

Character Education Through the Application of Ecological Architecture: A Case Study of Vocational High School in South Tangerang

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ABSTRACT

Schools with ecological architecture insight contribute to the surrounding environment, which has an impact on developing the character of students, such as increasing awareness of a sustainable environment. Therefore, the aim of this research is to examine whether the vocational high school in South Tangerang City, which is labelled as Adiwiyata (ideal environment) at the national level, has incorporated the principles of ecological architecture that take into account the surrounding environment, human movement, road circulation, drainage system, and noise level. In addition, this study also aims to explore whether the inculcation of character education has been implemented in habituation activities in schools. The research employed a case study research design, where the unit of analysis under study was one of the public schools in South Tangerang City, which had received a national-level Adiwiyata school award. Direct observation and interviews were used to gather the data. Interviews were conducted to the school principal, heads of study programs, teachers, and 24 students. This study revealed that the principles of ecological architecture principles were adhered in this school. In addition, the findings indicated that character development through character education is incorporated into all subjects as well as into well-executed routine activities, like the activity of "laskar hijau" (the green army), which teaches pupils to appreciate and maintain a beautiful school environment as a means of developing a sense of environmental responsibility.

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1. INTRODUCTION

Ecology in architecture refers to the mutually beneficial relationship that exists between living things and their environment. Fadhilah and Faqih (2019) argue that ecological concepts can be realized by designing that takes into account the environment, through building mass order patterns, ventilation and lighting concepts, and selection of ecological materials and sanitation systems. Furthermore Rahayu et al. (2017) stated that the concept of applying ecological architecture includes climate, alternative energy, green open space, waste management, drainage, and empowerment of the surrounding community. Similarly, Susanawati et al. (2018), in their research, suggested that ecological aspects include utility planning, climate response, material selection, and waste management. Meanwhile, Leu (2021) noted that a significant contributor to environmental harm and global warming is a lack of knowledge of environmental management. Environmental management policies can be developed by building public awareness through formal and non-formal education by involving the community as managers and environmental supervisors.

Previous research on environmental culture has been extensively researched in several countries, including Indonesia. For example, the research showed that an environmentally friendly school culture cultivates students' character of caring for the environment (Rokhmah & Munir, 2021). Other studies have found that supporting programs are required to establish a clean environment culture (Simanjuntak et al., 2022). The findings of the study also demonstrate the link between environmental culture and ecological architecture in the principles of green architecture for energy-efficient buildings (Masood et al., 2017), which is reinforced by other studies, namely environmental awareness through smart architecture (Ayona, 2021).

Students can benefit character education by developing self-character, shaping behavior, developing their mental and morals, taking responsibility, and building a generation with integrity (Hambali, 2021). Character education is a shared responsibility, but schools can play a significant part because students spend a lot of time engaging with friends and teachers while they are in school. A pattern of environmental care behavior that starts with simple things, such as waste management around schools (Purnami, 2021), which is an actualization of character education, is an example of what is being done in schools within the context of the Adiwiyata program.

The research and literature review results emphasize the importance of education from the perspective of ecological architecture. However, there have not been many studies linking education with insights into the ecological architecture and character education through environmental culture, especially in schools labeled Adiwiyata schools, this is the focus of this research. To fill the gaps in this research, this study aims to explore the application of ecological architectural principles such as the surrounding environment, human movement, road circulation, drainage systems, and noise that occurs in vocational high school (SMK) labelled Adiwiyata school, so that it can be used as a reference for other schools that want to implement the concept. In addition, the purpose of this study is to explore the cultivation of character

The principle of an ecological building is divided into several parts, including adapting to the local natural environment by utilizing sustainable practices, conserving energy and natural resources, preserving and enhancing the natural environment, reducing reliance on centralized energy and waste management systems, using locally available resources and producing one's own daily necessities within the vicinity of the building site, in order to power and sustain the building's systems, including materials and utilities like energy and water (Frick, 2007).

In its implementation, this principle must also consider other specific matters, such as the results of the study stating that the planning requirements include the site concept, appearance/shape of the building, spatial layout, building structure, building materials, building utilities by analyzing the problems and potentials that arise on-site (Rasdyana & Rahman, 2015). In the end, the application of ecological architecture, in principle, must produce comfort, safety, and beauty, known as eco-architecture (Suhada, 2018).

Environmental insight, ecological architecture, and eco-architecture are very closely related to green architecture, and in its implementation in a school, it is carried out by maximizing natural light and ventilation, reducing chemical use, and making the most of local vegetation in an environment dominated by green open space features (Sagala, 2021). Furthermore, in its implementation, an environmentally friendly school culture includes several aspects such as policies, relevant school activities, supporting facilities and infrastructure, and program implementation (Permana & Ulfatin, 2018).

Environmentally-friendly schools are implemented by changing school policies that support vision and mission and the allocation of funds for programs specifically designed for the needs of the school's Adiwiyata, and an environmentally-friendly curriculum by integrating environmental insight material into subjects. Environmental activities are carried out through the active participation of the school community and existing school facilities and infrastructure, as well as carrying out several activities involving students in the Adiwiyata program, in environmental action, and environmental workshops (Chamidah, 2020). In other words, due to the participation of all parties and effective coordination, this program will succeed through these actions.

Adiwiyata Program, known by the term green school program or eco-school program, is a program that encourages the implementation of environmental education under the initiative of Education for Sustainable Development (ESD) (Prasetyo et al., 2020). This program seeks to raise awareness of school members towards the environment by helping them develop the responsibility to make efforts to protect the environment and encourage sustainable development (Lace-Jeruma & Birzina, 2019), which requires good cooperation between students, school leaders, teachers, and related parties through environmental education in schools (Maisaro, Atik, 2018). Schools that run this program need facilitators who are able and responsible for enhancing the success of environmental education training because the involvement of student participation is an immense challenge (Brodie, 2017).

In Indonesia, environmental education programs began in 1996 and were renewed in 2005 by the Adiwiyata school program. There has been an agreement on cooperation in the formation of an educational network between the Ministry of National Education and the State Ministry of Environment. The Environmental Education Program at the primary and secondary education levels was developed in 2006 by the Ministry of Environment to develop a program known as the Adiwiyata program, which means green. This program starts from elementary school to high school. It was further explained that the guidelines for implementing the Adiwiyata program state that Adiwiyata schools are caring schools and have an environmental culture and the Adiwiyata program is a form of embodiment of this culture (Permana & Ulfatin, 2018).

Character education continues to be challenging as it encompasses very broad outcome objectives, pedagogical strategies, and philosophical viewpoints (Althof & Berkowitz, 2006). Character education is associated with higher levels of love, honesty, benevolence, and self-control (Jeynes, 2020). Students' personal development and capacity to carry out their civic duties as citizens are two ways character education is practised (Mc Laughlin, 2021). Thus, it is suggested that character education must be strengthened in school programs as a significant influence (Fauziah et al., 2021). School as a second home is not only a means of imparting knowledge transfer but also the cultivation of character values (transfer of values), to produce religious graduates who have noble character in accordance with educational goals. The study revealed that there was a relationship between students' perceptions of school culture and learning motivation and students' self-adjustment (Fitria et al., 2016; Irene A. & Tanuwidjaja, 2015). To fulfil this, all elements should work together to produce a positive understanding, especially with regard to character education that cares about the environment. Thus, the focus of this research is limited to the application of ecological architecture to vocational schools along with activities that support the implementation of character education that cares about the environment.

2. METHODS

2.1 Research Design

This qualitative study used a single case study design which is an empirical examination that looks at contemporary phenomena in actual settings, as stated by (Yin, 2003) and (Gall et al., 2007) which emphasizes four characteristics of case studies, including in-depth analysis of one or more examples of real-life phenomena and participants' perspectives on the phenomena. Because the unit of analysis under study was a school labeled Adiwiyata which was a small group, the case study design is a suitable design in this study (Gilham, 2000).

2.2 Participants and Research Context

Participants involved in this study included school principals, vice principals for curriculum, heads of study programs for each department, namely, nursing assistants, building modelling and information design, multimedia and animation, teachers who teach PKN, Religion, KWU lessons, and productive teachers respectively as a representation of teacher representatives related to character education with a total of 16 teachers, as well as students who were involved in character-building activities, especially grade 10, 11, and 12 who were randomly interviewed with a total of 24 students. The context of this research is a state vocational high school located in South Tangerang which is an Adiwiyata school at the national level and is moving towards an independent Adiwiyata school, whereas an Adiwiyata school has a program of caring and cultured school environment movement (GPBLHS) which intends to support schools in adopting environmentally responsible behavior through sensible, charitable, networked, and sustainable collective action.

2.3 Data collection and data analysis

Data were garnered through observation and structured interviews. Participant observation was carried out by researchers by directly being involved in the field to examine data sources that were directly related to the research topic and were directly involved in program implementation to obtain complete data. Interviews were conducted using interview instruments and systematically asking several questions. The school management validated Interview questions with instruments according to research needs. In addition, data were obtained from activity reports and student portfolios as well as photo and video documentation of activity implementation.

The instrument is structured based on the principles of ecological architecture which includes adaptation to nature, saving energy, maintaining air and groundwater, and managing clean water, garbage and waste. While the Adiwiyata instrument is in accordance with the Regulation of the Minister of Environment number 05 of 2013 concerning Guidelines for the Implementation of the Adiwiyata Program, including 1) Environmentally Friendly Policy; 2) Implementation of Environment-Based Curriculum; 3) Participatory Based Environmental Activities; and 4) Management of Environmentally Friendly Support Facilities. Law Number 20 of 2003 in vocational secondary education to be independent, career-choice-able, tenacious, persistent, and adaptable. Researchers utilise story analysis to reveal what happened by listening to and acquiring information from sources.

3. FINDINGS AND DISCUSSION

3.1 Existing Site

Occupies a land area of 4500m² This school is Ciputat sub-district, South Tangerang City, which is adjacent to an urban forest that is a green open space of 5,800 m². used as the lungs of the city as well as a place of recreation. Building area of 1798m² and 2708 m² of open space, Ceremonial grounds 800 m², parking area of 300 m² pavement using cone blocks.

3.2. Accessibility

Access to this school is using a neighbourhood road, namely Jalan Sumatra with a width of 6m and Jalan Tidore with a width of 4m, and ending on a community road, which is a dead end. Access to

the toll road can be via the Sumatra Road canal and, passing through Nusa Loka Street and then heading to Jalan Pahlawan Seribu, Serpong, Tangerang.

3.3. Site Plan and Zoning

The zoning area of this school is divided into 3; (a) Private, which is a limited area for learning activities that need quiet such as laboratories and classrooms (b) semi-private, which is an area that forms the boundary between private and public such as administrative services and (c) public, is an open area serving many interests such as parking areas and entrances to building areas.

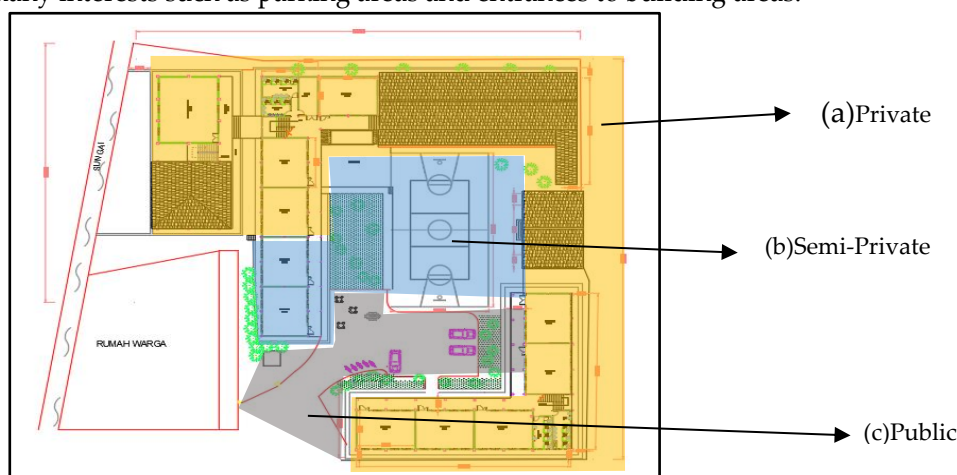


Figure 1. Site Plan (Personal Collection)

3.4. Ecological Condition

Table 1. Ecological Conditions

| Utilities | Existing Site | Effect | Ecological Solutions |
|--------------------------|--|--|--|
| Use of electrical energy | Using 3 phases of 44000 Watt using the nearest substation | The voltage in the neighbourhood is low, around 180 VA, it should be 220 | It is necessary to use its own substation so that it does not disturb the resident's electricity needs |
| Clean water | Using 2 water pumps with drilling as deep as 25 meters | There are no complaints from residents regarding the availability of water | Installation of alternative waterways using PDAM |
| Rainwater management | Utilization of rainwater By making infiltration wells at points of water flow and inundation, there are 5 infiltration wells with a depth of 3m with a diameter of 1m. the existence of infiltration wells is very effective. So that rainwater does not flow directly into the canals or sewers but is first collected in prescription wells, then discharged when the well is full. | Water is not immediately wasted through waterways, bio pore makes large trees fertile with their water reserves. Rainwater harvesting can save water for watering plants | The rainwater solution has been carried out well, with infiltration wells and storage tanks, it's just that there are not many holding tanks, seeing that there is still a lot of water being wasted when it rains heavily |



Figure 2.
Infiltration wells
(personal documentation)



Figure 3.
Rainwater catchment
(personal documentation)

| | | | |
|--|--|---|---|
| On AC | <p>In the use of air conditioners in several administration and management rooms, wastewater is used, it is collected to be used for watering the yard when it is dusty. and washing household items</p> <p>And it can also be used as a plant waterer, even according to (Rohmah et al., 2015) AC water can also be consumed, of course, with certain requirements.</p> | Can save the use of groundwater | The solution to the AC water problem has been implemented by making a reservoir where the water can be used for watering plants and washing kitchen utensils |
| Wastewater | <p>Kitchen and bathroom waste is almost non-existent because it enters the infiltration well</p> <p>did not reach the city sewage because it entered an infiltration well</p> <p>Rainwater runoff cannot be completely accommodated by infiltration wells, the rest is discharged into the next channel into the river</p> | The occurrence of a pungent odour in the infiltration well area | <p>Making control tubs for trapping grease/soap and filters to handle kitchen and bathroom waste before it enters the infiltration well</p> <p>Make rainwater storage on a large scale, for example making a fish pond.</p> |
| Other Waste Water (Use of ablution water) | Wastewater for ablution and washing hands is used as a source of water for fish ponds after several steps chamber filter | Can save the use of groundwater | It has been implemented very well so that it helps in saving groundwater |



Figure 4.
Utilization of ablution water
(personal documentation)

| | | | |
|------------|--|---|--|
| Energy Use | <p>Electrical efficiency is carried out by using LED lights in each room</p> <p>This efficiency is accompanied by appeals to each a switch to use electricity as needed, plus a school principal's decree requiring the use of electricity only when it's dark. on normal days the sunlight is enough to illuminate the room with more window openings</p> <p>of 20%</p> | <p>Can save hundreds of watts of electricity. When using ordinary TL lamps, one room measuring 7x9 m uses 8 40W TL lamps, so that's a total 320 watts, while the use of LED lights is only 72 watts</p> | <p>It is necessary to consider installing solar panels to reduce the use of electrical energy and replace them with light from the sun</p> |
|------------|--|---|--|

Table 2. Convenience

| Utilities | Existing Site | Effect | Ecological Solutions |
|---------------|---|---|---|
| Noise | <p>Occurred on neighbourhood roads due to student pick-up activities in the morning and evening</p> | <p>Occurred on neighbourhood roads due to student pick-up activities in the morning and evening</p> | <p>Occurred on neighbourhood roads due to student pick-up activities in the morning and evening</p> |
| Congestion | <p>Traffic jams occur not only on the school complex road but have reached the Sumatra road</p> | <p>Disturbing activities that use the Sumatra road, namely the activity of moving people from Bintaro to BSD and vice versa</p> | <p>School regulations related to parking management</p> |
| Air pollution | <p>During rush hour and pick-up times it is very congested and many do not turn off their vehicle engines, causing carbon monoxide exhaust gas pollution.</p> | <p>The residents were disturbed, especially since there were many rented houses along the neighbourhood roads</p> | <p>School regulations related to parking management</p> |


| | | | |
|--|--|---|--|
| Soil and vegetation management | <p>Shade</p> <p>With <i>ketapang Kencana</i> trees and mango fruit trees and <i>matoa</i> trees</p> <p>Cultivating toga (family medicinal plants) such as ginger, turmeric, moringa, eucalyptus, betel, teleng, lemongrass, etc.</p> <p>Usage of vertical garden in the UKS room as an effort to use plants as an aesthetic function Management of waste into compost using aerobic and an aerobic methods and liquid fertilizer (Pratama & Nurfitriani, 2011)</p> | <p>Comfort under the tree is used for student discussion activities.</p> <p>The toga plant is used as a resource conservation function and a production function, at least it is useless for school residents and local residents</p> <p><i>The vertical garden</i> has a hygiene effect as eye therapy because of the greening and binding of gas as well as dust</p> <p>Leaf waste is used as organic fertilizer which fertilizes trees and flowers. In fact, this liquid fertilizer has been produced to be sold to the public at a low price and effectively fertilizes the soil.</p> | <p>Making waste treatment in bulk and decomposing it in the form of compost and liquid waste which can be reproduced and has economic value, not only for waste from schools but also for treating waste from the nearest village community. So that it also maintains the cleanliness and health of the surrounding environment</p> |
|  | | | |
| <p>Figure 5 vertical garden (personal documentation)</p> | | | |

Table 3. Character Education Program

| Utilities | Existing Site | Effect | Ecological Solutions |
|---------------------------|--|--|--|
| School Vision | The formation of graduates who have a noble character, are healthy, independent, superior, creative, care for the environment, and have a global perspective | The school's goals are clear according to the vision and mission and this vision can be evaluated every year | Noble character, healthy, independent, superior, creative, cares for the environment, and has a global outlook |
| Curriculum implementation | Include environmental aspects of at least 1 KD in each lesson plan made by the teacher | Environmental-themed character learning was obtained by students in all subjects | Caring for the environment and the profile of Pancasila students (belief, fear God Almighty, Noble Character, Globally Diverse, Collaborative, |

| | | | |
|------------------|--|---|---|
| | | | Independent, Critical, and Creative) |
| Green Warriors | Is an environmental army formed to create an Adiwiyata school by carrying out routine activities and programs such as maintaining the cleanliness of the urban forest and the cleanliness of the school environment? | Members' enthusiasm for environmental care was instilled in these lascars so that it became an embryo of environmental character for their families and friends | Care for the environment and health. For all school members |
| Adiwiyata School | The Adiwiyata program is to create good conditions for schools to become places of learning and awareness for school members so that in the future these school residents can take responsibility for efforts to save the environment for schools. | Increased awareness of school members of the importance of maintaining environmental sustainability in a sustainable manner (<i>sustainable</i>) | Caring for the environment, mutual cooperation, creative, active, and critical thinking |
| Jumantik | Jumantik or larva monitors formed to monitor the health of the environment against the health of residents in posyandu And check the water lines from the danger of disease either inside the school or in the school environment | The school environment is healthy and free of dengue fever. The school community is also helped by the screening program | Care for health and a clean environment free of dengue |
| literacy | Literacy is delivered every day in the schoolyard with various themes, one of which is the environmental theme | Increase the awareness of school members about the importance of literacy | Passionate about reading, personable, curious, and environmentally conscious |
| Clean Friday | Clean Friday is carried out as part of a school program to keep the classroom environment clean, yard, and gutters, both in and around the neighbourhood ensuring that there are no clogged drains and puddles that can cause disease. | Rainwater drains both inside and outside the school are clean | Cleanliness, health, togetherness, and mutual cooperation |

The inculcation of character education in schools that is integrated with all subjects goes well according to the goals and targets. The direct interviews with a school principal as stated in the following excerpt:

"Implementation of character education is integrated with the curriculum and school activities that are carried out as a whole."

This is reinforced by the results of an interview with one of the students who is a member of the Green Troops, which is one of the extracurricular activities that has become a pioneer in the cleanliness and beauty of the school environment.

"All Laskar members are responsible for continuously campaigning for cleanliness and love for the environment both in schools and in the surrounding community such as clean Friday activities and commemoration of national holidays such as Earth Day." (Adi, student, direct interview)

The results of the interviews obtained with the heads of study programs and teachers stated that:

"The provision of an ecological environment has been carried out such as the use of water, waste management, soil, and vegetation management, it's just that the use of solar energy or solar power is only at the discourse stage considering the quite large costs at the start of the installation of solar panels." (Delta, Head of Study Program, direct interview)

"Meanwhile, efforts to control noise, pollution, and congestion have not been carried out but have been included in the school's medium-term program plan." (Demian, teacher, direct interview)

It can be concluded from these interviews that character education planting activities have been carried out continuously and consistently, which is also evidenced by the interviews conducted with other students. The results of this study aim to foster character education by applying ecological architecture such as adapting to the local natural environment, saving energy sources, conserving environmental resources (air, soil, water), protecting, and enhancing nature, this school has implemented it through curriculum integration with student activities that simultaneously and regularly carried out well, extracurricular activities and habituation activities have been carried out optimally through the support of all school members, so as to be able to create various positive characters such as love for the environment and responsibility for sustainable living. This is also supported by activities that are part of the implementation of Adiwiyata schools such as the green army and zone pickets. As it is emphasized that "one of the goals of education contained in the Indonesian education policy and curriculum documents is to cultivate the virtues of character and moral values of students" (Widodo et al., 2018, p., 134). In this context, activities that are carried out by loving the environment directly and are practiced are part of the character education carried out by this school.

In addition, the community needs members who have good character, therefore, the community needs children to develop into adults with the character that they have started to grow since school days with positive activities that support the development of good character as well. As stated that the strength of a child's character is an investment in the future (Dimerman, 2010). In fact, character is defined as the 'interpenetration of habits' (p. 38) and the effect of the consequences of the action on those habits (Dewey, 1922). This behavioral orientation has an important legacy for development in the field (Althof & Berkowitz, 2006) when they interact in society. As emphasized the character development of students cannot be separated from their interactions in society (Huffman, 1994). Berkowitz & Bier (2005), character education has a very far-reaching and varied set of target outcomes. Therefore the school has a target of integrating character education into the curriculum so that it becomes familiar with various kinds of activities that are aligned with the Adiwiyata school program, which emphasizes the environment. This current study has a similar finding that the application of ecological architecture in schools can influence students' character education (Rasdyana & Rahman, 2015). It is inferred that ecological architecture has profound contribution to develop students' character through practical activities to love the environment.

Another thing that has not been maximized in the application of ecological architecture in this school is efforts to reduce dependence on the central energy system and efforts to produce energy independently to be able to suppress the use of fossil energy and its connection with facade design and building site management which do not involve schools in its construction, ultimately reducing the

entirety of character education. In this school, one of which is the use of door and window openings that do not maximize air and light circulation so air conditioning and light are needed in the morning and evening during study hours. The school, in this context, needs a holistic planning and special budget to cover the issues as well as the technology and environmental experts.

4. CONCLUSION

The principles of ecological architecture which include adaptation to nature, energy saving, water, water and soil conservancy as well as the management of clean water, garbage, and waste, have been done very well in this school. The school's efforts to provide infrastructure by involving all school members are quite effective in solving problems Ecologically, for the record, Efforts must be made to use solar panels as part of sustainable energy efficiency. For such components of comfort as noise, pollution and congestion, serious attention should be paid so as not to develop into a larger area and cause ecological disturbances. Ecological architecture related to the use of self-generated energy by the school environment is difficult to obtain because it is related to the limited available funds such as solar panels, researchers also did not find a design process and building materials where schools are directly involved in planning, this is because public schools usually only accept finished buildings and their infrastructure. This of course has an impact on the application of ecological architecture that is not optimal as a whole. Future research is expected to be able to find the influence of school involvement with related education and cultural offices that can create building designs that are in accordance with ecological principles, and how far this affects the process of student character education. We realize several things that the results of this study are also strongly influenced by other variables such as school leadership, child and parent support and the participation of the surrounding community. In the end, a school building that applies the principles of ecological architecture will be enjoyed by students and the surrounding community, so as to create a sustainable urban ecological architecture. The recommendation of this study is that the cultivation of environmental cultural characteristics can increase awareness among school members about the importance of preserving the environment to take them wherever they live and develop to create a positive culture, which ultimately forms a civilization that loves the environment and continues from generation to generation, and this can be a prototype for schools that want to go to *adiviyata* schools.

REFERENCES

- Althof, W., & Berkowitz, M. W. (2006). Moral education and character education: their relationship and roles in citizenship education. 495–518. <https://doi.org/10.1080/03057240601012204>
- Angela Fricilia Sagala, & Imam Faisal Pane. (2021). The design of boarding school in Simanindo, Samosir : Green Architecture. *International Journal of Architecture and Urbanism*, 5(3), 375–386. <https://doi.org/10.32734/ijau.v5i3.7719>
- Berkowitz, M. W., & Bier, M. C. (2005). *What works in character education: a research-based guide for Practitioners*. Washington. ID.C.: Character Education Partnership.
- Chamidah, N. (2020). Implementasi konsep madrasah berwawasan lingkungan : Studi kasus di MAN Purworejo). *Cakrawala: Jurnal Manajemen Pendidikan Islam dan Studi Sosial*, 4(1), 165–187. <https://doi.org/10.33507/cakrawala.v4i1.217>
- Dewey, J. (1922). *Human nature and conduct: an introduction to social psychology*. In Henry Holt and Company
- Dimerman, S. (2010). *Character is the key: How to unlock the best in our children and ourselves*.
- Fadhilah, K., & Faqih, M. (2019). Penerapan arsitektur ekologis pada bangunan resort tepi pantai Karimun Jawa. *Jurnal Sains Dan Seni ITS*, 7(2), 100–104. <https://doi.org/10.12962/j23373520.v7i2.32761>
- Fauziah, R. S. P., Maryani, N., & Wulandari, R. W. (2021). Penguatan pendidikan parakter melalui

- budaya sekolah. *Tadbir Muwahhid*, 5(1), 91. <https://doi.org/10.30997/jtm.v5i1.3512>
- Fitria, R., Marsidin, S., & Nirwana, H. (2016). Hubungan persepsi siswa tentang budaya sekolah dan motivasi belajar dengan penyesuaian diri siswa. *Konselor*, 3(4), 142. <https://doi.org/10.24036/02014344086-0-00>
- Frick, H. (2007). *Dasar-dasar arsitektur ekologis*. In *Kansius Yogyakarta* (1st ed., Vol. 1, Issue 2007). Penerbit Kanisius.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An Introduction*, Eighth Edition. In *Jurnal Green Growth dan Manajemen Lingkungan* (8th ed.). Pearson/Allyn & Bacon. <https://doi.org/10.21009/jgg.082.01>
- Gilham, B. (2000). *Case study research method*. Paston PrePress Ltd.
- Hambali, I. (2021). Manajemen pendidikan karakter dalam meningkatkan disiplin peserta didik. *JiIP - Jurnal Ilmiah Ilmu Pendidikan*, 4(1). <https://doi.org/10.54371/jiip.v4i1.209>
- Huffman, H. A. (1994). *Developing a character education program: One school district's experience*. Alexandria: Association for Supervision and Curriculum Development.
- Irene A, A., & Tanuwidjaja, G. (2015). Studi komposisi pada fasad bangunan pendidikan menurut teori F.D.K. Ching. *EDimensi Arsitektur*, III(2), 153–160.
- Jeynes, W. H. (2020). A meta-analysis: The relationship between parental involvement and latino student outcomes. *Sage Journal*, 49(1), 4–28. <https://doi.org/https://doi.org/10.1177/0013124516630596>
- Leu, B. (2021). Dampak pemanasan global dan upaya pengendaliannya melalui pendidikan lingkungan hidup dan pendidikan Islam. *At-Tadbir*, 1(2), 1–15. <https://doi.org/10.51700/attadbir.v1i2.207>
- Maisaro, Atik, D. (2018). Manajemen Program Penguatan Pendidikan Karakter. *Jurnal Administrasi Dan Manajemen Pendidikan*, 1(September), 302–312.
- Masood, O. A. I., Al-Hady, M. I. A., & Ali, A. K. M. (2017). Applying the principles of green architecture for saving energy in buildings. *Energy Procedia*, 115, 369–382. <https://doi.org/10.1016/j.egypro.2017.05.034>
- Mayona, E. L. (2021). Konsep ecological city dalam kerangka konsep ekologi kota dan kota berkelanjutan. *Jurnal Planologi*, 18(2), 226. <https://doi.org/10.30659/jpsa.v18i2.17978>
- McLaughlin, N. (2021). *Jordan Peterson, Beyond Order: 12 More Rules for Life*. *Society*, 58(5), 447–452. <https://doi.org/10.1007/s12115-021-00636-1>
- Mulyono, A., Yuliani, S., & Samsudi, S. (2018). Penerapan konsep arsitektur ekologis pada redesain tempat pelelangan ikan di Kota Tegal. *Region: Jurnal Pembangunan Wilayah Dan Perencanaan Partisipatif*, 13(1), 64. <https://doi.org/10.20961/region.v13i1.17474>
- Permana, B. I., & Ulfatin, N. (2018). Budaya sekolah berwawasan lingkungan pada Sekolah Adiwiyata Mandiri. *Ilmu Pendidikan: Jurnal Kajian Teori Dan Praktik Kependidikan*, 3(1), 11–21. <https://doi.org/10.17977/um027v3i12018p011>
- Prasetyo, W. H., Ishak, N. A., Basit, A., Dewantara, J. A., Hidayat, O. T., Casmana, A. R., & Muhibbin, A. (2020). Caring for the environment in an inclusive school: The Adiwiyata green school program in Indonesia. *Issues in Educational Research*, 30(3), 1040–1057.
- Purnami, W. (2021). Pengelolaan sampah di lingkungan sekolah untuk meningkatkan kesadaran ekologi siswa. *INKUIRI: Jurnal Pendidikan IPA*, 9(2), 119. <https://doi.org/10.20961/inkuiri.v9i2.50083>
- Rahayu, T. P., Yuliani, S., & Daryanto, T. J. (2017). Pendekatan arsitektur ekologis pada pusat pengelolaan sampah di Surakarta. *Arsitektura*, 15(02), 483–490. <https://jurnal.uns.ac.id/Arsitektura/article/download/15210/13082>
- Rasdyana, R., & Rahman, S. A. (2015). Sekolah pendidikan karakter di Kabupaten Gowa dengan konsep arsitektur ekologis. *Nature: National Academic Journal of Architecture*, 2(2), 135–148. <https://doi.org/10.24252/nature.v2i2a1>
- Rokhmah, U. N., & Munir, M. (2021). Implementasi budaya sekolah berwawasan lingkungan dalam membentuk karakter peduli lingkungan siswa Sekolah Dasar. *Muallimuna: Jurnal Madrasah*

- Ibtidaiyah, 7(1), 63. <https://doi.org/10.31602/muallimuna.v7i1.5314>
- Simanjuntak, M. H. I. M., Budi, G. S., & Miranda, Y. (2022). Implementasi program Adiwiyata di sekolah dasar Santa Maria kota Palangka Raya. *Journal of Environment and Management*, 3(1), 71–79. <https://doi.org/10.37304/jem.v3i1.4292>
- Suhada, I. A. (2018). Penerapan prinsip eko arsitektur : Studi kasus perencanaan kawasan wisata Ponggok Ciblon. *Angewandte Chemie International Edition*, 6(11), 951–952., 2013–2015.
- Widodo, H. P., Perfecto, M. R., Canh, L. Van, & Buripakdi, A. (2018). A critical micro-semiotic analysis of values depicted in the Indonesian Ministry of National Education-endorsed secondary school. *English Language Education*, vol 9. Springer, Cham. https://doi.org/Cham.doi:https://doi.org/10.1007/978-3-319-63677-1_8
- Yin, R. K. (2003). *Case study research: Design and methods*. Sage Publication.