in schools is effective leadership. Principals must have a clear vision of how technology can be used to support learning, as well as the ability to involve the entire school community in the transformation process (Setiyadi & Rosalina, 2021).

An effective principal in digital leadership will be able to develop a comprehensive strategy to integrate technology into the curriculum, develop teachers' digital competencies, and create a culture of innovation in schools. This involves not only the application of technology but also the development of human capacity, including training and professional development for teachers to ensure they have the skills needed to teach in the digital era (Sterrett & Richardson, 2020). In an effort to prepare the "Golden Generation 2045," the role of principals and teachers. They must be able to overcome various challenges that arise in the digital transformation process, such as resistance to change, lack of technological infrastructure, and the need for continuous capacity development (Taufikurrahman, 2021).

In an increasingly connected world, the ability to adapt to technological changes is becoming one of the most important skills. Therefore, teachers also need to ensure that their students are not only skilled in using technology, but also have

the ability to think critically and solve complex problems in an increasingly digital world.

The researcher sees that SMA Kristen 7 PENABUR Jakarta is worthy of being an example for other Private Senior High Schools in East Jakarta and one of the Private Senior High Schools is SMA Cahaya Sakti, Jakarta Timur. The development of the number of students at SMA Cahaya Sakti Jakarta for 3 consecutive years can be seen in the following table:

Table 1. Recapitulation of Student Data at SMA Cahaya Sakti, Jakarta

No.	Year	Man	Woman	Amount
1	2022/2023	145	126	271
2	2023/2024	131	131	262
3	2024/2025	124	130	254

Source: SMA Cahaya Sakti High Data, 2024

SMA Cahaya Sakti Jakarta also has policies/programs related to technology development in the form of digital training for teachers, *digital classroom management, digital literacy programs, e-Learning Platforms,* and academic information systems.

Thus, the implementation of digital leadership in schools such as SMA Cahaya Sakti Jakarta will not only improve the quality of education but also prepare students to be part of the "Golden Generation 2045." As a case study, SMA Cahaya Sakti Jakarta can provide valuable insights into how digital leadership can be implemented effectively in high schools, as well as what factors influence its success.

Furthermore, effective digital leadership also requires support from various stakeholders, including government, parents, and the community [20] . Therefore, teachers must have the ability to build strong partnerships with various parties to support digital initiatives in schools. This includes seeking additional resources for technology investment, as well as building networks with other schools to share best practices in implementing digital technology (Sunaengsih et al., 2019).

Digital transformation in the education sector has become a necessity in this era of globalization. Digital technology has not only changed the way we communicate, work, and interact, but also revolutionized the way we learn and teach (Tulungen et al., 2022). SMA Cahaya Sakti, Jakarta, as one of the leading senior high schools in Indonesia, has made digital leadership one of the main pillars in improving the quality of education. This school has implemented various initiatives to integrate digital technology into the learning process to prepare students to face increasingly complex and dynamic future challenges (Sugeng, 2022).

SMA Cahaya Sakti Jakarta has a reputation as a progressive and innovative educational institution. The school actively seeks ways to improve the effectiveness

of learning through the use of digital technology. Under the leadership of a visionary principal and supportive teachers, SMA Cahaya Sakti Jakarta has implemented a variety of digital leadership strategies designed to improve technology skills among students and teachers, expand access to digital learning resources, and increase student engagement in the learning process (Suni et al., 2024).

In addition, digital leadership at SMA Cahaya Sakti Jakarta also emphasizes the importance of access to adequate digital infrastructure. The school has made significant investments in educational hardware and software, including computers, tablets, projectors, and online learning platforms. This initiative ensures that all learners and teachers have equal access to the technology needed to support digital learning. This adequate access allows the school to implement blended learning and distance learning models, which are increasingly relevant amidst the challenges of the global pandemic and changing educational needs (Mudarwan, 2018).

Digital leadership at SMA Cahaya Sakti Jakarta also involves developing a curriculum that is relevant to the digital era. This curriculum is designed to integrate information and communication technology (ICT) skills into various subjects, ensuring that students not only understand digital concepts but can also apply them in real-life contexts. The curriculum includes teaching about coding, data analysis, digital literacy, and cybersecurity, all of which are essential in preparing students for the future world of work dominated by technology.

The researcher's hope that the world of digital technology is very much needed in the world of education Focusing on SMA Cahaya Sakti Jakarta as a case study provides a concrete picture of how digital leadership can be implemented effectively in the school environment, as well as what factors contribute to its success. This study will not only add theoretical insight into the literature on digital leadership, but also provide practical recommendations for principals, teachers and students to adopt and implement digital leadership in their schools.

With a comprehensive scope, this study provides a comprehensive picture of the mastery of digital information technology by both teachers and especially students. The researcher took the title "Implementation of Digital Leadership of School Principals and Teachers in Preparing Students to Become the Golden Generation of 2045 at SMA Cahaya Sakti, East Jakarta"

METHODS

This study uses a qualitative descriptive approach to explore in depth the implementation of digital leadership by teachers in preparing students to become the Golden Generation of 2045. The qualitative descriptive approach according to (Sugiyono, 2022) is a study based on the philosophy of postpositivity to research the conditions of natural objects where researchers are key instruments. According to Moleong (2017), qualitative descriptive research is a type of research that aims

to provide an in-depth picture or description of the phenomenon being studied, based on qualitative data.

In this study, a qualitative approach was used to:

1. Understanding how digital leadership strategies are applied by teachers in the learning process, and how students respond to this approach.
2. Identifying various elements that influence success or challenges in implementing digital leadership.
3. Describes the specific context at SMA Cahaya Sakti, Jakarta, including school culture, policies, and technological infrastructure relevant to the research theme.

The research location is SMA Cahaya Sakti Jakarta, an educational institution that has implemented a digital leadership strategy as part of the educational transformation process in the digital era. SMA Cahaya Sakti Jakarta was chosen because it has several superior characteristics:

1. This school has a vision and mission to integrate technology in learning, which is in line with the focus of this research.
2. The school's accreditation status indicates good quality of education, making it worthy of being a case study for the application of digital leadership.
3. The school has adopted various digital technologies to support the learning process and administrative management, making it a model for technology implementation in the secondary education sector.

The study is scheduled to last for 2 to 4 months in 2024 to 2025. This time has been carefully chosen to ensure that all stages of the study can be completed properly according to the previously set schedule. In addition, this time period was also chosen to ensure that the study is carried out quickly while considering every detail of the process needed to achieve the results.

In this qualitative descriptive study, data collection aims to obtain in-depth information regarding the implementation of digital leadership at SMA Cahaya Sakti, Jakarta. Data were collected using three main techniques: in-depth interviews, observation, and documentation (Sugiyono, 2022).

Qualitative research data analysis according to Miles and Huberman is a systematic process for managing, understanding, and drawing conclusions from qualitative data. They propose a framework consisting of three main steps, namely data reduction, data presentation, and drawing/verifying conclusions [28].

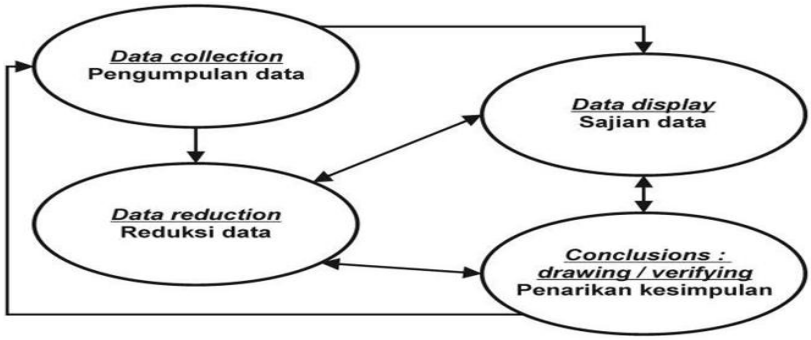

Figure 1. Miles and Huberman Data Analysis Model

RESULTS AND DISCUSSION

School Profile

SMA Cahaya Sakti is located at Jalan Otto Iskandardinata I No. 11, Jatinegara, East Jakarta, and has been established under the auspices of the Cahaya Sakti Foundation since 1981. According to the assessment by BAN-PDM in 2024, this school received an accredited grade of "A", which means very good. SMA Cahaya Sakti Jakarta is a private school that offers the 2013 Curriculum for grade XII students with Natural Sciences (MIPA) and Social Sciences (IPS) programs and the Independent Curriculum for grade X and XI students. In the last academic year (2024-2025), there were 254 students studying at SMA Cahaya Sakti Jakarta (Kemdikbud, 2025).

SMA Cahaya Sakti Jakarta is committed to providing high-quality education with the support of 24 professional teachers and 2 educational staff. Among the facilities available are comfortable air-conditioned classrooms, computer and network laboratories, science laboratories (physics, chemistry, biology), English and Mandarin laboratories with Chinese speakers, multimedia room, sports fields both indoors and outdoors, prayer rooms for various religions, library, canteen, and air-conditioned UKS (SMA Cahaya Sakti, 2023).

Data Analysis Results

The role of the Principal of SMA Cahaya Sakti Jakarta in providing digital learning to students to become the golden generation of 2045?

Based on the results of the interview with the Principal of SMA Cahaya Sakti Jakarta, several things can be seen:

The principal assisted by teachers at SMA Cahaya Sakti Jakarta has an important role in integrating digital technology into learning. Various steps have been taken, such as improving digital literacy for teachers and students, utilizing digital learning platforms, and holding regular training. In addition, they provide guidance in developing digital skills, technology-based curriculum, and assistance in using learning software. Students are also encouraged to get involved in digital-based projects to improve their problem-solving and collaboration skills. However, the application of technology in learning faces challenges, such as limited infrastructure, low digital literacy among some students and teachers, and resistance to changes in learning methods. Digital security is also a concern so that the protection of students' personal data is maintained. Therefore, the principal acts as a facilitator, motivator, innovator, and leader of change in digital-based education. With the right strategy, infrastructure improvements, and collaboration with external parties, digital learning can be an effective means of forming a golden generation of 2045 that is ready to face the technological era.

The principal of SMA Cahaya Sakti Jakarta faces various challenges in teaching materials with a digital approach, ranging from inadequate technological infrastructure to low digital literacy among some students and teachers. In addition, resistance to changes in learning methods is an obstacle to adopting technology comprehensively. Digital security and protection of students' personal data are also important concerns to prevent misuse of technology. Another challenge is limited access to devices and internet networks, which can hinder the effectiveness of digital learning. Therefore, an appropriate strategy is needed to improve facilities, digital literacy, and the readiness of students and teachers so that the application of technology in education can run optimally.

Table 2. Summary of Principal Roles

No.	Question	Findings
1	What steps does the principal take to integrate digital technology into classroom learning?	Principals and teachers have improved digital literacy, using digital learning platforms such as LMS, and conducting regular training to support technology-based learning.
2	How do principals provide training or guidance to students to use digital technology effectively?	Principals and teachers provide guidance through direct mentoring, digital-based curriculum development, and involving students in technology-based projects to improve their digital skills.
3	What are the challenges faced by the Principal in teaching material with a digital approach?	The challenges faced include limited technological infrastructure, lack of digital literacy among teachers and students, resistance to new learning methods, and the need for digital security policies to protect student data.
4	How important do you think the role of the Principal is in educating students through digital technology to prepare the golden generation of 2045?	The role of the principal and teachers is very important as facilitators, motivators, innovators, and leaders of change in supporting students' readiness to face a technology-based future.

Source: Data processed by researchers, 2025

Implementation of teacher leadership in preparing students to become the golden generation of 2045

The results of interviews on the implementation of teacher leadership in preparing students to become the golden generation of 2045 at SMA Cahaya Sakti, Jakarta and SMA Kristen 7 PENABUR, Jakarta showed various things:

The interview results showed that the leadership approach used in directing students towards mastery of digital technology is centered on the concept of transformational leadership. Teachers from SMA Cahaya Sakti Jakarta (B1) emphasized the role of agents of change who inspire students to see technology as a tool for empowerment, while teachers from the same institution (B2) focused more on providing real examples in the use of technology such as PowerPoint and Canva. Meanwhile, teachers from SMA Kristen 7 PENABUR Jakarta (B3) applied a similar approach by building a shared vision of the benefits of technology and encouraging positive adoption among students.

In implementing strategic steps in digital activities, each teacher has a different approach but still aims to improve the use of technology in learning. Teachers at SMA Cahaya Sakti Jakarta (B1) implement a structured strategy, starting from setting goals and choosing relevant digital platforms, designing interactive content, creating a safe learning environment, to providing technical and pedagogical support and evaluating the effectiveness of digital activities. Meanwhile, teachers from the same school (B2) focus more on mentoring, guiding, and directing students so that they can use digital technology wisely. Teachers at SMA Kristen 7 PENABUR Jakarta (B3) emphasize creating a learning environment that supports mastery of technology and facilitates students in developing digital skills that are relevant to the times, so that they are ready to face challenges in the future.

Table 3. Summary of the role of teachers in preparing students to become the golden generation of 2045

No.	Question	Findings
1	What leadership approaches do teachers use in guiding students towards digital technology mastery?	Teachers at SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR Jakarta apply transformational leadership in guiding students to master digital technology. SMA Cahaya Sakti Jakarta emphasizes the role of agents of change and real examples of the use of technology, while PENABUR Christian High School 7 builds a shared vision of the benefits of technology. Both schools motivate students with digital assignments and interactive platforms, and provide support through mentoring and digital security education. The strategy at SMA Cahaya Sakti Jakarta is more systematic with periodic evaluations, while PENABUR Christian High School 7 focuses on creating a learning environment that supports technology mastery.
2	How do teachers motivate students to utilize digital	Teachers at SMA Cahaya Sakti Jakarta motivate students with digital assignments, the use of applications, and interactive platforms, including educational games. Meanwhile, teachers at SMAK 7 PENABUR Jakarta give students the freedom to explore

	technology in learning?	and choose technology according to their learning style, encouraging independence in the use of digital technology.
3	How much support do teachers provide to students in solving problems related to digital learning?	Teachers at SMA Cahaya Sakti Jakarta provide support by allowing the use of mobile phones and providing full assistance to students who are not yet proficient in technology. Meanwhile, teachers at SMAK 7 PENABUR Jakarta provide more comprehensive support by teaching digital security, technology ethics, and technical skills for responsible use of technology.
4	What strategic steps do teachers take in leading digital-based activities in schools?	Teachers at SMA Cahaya Sakti Jakarta implement a more structured strategy by setting goals, choosing digital platforms, and evaluating effectiveness and also focusing more on mentoring and guiding students in using technology wisely. On the other hand, teachers at SMAK 7 PENABUR Jakarta emphasize creating a learning environment that supports mastery of technology and the development of digital skills that are relevant to the times.

Source: Data processed by researchers, 2025

Overall, teacher leadership in preparing students to become the golden generation of 2045 at SMA Cahaya Sakti Jakarta has been running well through various innovative and adaptive strategies. However, to increase the effectiveness of this digital leadership, it is necessary to strengthen the technological infrastructure, increase training for teachers in integrating technology into learning, and collaborate with external parties to enrich the learning experience of students through various digital innovations. With these steps, it is hoped that students can be better prepared to face global challenges and contribute optimally to technological developments in the future.

The desired results to be achieved with students' digital mastery in technological developments

The results of interviews regarding the desired results achieved by students' digital mastery in technological developments at SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR 7 Jakarta, show several things:

The main objective of mastering digital technology for students at SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR Jakarta focuses on increasing the effectiveness of learning and developing critical thinking skills and creativity. Teachers at at SMA Cahaya Sakti Jakarta (C1) emphasize mastery of technology to support more effective learning, improve critical thinking skills, and help students adapt to the times, while teachers at the same school (C2) focus more on developing skills and increasing the effectiveness of learning. On the other hand, teachers at SMAK 7 PENABUR Jakarta (C3) emphasize the wise and productive use of technology, encourage innovation, collaboration, and the use of technology to create solutions in various aspects of life.

Assessment of students' readiness to utilize digital technology for future needs is carried out through various approaches by teachers at at SMA Cahaya Sakti Jakarta and

SMAK 7 PENABUR Jakarta. Teachers at at SMA Cahaya Sakti Jakarta (C1) assess students' readiness based on indications of current needs and their habits in using digital technology, while teachers at the same school (C2) focus more on observations in daily learning. On the other hand, teachers at SMAK 7 PENABUR Jakarta (C3) evaluate students' readiness by looking at their habits in interacting with digital devices, as well as considering students' interests and talents in the field of technology. This approach allows teachers to understand the extent to which students are ready to face digital challenges in the future.

Mastery of digital technology has a significant impact on student achievement in both academic and non-academic fields. Teachers at at SMA Cahaya Sakti Jakarta (C1) emphasized that technology has a significant impact on increasing access to information, making learning more interactive, and encouraging creativity and collaboration in non-academic fields. Meanwhile, teachers at the same school (C2) stated that the influence of technology on student achievement is quite large, although it was not explained in detail. Teachers at SMAK 7 PENABUR Jakarta (C3) have a view that is in line with B1, where technology makes it easier to access information and increases the interactivity of learning in academic aspects, as well as supporting creativity, collaboration, and talent development in non-academic fields. This shows that optimal use of digital technology can contribute to improving student achievement in various aspects.

Indicators of success in mastering digital technology include various important aspects that support students' readiness to face the digital era. Teachers at at SMA Cahaya Sakti Jakarta (C1) emphasize strong digital literacy, creativity, innovation, critical thinking, and the ability to adapt to change, accompanied by an understanding of digital ethics and security as well as communication and collaboration skills. Meanwhile, teachers at the same school (C2) are simpler in determining indicators of success, namely students' ability to adapt to new technologies. On the other hand, teachers at SMAK 7 PENABUR Jakarta (C3) have indicators that are in line with B1, with the addition that students must also be able to use technology productively and independently. This shows that mastery of digital technology does not only focus on technical skills, but also on aspects of ethics, adaptation, and responsible use of technology.

Table 4. Summary of the desired results achieved by students' digital mastery in technological developments.

No.	Question	Findings	
		SMA Cahaya Sakti Jakarta	SMAK 7 PENABUR Jakarta
1	What are the main objectives of digital technology mastery that teachers expect from students?	Mastering digital technology for effective learning, critical thinking, creativity, and adaptation to current developments.	Using technology wisely and productively, improving critical thinking skills, innovating, collaborating, and creating solutions.
2	How do teachers assess students' readiness to	Through indications of current needs and	Through students' habits in using technology,

	utilize digital technology for future needs?	student habits in using digital technology as well as observations in daily learning.	interactions with digital devices, and interests and talents in the field.
3	How big is the influence of digital technology mastery on student achievement in academic and non-academic fields?	Highly influential in academic achievement through access to information and interactive learning, as well as in non-academic fields by increasing creativity and collaboration.	Significantly impacting academic achievement by facilitating access to information and increasing learning interactivity, as well as in non-academic areas by supporting creativity, collaboration, and talent development.
4	What are the expected success indicators for students in mastering digital technology as the golden generation of 2045?	Strong digital literacy, creativity and innovation, critical thinking, adaptation to change, digital ethics and security, and communication and collaboration skills.	Good digital literacy, critical thinking skills, creativity, innovation, digital ethics, and communication and collaboration skills. Students must also be able to use technology productively and independently.

Source: Data processed by researchers, 2025

The impact of digital technology mastery on students' academic and non-academic achievements is quite significant. In the academic aspect, technology helps improve learning efficiency, facilitates access to information, and encourages students' creativity in completing assignments and projects. While in the non-academic aspect, technology contributes to the development of social skills and supports innovation that can be applied in various areas of life.

The success of students in mastering digital technology as part of the golden generation of 2045 is measured through several main indicators, including strong digital literacy, the ability to adapt to technological developments, and critical and innovative thinking skills in solving problems. In addition, students are also expected to be able to use technology ethically and responsibly, so that they are not only passive users, but also able to create and develop technology-based innovations.

Discussion

The role of the principal of Cahaya Sakti Jakarta Senior High School in providing digital learning to students to become the golden generation of 2045

The principal of SMA Cahaya Sakti Jakarta has a significant role in integrating digital technology into learning. Various steps have been taken to ensure that technology can be optimally utilized in the teaching and learning process. One of

the main steps taken is to improve digital literacy for teachers and students. Good digital literacy allows students to more easily understand and apply technology in their learning (Aoun, 2017). In addition, the principal also utilizes digital learning platforms such as the Learning Management System (LMS) to support a more flexible and interactive learning system. The use of LMS has proven effective in increasing student engagement in learning (Hodges et al., 2024).

In addition to technology integration in learning, the principal also ensures that learning evaluation is carried out by utilizing digital technology. The use of a technology-based evaluation system can provide faster and more accurate feedback for students and help teachers analyze student development (McLaughlin & Yan, 2017). This approach also allows students to be more active in assessing their own learning progress, thereby increasing independence in the learning process.

Although various efforts have been made, the implementation of digital learning at SMA Cahaya Sakti Jakarta still faces various challenges. Inadequate technological infrastructure is one of the main obstacles in the process of digitizing education. stated that the success of digital learning is highly dependent on the availability of supporting infrastructure, such as stable internet access and adequate devices. In addition, the low digital literacy of some teachers and students is also a challenge in itself. Not all teachers are ready to adapt to technology-based learning methods, so a more intensive mentoring strategy is needed.

Resistance to changes in learning methods is also a challenge that must be faced by school principals. Some teachers and students still feel more comfortable with conventional methods and are less accustomed to using technology in learning. In fact, according to Wahyuningtyas et al. (2022), changes in the education system require strong leadership and effective change management strategies so that innovation can be well received by all elements of the school. In addition, digital security is also an important issue in the implementation of technology-based learning. Protection of students' personal data must be a priority so that they can learn safely and comfortably in a digital environment (Selwyn, 2021).

The importance of the principal's role in educating students through digital technology not only affects the success of current learning, but also in preparing the golden generation of 2045 in line with the 5C concept by Prof. Muhajir Effendy, 2022), namely digital learning encourages critical thinking, creativity, communication, collaboration, and utilization of technology. With strong digital leadership, students are better prepared to face global challenges in the digital era. In facing the industrial revolution 4.0 and 5.0, students are expected to have high critical thinking, problem-solving, and collaboration skills. Digital-based learning allows students to develop these skills better. Therefore, with the right strategy, infrastructure improvements, and collaboration with external parties such as technology institutions and companies, principals can ensure that students receive quality digital-based education that is relevant to future needs.

Implementation of teacher leadership in preparing students to become the golden generation of 2045

Digital in learning, teachers in both schools apply various strategies according to the characteristics and needs of students. Teachers at SMA Cahaya Sakti Jakarta encourage the use of technology by giving digital-based assignments, such as searching for online references, using design applications such as Canva, and collecting assignments through Google Classroom. Meanwhile, other teachers emphasize the use of real examples, educational games, and the introduction of interactive learning platforms to increase student engagement in learning. In contrast to the previous approach, teachers at SMAK 7 PENABUR Jakarta give students the freedom to explore and choose technological tools that suit their learning styles, so that they can be more independent in utilizing digital technology optimally. This approach is in accordance with the theory of intrinsic motivation proposed by (Sheikh et al., 2024) in *Self-Determination Theory and the Facilitation of Intrinsic Motivation,* which states that giving autonomy to students can increase their motivation to learn.

The support provided by teachers in solving problems related to digital learning also varies from school to school. Teachers at SMA Cahaya Sakti Jakarta provide flexibility by allowing students to use mobile phones as a tool to access digital learning resources in class. Meanwhile, other teachers focus more on providing full assistance to students who have not yet mastered technology and continue to provide support so that they can develop further in utilizing digital learning. Teachers at SMAK 7 PENABUR Jakarta provide more comprehensive support by not only helping students integrate digital skills into learning, but also teaching aspects of digital security, ethics in using technology, and technical skills needed to utilize technology effectively and responsibly. This approach is in line with research conducted by (Rambe & Nofrizal, 2022) which emphasizes the importance of digital literacy for students so that.

Overall, teacher leadership in preparing students to become the golden generation of 2045 has been going well through various innovative and adaptive strategies. However, to increase the effectiveness of this digital leadership, it is necessary to strengthen the technological infrastructure, increase training for teachers in integrating technology into learning, and collaborate with external parties to enrich the learning experience of students through various digital innovations. With these steps, it is hoped that students can be better prepared to face global challenges. and contribute maximally to the development of technology in the future.

The desired results to be achieved with students' digital mastery in technological developments

In addition, students' readiness to utilize digital technology for future needs is assessed through various approaches by teachers at both schools. Some teachers assess students' readiness based on indications of current needs and their habits in using digital technology, while others focus more on observations in the daily learning process. At SMA Kristen 7 PENABUR, students' readiness is also monitored through their habits in interacting with digital devices and the interests and talents they show in the field of technology. According to Voogt et al. (2013) in the Journal of Computer Assisted Learning, the success of technology integration in education is highly dependent on how students engage with technology in their daily lives, which can be observed through their interaction patterns and level of curiosity about digital innovation.

Mastery of digital technology also has a significant impact on student achievement, both in academic and non-academic fields. Students at SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR Jakarta revealed that the use of digital technology allows students to access information faster, increase interactivity in learning, and encourage creativity and collaboration. This is reinforced by the findings of their research [40] on the Technological Pedagogical Content Knowledge (TPACK) model, which shows that optimal use of technology can improve understanding of academic concepts while strengthening non-academic skills such as problem-solving and innovation.

Preparing students to become the Golden Generation of Indonesia 2045

The Vision of Golden Indonesia 2045 is a long-term plan that aims to make Indonesia a sovereign, advanced, just, and prosperous country. This vision is built on the principles of Pancasila and the 1945 Constitution of the Republic of Indonesia, which are the foundation for achieving these goals.

In this vision, there is a focus on quality human development, where mastery of science and technology is the key to increasing the nation's competitiveness. In addition, sustainable economic development is a priority, with the hope of creating inclusive and equitable growth. Equitable development is also a major concern, so that every region in Indonesia can feel the benefits of the progress achieved, so that no one is left behind in the development process.

Furthermore, strengthening national resilience and good governance are important aspects in maintaining the stability and security of the country. By prioritizing these principles, this vision is in line with the objectives stated in the Preamble to the 1945 Constitution of the Republic of Indonesia, namely to protect the entire Indonesian nation, advance public welfare, educate the nation's life, and realize world order based on independence, eternal peace, and social justice. Thus, the Vision of Golden Indonesia 2045 is expected to bring Indonesia towards a better and more prosperous future for all its people.

In order to prepare the golden generation of Indonesia 2024 in the education sector, among others, by implementing digital leadership of school principals and teachers. The golden generation of Indonesia 2045 is a generation that has the characteristics of 5C as

stated by Prof. Muhadjir Effendi, namely: a*) Critical Thinking; b) Creativity and Innovation; c) Communication Skills; d) Collaboration; e) Confidence.*

The results of the research on the digital leadership of principals and teachers are very significant and contribute to preparing students to become the golden generation of 2045 at SMA Cahaya Sakti Jakarta. Systematically, it can be described as follows:

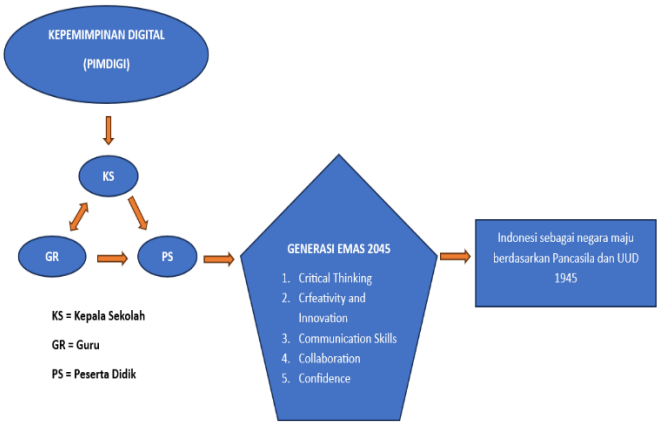

Figure 2. School Digital Leadership Scheme related to the 5 C Characters of students in preparing the golden generation of 2045

The role of digital leadership of principals and teachers is very significant in preparing students to become the generation of meas 2045 characterized by Critical Thinking, Creativity and Innovation, Communication Skills Collaboration, Confidence. Thus, it is hoped that they will contribute and become pillars of Indonesia in realizing Indonesia as a developed country based on Pancasila and the 1945 Constitution. This is one of the manifestations in achieving and achieving one of the national goals stated in the Preamble to the 1945 Constitution, namely to educate the nation's life and advance public welfare.

CONCLUSION

The role of the principal of Cahaya Sakti Jakarta Senior High School in providing digital learning to students to become the golden generation of 2045

Integration of digital technology in learning is one of the main focuses in improving the quality of education. The steps taken include increasing digital literacy, providing adequate infrastructure, adapting technology-based curriculum, and implementing innovative learning methods. With this approach, it is hoped that students will be better prepared to face an increasingly digitalized world and be able to compete in the future.

Training and guidance for students in the use of digital technology is also an important concern. The principal emphasized that students need to be equipped with basic skills in digital technology, understand how to use it in learning, and master aspects of digital security and ethics. In addition, students are also involved in technology-based projects so that they can develop creativity and critical thinking skills.

Continuous feedback and support are also provided to ensure the effectiveness of digital-based learning.

The role of the principal in educating students through digital technology is very important, especially in preparing the Golden Generation of 2045. In facing the rapidly developing digital era, students need to be equipped with relevant skills in order to utilize technology optimally. Digital-based education not only aims to improve academic abilities, but also to shape the character of students to be more adaptive, innovative, and able to think critically in solving problems.

With Indonesia's vision to achieve great progress by 2045, technology integration in education must be a top priority. Principals and teachers have a big responsibility in ensuring that students are not only users of technology, but are also able to create new innovations that are beneficial to society. With the right strategy, digital transformation in education can be an effective step in producing a competent generation that is ready to face global challenges in the future.

Implementation of teacher leadership in preparing students to become the golden generation of 2045

The implementation of digital leadership by teachers in preparing students to become the golden generation of 2045 at SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR Jakarta shows that the transformational leadership approach is the main strategy implemented by teachers. This leadership is manifested in various forms, such as becoming an agent of change who inspires students to utilize technology positively, providing real examples of the use of technology in learning, and building a shared vision regarding the benefits of digital technology in their lives.

In an effort to motivate students, teachers at both schools adopted a variety of methods, including giving digital-based assignments, using educational games, and introducing various interactive learning platforms. Teachers at SMA Cahaya Sakti Jakarta emphasized a structural approach with digital assignments and the use of certain applications, while teachers at SMAK 7 PENABUR Jakarta gave students the freedom to explore technological tools that suited their learning styles.

Overall, students at SMA Cahaya Sakti Jakarta have received good guidance in utilizing digital technology. However, infrastructure optimization, increased training for teachers, and more personal support for students who are having difficulties are still needed so that they are better prepared to face the challenges of the digital era and become part of the golden generation of 2045.

The desired results to be achieved with students' digital mastery in technological developments

The conclusion of the interview results shows that there is a difference in focus between SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR Jakarta in mastering digital technology by students. Teachers at between SMA Cahaya Sakti Jakarta emphasize the effectiveness of learning and the development of basic skills such as critical thinking and

adaptation to technological developments. Meanwhile, at SMAK 7 PENABUR Jakarta, teachers emphasize the use of technology wisely and productively, with a stronger push for innovation, collaboration, and solution creation.

In terms of student readiness, teachers at between SMA Cahaya Sakti Jakarta assess based on habits in using technology and observations in daily learning activities. In contrast, teachers at SMAK 7 PENABUR Jakarta use a broader approach by considering students' interactions with digital devices as well as their interests and talents in technology.

Specifically for between SMA Cahaya Sakti Jakarta students, it shows that mastery of digital technology is directed to improve the effectiveness of learning, critical thinking skills, and adaptation to developments in the era. Student readiness is assessed through their habits in using technology and observations in daily learning activities. The influence of technology on academic and non-academic achievement is considered quite large, especially in access to information and interactive learning. Indicators of successful mastery of technology in this school emphasize digital literacy, creativity, innovation, and the ability to adapt to technological changes

CONCLUSION AND RECOMMENDATIONS

Conclusion

A. The Role of Principals in Digital Learning

The Principal of SMA Cahaya Sakti Jakarta plays an important role in preparing students to become the golden generation of 2045 through the integration of digital technology in learning. The steps taken include improving digital literacy, providing infrastructure, adapting technology-based curriculum, and implementing innovative learning methods. This aims to make students ready to face the digital world and be able to compete in the future.

Training on the use of digital technology is also in focus, with an emphasis on basic skills, security, and digital ethics. Technology-based projects are expected to develop students' creativity and critical thinking skills. However, challenges such as infrastructure limitations, skills gaps, and cybersecurity issues need to be addressed through collaboration between principals, teachers, students, and stakeholders.

Principals and teachers have a responsibility to ensure that students are not only users of technology, but also innovators who benefit society. With the right strategy, digital transformation in education can produce a competent generation that is ready to face global challenges.

B. Implementation of Teacher Leadership

The digital leadership of teachers at SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR Jakarta uses a transformational approach. Teachers act as agents of change who inspire students to use technology positively. The methods used include digital-based assignments, educational games, and interactive learning platforms.

Teacher support varies; at SMA Cahaya Sakti Jakarta, support is provided through the flexibility of digital devices and mentoring, while at SMAK 7 PENABUR Jakarta, a more comprehensive approach with the teaching of digital security and technology ethics. Strategic measures such as the selection of relevant platforms and periodic evaluations are also implemented to increase the effectiveness of learning.

Overall, students at SMA Cahaya Sakti Jakarta have received good guidance in the use of digital technology, although infrastructure optimization and training for teachers are still needed.

C. Expected Outcomes of Digital Mastery

The results of the interviews show the difference in focus between SMA Cahaya Sakti Jakarta and SMAK 7 PENABUR Jakarta in mastery of digital technology. SMA Cahaya Sakti Jakarta emphasizes the effectiveness of learning and basic skills, while SMAK 7 PENABUR Jakarta focuses on the wise and innovative use of technology.

The readiness of students is considered different; SMA Cahaya Sakti Jakarta is based on the habits of using technology, while SMAK 7 PENABUR Jakarta considers the interaction and interests of students. The impact of technology on academic and non-academic achievement also varies, with SMA Cahaya Sakti Jakarta seeing technology as a learning tool, while SMAK 7 PENABUR Jakarta considers it a means of developing creativity.

The indicators of success in mastering digital technology are also different, with SMA Cahaya Sakti Jakarta emphasizing digital literacy and adaptability, while SMAK 7 PENABUR Jakarta includes digital ethics and a balance of innovation. Overall, SMA Cahaya Sakti focuses on effectiveness, while SMAK 7 PENABUR Jakarta has a more holistic orientation towards the use of technology.

Recommendations

School principals are expected to take strategic steps to increase the effectiveness of digital technology integration in learning. These measures include improving digital literacy through training for students and educators, providing adequate infrastructure, and adapting technology-based curriculum. In addition, the application of innovative learning methods and increased awareness of digital security and ethics are also very important. Collaboration with various parties, continuous evaluation, and cooperation with other schools that have been successful in digital leadership are also recommended to create a conducive learning environment.

Teachers need to strengthen their leadership in preparing students to become the Golden Generation of 2045 by improving competence in digital technology. They must act as agents of change that inspire students to use technology positively. Diversifying technology-based learning methods, improving access to digital infrastructure, and education about digital security and ethics are also in focus. A personalized approach to continuous learning and evaluation will help teachers improve the quality of digital-based learning.

Students are advised to improve their mastery of digital technology to support learning effectiveness and creativity. This can be done by ensuring equitable access to digital devices and the internet, as well as the integration of technology in daily learning. Strengthening digital literacy and cybersecurity, developing critical thinking skills, and training in the use of technology are also important. Encouraging digital collaboration and evaluating digital literacy progress will help students be better prepared to face challenges in the digital era.

The next research is suggested to analyze the implementation of digital leadership at various levels of education, measure the effectiveness of digital learning on the readiness of the 2045 Golden Generation, and explore strategies to improve teachers' digital competence. In addition, it is important to examine the role of infrastructure and policy support in the digital transformation of schools, as well as evaluate challenges and solutions in the use of digital technologies. This research is expected to provide broader insights into digital transformation in the world of education and support efforts to create a superior Golden Generation 2045.

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