



Analysis of Constraints and Teachers' Adaptive Teaching Strategies in Elementary School Physical Education with Limited Facilities

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Abstract

Limited facilities and infrastructure remain a common issue in the implementation of Physical Education, Sports, and Health (PE) learning in elementary schools. These limitations may affect the effectiveness of learning activities and students' participation in physical education. This study examines the challenges encountered and the adaptive teaching strategies employed by teachers in the implementation of Physical Education, Sports, and Health (PE) learning in schools with limited facilities. This study employed a qualitative approach with a case study design at Pangadegan Elementary School to explore the phenomenon in its real context. Data collection was conducted by interviews, observations and documentation. Data analysis was conducted through the stages of data reduction, data presentation and conclusion development. The results indicate that the main challenges are linked to the limited access to sports fields, insufficient equipment and limited space for students to move, which leads to less optimal learning activities. To meet these challenges, teachers applied adaptive strategies, such as changing the location of learning activities, adjusting games, and adapting learning materials to the conditions available. The role of the school principal in facilitating learning management also supports the effectiveness of these strategies. However, students showed high enthusiasm in participating in learning activities, but they still had difficulties in motor skill performance. These results show that the success of Physical Education learning is determined not only by the availability of facilities, but also by the adaptability and support from the school teachers.

How to Cite

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INTRODUCTION

Physical Education, Sports, and Health (PE) plays a central role in primary education and contributes to the development of students' physical fitness, motor skills, including their social and emotional development in an integrated manner. PE extends beyond physical activities and also functions as a means of character building, promoting social interaction through collaboration, and encouraging healthy lifestyle practices among students at an early stage (Mustafa & Dwiyoogo, 2020; Opstoel et al., 2020; Saputra et al., 2022). In addition, physical activity in PE learning is also associated with the development of academic abilities among elementary school students (Dinangsit et al., 2020). Thus, the effective implementation of PE learning requires support from various aspects, such as teacher competence, the right way of teaching, and the adequacy of facilities and supporting infrastructure.

In an optimal context, PE learning in elementary schools should be supported by adequate and standardised facilities, so that teachers can implement various learning models that are diverse, active, and engaging. The existence of adequate facilities and infrastructure is very important in increasing student participation and improving the effectiveness of learning (Jaya et al., 2021; Wiguna et al., 2021). Unfortunately, these circumstances have yet to be realized in numerous elementary schools, especially those with scarce resources.

Several researches have shown that scarcity of learning equipment remains an obstacle in the execution of PE, especially in exercises that necessitate adequate equipment and movement areas. Sports equipment, scarcity of field equipment, and inadequate environmental facilities are some of the main obstacles to effective learning implementation (Abidin et al., 2021). These findings suggest that the availability of learning facilities significantly influences determining the quality of the learning process and influencing students' participation levels in PE activities. Furthermore, additional research highlights that the state of PE facilities in several elementary schools is still categorized as inadequate and does not meet established standards, which impacts the limited variety of learning activities that can be conducted (Kamadi, 2024).

Furthermore, differences in facility availability between urban and rural schools have

become a significant issue. Schools in rural areas tend to have more limited facilities compared to those in urban areas, thereby affecting the quality of PE learning implementation (Maulana et al., 2025). In practice, the limitations of learning facilities found in some schools serve as a barrier to improving the quality of PE learning. Amid these limitations, are expected to demonstrate to adaptive competencies in managing the learning process. Teachers are not merely knowledge transmitters, but also function as facilitators who are able to create effective learning experiences despite limited conditions. Various adaptive strategies, such as modifying equipment, optimizing the surrounding environment, and applying flexible teaching methods, become important alternatives to overcome facility constraints (Destriana et al., 2022; Opstoel et al., 2022). These adaptive capabilities serve as an important indicator of teacher professionalism in dealing with limited resources within the school environment. Other studies have also shown that facility limitations, if not accompanied by appropriate strategies, can lead to decreased student interest and participation in PE learning (Sodiq & Iwandana, 2023).

While many studies have explored PE learning, most of them focus on the effectiveness of learning models or student learning outcomes. Meanwhile, studies that specifically investigate the challenges and adaptive teaching strategies in conditions of limited facilities, particularly in the context of elementary schools, remain relatively limited. This suggests a research gap that remains insufficiently explored. Therefore, this study not only focuses on identifying challenges or learning outcomes, but also seeks to gain a deeper understanding of how teachers adjust their teaching strategies and how students respond to learning in situations of limited facilities.

Based on these issues, this study examines the challenges encountered by teachers and the adaptive strategies implemented in PE learning in elementary schools with limited facilities and infrastructure. This study is intended to provide theoretical contributions to the development of PE learning studies, and offer practical insights for teachers and schools in optimizing learning under constrained conditions. Furthermore, this study offers a novel perspective by integrating learning constraints, adaptive teaching strategies, school support, and student responses into a comprehensive analytical framework within the context of limited facilities in elementary schools.

METHOD

This research utilized a qualitative approach with a descriptive case study design. The qualitative approach was applied to obtain a comprehensive understanding of phenomena occurring in real-life contexts, particularly related to the challenges and adaptive teaching strategies of teachers in Physical Education, Sports, and Health (PE) learning in elementary schools with limited facilities and infrastructure. Qualitative research emphasizes understanding meaning and social processes that occur naturally within the research setting (Rashid et al., 2019).

The research design used in this study was a case study, which is an approach aimed at examining a phenomenon in depth within its real-life context with clearly defined boundaries (Gudkova, 2018; Ridder, 2017). The case study in this research focused on the implementation of PE learning at Pangadegan Elementary School, which has limited facilities and infrastructure. The participants were selected through purposive sampling, which involves selecting informants intentionally based on criteria aligned with the research objectives (Fadli, 2021). The informants in this study consisted of 1 PE teacher, 1 honorary PE teacher, 1 school principal, 1 classroom teacher, and 6 students, totaling 10 participants. The selection of informants was according to their direct involvement in the PE learning process and their understanding of the school's facility conditions.

Data collection was conducted using observation, interviews, and documentation. Observations were carried out to observe directly the implementation of PE learning and the condition of available facilities and infrastructure in the school. Observations were carried out three times to obtain more detailed and accurate data regarding the implementation of learning. In-depth interviews were carried out with the PE teacher, honorary PE teacher, school principal, classroom teacher, and students to gather information about the challenges faced and the adaptive strategies applied in the learning process. Documentation served as supporting data, including photographs of activities, field notes, and relevant learning documents. The instruments used in this study consisted of observation and interview guidelines adapted from (Supramono, 2018). The instruments were further modified by the researchers to align with the context and conditions of PE learning at Pangadegan Elementary School. The observation guideline was designed to examine learning activities, the use of facilities, and

interactions between teachers and students. The interview guideline was used to explore in-depth information related to experiences, challenges, and strategies implemented by teachers in PE learning.

To enhance data validity, this study utilized source triangulation and technique triangulation. Triangulation refers to a technique for verifying data validity by utilizing multiple data sources and data collection techniques to enhance the credibility of research findings (Nowell et al., 2017). Data analysis was carried out through thematic and interactive analysis techniques. The research employed thematic analysis to reveal patterns and themes within interview and observation data (Nowell et al., 2017). Additionally, during the qualitative data analysis process, NVivo 12 software was applied to facilitate data analysis systematically. First, the analysis process involved open coding of the interview and observation data so that units of meaning could be identified. After that, codes with related meanings were grouped in a category (node), including such categories as challenges, adaptation strategies, school support, and reactions of students. These nodes would then become a basis for development of themes via identification of relations between nodes. The use of NVivo 12 software made the analysis easier since relationships could be identified graphically, and this way, analysis could be more effective and accurate. Finally, interactive analysis involved going through the stages of data reduction, data display, and drawing conclusions (Miles et al., 2018). Interactive analysis allowed obtaining an in-depth insight into the challenges experienced by PE teachers and adaptive strategies used by them.

RESULTS AND DISCUSSION

The findings were derived from in-depth interviews with the school principal, PE teacher, honorary PE teacher, classroom teacher, and several students at Pangadegan Elementary School. The collected data were subsequently analyzed qualitatively to identify various findings related to challenges and adaptive strategies in implementing Physical Education, Sports, and Health (PE) learning. To facilitate data source identification, informant codes were used, namely GPJ (PE Teacher), GHP (Honorary PE Teacher), GK (Classroom Teacher), KS (School Principal), and S (Student). The findings show that PE learning practices at Pangadegan Elementary School still continues to encounter multiple challenges, particularly those related to limited facilities and infra-

structure. Findings related to these challenges are presented in more detail in **Table 1**.

Table 1. Challenges in Physical Education Learning at Pangadegan Elementary School

Sub category	Key Findings
Field Limitations	The school does not have its own sports field, requiring shared use with other schools, which leads to scheduling conflicts. In addition, the field is located relatively far from the school, reducing effective learning time.
Equipment Limitations	The number of sports equipment is limited and insufficient to meet students' needs, with some equipment in damaged or unfit condition.
Limited Student Movement Space	Limited space restricts students' movement, and learning time is reduced due to travel to the learning location.

Another problem that can be highlighted from the findings is that of limited sports fields. From the results of the interviews, it can be seen that there is no sports field for the school, and thus learning should take place outside the school grounds using community facilities. This problem is exacerbated by the fact that the sports field is used in rotation with other schools, leading to conflicts in scheduling. As stated by the PE teacher, *"We do not have our own sports field, so we have to share and take turns using the field with other schools"* (GPJ). This was articulated by the PE teacher who said that the sports field is used in rotation with other schools. Moreover, the distance to the sports field is around twenty minutes walking distance, thus limiting the duration of learning. A classroom teacher also explained, *"Students need considerable time to walk to the field, which reduces the effective learning time"* (GK).

Apart from field limitations, another obstacle that hinders PE learning is the scarcity of sports materials. From the interview responses, it was found that there were not enough facilities for the students, and some sports materials are also in bad shape. According to the PE teacher, *"The available sports equipment is still limited, and some of it is already damaged"* (GPJ). Meanwhile, the students complained about a lack of materials like balls, and also the poor state of mats. One student stated, *"Sometimes we have to take turns using the balls, and some mats are not suitable for practice anymore"* (S). Consequently, it becomes difficult for all the students to take part in each activity.

The other difficulty is the movement limitation of students while performing the learning activity. There being no school field means that there is limited space in performing learning ac-

tivities in the class and even out of school premises, thus limiting the students' freedom of movement. As stated by the class teacher, this issue limits learning since the students too mentioned being limited in their movements during the PE activities. A student mentioned, *"We cannot move freely during PE activities because the practice area is limited"* (S). Moreover, most of the learning time is utilized on moving to the designated place, thus reducing the amount of physical activity undertaken by the students. From the results, it can be seen that movement limitation leads to ineffective learning and physical inactivity among the students. Adaptive practices adopted by PE teachers in addressing the above difficulties are described below, and the results are shown in **Table 2**.

Table 2. Adaptive Teaching Strategies in Physical Education

Sub category	Key Findings
Relocating Learning Activities	Teachers utilize nearby community sports facilities such as volleyball and soccer fields, although this requires additional time for mobility.
Game Modification	Teachers employ easy-to-find equipment in place of sports equipment and alter activities to ensure the participation of all students.
Adjustment of Learning Materials	Learning aids are adapted to suit the available facilities and weather, while activities are moved from practical to theoretical learning if they cannot be conducted practically.

One approach used was the movement of the learning activity to other sport-related facilities within the community like volleyball courts and soccer fields. The PE teacher explained, *"When the school area is not possible to use, we move the learning activities to nearby community sports facilities"* (GPJ). In this way, the learning activity would still be pursued, albeit with changes in time management and other organizational issues.

Moreover, teachers had the game changed by making use of simple materials as substitutes for the lack of sporting equipment. Teachers could make other devices out of simple materials like paper when there is a lack of sporting equipment. Another teacher stated, *"We try to modify games and use simple materials so that students can still participate actively"* (GHP).

In addition to this, teachers adapted learning materials according to current circumstances. These adaptations were based on aspects like the weather condition and availability of facilities. For example, if it was not possible to learn outside, then learning took place inside where

there was more theoretical knowledge rather than practical skills being taught. The process of learning was also stressed by teachers rather than just concentrating on the results of assessments. The application of these adaptive strategies was facilitated by support from the school. Findings related to school support are presented in **Table 3**.

Table 3. School Support in Physical Education Learning

Sub category	Key Findings
Principal Support	The school allows teachers flexibility in organizing and managing the learning process, supports communication regarding learning programs, and facilitates permission for the use of external facilities.

The school principal provided support by granting flexibility to PE teachers in managing learning activities and maintaining communication regarding planned learning programs. In addition, the school facilitated permission for the use of external facilities. The school principal stated, *"The school always supports PE learning activities, including permitting the use of facilities outside the school"* (KS). This support played an important role in helping teachers overcome challenges in implementing PE learning. On the other hand, student responses and participation in PE learning showed a generally positive trend. Findings related to student responses and participation are described in **Table 4**.

Table 4. Student Responses and Participation

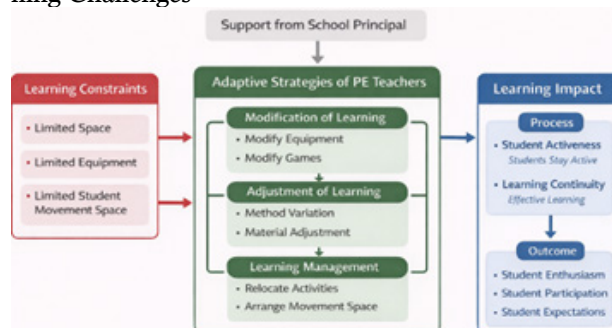
Sub category	Key Findings
Student Enthusiasm	Students show interest and enjoyment in taking part in physical education activities, as they view the learning process as enjoyable and similar to games.
Movement Difficulties	Students experience difficulties in performing certain movements, such as warm-up exercises and push-ups.
Student Expectations	Students expect improved sports facilities and more engaging learning activities.

Most students demonstrated high enthusiasm for PE learning, as it was perceived as enjoyable and provided opportunities for active movement. One student expressed, *"PE learning is enjoyable because we can play and move actively with friends"* (S). On the other hand, some students encountered problems in executing some movements such as warm-up and strength exercises. These demonstrate that there are disparities among students' physical capabilities, as well as the constraints involved in conducting practical activities.

In addition to this, both students and teachers made expectations regarding the upgrading of facilities and infrastructures in PE. This is because teachers were looking forward to having sufficient sports fields facility, while students looked forward to getting more sports equipment to make sure that learning proceeds effectively and more interesting. This clearly shows that even though students have high motivation levels, upgrading facilities is still essential.

In conclusion, the result above shows that there are challenges faced during the application of PE learning in Pangadegan Elementary School because of the fewness of sports field, facility, and space to move for the students. Adaptation strategy by teachers to overcome the challenges is moving of learning activity, changing of game, and changing of learning media. School support and good response from the students are also part of the factors that help to maintain the learning process. But improvement of facilities and infrastructure plays an important role in maximizing PE learning. The relationship of the findings above can be seen in the conceptual model which can be viewed in **Figure 1**.

Figure 1. Conceptual Model of Adaptive Teaching Strategies of PE Teachers in Addressing Learning Challenges



From the results of this research, it is clear that there are some problems faced in conducting PE learning at elementary school with inadequate facilities and infrastructure, including limited spaces for sports activities, learning equipment, and space available for learners' movements. This was done using qualitative data analysis aided by NVivo 12 to help the researcher explore relations and connections between different categories. The existence of these constraints influences the poor implementation of the learning process, especially during practical lessons where learners need to have sufficient movement space and facilities. Facilities and infrastructure are essential in supporting the learning process, hence their limitations might influence the accomplishment

of learning goals (Dudley et al., 2022; Fajar et al., 2024; Hendriadi, 2021). This is in line with the view that an adequate physical learning environment is an important factor in creating effective and meaningful learning experiences (Dyson, 2019). However, the findings of this study also show that limited facilities do not always directly result in learning failure, but rather depend on how teachers manage these conditions adaptively. This indicates that the human factor (teacher) plays a more dominant role than facilities in determining learning success in certain contexts.

This condition indicates that PE learning is highly dependent on a supportive physical environment. When facilities are limited, the quality of students' learning experiences declines, affecting both cognitive aspects and the development of students' motor skills. Previous studies emphasize that students' motor skills can improve when they are engaged in well-organized physical activities within a supportive learning environment (Barnett, 2020; Lonsdale et al., 2019). However, the results of this study indicate that these limitations can still be reduced through flexible teaching approaches, allowing students' motor development to be facilitated even under non-ideal conditions. Thus, the flexibility of teaching strategies acts as a mediating variable that can reduce the negative impact of facility limitations on students' motor skill development.

Furthermore, limited facilities also affect the level of student engagement in learning. When the available equipment is insufficient, students cannot fully participate in every activity, thereby reducing opportunities to develop movement skills. This is consistent with findings that inadequate facilities can decrease students' active participation in PE learning (Goodyear et al., 2021; Munandar, 2025; Witanto & Dinata, 2023). More broadly, student engagement is an important indicator of learning success, as higher engagement increases the likelihood of achieving learning objectives (Casey et al., 2017). However, the findings of this study indicate that student engagement is influenced not just by the availability of facilities, but also by how teachers design and manage their instructional practices. This confirms that student engagement is multidimensional, influenced not only by physical factors but also by the quality of pedagogical interactions established by teachers.

These findings indicate that facility limitations are not merely a technical issue but also have psychological implications for students, such as decreased motivation and self-confidence in participating in learning activities. This is in

line with findings that students' motivation in physical activity is strongly influenced by a supportive learning environment (Barnett, 2020). Nevertheless, in the context of this study, students still demonstrated high enthusiasm, indicating that enjoyment and engaging teaching approaches can compensate for existing limitations. This condition suggests that students can compensate for limited facilities through positive emotional experiences, where enjoyment in learning helps reduce the negative impact of structural constraints.

The condition of limited facilities is also supported by various studies indicating that many schools still fall into the "moderate" to "low" categories in terms of PE facility availability, thus limiting optimal learning implementation (Harianto et al., 2024; Josia Marpaung et al., 2025). In contrast to some previous studies that tend to position facility limitations as the primary barrier in PE learning, the results of this study show that teachers can still create adaptive learning opportunities by applying teaching strategies that are adjusted to the context, allowing learning to remain effective despite constrained conditions. Therefore, this study shifts the perspective from a "facility deficit" toward "teachers' adaptive capacity" as the main focus in the study of PE learning.

In responding to these issues, PE teachers exhibited adaptive abilities by applying different teaching methods, such as moving learning sessions and changing games. These methods indicate how teachers creatively adapt the learning environment considering available constraints. Adaptive ability turns into a crucial determinant in maintaining PE learning despite the absence of sufficient facilities (Dyson, 2019; Suhartini & Lubis, 2023). This study is also consistent with empirical evidence on how improving the competence and practical expertise of PE teachers immensely influence the success of the learning process in elementary schools (Sudirjo et al., 2019). Moreover, the findings align with the theory of adaptive pedagogy, where teachers adapt their instructional design according to the context and students' circumstances (Casey et al., 2017). Consequently, these results illustrate that teachers' pedagogical competence plays a vital role in overcoming the difference between facility constraints and learning goals. In short, effective pedagogical practice partially balances insufficient learning facilities.

This adaptability highlights that teachers are not limited to delivering content, but are also responsible for addressing challenges that arise

during the learning process. Creativity in modifying games becomes a key factor in maintaining student activity. Activity modification in PE has been proven effective in increasing student participation and enabling active involvement of all students (Barker et al., 2017; Bodsworth & Goodyear, 2017). In addition, such modifications contribute to creating more inclusive learning, where each student still has the opportunity to participate without being constrained by limited equipment. This indicates that simple innovations in teaching can have a significant impact on inclusivity and equitable student participation.

Furthermore, the success of teachers' adaptive strategies cannot be separated from the support of school management in managing facilities and infrastructure. Effective management, from planning to the utilization of facilities, has been shown to improve the effectiveness of PE learning as well as students' learning motivation (Malik & Wasliman, 2025; Supriadi et al., 2025). This indicates that support from school management plays a crucial role in ensuring the success of physical education learning (Dudley et al., 2022). Therefore, collaboration between teachers and the school becomes key in creating effective learning, where the support of the school principal is not only administrative but also provides space for teachers to innovate. In this case, supportive leadership plays the role of facilitator in enhancing the process of implementing adaptive strategies. In essence, the success of PE learning is determined by the joint efforts of teachers' proficiency and institutional support rather than being dependent solely on personal variables.

Furthermore, good facilities not only ensure that the process of learning takes place successfully but also facilitate efficient and high-quality teaching processes by the teachers. This finding indicates that having good facilities and infrastructure makes it easier for efficient learning processes to take place (Haetami et al., 2025). This finding is in agreement with previous findings that suggest that there is a positive relationship between the quality of facilities and the effectiveness of learning process (Lonsdale et al., 2019). Nonetheless, this study shows that facilities are just supporting factors and not the sole determinant of success in learning process because they require supportive teaching methods to succeed.

On the other hand, from the respondents' answers in this research, it can be seen that although there were some obstacles, the respondents still showed their enthusiasm in joining learning activities. Therefore, it can be concluded that the adaptive methods conducted by teachers

successfully maintained the enthusiasm of students in studying. This result is similar to other studies proposing that motivation in physical activities is significant in raising student involvement in learning activities (Dinangsit et al., 2021). It shows that the enthusiasm of the respondents can positively influence the success of the learning process because the PE learning was done in an interesting way, so it could improve the students' emotions. However, the respondents still faced difficulties in making some moves due to the limitation of facilities. It implies that there is a gap between motivation and ability because the respondents have high motivation but do not have suitable learning environments.

In summary, the findings show that there is a high correlation between the difficulties, adaptation by the teachers, support from the school principal, and the reaction of the learners in PE learning. The constraints do not automatically become a hindrance; rather, they may be solved using proper management techniques.

In addition, this research contributes to the PE learning process, particularly within schools that lack adequate facilities. This study not only reveals problems but also recognizes the potential role of adaptive processes employed by teachers and school institutions as effective solutions in promoting learning. This insight enhances previous literature that centers around how limitations can act as impediments to learning as the research demonstrates that limitations have the capacity to generate new ideas for instruction. This study demonstrates the incorporation of problems, adaptive processes, institutional assistance, and student reactions into one conceptual framework. This insight implies that the design of PE teacher training programs must encompass not just subject knowledge but also adaptive skills in dealing with inadequate facilities.

CONCLUSION

Based on the research findings, it can be concluded that the practice of the PE learning model in Pangadegan Elementary School is influenced by several factors that are mutually related to one another. This involves limitations in the sports field, sports equipment used, and room for the movement of the students themselves. Indeed, this affects the efficiency of the practice conducted during the learning process. Yet, from the research finding above, it can be seen that those limits can be managed by the teacher so that learning activities are not disrupted. It can be done through various adjustments made in terms of moving the location, changing the game,

or even modifying the learning material used. In this case, the involvement of the school principal plays an important role in fostering collaborative efforts. The responses from the students' point of view are positive in the context of their enthusiastic participation in learning exercises, even though there were some problems regarding the performance of the motor skills. It can be inferred that PE learning amid limited conditions is characterized as a dualistic form in which the affective domain is quite good whereas the psychomotor domain is suboptimal. In essence, the achievement of the success in PE learning does not only rely on the existence of the facilities, but it also depends on teachers' adaptability and school support to create effective learning amid the limited conditions. Thus, the PE teachers are recommended to constantly enhance their creativity and pedagogical ability to formulate creative learning amid the limited conditions at school, while the schools are urged to gradually improve the management of facilities. Further studies are recommended to examine the effects of the adaptive strategy used in other settings or through alternative methods.

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