

Analysis of Adaptive Reuse Building for Early Childhood School: Optimizing Interior Design for Child Development

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How to cite: Tanzillah, N. & Sakya, A.K. (2024). Analysis of Adaptive Reuse Building for Early Childhood School: Optimizing Interior Design for Child Development. *Gorga : Jurnal Seni Rupa*, 13(2), 464-474
<https://dx.doi.org/10.24114/gr.v13i2.62371>

Article History : Received: June 13, 2024. Revised: June 23, 2024. Accepted: October 2, 2024

ABSTRACT

The conversion of unused or abandoned buildings into educational facilities, known as adaptive reuse, is a common practice in school construction. The process involves transforming old buildings to meet new educational needs. While adaptive reuse is considered an innovative and sustainable solution, research shows that this approach often does not support optimal child development. This research explores the application of educational principles in the context of adaptive reuse with a focus on creating learning spaces suitable for early childhood education. The method used involved a qualitative approach with an open-ended questionnaire administered to school principals, teachers, staff and parents. The questionnaire was designed to elicit understanding and perceptions of how interior design can support children's physical, emotional and social development. The novelty of this study lies in the integration of interior design principles specific to early childhood education in the context of adaptive reuse. Different from previous studies that focus on structural or functional aspects, this research offers practical guidance to transform old buildings into learning spaces that support various aspects of children's growth. The results reveal that adaptive reuse applications often do not fulfill all important aspects of designing learning environments. Key issues identified include limitations in creating spaces that support children's creativity, safety, comfort and social interaction. This research emphasizes the need for a more integrated and developmentally-focused design approach to ensure that the resulting learning spaces truly support various aspects of children's growth and learning.

KEYWORDS

Adaptive reuse
Building
Early childhood
education
Interior design
Sustainability
Child creativity
Social interaction

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INTRODUCTION

In the context of school construction, the conversion of underutilized or abandoned buildings into educational facilities has long been recognized as an effective practice (Spector, S, 2023). Educational institutions such as kindergartens, private schools, charter-type schools, and community colleges often apply adaptive reuse principles to meet their facility needs (Graves, 1993). Various types of buildings, including offices, factories, churches, stores, mansions, and military buildings, have been converted into schools (Spector, S, 2023). Adaptive reuse is the process of transforming an old building or area with a specific function into something new and different (Rajput, 2023). The process begins with the identification of unused buildings and an assessment of their potential to be converted into learning spaces (Giljahn, 1981).

In the realm of educational innovation, building transformation through adaptive reuse can add significant value, especially in creating effective and child-friendly school environments. Sustainability in the school environment is an important aspect in the face of future uncertainty

(Zurita, 2008). Although many efforts have been made to create sustainable schools, research focusing on the design aspects of school buildings is still limited. The design and layout of school buildings play an important role in influencing the student experience and can serve as an effective teaching tool if well designed (Newton, 2009). Residential houses that are used as schools must have an interior design as an attempt to solve problems related to the interior space of a building (Yusuff, 2024).

Early childhood education plays an important role in ensuring children's optimal development, focusing on Physical, Intellectual, Language, Emotional, and Social aspects (PILES) (Wahdah, M., & Mujiwati, Y., 2020). The main principle of early childhood education is to create a physical environment that supports the learning process and involves parents in children's education (Budiharjo, 2017). The Ministry of Women's Empowerment and Child Protection encourages the implementation of the Child-Friendly School model (Regulation of the Minister of Women's Empowerment and Child Protection, 2014), which aims to give children full rights and create a friendly and comfortable learning environment, both socially and physically (Kurniyawan, 2020). The condition of the living environment affects the quality of life of individuals; a poor environment can reduce the well-being and health of individuals living there, so it is important to ensure that the educational environment also supports the optimal development of children (Halim, 2023).

This research develops the concept of adaptive reuse with a specific focus on interior design for early childhood education. Different from previous studies that focused more on structural or functional aspects, this research explores the application of interior design principles that support children's physical, emotional and social development. By involving the perspectives of parents, teachers and school principals, this research provides practical guidance for transforming old, unused buildings into child-friendly and sustainable learning spaces.

This research aims to explore the application of educational principles in the context of adaptive reuse to create optimal learning spaces for children. The results of this research are expected to provide practical guidance for similar projects, so that old unutilized buildings can be transformed into valuable assets in the development of quality early childhood education.

METHOD

This study used a qualitative approach with a questionnaire as a data collection tool. Unlike questionnaires in quantitative research which usually consist of closed questions, qualitative questionnaires often consist of open-ended questions that allow participants to provide longer and more reflective answers. This questionnaire aims to explore the understanding, experiences and perceptions of individuals related to a particular phenomenon or issue. Questionnaires in qualitative research can be an effective tool for obtaining data that is rich in information, because it provides space for participants to explain their views freely without being limited by predetermined answer choices (John W. Creswell, 2016). This qualitative method includes descriptive analysis conducted using questionnaires addressed to principals, teachers, staff and parents. The main focus of the research was on the needs of the school as well as child development factors related to the interior design of classrooms and the school environment. The results of the questionnaire provided insights into how these elements can influence children's learning and developmental experiences in an educational environment.

RESULT AND DISCUSSION

The questionnaire analysis phase began with the collection of data from six early childhood schools that had completed the questionnaire. Once the data was collected, it was processed to identify patterns or trends that emerged from the participants' answers.

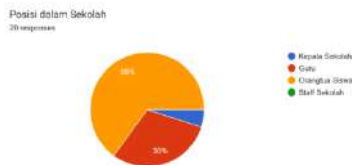
The analysis also involved comparisons between the schools to see differences or similarities in needs and views related to the interior design of early childhood classrooms and school environments. The results of this analysis will then be used as a basis for developing interior design recommendations that suit the needs and characteristics of each school.

The questions in the questionnaire are based on references or sources from the journal (Widera,

2012), which discusses education towards an environmentally responsible future, as well as the journal (Fardillah, Q., & Suryono, Y., 2018), which discusses the principles and elements of classroom design in early childhood education.

From the six schools, there were 20 participants who filled out the questionnaire. Each participant provided responses that will be analyzed to gain a deeper understanding of the needs and views related to classroom interior design and the early childhood school environment.

1. Role in Educational Institutions



Of the total 20 participants, 65% were parents, 30% were teachers and 5% were principals. This shows that the majority of participants came from parents, followed by teachers and principals.

2. Presence of safe and fun play spaces



Out of a total of 20 participants, 100% stated that having a safe and fun play space for children at school is very important. This shows that all participants agreed on the importance of this factor in supporting a good learning environment for children.

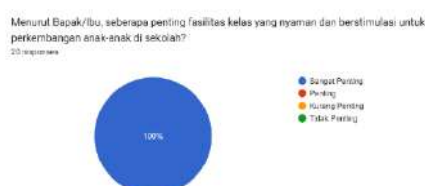
The importance of safe and fun play spaces in early childhood schools is crucial. Adequate play areas should not only be designed for safety, but also to support children's social and physical development.

A well-designed play space provides children with opportunities to interact with their peers, develop social skills and improve motor abilities through physical play. Therefore, ensuring that play areas in schools meet safety standards and provide stimulation that supports children's development is a very important aspect of creating a holistic learning environment (Hadi, 2024).



Figure 1. Safe & Fun Play Space (Tanzillah, 2024)

3. Comfortable and stimulating classroom facilities for children's development



Of the 20 participants, 100% stated that comfortable and stimulating classroom facilities for children's development at school are very important. This shows strong agreement that good classroom conditions can contribute positively to children's development in the school environment.

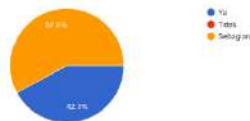
Comfortable and stimulating classroom facilities are very important, indicating strong agreement that the physical environment of the classroom should be designed to support effective and enjoyable learning. The arrangement of the physical environment in the classroom needs to consider various aspects, such as the arrangement of the room, placement of learning equipment, selection of furniture, as well as attention to the needs of children's play activities in various learning centers. Classroom planning should also allow children to play independently, in small groups and in large groups, while maintaining safety, hygiene, comfort and accessibility, including for children with special needs (Mariyana, 2010).



Figure 2. Safe & Fun Classroom
(Tanzillah, 2024)

4. The need for learning spaces that support children's creativity and imagination

Apakah Bapak/Ibu merasa kebutuhan ruang belajar yang mendukung kreativitas dan imajinasi anak-anak sudah terpenuhi di sekolah ini?
19 responses



Of the 20 participants, 42.1% stated that the need for learning spaces that support children's creativity and imagination had been met, while 57.9% stated that the need was only partially met. This suggests that there is still room to improve facilities and learning environments that can better support children's creativity and imagination at school.

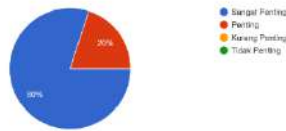
This statement indicates a need for improvement in the design of learning spaces that better support children's creativity and imagination. By improving the quality of learning spaces and supporting facilities, such as providing creative and comfortable play spaces and creating a safe and engaging environment, early childhood schools can create an environment that is more conducive to learning. Comfortable and attractive interior design also plays an important role in improving the quality of learning, as it can create an environment that is not only safe but also supports the development of children's creativity and imagination (Mumtaz, 2023).



Figure 3. Study Room
(Tanzillah, 2024)

5. Child-friendly interior design in increasing children's learning motivation

Seberapa penting menurut Bapak/Ibu desain interior yang ramah anak dalam meningkatkan motivasi belajar anak-anak?
 20 responses



Of the 20 participants, 80% stated that child-friendly interior design is very important in increasing children's learning motivation, while 20% stated that it is important. This shows that the majority of participants strongly consider the importance of interior design that can motivate children in the learning process.

Child-friendly interior design is very important to increase learning motivation. A supportive physical environment can significantly influence children's interest and enthusiasm in learning. Child-friendly schools have characteristics that are safe, clean, healthy, green, inclusive and comfortable, so that they are able to support physical, cognitive and psychosocial development for both girls and boys, including children who need special education and special education services (Alfina, A., & Anwar, R. N., 2020).



Figure 4. Child-friendly Interior Design
 (Mumtaz, 2024)

6. The role of color in classroom interior design on children's learning mood and concentration

Apakah Bapak/Ibu setuju bahwa penataan ruang yang baik dapat meningkatkan interaksi sosial dan kemampuan berkolaborasi anak-anak?
 20 responses



Of the 20 participants, 85% stated that the role of color in classroom interior design on children's learning mood and concentration is very important, while 15% stated that it is important. This shows that the majority of participants strongly consider the use of color in classroom interior design to influence children's learning mood and concentration.

Good color selection in classroom interiors can significantly affect children's mood and comfort. This emphasizes how crucial the right color selection is in creating a conducive learning atmosphere. For example, for printing plate colors and classroom interiors, choose colors that complement the interior design and support children's mood and comfort. Ensure that the color of the printing plate is contrasting enough to improve readability and is in harmony with the classroom theme. Consider the psychological effects of bright colors to stimulate creativity and soft colors for calmness. Maintain design consistency between the color of the printing plate and the classroom interior, and

adjust the color to the function and location of the printing plate in the classroom to create a harmonious and effective environment (Hadinanti, H., & Ramadhan, M. S. , 2024).



Figure 5. Color in the Classroom
(Mumtaz, 2024)

7. A well-organized space can improve children's social interaction and collaboration skills

Apakah Bapak/Ibu setuju bahwa penataan ruang yang baik dapat meningkatkan interaksi sosial dan kemampuan berkolaborasi anak-anak?
Zil response



Of the 20 participants, 95% agreed that good spatial arrangement can improve children's social interaction and collaboration skills, while 5% were neutral. This shows that most participants agreed that space design can influence children's social interaction and collaboration skills.

A good space arrangement can improve children's social interaction and collaboration skills. This shows the importance of space design that is not only functional but also supports social aspects in the learning process. Each physical element in the classroom, such as the size and shape of the space, the furniture and its arrangement, the color of the space, the aspect of sound, temperature, and lighting, has variables that can affect the behavior of individuals who use it (Qonita, F & Yoyon, S., 2018). The design elements of the classroom and the equipment within it should be adapted to the size of the children to support their comfort and engagement. In addition, optimal natural lighting should be available in the classroom to create a healthy and conducive environment for learning.



Figure 6. Space Arrangement for Early Childhood School
(Tanzillah, 2024)

8. Three things to improve or add in the interior design of early childhood classrooms and school environments

From the 19 participants, there are several things that need to be improved or added in the interior design of early childhood classrooms and school environments, namely:

- 1) Adding a larger play area and providing safe and educational games that comply with early childhood safety standards. This means identifying additional space that can be allocated for play areas and selecting games that are not only fun but also educational, as well as ensuring the

- safety of these games in accordance with applicable safety standards.
- 2) Make improvements to the natural and artificial lighting systems to optimize them, with the aim of creating a comfortable and healthy learning environment for children. This includes evaluating and upgrading indoor lighting systems, as well as implementing lighting that takes into account children's visual comfort and eye health.
 - 3) Selecting furniture that meets children's standards and is safe for them. This includes selecting furniture that is ergonomic, child-friendly, and suited to the needs of its use in an early childhood school environment.
 - 4) Repainting for a fresher look, tidying up picture decorations, and improving air ventilation. This means making improvements to the visual appearance of the room with appropriate repainting, rearranging picture decorations to make them neater, and ensuring adequate air ventilation for children's well-being.
 - 5) Using lighter paint colors, improving ventilation to address overheating during learning, and performing maintenance to keep play facilities safe. This involves choosing appropriate paint colors to create a bright and refreshing environment, as well as ensuring sufficient ventilation for children's comfort and regular maintenance of play facilities.
 - 6) Improving classroom lighting. This involves evaluating and upgrading the lighting systems within classrooms to create a bright and comfortable learning environment.
 - 7) Improving playgrounds and school ambience. This involves developing and upgrading play areas, as well as creating a welcoming and fun atmosphere throughout the school environment.
 - 8) Designing rooms to be more cheerful, colorful and educational. This means designing classrooms and school environments with attention to cheerful and attractive aesthetics, and incorporating educational elements in the design.
 - 9) Expanding the space and adding toys. This involves updating the school's physical infrastructure by adding additional space and expanding play areas, as well as providing a variety of toys that support children's learning.
 - 10) Painting the walls with safe and standard paints. This means using safe and environmentally friendly wall paints and ensuring that the painting process is done in accordance with applicable standards.
 - 11) Providing equipment that is appropriate to the needs of the classroom. This involves providing learning support equipment that is in line with the curriculum and teaching needs of the classroom.
 - 12) Reorganizing classrooms, playgrounds and adding outdoor areas. This involves restructuring the physical space of the school to improve functionality and comfort and adding open areas for outdoor activities.
 - 13) Adding pictures that support children's imagination and creativity. This involves adding decorative elements such as paintings or posters that stimulate children's imagination and creativity.
 - 14) Improving lighting, increasing open gardens and adding greenery. This involves improving the lighting system in the school environment, developing pleasant outdoor gardens and adding greenery to create a healthier and more comfortable environment.
 - 15) Using attractive paint colors and designs that suit children's motives. This involves choosing paint colors and designs that are attractive and in line with children's interests and preferences.
 - 16) Decorating the walls or repainting them. This involves improving the visual appearance of the room with attractive wall decorations or repainting as needed.
 - 17) Improving safety on swings and tunnel toys. This involves improving the safety of playground equipment in the school environment to prevent the risk of accidents or injuries.
 - 18) Making repairs to classroom, toilet and playroom walls. This includes structural and aesthetic repairs to classroom walls, toilet areas and play areas to improve the overall condition of the school environment.
 - 19) Making repairs to ceilings or roofs, wall colors, and bathrooms. This involves repairing the ceiling or roof of the building, selecting appropriate wall colors, and repairing or maintaining bathrooms to improve the quality of the school environment.

Participants provided various suggestions for improvements, including the addition of play areas, improved lighting, and the selection of safe and appropriate furniture for children. This suggests that while most facilities may be adequate, there is still room for improvements that can better support children's developmental needs.

9. Three child development factors to consider in the interior design of early childhood classrooms and school environments

Based on the answers from 20 participants, the child development factors that need to be considered in the interior design of early childhood classrooms and school environments are as follows:

- 1) Participants think that the interior design of early childhood classrooms and school environments needs to consider factors such as social-emotional, cognitive, and environmental development to create an appropriate learning environment.
- 2) Pay attention to environmental, emotional, and social factors in the interior design of early childhood classrooms and school environments.
- 3) The interior design of early childhood classrooms and school environments needs to take into account environmental, social, and emotional factors to create a supportive learning environment.
- 4) Consider environmental, social, and emotional factors in the interior design of early childhood classrooms and school environments.
- 5) The interior design of early childhood classrooms and school environments needs to consider environmental, emotional, and social factors to create a good learning environment.
- 6) Pay attention to shapes and dimensions in the interior design of early childhood classrooms and school environments.
- 7) Pay attention to the selection of appropriate furniture and lighting in the interior design of early childhood classrooms and school environments.
- 8) The interior design of early childhood classrooms and school environments needs to consider environmental, social, emotional, and cognitive factors in creating a good learning environment.
- 9) Consider environmental, cognitive and physical factors in the interior design of early childhood classrooms and school environments.
- 10) The interior design of early childhood classrooms and school environments needs to consider environmental, physical, and cognitive factors to create a good learning environment.
- 11) Pay attention to the environment, arrangement, and tidiness in the interior design of early childhood classrooms and school environments.
- 12) The interior design of early childhood classrooms and school environments needs to consider social, emotional, and environmental factors to create a supportive learning environment.
- 13) Using brightly colored or attractive rooms can affect children's mood and increase their enthusiasm for learning.
- 14) Suggestions that designing rooms with certain motifs such as animal, fruit, or calligraphy motifs can make children learn while playing.
- 15) Considering cognitive, environmental, and emotional factors in the interior design of early childhood classrooms and school environments.
- 16) Take into account safety, creativity, and social aspects in the interior design of early childhood classrooms and school environments.
- 17) Taking into account socio-emotional, environmental, and cognitive factors in the interior design of early childhood classrooms and school environments.
- 18) Take into account classroom arrangement factors in the interior design of early childhood classrooms and school environments.
- 19) Take into account the factors of wall paint and pictures on the walls in the interior design of early childhood classrooms and school environments.
- 20) Considering the factors of teaching aids/playground equipment in the interior design of early childhood classrooms and school environments.

Participants highlighted the importance of considering social-emotional, cognitive and environmental factors in interior design. This emphasizes that classroom design should be holistic, considering different aspects of child development to create an optimal learning environment.

10. Additional suggestions or comments related to the interior design of early childhood classrooms and school environments

The following is a summary of the 16 responses to the question:

- 1) Participants felt that the current state of the classroom interior design and early childhood school environment was adequate, with no significant changes needed.
- 2) Suggestions to repaint the room to make it look fresher and more attractive, by choosing bright and diverse colors.
- 3) Improvements are needed in the color of the room paint to make it brighter and more diverse, as well as the addition of adequate play facilities.
- 4) Suggestions to increase the element of creativity in the interior design of classrooms and early childhood school environments.
- 5) Suggestions to expand the room to provide a wider and more comfortable space for children.
- 6) Suggestions to choose appropriate paint colors to create a comfortable and artistic learning environment.
- 7) Suggestions to improve the design aspects according to students' needs to make the learning environment more effective.
- 8) Suggestions to design the classroom interior according to the needs and available budget.
- 9) Suggestions to adapt the design to the conditions of the school's surrounding environment.
- 10) Suggestions to create a comfortable space with specialized learning facilities that suit the needs of children.
- 11) Suggestions to add natural lighting and proper ventilation in the classroom.
- 12) Responses indicated that participants had no additional comments regarding the interior design of early childhood classrooms and school environments.
- 13) Responses indicate that participants have no additional suggestions or comments regarding the interior design of early childhood classrooms and school environments.
- 14) Suggestions to revamp the indoor play area and make improvements to the restrooms.
- 15) Suggestions to improve the classroom walls by using brighter paint to give a sense of vibrancy in the learning process.
- 16) This response implies that participants perceived the condition of the classroom interior design and early childhood school environment as good or satisfactory, without providing any additional suggestions or comments for improvement.

Participants made a variety of suggestions, ranging from repainting the room to improving play facilities and ventilation. This suggests that the interior design in these schools can still be further customized and improved to create a better learning environment for children.

Overall, the results and discussion provide a clear picture of the participants' needs and views on the interior design of early childhood schools, which will be an important basis for developing design recommendations that are better suited to children's developmental needs.

CONCLUSIONS

Based on data from participants, the adaptive reuse approach can significantly influence various aspects of child development in early childhood school design. While 57.9% of participants felt that current learning spaces only partially meet the needs of children's creativity and imagination, adaptive reuse allows the redesign of spaces to further support these aspects by utilizing existing building elements and adding new creative features, such as innovative play areas. Child-friendly interior design, which 80% of participants considered important for learning motivation, can be adapted in adaptive reuse projects to create a safe, comfortable and stimulating environment. In

addition, 85% of participants rated the use of color and lighting in interior design as important factors for children's mood and concentration. Adaptive reuse allows the integration of bright colors and good lighting according to the principles of color psychology, which can create an atmosphere that supports concentration. For social interaction and collaboration, which was considered very important by 95% of participants, adaptive reuse can redesign spaces to facilitate group activities and social interaction, aiding the development of social skills. Meanwhile, improvements in safety and comfort, which are major concerns in classroom interior design, can be achieved by updating old facilities to meet modern standards through adaptive reuse projects. Finally, the suggestion to improve ventilation and hygiene can be implemented in adaptive reuse by improving the ventilation and hygiene systems in the old building, creating a healthier environment for children. Overall, the adaptive reuse approach can effectively meet the various developmental needs of children by utilizing existing structures and making necessary improvements.

Based on these findings, the adaptive reuse approach shows significant potential in supporting various aspects of early childhood development, but there is still room for improvement. Future research is recommended to explore specific design methods that can be more effective in enhancing creativity, safety and social interaction in adaptive reuse learning spaces. In addition, further studies could include longitudinal evaluations to assess the long-term impact of adapted interior design on children's development. Integrating modern technology and data-driven approaches in adaptive reuse design could also provide additional insights into how best to create optimal learning environments.

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