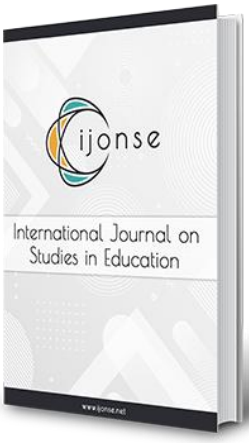

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Abstract

Digital Transformation (DT) was one of the initiatives promoted within the new curriculum in Indonesia. This study aimed to describe the digital transformation of Batch 1 of the Digital School Program (SPB1) in Gunung Mas district, Central Kalimantan, Indonesia. A qualitative research design with a case study approach was employed. Data were collected through observations, interviews, and document analysis. The research subjects included 10 respondents, consisting of 5 principals and 5 classroom teachers. Findings from this research indicated that DT in school management primarily focused on the provision of digital technology to support learning activities. The digital initiatives developed by the government were implemented by SPB1. However, DT in teaching remained limited to the use of digital technology for creating teaching materials and conducting assessments. Teachers' innovations in digital technology-based learning required further support and guidance. Additionally, enhanced collaboration between schools, parents, and stakeholders will be necessary to accelerate the realization of Digital Transformation within the Digital School Program.

Introduction

In Indonesia, curriculum changes have occurred several times, starting from the 1947, 1968, to the latest Merdeka Curriculum (Yulia et al., 2024). Curriculum changes are certainly necessary because the curriculum serves as a guideline and basic framework for the learning process, which aims to develop students' potential to suit the demands and needs of the times (Okojie et al., 2022). The Independent Curriculum is one of the latest education policies implemented by the Ministry of Education, Culture, Research, and Technology in Indonesia since 2021. This new curriculum was initially not mandatory to be implemented in all schools but was mandatory for selected schools only called *Sekolah Penggerak* (Mulyadi & Mardiana, 2022; Vebrianto et al., 2024).

Sekolah Penggerak (SP) is an initiative program of the Ministry of Education and Culture of the Republic of Indonesia. This program aims to improve the quality of education in Indonesia by strengthening the role of schools as agents of change in creating inclusive, innovative, and quality learning environments (Afrina et al., 2022; Rusdiman AB et al., 2022). Schools that become SP are determined through a selection process that aims to select schools that have the potential to become agents of change in improving the quality of education in Indonesia through innovation and the application of best practices in learning. One of the main focuses of the *SP* is to utilize

information and communication technology in learning. By utilizing technology, the SP is expected to create a learning atmosphere that is more dynamic, interactive, and relevant to the times (Afrina et al., 2022). SP are expected to become the motor of school digitalization transformation in Indonesia.

Digitalization of education is a comprehensive step in utilizing the latest digital technology in the world of education to advance understanding (Alvarado-Acosta et al., 2024; Phuong et al., 2023). This includes increasing the use of information technology in the learning process, developing educational resources, increasing the efficiency of the educational process, increasing understanding of digital technology, and encouraging the overall modernization of education (Klopov et al., 2023). Digital transformation (DT) in education means changing the way people, data, and processes are integrated to create a better environment for students, educators, parents, and system leaders (Aldhafeeri & Alotaibi, 2022; Pasju, 2024). This transformation also aims to prepare for innovation and face future challenges in today's digital (McCarthy et al., 2023; Zinchenko et al., 2023). School digitization is no longer just about using computers in classrooms but includes the application of various technologies such as mobile devices, the internet, educational applications, and online learning platforms (Haleem et al., 2022). This opens the door to a more dynamic, collaborative, and personalized learning model that is not limited by geographical or time boundaries. Many studies show a positive correlation between the use of school digitalization and student achievement at various levels (Aldhafeeri & Alotaibi, 2022; Hoerunnisa et al., 2019; Stierle et al., 2023; Timotheou et al., 2023).

School digitization has been well implemented in developed countries (Bosova et al., 2021; Machekhina, 2017; Muetterties, 1971), but the school digitization movement is still a challenge Especially Indonesia. There are still areas in Indonesia that cannot access the internet network or blank spots, The gap between rural and urban is widened, the problem of digitalization also arises due to the lack of readiness of human resources, lack of digital facilities and infrastructure that have not been supported in Indonesia (Atabik et al., 2024; Onitsuka et al., 2018; Situmorang et al., 2023; Soekamto et al., 2022). This can hinder someone from learning digitally. This shows that Indonesia's digital literacy level needs improved (Harmoko, 2021; Santiula et al., 2020). To overcome the existing challenges, the Ministry of Education and Culture wants to immediately realize digital transformation in schools throughout Indonesia by starting from the selected SP. *SP* is a catalyst for realizing Indonesia's educational vision that focuses on developing student learning outcomes holistically to achieve the Pancasila Student Profile.

Research related to the digitalization of SP has been carried out (Atabik et al., 2024; Desianti & Rahayuningsih, 2022; Fatimah et al., 2024; Klopov et al., 2023; Pasju, 2024; Vebrianto et al., 2024; Whitworth et al., 2024). The research by Pasju aims to see the readiness of teachers and students in the use of e-learning in *SP*, while this study has a broader discussion that is not limited to the use of e-learning only. Research conducted by Desianti & Rahayu (2022), Fatimah et al (2024) and Vebrianto et al (2024) discusses the SP program but has not focused on digital transformation. Research conducted by Atabik et al (2024), Klopov et al (2023) and Whitworth et al (2024) discusses digitalization but does not focus on SP.

The purpose of this study is to examine the digital transformation in SP. More specifically, this study aims to address the following research questions:

1. How is DT in system management at SP to improve learning?
2. How is DT in classroom learning at SP?

Method

This research applies a qualitative approach with case studies as the research design. A case study is a research method to carefully investigate a case by collecting complete information using various data collection procedures (Creswell & Creswell, 2018). A case study is a qualitative research method designed to investigate the context and circumstances as well as the interactions that occur in that context (Priya, 2021; Rashid et al., 2019). The case study was chosen because this research focuses on DT cases in Batch 1 *SP* with backgrounds, contexts, and characteristics in Gunung Mas District, Central Kalimantan, Indonesia. This case study was conducted to explore the digital transformation that occurs in SP, which differs from other SP with different characteristics.

Participant

Research sampling uses a purposive sampling method that emphasizes selecting individuals based on motivation or certain desired factors. This sampling method is considered a deliberate approach in determining research participants, specifically in elementary schools that include SP. This research was conducted in five elementary schools, the first batch of SP in Gunung Mas Regency, Central Kalimantan which is here in after called SPB1. The data on schools including SPB1 was obtained from the *Balai Guru Penggerak* (BGP) in Central Kalimantan. SPB1 which consists of five schools is coded S1, S2, S3, S4 dan S5. School demographic data was obtained from the basic data of online education that had been confirmed with student data in schools obtained so that the data in Table 1 was obtained.

Table 1. Demographics of SPB1

School Name	School location	Number of students	Number of classes/group
S1	rural	53	6
S2	urban	448	18
S3	urban	141	6
S4	Rural Transmigration Area	19	5 (no grade 5th)
S5	Rural Transmigration Area	62	6

The researcher contacted the principal directly and at the same time asked for a recommendation on the name of the teacher who could be used as a participant to be interviewed while explaining the voluntariness, confidentiality, and benefits of the research. The respondents from this study were 10 respondents consisting of 5 principals and 5 classroom teachers. To maintain the confidentiality of the research subject, the researcher uses code instead of the real name of the research subject. The subjects interviewed, namely the principal, were given the code P1, P2, P3, P4 and P5 while the teacher was given the code T1, T2, T3, T4 and T5 in Table 2.

Table 2. Demographics of Research Subjects

School Name	Participant	Gender	Age (year)	Long time teaching/leading (year)
S1	P1	Female	41	5
	T1	Female	44	19
S2	P2	Male	53	8
	T2	Female	40	15
S3	P3	Female	53	8
	T3	Male	35	2
S4	P4	Female	39	10
	T4	Female	30	5
S5	P5	Male	54	7
	T5	Female	51	25

P: Principal

T: Teacher

Data Collection

Collection of research data using observation sheet, interview sheets, and documentation instruments. Data collection will be carried out from Juli 2024 to September 2024. Observation activities were carried out in October 2024 by directly observing the digitalization programs in schools, including learning that was carried out for 3 hours for each school. The interview is conducted once a month for 3 months with an average duration of 90 minutes for each respondent in each interview session. The document review was carried out for 3 months by reviewing the learning plan documents made by teachers, the school curriculum, school work plans and the main data of school education to strengthen the results of interviews and observations.

Observation sheets in case studies are used to record data and information obtained directly during the observation process. The observation sheet was developed by the author by referring to the theme of digitalization transformation in schools by McCarthy et al., (2023). Observations were made to see firsthand the school's digital management system and the school's digital infrastructure that focuses on learning. Observation was also carried out to observe digital-based learning in the classroom. Aspects studied and indicators for the observation sheet as shown in Table 3.

The interview technique uses a semi-structured interview by using interview guidelines as an interview instrument. The researcher's goal in using semi-structured interviews is to better understand the participants' unique perspectives rather than the general understanding of something. The interview process begins with the explanation and approval of the informants involved in the research. Interviews between researchers and informants were conducted face-to-face and online using google meet. The indicators for the interview questions were developed by the researcher as shown in Table 4.

Table 3. Observation Sheet

Research focus	Aspects observed	Statement items	Example of observation statement
Digitalization management	Digital-based management system	1-6	The school has a digital library
	Technology infrastructure in schools	1-6	The school has a computer/tablet/smartphone
Digitalization in learning	Use of technology	1-5	Teachers are skilled in using technology such as laptops or the like in learning
	Teacher innovation	1-2	Teachers develop their own digital teaching materials

Table 4. Interview Guidelines

Research focus	Indicator	Sample questions
Digitalization in management	School digitalization program	What are the changes in school digitalization that already exist?
	Human resource readiness for digitalization	What training has the school provided for educators and education related to school digitalization?
	Digital-based management system	How is digitalization used in school administration?
	Technology infrastructure in schools	Were there any significant additions to the technology infrastructure during the merger as an SP?
	The role of digitalization in school partnerships	How does digitalization play a role in establishing partnerships between schools and parents, the community and stakeholders?
	Obstacles to digitalization in school management	How does the school principal's strategy overcome these obstacles?
Digitalization in learning	Teachers' readiness to use technology in learning	What changes did you feel when you joined SP related to readiness to use technology in learning?
	Technologies used in learning	What are the students' responses regarding the technology that the teacher does?
	Digital learning resources	What digital learning resources are used in learning?
	Digital learning resources	What are the digital assessments that teachers have just used during their time as SP?
	Obstacles to digitalization in learning	What obstacles teachers experience while implementing digitalization in learning?

Data Analysis

Before conducting data analysis, it is essential to validate the data. The validity of the research data was verified

through method and source triangulation (Noble & Heale, 2019). Data analysis in this study uses Miles & Huberman stages: data reduction, data display, and verification/ conclusion (Miles et al., 2014). In the data reduction stage, the researcher systematically simplifies, selects, and focuses relevant data from the results of interviews, observations, and documents. This stage aims to filter information that is directly related to the focus of the research, namely digital transformation in school management and learning in SP. In this study, the data reduction process was carried out by reading the interview transcript thoroughly, marking the initial codes, and grouping the main themes that were in accordance with the research objectives. Irrelevant data, such as discussions that are too personal or outside the context of digital transformation, are set aside to make the analysis more focused. In the data display stage, the data is systematically arranged so that patterns, relationships, and findings can be seen more clearly (Kulkarni, 2016). Data presentation can be done in various forms, such as tables, diagrams, matrices, charts, or descriptive narratives, which allow researchers to see the whole picture and make more focused conclusions. At the verification and conclusion stage, the conclusions expressed are provisional and can still change if new evidence is found that is more convincing. The conclusion in this study was carried out after various steps were taken to ensure that the conclusion can be accounted for and is really able to answer the research question. The validity test of the data used is a credibility and triangulation test. In testing the credibility of the data using the persistence improvement method, peer discussion and member checks (Liao & Hitchcock, 2018).

Results

DT in System Management to Improve Learning

The results of observations on DT in school management to improve learning have been carried out in five SPB1s. The results of the observation have also been triangulated with school documents in the form of school curriculum, learning plans, school work plans and basic data of school educators. The results of observation and documentations in SPB1 related to the system management can be seen in Table 5.

Table 5. DT of System Management

Aspects observed	**Statement items**	**Appearance on**				
		T1	**T2**	**T3**	**T4**	**T5**
Digital-based management system	Attendance system (teachers and students) is managed digitally and integrated with administrative reports	x	x	x	x	X
	Administrative services (e.g., mail requests, document management) are available digitally and easily accessible online	x	√	x	√	x
	The school uses an easily accessible digital library system	x	x	x	x	x
	Student and teacher data can be accessed digitally and integrated with	x	x	x	x	x

Aspects observed	Statement items	Appearance on				
		T1	T2	T3	T4	T5
	other systems, such as administration and learning					
	The school has a website	x	x	x	x	x
	Data-driven school planning	√	√	√	√	√
	Schools use digital student progress reports such as e-report cards	√	√	√	√	√
Technology infrastructure in schools	There are computers/laptops/tablets/Chromebooks/others in schools that meet learning needs	x	√	√	x	x
	There is an adequate internet network in the school	√	√	√	√	x
	There are projectors in schools that meet learning needs	√	x	√	x	x
	There are digital presentation tools in schools that meet learning needs	x	x	x	x	x
	There are printers and scanners in schools that meet learning needs	√	√	√	√	√

x : does not possess

√ : possesses

Based on the results of observation and document review, the digital-based school management system is still not running well in SPB1 in addition to the use of e-report cards for students and data-based planning. Student e-report cards have been implemented because it is the policy of the local education office for SP to use e-report cards, although student e-report cards are still not publicly accessible to students and parents. The data-based planning for the five schools in SPB1 is based on the school education report card which is integrated with the school work plan and school work budget. This is a new change for the five SPB1s because previously school program planning was not data-based.

The management system at SPB1 is still not online so information is limited to school administration holders. The school administration supervisor in SPB1 is a teacher appointed by the principal and the principal himself. School administrators are given school laptop facilities so that school data such as school administration or important school data are on the laptop. SPB1 in P2, P4 and P5 schools have begun to tidy up school administration using a shared drive system that was carried out when they joined SPB1. DT in school management is considered important by the five principals even though it has not been implemented well and has not provided significant changes. This is in accordance with the results of interviews with P1, P2, P3, P4 and P5 as follows:

How does DT in school administration that has been carried out during joining as an SP?

"*There have not been many changes in the use of digital for school administration while participating in SP even though I realize the importance of doing digital-based school administration, especially online-based, but the limited ability and number of teachers in the school make it not yet implemented" (P1)*

"Digitalization in school management is good, but our school is still in the process so that we can only use the Shared drive to store important school data, for example, each teacher uploads the teaching modules that they have created in the shared drive according to their class, so it is very helpful for other teachers to discuss. I feel this is a good change because previously we only stored school data on each laptop." (P2)

"Yes, there is a change in the collection of important school data even though our school has not done school administration online and is still typed manually on the school administrator's laptop and the principal's laptop because I do not understand the use of technology for the administration. However, we have much better school data than before joining SP" (P3).

"The change is very extraordinary because before joining SP, our school didn't even have wi-fi and now it exists so that I and my teachers can use it to do administration online with a shared drive "(P4)

"In terms of knowledge related to digital-based school administration, of course, it has increased, but our school is in a location where there is no internet signal so that school administration is still stored on the laptops of administrators and principals, but we also use storage on the drive when getting an internet signal at home, even though it is not optimal." (P5)

Based on the results of observations, document reviews and interviews, information can be obtained that the five SPB1 for DT have changed their thinking when compared to the situation before joining SP but still not optimal in implementation in schools. This is also influenced by the availability of existing digital technology infrastructure. The digital technology infrastructure that has met the needs of schools in learning is still limited. The infrastructure owned by the five SPB1s and meets the needs of only printers and scanners while the needs of computers/laptops and projectors are still not met. As for the availability of the internet network, it is still not optimal for P5 schools, this is because the location of the school is in a blank spot area. This is confirmed from the results of interviews with the principal as follows:

How does DT in infrastructure in any school?

"*At school there are 4 laptops and 1 computer that function properly while tablets that have received assistance from the government can no longer be used because they have not been used for a long time. There are a projector and 2 printers. The number of laptops is still enough if used for teacher learning in the classroom will be because only one teacher wants to use a laptop in the classroom while for computer-based national assessment activities, of course, the number of computers is not enough, so I borrowed laptops from teachers I know" (P1)*

"In the school's computer laboratory there are 23 computers but only 14 computers are functioning properly, there are 28 Chromebooks and 6 laptops. Projectors are installed in classrooms and some are placed in the principal's room, so there are 9 in total. There are 4 printers plus there is a scanner. The number of computers, Chromebooks and laptops is enough to meet the needs of students to learn alternately in computer laboratories and in the classroom, including for the needs of computer-based

national assessments. Although there are 9 projectors, it is still not enough for learning because there are 18 classes here. My plan is that every class must have a projector" (P2)

"The number of laptops is 6, 15 Chromebooks and a computer. I think that number has met for learning activities, especially since teachers sometimes also use their own laptops to teach. The computer-based national assessment activities will alternate so it is enough and our school is also used by other schools that ride during the computer-based national assessment. We have 3 projectors and 4 printers that work fine" (P3)

"We don't have a Chromebook because we have never received assistance from the government but I try to buy laptops from the school operational assistance fund so that there are 6 laptops, 7 printers and 1 projector for learning. Because the students are small, the number of laptops is enough for student learning, but for the use of projectors, they must be alternated. The signal is good as long as it is not cloudy or rainy because we use solar electricity so if there is no electricity, the wi-fi will not work" (P4).

"3 laptops, 2 printers and 1 projector. We teach a classroom phase system so that a laptop is only enough for learning, but for a computer-based national assessment, of course, it is not enough. The addition of projectors still needs to be allocated more funds for the next one. In this school, it is an area where it is difficult to signal even though wi-fi/orbit has been installed, it is still difficult to connect to the internet" (P5).

Based on the results of observations and interviews with school principals, data was obtained that the infrastructure needs of each school are different. S1 which has a small number of laptops and projectors is sufficient for learning because not all teachers there use it in class. S2, even though it has a large number of laptops and projectors, but teachers need each class to teach, so they still feel that they have not met the needs of the school. Based on the results of the interview, the five schools have procured digital technology infrastructure while participating in the SP because P1, P2, P3, P4 and P5 feel it is important to budget for the procurement of the technology so that teachers can also adapt their teaching methods using digital technology.

The five schools have also digitized school spending with an application, namely the *Sistem Informasi Pengadaan Sekolah* (SipLah) paltform which is synchronized with the *Aplikasi Rencana Kegiatan dan Anggaran Sekolah* (Arkas). The school work plan has also been carried out digitally by analyzing the results of the school education report card. These applications are all developed by the government so that schools only need to use the application.

The five principals admitted that when compared to schools in provincial cities and national capitals that have been good in digitalization, of course they are still far behind. However, the DT process that they carried out of course also had a much better improvement in terms of technological infrastructure and its use by teachers when compared to the situation before joining SP. The assistance obtained during joining SP which is related to DT was recognized by the five principals who were able to change their views and also school residents about the importance of accelerating digitalization in their schools so that they could follow the demands of education in their era.

DT in Learning

In this study, digitalization in learning obtained data on teacher competence in the use of digital and innovation in digital-based learning. Table 6 is a result of the observation and lesson plan document by teacher on digitalization in learning.

Table 6. DT in Classroom Learning

Aspects observed	**Statement items**	**Appearance on**				
		T1	**T2**	**T3**	**T4**	**T5**
Use of digital technology	Teachers use laptops/tablets/Chromebooks or the like in learning	x	√	√	√	√
	Do teachers use LMS in learning such as Google Classroom, Microsoft Teams, or other platforms?	x	x	x	√	x
	Teachers use digital-based teaching materials	x	√	√	√	√
	Teachers take advantage of the Merdeka teaching platform	x	√	√	√	x
	Teachers conduct assessments with digital technology such as Khoot, Quizizz or others	x	√	√	√	x
Teacher innovation in digital-based learning	Teachers develop their own digital teaching materials	x	√	x	√	x
	Teachers develop their own digital-based assessments	x	√	x	√	x

x : invisible

√ : visible

The results of observation and document review show that T1 has not utilized technology or innovated in learning using digital technology. This is because competence in the use of T1 digital technology still needs to be guided. This is reinforced by the results of an interview with T1 regarding the use of technology.

What digital technology skills are you proficient in learning?

> "*I can operate a laptop or open YouTube or other digital sources but I don't use a laptop in class because I can't use a projector and the internet network in the teacher's room doesn't reach the classroom I teach" (T1)*

The results of observations and interviews also show that T1 is still based on textbooks when teaching, there are no media innovations or teaching materials that have been developed by themselves, let alone developed in digital

form. T1's ability to use an LMS like google classroom is actually possible but never worked in the classroom that eventually forgets its features. The assessment carried out by T1 is also still using paper. However, T1 admitted that he gained a lot of knowledge related to digital technology from the trainings held by the SP program organizers as shown in the following interview results.

What changes do you feel when joining SP related to readiness to use technology in learning?

> "*I learned a lot when accompanied by facilitators related to the use of technology such as opening Zoom, Google Meet, using Canva, the Merdeka Teaching platform and others but often forgot because I didn't use it to teach*". (T1)

T1 mentioned that they learned a great deal about using various technologies, such as Zoom, Google Meet, Canva, and the Merdeka Teaching platform, during the sessions with facilitators. These tools were introduced to help improve their teaching practices and enhance the learning experience. However, T1 also admitted that they often forget how to use these technologies effectively because they do not regularly apply them in their teaching. Without consistent practice or integration of these tools into their lessons, it becomes challenging to retain the knowledge gained from the training. This highlights the importance of ongoing use and familiarity with digital tools for teachers to fully benefit from the training and incorporate them into their classrooms.

What innovations have you done in digital technology-based learning during your time as an SP?

> "*I made learning media using Canva, previously I had also made media but using only power points can now be used for both". (T2)*

The results of the interview with T2 also informed that during joining SP, many changes were felt related to DT. According to T2, at first T2 was not confident in teaching using technology because he was afraid of being called arrogant by other teachers, but when he joined SP, he was required to use technology, finally T2 got used to it. T2 learns with other teacher friends in the teacher learning community in S2 in addition to learning from trainings held outside of school. T2 feels ease when utilizing digital technology in learning, besides that the impact for students is also good. Students become interested in learning so that their learning results are also good.

The use of digital technology by T3 based on the results of observations and interviews has been good and has been partially implemented in the classroom. T3 has not yet innovated digital-based learning both in making teaching materials and learning media. T3 still utilizes teaching materials or media that already exist or are already available in applications such as the Merdeka Teaching platform, YouTube, or search on google. The following is a snippet of the interview with T3.

What innovations have you done in digital technology-based learning during your time as an SP?

> *"I still use existing applications such as displaying YouTube videos, using assessments from the Merdeka Teaching platform or searching on Google to find interesting teaching materials" (T3).*

This T4 experience is very interesting. Even though it is in an area with a small population and the road to school

is full of challenges, there are still teachers who are still enthusiastic about utilizing and innovating in learning using digital technology even though schools have limitations related to digital technology infrastructure. T4 in addition to using laptops using projectors in learning, e-learning is carried out using Google Classroom. Student assessments have also been carried out online, namely using google forms, Quizizz or taking from the Merdeka Teaching platform. T4 has also innovated in creating digital teaching materials by creating materials in the power point application. The following are the results of the interview with T4.

What innovations have you done in digital technology-based learning during your time as an SP?

> "*Like using Google Classroom for learning, not only assignments but also providing material there. My classes are more dominant online, but I still guide them in doing it because there are few students, so it is easier to teach it. I also make materials in the form of power points but sometimes also study without technology if the weather is not supportive" (T4).*

The use of technology in learning carried out by T5 can be seen from the use of laptops and projectors in the classroom. T5 conveyed that the material is more dominant using books even though sometimes using videos that have been downloaded previously at home to be displayed in class. T5's digital technology-based learning innovations have not been seen. The following are the results of the interview with T5.

What innovations have you done in digital technology-based learning during your time as an SP?

> "*For innovation, there is actually no arena in schools, it is difficult to have an internet signal, so we use more books and papers for assessment". (T5)*

T5 admitted that he gained a lot of valuable knowledge when he joined SP, which helped expand his understanding of various topics. One of the key areas he learned about was the use of technology in education, which he found to be incredibly beneficial. However, he pointed out that most of the tools and platforms he was introduced to, such as Canva, Quizizz, Kahoot, and Google Meet, were designed for online learning environments. Unfortunately, this presented a challenge when it came to applying these tools in his physical classroom. Despite recognizing the potential of these technologies, T5 found it difficult to integrate them into his teaching practices due to their online nature.

Based on the results of observations, interviews, and document reviews related to Digital Technology (DT) in learning, there has been a noticeable increase in its use compared to before joining the SP program. Teachers have shown greater engagement with integrating DT into their teaching practices. The support provided by the SP program has been quite helpful, offering guidance and resources to enhance their skills in using technology effectively. However, the application of these tools is still hindered by challenges, particularly the technological infrastructure available at the school. Additionally, the teachers' own willingness to embrace change plays a crucial role, as some are still hesitant to fully adapt to new methods and technologies.

The availability of digital technology infrastructure is still a challenge for school principals and teachers. Digital transformation will be easily realized with adequate technological infrastructure and a stable internet connection

that all school residents can use. This is still a challenge in SPB1. However, the school is still trying to increase these facilities by making a more careful school operational assistance fund budget so that it can be explained to buy a laptop every year. S2 and S3 also received laptop and Chromebook donations from the central government while mobilizing schools to support the acceleration of school digitalization transformation. For laptop/Chromebook assistance, not all SP have received it because there are specific priorities and conditions for schools that can get the assistance, in addition to the limited aid quota. However, another obstacle to accelerating school digitalization is the availability of internet networks in schools.

Not all teachers and education staff have sufficient skills or knowledge in using technology, which can hinder the adoption and implementation of digital technology in the school environment. Based on the interview, not all teachers are proficient in operating laptops, such as editing files, creating learning media, and making teaching materials. School obstacles still have teachers who cannot use laptops because they complain about the age factor approaching retirement so that vision is reduced, the fear factor will damage/eliminate essential files on the laptop, and the factor of teacher busyness in dividing time.

Without full support from relevant parties, such as the government, educational institutions, and the community, digital transformation in schools may be difficult to realize. This challenge occurs in several SP. For S2 and S3, support is still obtained from the government because the school's location is easily monitored by the local education office. Hence, school visits from the office are also accessible. Support for digital facilities and digital training has been obtained by S2 and S3. However, support from local governments for P1, P4, and P5 is still lacking.

Assistance for laptops/Chromebooks has never been obtained. For S5, they must try their own to connect to the internet network even though it is not optimal. For S4, because the school's location is still affordable with the company's internet signal, it can still take advantage of this. Parental support is also an obstacle to the implementation of digitalization, especially in learning. Parents do not provide data packages for their children, and do not even lend mobile phones for their children to use in learning, while at school it is not enough for laptop needs.

Discussion

DT in system management in the SPB1, especially the procurement of digital school facilities, still does not meet the needs. Making digital school profiles and utilizing platforms to support teacher learning, school administration, and school financial reporting have been carried out in SPB1. Digitalization of schools in procuring facilities is still an obstacle in many schools (Reichert-Schlax et al., 2023; Suleiman & Danmuchikwali, 2020). The lack of this facility will result in the efficiency of school management performance.

DT in learning in SPB1 there are still teachers who have not used technology in the classroom. Teacher competence that has not been optimal in operating digital facilities such as laptops and LCDs also occurs in several other schools (Mirfani, 2019). But this case does not occur in general because there are *SP* in other areas where

teacher readiness in digital use is good (Alvarado-Acosta et al., 2024; Pasju, 2024). However, competencies that have not been maximized related to the use of digital facilities will be upgraded if teachers have the willingness to continue learning both independently learning and attending training and implementing it in direct learning. Teachers who continue to learn to develop digital skills will have an impact on the future of their students' learning (Angelova & Nikolova, 2024; Rêgo et al., 2024).

The effectiveness of digitalization in school management and learning in SP is reasonable compared to before joining SP. There has been a transformation in the number of digital facilities owned by the school and the optimization of school Wifi. The transformation of digitalization of learning is realized by implementing real action in platform learning, training during workshops, and technical guidance in the routine agenda of *SP* activities that increase teachers' insight and competence in digital utilization for learning. Digital transformation in several SP has also been effective in improving teacher competence in digital matters and improving student learning outcomes, especially in using platform learning (Ikram et al., 2023; Soedjono, 2023; Tuminah & Gularso, 2023). School digitalization also makes teachers creative in designing learning (Nurlaeli et al., 2023; Pham & Nguyen, 2024).

Constraints in school digital facilities, the competence of school human resources in digital utilization, and the support of various parties are challenges in digital transformation faced by SPB1 still has many areas that bank spots. Of course, digitizing schools is challenging for schools and local governments to improve their infrastructure. It turns out that not only in rural areas such as Gunung Mas but also schools near big cities experience problems with the stability of internet signals and limited school digital facilities. This is both an obstacle and a challenge because sometimes, with limitations, teachers can learn together at school (Masiello et al., 2023; Onitsuka et al., 2018; Safta-Zecheria et al., 2020). In the 1st generation mobilizing schools in Gunung Mas, there are also obstacles in the support of various parties to realize education transformation. The role of parents, communities and stakeholders is urgently needed to accelerate school digitalization (Bordalba & Bochaca, 2019; Holvikivi, 2024; Osorio-Saez et al., 2021; Owens et al., 2023).

Conclusion

The government's efforts to realize the school digitization program, especially in SPB1 have been transformed compared to before becoming mobilization schools. DT in school management has been carried out by procuring technological facilities from school efforts and assistance from the Indonesian government, even though it still does not meet school needs. The procurement of digital learning tools is already available by utilizing the online learning platform provided by the Ministry of Education and Culture. E-learning, digital libraries, and digital attendance have not been running. At the same time, global/national school administration has been carried out, for example, e-report cards, teacher e-performance, and SipLah and Arkas. In learning, teachers can already use laptops, edit files, carry out online learning with Zoom/Google Meet, create digital learning media, and make digital evaluations such as Quizizz and Kahoot to increase student interest.

The digitalization program ineffective SP can realize digital transformation compared to the conditions before

joining the *SP*. The digital transformation that wants to be realized in SP receives support from both the central, regional governments and mobilizing school facilitators. Although there has been an increase in digitalization in SP, there are still several obstacles faced to realize a better digital transformation. These obstacles include the location of several SP that are far from the reach of the internet, the ability of teachers to vary in following the increasingly rapid development of technology, facilities for digitalization programs are still not fulfilled and also policies on digitalization that need to be evaluated. Therefore, a strong commitment is needed from all parties, so that the school digitization process can bring significant changes to improve the quality of education and the quality of the school itself. The stronger stakeholder support in making policies will accelerate the process of transforming school digitalization *SP* are pioneers in digital transformation, which will later be asked to scan other affected schools. This research will provide an overview of digitalization in *SP* so that it can be used as a reference in policy making to continue mentoring programs in the next SP programs.

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