

THE USE OF WOODEN MATERIAL IN THE KINDERGARTEN'S INTERIORS IN ORDER TO SUPPORT INCLUSIVE EDUCATION AND THE QUALITY OF LIFE OF CHILDREN

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ABSTRACT: The aim of this paper is to point out the influence of the wood material in the interiors of kindergartens on its positive impact on the child's development and its inclusiveness in education. The use of furniture and interior elements made of wood in the architecture of kindergartens opens a new area of research and interest in the context of promoting diversity and access for every child, regardless of his abilities or limitations. The article assesses how this architectural and design change can contribute to the inclusive education of children and can positively affect children's cognitive abilities and ultimately improve their quality of life. The obtained results presented in the article can contribute to the creation of new ideas and solutions for the creation of kindergarten architecture, which strive to create an inclusive environment for children and offer the development of knowledge, experience and design thinking in practice.

KEYWORDS: well-being; kindergarten; wood; restorative environmental design; biophilic design; salutogenic design

INTRODUCTION

The influence of the physical environment on children's health and well-being is becoming an increasingly important social issue. Opportunities for direct contact with nature are diminishing due to modern urban lifestyles and inappropriate architectural solutions. Wood, with its pleasant color, texture, softness, and even scent, reminds children of something they intimately know and instinctively feel close to [1]. It has a positive impact on their physical and mental health, and children don't have to make an extra effort to familiarize themselves with this material. The contact of children with nature in the interior environment of kindergartens can reduce stress, and improve concentration, cognitive abilities, and a sense of security.

We believe that due to the aforementioned positive qualities, wood is an excellent material for creating an inclusive-friendly architectural environment in kindergartens. The Salamanca Statement (UNESCO, Salamanca, 1994) introduced the principles of inclusion and stated: "The principle of inclusive education implies that schools should accommodate all children regardless of their physical, intellectual, emotional, social, linguistic, or other conditions" [2]. The use of structural elements, built-in furniture, and standalone solid wood furniture in the interiors of kindergartens opens up a new area of research and interest in the context of supporting diversity and access for every child, regardless of their abilities or limitations. The application of solid wood in the environment of kindergartens can contribute to inclusive education for children, influence their cognitive abilities, and ultimately improve their quality of life. Educational processes, inclusion, and the well-being of users of the physical/built environment could be supported by implementing designs based on modern philosophies such as biophilic design, restorative-environmental design, or salutogenic design.

The main goal of inclusive approaches in education is to provide all children with the opportunity to develop their potential in a school closest to their place of residence and to develop their potential in life and later in the job market. A kindergarten that nurtures and educates a child must be structured in a way that, within an inclusive approach to education, respects the uniqueness of each child. At the same time, it should adapt goals and educational content, as well as

teaching methods and forms of assessment, to their abilities.

This article aims to highlight the impact of wood materials in the interiors of kindergartens on the child's development and inclusiveness in education. We focus on existing timber constructions in Slovenia, one of the "Alpine countries" where timber kindergartens are relatively widespread, influenced by the cradle of timber architecture in another "Alpine" country, Austria (Styria and Vorarlberg). A case study presents research conducted in five selected Slovenian kindergartens. The study analyzes the presence of solid wood in their structural, architectural, and furniture design aspects. The results obtained in the article are presented as inspiration for the creation of new ideas and solutions for the creation of kindergarten architecture that strives to create an inclusive environment for children, offering the development of knowledge, experience, and design thinking in practice.

BACKGROUND / THEORETICAL FRAMEWORK

Biophilic design

Combining the philosophy of biophilic design with the creation of physical environments in kindergartens using structures and furniture made of solid wood creates a harmonious and nature-evoking setting for children. This concept is suitable for the inclusion of children as it brings numerous benefits to their physiological and psychological well-being. As studies [3] have shown, the disconnect between people and nature has a negative impact on human physiology and well-being, leading to various disorders and health problems associated with stress. The stress induced by an unpleasant environment can trigger feelings of anxiety, sadness, or helplessness, raising blood pressure, and heart rate, causing muscle tension, and suppressing the immune system.

Conversely, the presence of natural elements such as solid wood in the physical environment of kindergartens helps reduce anxiety, and stress, and improves mood and well-being. For children with specific needs, the presence of solid wood can create a stable and predictable environment that helps optimize their emotional balance. Additionally, the presence of wood can support children's sensory development, stimulate their sensory perception, help create an environment that enhances mood, reduces stress, and provides a pleasant and natural space in which children can feel

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comfortable and safe.

Restorative environmental design (RED)

The materials used in the environment surrounding children have a tremendous impact on their well-being, providing children with a tangible and real world. Instead of spaces in kindergartens that foster a sense of restoration, we often encounter materials that, while practical and efficient, are primarily cheap and often unsuitable, evoking undesirable emotions. The plastic feels artificial, the stone feels hard, the concrete feels cold, and even walls painted white evoke little emotion. In contrast, wood always creates a warm and pleasant impression. Furthermore, it is the only sustainable/renewable natural material among all the mentioned materials.

Lately, there has been an increase in the use of wood imitations (various laminates or ceramic tiles with wood prints), which, at best, offer only a positive visual experience. This artificially created product may look good, but it lacks tactile qualities, scent, and, above all, it is a material that deceives. Compared to authentic solid wood, it is always artificial, and fake, and can negatively affect children's spatial experiences.

Salutogenic design

Health and wellness are gaining increasing importance in the world of interior design. However, it is important to note that salutogenic design and biophilic design are not identical concepts. The biophilic design explores our relationship with nature and natural elements, not only through the presence of plants, trees, and natural wood but also by incorporating concepts such as natural lighting, improved air quality, and the presence of water elements. Salutogenesis goes further and focuses on promoting active health, productivity, and efficiency. It is measurable and motivates us to achieve maximum performance, both mentally and physically. Salutogenic design is a key component of WELL building certification.

In addition to biophilia, the salutogenic design also addresses comfort, nutrition, fitness, and mental state in the environment. For example, the salutogenic design focuses on designing stairs that encourage people to use them instead of elevators or creating active courtyards, terraces, and atriums that promote personal interactions instead of screen-watching and media consumption. It is not concerned with carbon footprint or renewable resources but rather focuses on whether a space contributes to improving people's health and enables them to achieve mental, social, and physical well-being [4].

RESEARCH METHOD

The case study presents a conducted research in five selected kindergartens in Slovenia:

1. Vrtec Loče, Šolska ulica 2, 3215 Loče
2. Vrtec Poljčane, Dravinjska cesta 28, 2319 Poljčane
3. Vrtec Šoštanj, Kajuhova cesta 8, 3325 Šoštanj
4. Vrtec Polzela, Glavni trg 1, 3313 Polzela
5. Vrtec Škofja Loka, Partizanska cesta 1e, 4220 Škofja Loka.

These kindergartens were implemented by the Slovenian architectural studio KONTRA Arhitekti. It analyzes the presence of solid wood and wood-based materials such as plywood in the structural, architectural, and furniture design aspects. The obtained results, presented in the article, serve as an inspiration for the creation of new ideas and solutions for the development of kindergarten architecture, aiming to create an inclusive environment for children and offering the advancement of knowledge, experience, and design thinking in practice.



Fig. 1.: Playroom in kindergarten Loče, nŠolska ulica 2, 3215 Loče. (Photo author: arhiv biroja, available at: <https://www.openhouseslovenia.org/objekt/kindergarten-loce/>)



Fig. 2.: Playroom in kindergarten Poljčane, Dravinjska cesta 28, 2319 Poljčane. (Photo author: Jakub Hanták, 2021)



Fig. 3.: Playroom in kindergarten Šoštanj, Kajuhova cesta 8, 3325 Šoštanj. (Photo author: Jakub Hanták, 2021)



Fig. 4.: Fig. 4. Playroom in kindergarten Polzela, Glavni trg 1, 3313 Polzela. (Photo author: Miran Kambič, available at: <https://www.openhouseslovenia.org/objekt/vrtec-polzela-z-medgeneracijskim-centrom/>)

Explanatory notes:

Biophilic design - represents a holistic approach to the design of interiors and exteriors, where the focal point is the human being and its impact on their psychological and physical well-being and health. In combination with an approach that considers the long-term impact on the natural environment, we refer to it as restorative environmental design, which promotes individual health [5].

Restorative environmental design - is a paradigm of architectural design that combines sustainable construction practices with building methods that are beneficial to the health of occupants [6].

Salutogenic design - Salutogenic design is a concept and approach to environmental design that aims to support and enhance the health and well-being of individuals. Its focus is different from the traditional approach, which concentrates on disease prevention and addressing negative environmental impacts. Salutogenic design instead emphasizes strengthening factors that contribute to health and creating conditions for prosperity and a better quality of life for individuals [4].

This research is part of a broader study conducted during the preparation of the first author's (currently unpublished) dissertation. The methods used included discussions with teachers in kindergartens, observation, and photography, and the results are described in this article. Digital photography was used to document the presence of solid wood in the structural, construction, architectural, and furniture design aspects of the playrooms and the spatial organization of these rooms. Teachers were asked for their opinions on interior design, architecture, necessary space, furniture, and equipment. The interviews took place during reg-



Fig. 5.: Playroom in kindergarten Škofja Loka, Partizanska cesta 1e, 4220 Škofja Loka. (Photo author: Jakob Hanták, 2021)

ular daily activities in all observed kindergartens in October 2021.

RESULTS AND DISCUSSION

In the visited interiors of kindergartens, architects enthusiastically incorporated wooden elements, structures, and solid wood furniture. These elements add a natural and warm aesthetic touch to the space and create a pleasant and organic environment for children. They evoke a pleasant atmosphere and bring a sense of warmth to both children and teachers or caregivers. The solid wood material is prominently featured in the structural components of walls, ceilings, and floors, as well as built-in and freestanding furniture. Wooden floors are highly popular and offer various design options and textures. Most flooring surfaces in the case studies were implemented in the natural color, shade, and texture of wood in a brownish-honey hue.

The use of wooden elements in the interior of the kindergarten was employed on various levels. For instance, low-lying wooden shelves, racks, and toy shelves were positioned at an accessible height for all children, including those with limited physical mobility. This ensures a friendly, inclusive environment where all children have equal access to toys and materials. Solid wood provides children not only with natural and aesthetic value but also contributes to the creation of an environment that is accessible and friendly to all children, regardless of their abilities and needs.

Unfortunately, the wooden furniture in the kindergarten did not offer adaptability and flexibility. For example, tables and chairs with adjustable height could be modified according to the individual needs of children with different body proportions and physical abilities. This would allow each child to find comfortable and ergonomic seating, promoting their participation and engagement in various activities.

Equally important was the use of contrasting, predominantly plastic materials executed in a basic color palette, which assists children with visual impairments in perceiving the space and distinguishing individual elements better.

When the space is effectively arranged with open pathways that clearly led to activity centers, children gain the ability to independently participate in specific activities or engage in play. They enjoy the freedom to move around and transition from one activity or center to another without requiring constant guidance from a teacher. Conversely, when the space is disorganized, children become reliant on the teacher for direction, resulting in the teacher's behavior becoming more controlling [7].

Teachers who spend more time managing group behavior find themselves with less time to provide individual support to children, consequently limiting the opportunities for free play. In poorly organized spaces, children depend on the teacher and experience restrictions in their choices and movements. For instance, by introducing a more complex or interactive play unit into the environment, children can actively engage in free play, exhibit increased self-sufficiency, and develop longer attention spans [8]. Preschool teachers, based on their observations, believe that the space where children spend time should offer flexibility in terms of furniture and partitions, allowing children themselves to rearrange items like toys, books, and furniture. Children feel at ease when they have control over their surroundings, enabling them to explore and create small spaces tailored to their activities. Conversely, when the space remains static, children feel uncertain and less independent. Moreover, each area of the play space should be well-organized, clearly indicating its purpose. A chaotic space hampers children's orientation and diminishes their capacity to engage fully because they struggle to navigate the surroundings. Therefore, it is crucial for communication paths within the space to be clear and concise, minimizing any disorientation. Incorporating color into corridors, walls, and the floor surface can contribute to achieving this goal [9]. Additionally, the space should offer visual accessibility since children value visibility, even when they seek separation or prefer playing in smaller groups. From a safety standpoint, visibility is advantageous as it allows teachers to maintain constant supervision. Visual accessibility should extend beyond playrooms and include other commonly used areas like dressing rooms, toilets, and communication devices. Nikoloska [10] highlights that the size of the spaces and the available resources within them are important factors for fostering social interaction. If the playroom is too small, it may lead to increased aggression and emotional excitement. Conversely, excessively spacious rooms can cause children to feel overwhelmed and disoriented if the space is not properly organized. The selection of toys also influences children's interactions, as each child typically has their favorite toy at a specific time of the day. Conversely, reducing the number of toys provides children with greater opportunities to socialize with one another, thereby promoting increased social interaction.

So when we look at the furniture and the overall environment in which children spend time in preschools, we cannot fully agree with Dorfler's [11] statement about good construction. The furniture found in preschools has essentially remained unchanged for the past hundred years [12]. Haviarová et al. [13] point out that "today's concept of school furniture design is mostly traditional (...). The most common forms of tables are small, four-legged, with flat work surfaces, as well as tables with plywood veneer and steel tops. Nowadays, work surfaces are most commonly constructed from laminated particle boards attached to a welded base structure. Unfortunately, the existing furniture is mostly guided by construction and design solutions that are not in line with the current needs of modern education, students' anthropometric dimensions, and new standards. It is ergonomically poorly designed, structurally unstable, and lacks durability and strength."

In most countries, school furniture is made of three basic materials - wood (solid or wood products), metal and plastic [14]. A school desk and chair made of solid wood are the most expensive, but at the same time the most suitable for the student, especially in terms of tactile properties, warmth, softness, and the impression of naturalness. Wood materials such as veneer board (from which back and seat moldings are made) have similar properties. Given the price of solid wood, most wood materials (chipboard and plywood) are veneered or covered with foil or laminate. Metal is

most often used in the form of pipes for making plinths, which must be structurally strong and stable, so a bent or welded pipe is the most common choice. Due to the economic demands for a cheap product of large series, more and more plastic furniture is produced (back and seat of chairs, table tops and even pedestals) [15], but it showed the worst properties in terms of durability, strength and maintenance. Hedge's [16] research also shows that plastic, beside that is not an environmentally friendly material, retains more bacteria than wood at the surface.

Unfortunately, existing furniture most often is redesigned visual and construction solutions, inconsistent with today's needs of modern education, anthropometric sizes of students and new norms, non-ergonomically designed, unstable construction and inadequate durability and strength. With the development of new materials and new technologies, pedagogical equipment and educational interiors, it is expected that in the near future the current classic way of equipping children's workplaces will change significantly, certainly in anticipation of rising standards and economic opportunities.

A good designer must be aware of his social and moral responsibility. The designer should know how to shape his products and his environment, and thus, he must analyze the past, predict the future, and the consequences of his actions. Especially today, when the super-technologically, sterile, and inhumane environment in which a person lives, has led to a planet that is constantly choking in the gray polluted air [17]. Using of environmentally degradable materials and giving preference to wood.

The selection of structural elements and furniture made of solid wood and wood-based materials such as plywood plays a crucial role in creating an inclusive environment in kindergarten architecture and is an essential step in establishing an environment that promotes equal opportunities and children's involvement in educational processes. The presence of solid wood material allows children to feel accepted, comfortable, well, and safe, as they do not have to exert extra effort to familiarize themselves with this material. They can freely and successfully interact with the environment and develop their abilities and potential regardless of their physical or psychological limitations.

CONCLUSION AND RECOMMENDATIONS

The presence of solid wood in the interiors of kindergartens has a positive impact on children with various psychological and physical issues. The elements of solid wood in the structural, architectural, and design aspects can help reduce feelings of anxiety and stress, improve mood and well-being, and support inclusive education.

Solid wood as part of the physical environment in kindergarten architecture provides an aesthetic and visually pleasing space that is naturally connected to nature. The visual appeal of wood, its natural patterns, and even its scent can remind children of something familiar, increasing their sense of security and stability, which is crucial for children with special needs. Architectural and interior elements and wooden furniture, in combination with the proper spatial organization, can create a predictable environment for children, helping them with multisensory integration. Additionally, it is important to emphasize safety, ensuring that the wooden elements and furniture are made from smooth and non-splintering wood material to minimize the risk of injuries.

The use of wooden elements also opens up opportunities for flexibility and adaptability. Folding or modular constructions of wooden furniture allow diverse

arrangements and customization of space based on individual needs and group or individual activities. Children with different abilities can effectively utilize the space and adapt it to their individual preferences and learning styles.

Solid wood is tactile and interactive, allowing children to engage in sensory and motor activities. Children with various physical limitations can use solid wood to support their physical development and rehabilitation. Furthermore, solid wood can serve as a tool for developing children's cognitive abilities. Its natural patterns and creatively tactile qualities can promote creativity, imagination, and object manipulation. Children with different psychological issues, such as ADHD, may benefit from an environment in the kindergarten that incorporates solid wood, as it can help them focus on learning and improve their ability to sustain attention.

One of the negative aspects of using wood in kindergarten interiors is its susceptibility to scratches and other surface damages that can create wood splinters. Small protrusions - wood splinters or deeper knots - can pose a potential risk to children, especially if the splinters remain unremoved and children can get injured, inhale them, or even swallow them. Therefore, it is important to regularly inspect wooden elements and furniture in the kindergarten.

Another significant disadvantage of using solid wood is its high cost in terms of investment. Architects and designers often have to resort to cheaper alternatives due to budget constraints. The increased costs can be associated with the fact that wood is a valuable and natural material that is typically sourced and processed with sustainability in mind. The problem arises not only from furniture manufacturers and clients (preschools) but also from the deficiencies of relevant institutions that inadequately monitor this crucial issue. Furniture in preschools is an integral factor in the overall conditions of preschool institutions.

The design and ergonomics of furniture in preschools are crucial as they have a significant impact on children's comfort and health. It is necessary to consider the correct dimensions and form of furniture to meet children's needs and promote proper posture. Designers have a responsibility to create furniture that is not only aesthetically pleasing but also functional and ergonomic.

It is necessary to systematically conduct further empirical studies that explore and validate the salutogenic model and identify various wellness factors in psychosocially supportive design. The study supports decision-makers to implement psychosocially supportive design, which in turn promotes health and well-being. It is time to step into a new millennium where the salutogenic approach and psychosocially supportive design lead the way to a new paradigm. Finally, it is essential to understand the quote by Winston Churchill - "We shape our buildings, and afterward, our buildings shape us," which speaks to the significant impact that the buildings we design have on human behavior.

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