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EDUCATIONAL TRANSFORMATION IN THE DIGITAL ERA: CHALLENGES AND OPPORTUNITIES OF 21ST CENTURY 4C LEARNING IN SMK NEGERI 1 GUNUNGSITOLI

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Abstract. *This research aims to analyze the transformation of education in the digital era with a focus on the application of 21st century skills (4C: Critical Thinking, Creativity, Collaboration, and Communication) at SMK Negeri 1 Gunungsitoli. The urgency of the research lies in the need to prepare students to be able to adapt to the increasingly complex and technology-based demands of the modern world of work. This research uses a qualitative approach with a case study method. The research location was SMK Negeri 1 Gunungsitoli, with the main informants consisting of teachers, students, and school management. Data were collected through in-depth interviews, direct observation, and analysis of relevant documents. The results show that the transformation of education at SMK Negeri 1 Gunungsitoli has begun to be seen through the integration of digital technology in learning. Teachers use digital platforms such as Google Classroom and Zoom, while students are starting to be involved in technology-based activities to improve 4C skills. However, this study also found challenges such as the digital divide, low technological literacy and resistance to change, especially from some teachers. Nonetheless, there are opportunities for further transformation through the development of technology infrastructure, intensive training for teachers and support for inclusive school policies. This research contributes to the growing literature on educational transformation in the digital age, particularly in the context of vocational schools in remote areas. The findings provide practical insights for other schools in implementing technology-based learning to enhance 21st century skills.*

Keywords: *4C Learning, Digital Era, Write Education Transformation.*

1. INTRODUCTION

Education in Indonesia, especially at the Vocational High School (SMK) level, faces great challenges in preparing young people who are ready to face the dynamics of an increasingly digitalized world of work. The transformation of education in the digital era requires not only adequate infrastructure but also a teaching and learning approach that suits the needs of the 21st century, which emphasizes mastery of 4C skills (Critical Thinking, Communication, Collaboration, Creativity) (Kahar, M. I., et al., 2021). SMK Negeri 1 Gunungsitoli, as one of the educational institutions, has a strategic role in producing a competent, creative, and adaptive workforce to technology. However, despite efforts to integrate technology in learning, there are still many challenges faced, both in terms of mastery of technology by teachers, students' readiness to use digital tools, and the lack of strengthening 21st century skills in the learning process.

This phenomenon is not unique to SMK Negeri 1 Gunungsitoli, but can also be found in many other schools in Indonesia. Previously, various studies have been conducted to identify challenges and opportunities in the implementation of digital learning, but there is still a gap between educational theories that prioritize the 4Cs and learning practices applied in the field. For example, research by Agustinova, D. E. (2020) explains that 21st century education is considered as an alternative to prepare the younger generation to be better able to adapt to the times. However, although this view is not

entirely wrong, there are negative impacts that arise from various interpretations of the 21st century education concept, one of which is the inequality in the education system in Indonesia.

Research by Nurohmah, A. N. (2023) explains that in the 21st century, students are required to master various skills or competencies known as 21st Century Skills, which are part of the 21st century learning concept. These skills aim to improve the quality of education and produce superior individuals. Therefore, revitalization in education is needed in order to create people who are skilled and ready to face the challenges of the 21st century. However, we cannot ignore the fact that the learning crisis that has occurred, especially due to the pandemic, has caused learning loss and learning gaps, which have further worsened the quality of education.

In addition, Fernandes, R. (2019) in his research explained that, the development of information technology is often considered as a trigger for the formation of a new culture, which includes values and people with different personalities. The generations born in this era of information technology, namely Generation Z and Alpha, are often referred to as digital natives. Their presence is a challenge in education, given the knowledge and character gap between teachers who are digital immigrants and students who are digital natives. To minimize this gap, educators are expected to have skills in utilizing technology as a tool for the teaching and learning process.

This research will focus on some of the main problems faced by SMK Negeri 1 Gunungsitoli in facing the transformation of education in the digital era, particularly in the context of 21st century 4C learning. Although some technology facilities are available, there are still limitations in terms of accessibility and effective use of technology in learning. The use of digital devices by students and teachers is often limited to basic learning, while more complex skills to support 4C learning have not been well integrated. Many teachers at SMK Negeri 1 Gunungsitoli are still limited in developing 21st century skills, particularly in critical thinking, collaboration, communication and creativity in a digital context. This results in students not fully gaining a learning experience that equips them with skills relevant to the needs of the job market.

The education curriculum in SMK requires teaching technical skills, but there is a lack of integration of 4C skills in daily teaching (Sipayung, H. D., et al., 2019). Despite the government's efforts to introduce 21st century learning, its implementation in the field is still not optimal. This research needs to be conducted because the transformation of education in the digital era cannot be realized without a deep understanding of the challenges and opportunities that exist in the field, especially at the SMK level which plays an important role in producing the workforce (Perdana, N. S., 2019). Through this research, it is expected that solutions can be found to overcome the problems faced by SMK Negeri 1 Gunungsitoli in utilizing technology to support 4C learning. The exposure of real phenomena at SMK Negeri 1 Gunungsitoli shows that although this school has a fairly good technology infrastructure, many students and teachers are not fully prepared to adapt to technology-based learning that requires 21st century skills (Mulyono, R., 2022). This creates a gap between the vision of digital education set by the government and the reality on the ground.

Therefore, this research targets to find the main challenges faced by teachers and students in the implementation of 4C-based learning in SMK Negeri 1 Gunungsitoli, potential opportunities that can be utilized to support digital learning, as well as effective strategies that can be applied to enhance 21st century learning. In addition, this research aims to identify the most appropriate technology-based learning model to be implemented in vocational schools with local contexts such as Gunungsitoli. This research makes a significant contribution to the development of education science, especially in the field of vocational education and 21st century learning. By analyzing the implementation of 4C learning in SMK Negeri 1 Gunungsitoli, this research can serve as a reference for further studies on technology integration in education in resource-limited areas. Furthermore, this research offers a practical approach that can be applied

in other SMKs to strengthen the relevance of education to the needs of the working world in the digital era, while encouraging innovation in technology-based teaching and learning.

2. LITERATURE REVIEW

2.1 Transforming Education in the Digital Age

The digital era has brought major changes in various aspects of life, including education. The transformation of education in this era includes fundamental changes in the way teachers teach, students learn, and educational institutions manage the learning process (Nugraha, G. A., et al., (2021). The development of digital technologies, such as the internet, artificial intelligence (AI), virtual reality (VR), and online learning platforms, has created great opportunities while presenting significant challenges for education (Amrullah, et al., 2024).

The transformation of education in the digital era is driving significant changes in the learning paradigm (Purba, A., 2023). This shift leads to a more interactive, collaborative and technology-based model, replacing traditional methods that generally focus on lectures. In this new model, the teacher's role is no longer as the sole source of information, but rather as a facilitator who supports the learning process (Rahmawati, M., 2019). Teachers encourage students to become active learners, who engage in material exploration, collaboration with fellow students, and innovate to find solutions to problems faced. One of the approaches used to support this shift is project-based learning. Through this approach, students are given the opportunity to solve real-world problems, which directly integrates 21st century skills such as critical thinking, communication, collaboration, and creativity (4C), which are highly relevant to the needs of today's working world (Rahmadani, A., et al., 2023).

In addition, technology is becoming a major tool in changing the way education is delivered and accessed, especially in the digital era. Online learning has opened up wider access to education through platforms such as Google Classroom, Zoom, and Moodle, allowing students to learn from anywhere and at any time (Sholihah, K., et al., 2023). This provides unprecedented flexibility in time and location, so even students in remote areas can enjoy quality learning. In addition, artificial intelligence (AI) plays an important role in personalizing learning by providing automated feedback to students and tailoring materials according to individual needs (Mambu, J. G., et al., 2023). AI helps to create a more efficient and relevant learning experience for each student. On the other hand, technologies such as virtual reality (VR) and augmented reality (AR) provide immersive and interactive learning experiences (Endarto, I. A., 2022). With these technologies, students can conduct laboratory simulations, explore the world of history, or learn in a more engaging and immersive way. The combination of these technologies not only increases access to education but also enriches the learning process, making it more relevant to the needs of the 21st century (Azhar, M., et al., 2024).

The transformation of education in the digital era cannot be separated from various obstacles that need to be overcome to achieve effectiveness. One of the main challenges is the digital divide, where not all schools have equal access to technology, especially in remote areas that often face infrastructure limitations such as internet and hardware (Susanto, N. W., 2024). This creates disparities in the quality of education between urban and rural areas. In addition, digital literacy is a crucial issue, as both teachers and students need adequate skills to utilize technology effectively in the learning process. Without sufficient understanding, even sophisticated technology cannot be used to its full potential. Another challenge is resistance to change, where most teachers and educational institutions are reluctant to shift to new learning methods (Shobri, M., 2024). This can be due to limited knowledge, lack of training, or comfort with long-established traditional methods. These barriers require a planned and

collaborative approach to ensure the transformation of education in the digital era is successful and inclusive.

2.2 4C Learning in the 21st Century

4C learning is a framework of key skills required by students to face the challenges of the 21st century (Nurhayati, I., et al., 2024). The 4Cs consist of Critical Thinking,

Communication, Collaboration, and Creativity (Andris, V., 2023). In an increasingly complex and technology-based world, these skills become the foundation for solving problems, innovating, and adapting to change. The importance of 4C learning lies in its ability to prepare students for the world of work and global life, where demands for analytical thinking, cross-cultural teamwork, and innovation are top priorities (Muhali, M., 2019).

Critical thinking is the ability to analyze, evaluate, and solve problems in a logical and evidence-based manner. In the context of 21st century education, critical thinking encourages students to not only passively receive information but also to ask questions, seek alternative solutions, and make decisions based on in-depth analysis (Halim, A., 2022). These skills are particularly relevant in the digital age, where students are exposed to a wealth of information and must be able to sort valid data from invalid ones. Project-based learning and case studies are effective approaches to train critical thinking skills in the classroom.

Effective communication includes the ability to convey ideas clearly and listen actively, both orally and in writing (Septikasari, R., 2018). In the digital era, communication skills also include the use of digital media, such as virtual presentations and technology-based communication. Meanwhile, collaboration involves the ability to work together in teams to achieve common goals. In 21st century education, students are taught to work in diverse groups, both locally and globally, to solve problems and complete projects (Sumantri, B. A., 2019). This ability prepares them for challenges in the workplace that prioritize interdisciplinary and cross-cultural teamwork.

Creativity is the ability to generate new and innovative ideas that can be applied in various contexts (Kurniawan, H., et al., 2024). In the digital era, creativity is essential to create unique solutions to modern challenges. Technologies such as graphic design, coding, and digital media provide platforms for students to express their creativity. In 21st century learning, creativity is not only applied in the arts, but also in problem solving in science, technology and business. By integrating 4C skills into the curriculum, students are not only prepared to be competent learners, but also innovators who are able to contribute to society in the era of globalization.

2.3 The Nature of Multiple Intelligences Theory in Learning (Howard Gardner)

The Multiple Intelligences theory proposed by Howard Gardner asserts that each individual has various types of intelligence, such as linguistic, logical-mathematical, spatial, kinesthetic, interpersonal, and intrapersonal (Fitria, F., 2020). In the context of 21st century education, this theory is highly relevant as it supports diverse learning approaches to accommodate the unique needs and potential of each student. Critical thinking can be honed through analytical tasks that involve problem solving or scientific experiments, according to the characteristics of students who have logical-mathematical intelligence (Mawaddah, K., 2023). Meanwhile, collaboration is perfect for students with interpersonal intelligence, who excel in interacting and working together in groups to achieve common goals (Tabrani, T., 2023). On the other hand, creativity can be realized through art, music, or design exploration activities, which provide space for students with spatial or kinesthetic intelligence to express themselves (Zakiah, N. E., et al., 2020). By applying the theory of multiple intelligences in learning, teachers can create an inclusive learning environment, empower each student to develop according to their strengths, and support the mastery of the essential 4C skills in the 21st century.

According to Howard Gardner, the theory of multiple intelligences includes various types of intelligence that describe the unique way individuals understand, learn, and interact with the world around them (Mariana, E., 2018). These intelligences include: verbal-linguistic (word-smart) which reflects the ability to read, write, or speak effectively; logical-mathematical (number-smart) which relates to analytical, problem-solving, and systematic thinking; visual-spatial (image-color-smart) which involves the ability to visualize objects and manipulate space; musical (music-smart) which relates to sensitivity to pitch, rhythm, and melody; and kinesthetic (movement-smart) which describes the ability to control body movements and motor skills (Desda Yani, Y., 2023). The other intelligences are interpersonal (social intelligent) which demonstrates the ability to understand and interact with others; intrapersonal (self intelligent) which reflects self-awareness and the ability to manage emotions; naturalist (nature intelligent) which describes sensitivity to the natural environment and biological phenomena; and existential (essence intelligent) which is related to the ability to reflect on the meaning of life, existence, and deep values (Salang, J. M., 2021).

Figure 1. Types of multiple intelligences
(Source: https://pgsd.binus.ac.id/2021/12/07/1372/)

Each of these intelligences has certain indicators that can be identified through behavioral observations such as tendency to act, interest in an activity, sensitivity to certain aspects, prominent abilities, and spontaneous responses to situations or stimuli. For example, a child with musical intelligence will show enthusiasm for tones and rhythms, while a child with naturalist intelligence will be more interested in the natural environment and the lives of living things. By understanding these multiple intelligence indicators, teachers or parents can help children develop their potential optimally through appropriate learning approaches.

Multiple intelligences-based education provides opportunities for children to enjoy enjoyable learning experiences while maximizing their intelligence potential (Purwati, E., et al., 2020). As expressed by Howard Gardner, the development of a person's intelligence is strongly influenced by crystallizing experiences (experiences that strengthen potential) and paralyzing experiences (experiences that hinder development). This emphasizes the importance of creating positive experiences that are meaningful to children, while avoiding negative experiences that can have a negative impact on their development.

By applying the multiple intelligences approach, children are treated fairly according to their uniqueness and needs. This approach also provides support that allows children to have crystallizing experiences, which can motivate them to develop further. Children will have the opportunity to optimize each type of intelligence they have, which will then show in the form of extraordinary skills and abilities according to their unique potential.

Northern Illinois University Center for Innovative Teaching and Learning. (2020) explains that Howard Gardner's multiple intelligences theory can be applied in various aspects of education, such as curriculum development, learning planning, selection of learning activities, and assessment strategies. Gardner argues that each individual has a combination of different intelligences, where some intelligences are more dominant than others (Kusniati, E., 2016). Therefore, it is important for educators to consider the diversity of students' intelligences when designing learning experiences.

In curriculum development, the theory of multiple intelligences allows flexibility to include different types of activities that can accommodate all intelligences (Wijaya, S. E., et al., 2023). For example, project-based learning can integrate logical-mathematical, interpersonal and spatial intelligences simultaneously. For lesson

planning, teachers can choose methods that are most relevant to the material and student characteristics, such as group discussions for students with interpersonal intelligence or visual art tasks for students with spatial intelligence.

The selection of learning activities should also be designed so that students can explore their intelligence potential (A'ini, Q., 2024). For example, simulations or role plays may be used for students with kinesthetic intelligence, while scientific experiments may appeal to students with naturalist intelligence. Assessment strategies also need to reflect this variety of intelligences, such as using portfolios, presentations, or creative projects as alternatives to traditional written tests.

3. RESEARCH METHODS

This research uses a descriptive qualitative approach (Hanyfah, et al., 2022) to understand the transformation of education in the digital era with a focus on the challenges and opportunities in learning the 4Cs of the 21st century at SMK Negeri 1 Gunungsitoli. This method was chosen because it provides an in-depth understanding of the phenomena that occur, including the experiences of teachers, students and school parties in applying digital technology and developing 4C skills (Critical Thinking, Creativity, Collaboration, Communication).

This research was conducted at SMK Negeri 1 Gunungsitoli, as the institution is relevant to the development of 21st century skills through the implementation of digital technology in its curriculum. Research participants included teachers, students and school management, who were selected through purposive sampling to ensure their relevance to the research topic. Teachers provided insights on technology implementation and 4C learning strategies, students shared technology-based learning experiences, while school management provided information related to policies and infrastructure support.

Data were collected through in-depth interviews, direct observation, and documentation to understand the challenges and opportunities in 4C learning. The data obtained were analyzed using data analysis techniques (Saputra, N. G., et al., 2021). Data validity was ensured through source triangulation and member checking to ensure accuracy and consistency of findings (Humaira, N., et al., 2025). This research provides a comprehensive picture of the implementation of digital technology and the development of 4C skills at SMK Negeri 1 Gunungsitoli.

4. RESULTS AND DISCUSSION

RESULTS

a. Education Transformation at SMK Negeri 1 Gunungsitoli

This research shows that the transformation of education at SMK Negeri 1 Gunungsitoli has begun through the application of digital technology in the learning process. Teachers utilize various digital platforms such as Google Classroom, Zoom and WhatsApp to support teaching and learning activities, especially during the COVID-19 pandemic. This is a significant first step in integrating technology into formal education. In addition to the use of digital platforms, some learning materials have been digitized to make them more accessible to students. This process allows students to learn independently outside of class hours, which is an added value in a technology-based education system (Khusni, A. R., et al., 2024). Such digitized materials not only provide flexibility for students, but also open up opportunities to enrich the learning process with more diverse resources.

Facilities such as computer labs are also being actively utilized as part of the transformation of education in the digital era. These laboratories are used to teach students technology skills, such as the use of productivity software, graphic design and technical simulations. The utilization of these facilities demonstrates the school's efforts in preparing students to face the challenges of an increasingly technology-connected world of work.

Generally, these steps reflect SMK Negeri 1 Gunungsitoli's efforts in facing the digital era, although there is still room for further development. By optimizing technology and strengthening digital skills, schools can accelerate the process of educational transformation while improving the quality of learning that is relevant to the needs of the 21st century.

b. Implementation of 4C Learning

The implementation of 21st century skills (Critical Thinking, Creativity, Collaboration, and Communication) at SMK Negeri 1 Gunungsitoli has started although it is not yet optimal. Teachers emphasize the development of critical thinking and communication skills through class discussions and analytical assignments. However, two other important elements, namely collaboration and creativity, have not been fully accommodated due to limited time and resources. This reflects the need for a more comprehensive learning approach to ensure the development of all aspects of 21st century skills.

The application of 21st century skills at SMK Negeri 1 Gunungsitoli includes various forms of activities designed to develop students' abilities in Critical Thinking, Creativity, Collaboration, and Communication. The following are the forms of implementation:

1) Critical Thinking

Critical thinking skills are applied through class discussions, case studies, and problem analysis. Teachers often assign analytical tasks that ask students to evaluate a situation or problem, for example, analyzing how to improve work efficiency in their vocational field. In addition, project-based lessons, such as product or prototype design, require students to evaluate needs, devise solutions, and make decisions based on analyzing relevant data.

2) Creativity

Creativity is nurtured through project-based assignments that allow students to generate new and innovative ideas. For example, students in graphic design courses are encouraged to create unique visual designs that are relevant to industry needs. In other fields, such as engineering or catering, students are invited to develop new products or conduct experiments that encourage creative exploration. However, creativity is not fully accommodated due to limited resources and learning time.

3) Collaboration

Collaboration is implemented through group work on practical tasks. For example, students are often grouped to complete projects together, such as designing a specific tool in engineering or drafting a business plan in office administration. These activities help students to share responsibility, negotiate and learn from others' perspectives. However, the implementation of collaboration often faces barriers, such as skill gaps among group members or lack of time for coordination.

4) Communication

Communication skills are developed through presentations, class discussions and the preparation of project reports. Teachers provide opportunities for students to present their work in front of the class, which not only trains public speaking skills but also fosters self-confidence. In addition, digital interaction through platforms such as WhatsApp or Google Classroom also helps students learn to communicate effectively in a virtual environment.

The implementation of 21st century skills at SMK Negeri 1 Gunungsitoli reflects the school's efforts to prepare students for the demands of the modern world of work. Although good steps have been taken, further strengthening is needed, especially to enhance collaboration and creativity through the provision of adequate resources and more intensive project-based learning. In this context, the Multiple Intelligences theory proposed by Howard Gardner can provide a relevant conceptual framework (Syarifah, S., 2019). Gardner explains that each individual has various types of intelligence, such as interpersonal, intrapersonal, linguistic, logical-mathematical, kinesthetic, musical, naturalist, visual-spatial, and existential intelligence (Berliana, D., 2023). This approach emphasizes the importance of recognizing the diversity of student potential and providing learning methods that can accommodate these various intelligences. For example, interpersonal intelligence can be optimized through collaborative activities, while musical and visual-spatial intelligence can be facilitated through creative art- or design-based tasks.

At SMK Negeri 1 Gunungsitoli, the implementation of 21st century skills can be more effective if teachers integrate Multiple Intelligences theory in learning strategies. By understanding students' multiple intelligences, teachers can design diverse learning methods, such as simulations, group-based projects and creative activities. This will not only improve collaboration and creativity skills, but also ensure that all students have the opportunity to develop their potential to the fullest according to their intelligence type. Therefore, linking 21st century skills with Multiple Intelligences theory provides a great opportunity for SMK Negeri 1 Gunungsitoli to deliver more inclusive and effective learning. By integrating multiple intelligences in the learning process, challenges faced, such as lack of collaboration and creativity, can be overcome. This approach not only supports the development of 21st century skills, but also prepares students to face the increasingly complex world of work and life in the digital era.

c. Challenge

The challenges faced at SMK Negeri 1 Gunungsitoli in implementing educational transformation in the digital era include various aspects, ranging from technological accessibility to infrastructure barriers. One of the main challenges is the digital divide, where not all students have devices such as laptops or smartphones, as well as adequate internet access. This condition is further exacerbated for students living in remote areas, where technology infrastructure and internet networks are still very limited. This makes it difficult for some students to follow technology-based learning to the fullest. In addition, digital literacy is an obstacle for teachers and students. Many are not fully accustomed to using technology in learning, such as digital platforms or educational software. For some teachers, this difficulty is exacerbated by resistance to change, where they feel more comfortable with traditional teaching methods that have long been used. This hinders the optimization of the implementation of digital technology and 21st century skills in the classroom.

Another challenge is the limitation of learning media, both in quantity and variety.

Schools still lack technological devices such as computers or projectors, so digital learning often cannot be implemented consistently in all classes. Even visual media such as videos or animations, which are supposed to increase the attractiveness of learning, have not been fully utilized due to limited resources.

In addition, infrastructure disruptions, such as frequent power cuts by PLN, become a serious problem in technology-based learning. Unexpected power outages often disrupt the learning process that utilizes electronic devices, such as projectors, computers, or the internet. This condition requires schools to find alternative solutions so that learning can continue despite the limited facilities available.

d. Opportunities

SMK Negeri 1 Gunungsitoli has various opportunities to utilize the transformation of education in the digital era, especially in developing 21st century skills (4C: Critical Thinking, Creativity, Collaboration, Communication). One of the main opportunities is the awareness of the importance of digital technology in learning. Teachers and students have started to recognize and use digital platforms such as Google Classroom, Zoom, and WhatsApp as learning tools. This shows the potential to further integrate technology into the curriculum, which can enrich teaching methods and expand access to education. Schools also have supporting facilities, such as computer laboratories, which can be optimized to improve students' digital literacy. By utilizing these facilities, students can be trained to use digital software and applications, which are relevant to the modern world of work. In addition, the digitization of learning materials that has begun in schools is an opportunity to develop more innovative and interactive learning resources, such as electronic modules or learning videos.

Support from the government and education policies related to strengthening vocational education is also a great opportunity for SMK Negeri 1 Gunungsitoli. Programs such as technology device assistance, teacher training, or collaboration with industry can be utilized to strengthen students' 21st century skills. These opportunities can help schools bridge the gap between classroom theory and the needs of the world of work, so that SMK graduates have competencies that are more in line with the demands of the times.

In addition, students' enthusiasm for technology and digital-based learning is also an opportunity. Many students have an interest in technology, both in the use of apps and the exploration of digital tools. This potential can be directed to develop creativity and collaboration through technology-based projects, such as digital content creation, simulation, or the use of design software. With the right strategy, SMK Negeri 1 Gunungsitoli can overcome the challenges and capitalize on these opportunities to create a more advanced and inclusive education ecosystems.

DISCUSSION

Transforming education in the digital era requires collaboration between various parties, including teachers, students and school management. This research shows that although SMK Negeri 1 Gunungsitoli has started the move towards digital education, there are still significant challenges to overcome, such as the digital divide and technological literacy. The implementation of 4C learning in SMK Negeri 1 Gunungsitoli requires a more structured approach, one of which is through intensive training for teachers in designing technology-based learning. This training should include how to integrate technology into the learning process that encourages 21st century skills, such as critical thinking, creativity, collaboration and communication. In addition, school policies that support the creation of an inclusive and technology-based learning environment are needed, including the provision of adequate infrastructure and incentives for teachers who implement innovative learning methods.

By utilizing existing opportunities, such as emerging technology facilities and flexible curriculum, the transformation of education at SMK Negeri 1 Gunungsitoli can have a significant impact. The school has the potential to become a model for other vocational

education institutions, especially in adopting learning that is relevant to the needs of the digital era. Support from various parties, including the government and local community, can accelerate this process, making SMK Negeri 1 Gunungsitoli a pioneer in creating a generation that is ready to face the challenges and opportunities of the 21st century workforce. The findings suggest that digital literacy, openness to change and a collaborative approach are key elements in implementing effective technology-based learning. Digital literacy encompasses students' and teachers' ability to use technology productively, including understanding how digital devices work, utilizing online resources and applying technological tools for learning. In the context of SMK, digital literacy is not only important to improve the teaching-learning process, but also to equip students with skills relevant to the modern world of work.

Openness to change and a collaborative approach are key enablers in ensuring the success of educational transformation in the digital era. Teachers and students need to be adaptive to innovations in learning, including the use of new technologies. The collaborative approach, which involves cooperation between teachers, students and school management, creates an ecosystem that supports 4C skills (Critical Thinking,

Creativity, Collaboration and Communication). By applying this approach, students are not only able to improve their academic abilities, but are also ready to face the challenges of a complex and dynamic global workplace.

CONCLUSION

The transformation of education in the digital era at SMK Negeri 1 Gunungsitoli has shown initial steps in integrating technology into the learning process. Teachers have started to utilize various digital platforms, such as Google Classroom and Zoom, to support teaching and learning activities. In addition, facilities such as computer labs have been utilized to help students develop technology skills. However, these implementations still face challenges, such as the digital access gap among students and limited digital literacy among some teachers and students. These challenges point to the importance of improving infrastructure and digital literacy training.

Despite the obstacles, the implementation of 4C learning at SMK Negeri 1 Gunungsitoli has great potential to grow. Critical thinking and communication skills are starting to be applied through class discussions and analytical assignments, although collaboration and creativity are still less than optimal due to limited time and resources. With an approach based on Howard Gardner's theory of multiple intelligences, each student can be further empowered according to their individual strengths, such as developing creativity through art projects or collaboration through group work. A more strategic implementation of 4C learning will prepare students with relevant skills for the modern world of work.

To support this transformation, systematic efforts are needed in the form of intensive training for teachers, increased technological infrastructure support, and inclusive and adaptive school policies. By utilizing opportunities such as flexible curriculum and available technology facilities, SMK Negeri 1 Gunungsitoli can become a successful vocational school model in facing the challenges of the digital era. This transformation not only improves the quality of learning, but also prepares students to compete in an increasingly complex global workforce.

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