

# The positive impact of wooden material on educational processes in the environment of Slovenian wooden kindergartens

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## Article information

Sent: Jul 17, 2022

Accepted: Aug 30, 2022

**Abstract:** Several scientific studies confirm that the colors, structures or materials used in the physical environment of interiors affect the human psyche. Wood, as a material applied in the interior spaces of buildings, is an attractor that, in addition to its static and structural properties with high environmental responsibility, also brings other benefits to users. It has a much greater impact on the society than we might think. The topic of applying sustainable materials and transforming them into newly-built, valuable and cultural architecture is currently also popular in connection with the new initiative the New European Bauhaus. The initiative has ambitions to use the existing national and international legislative frameworks, and to set sustainability rules with an interest in aesthetics and the involvement of communities in the creation of new living spaces. This paper aims to expand current scientific knowledge about the positive influence of wood material and its impact on educational processes in the architectural environment of kindergartens. Selected analyses and comparisons made it possible to assess whether the presence of wood material can positively affect the well-being of children in the physical environment of kindergartens. The article presents the results regarding children's sensory perception, the feeling of safety, the feeling of a peaceful atmosphere. It aims to prove that interiors with exposed wood can improve the quality of teaching, can support social interaction and playful learning of children. The wood material is characterized in the presented author's research as an interior, visible, massive material. Its design is authentic, with or without fine surface treatment, which does not degrade its visual-haptic-olfactory qualities. The study examines, analyzes and compares the architecture of kindergarten interiors in Slovenia. It interprets the results of practical research from the locations of Loče, Poljčane, Šoštanj, Polzela and Škofja Loka.

**Keywords:** well-being, influence of wood, kindergarten, new European Bauhaus, Slovenia

## INTRODUCTION

The environment in which children grow up and spend their time constitutes a fundamental aspect of their knowledge, social and personality development. As in the case of adults, children today spend most of their time in man-made environments. Kindergartens and the physical environment of playrooms are places that significantly influence children. Therefore, such an environment should respect not only the physical but also the psychological needs of children. Recent research (Köhldorfer, 2010; Grote, 2021; Filová, 2019) partially proves that by applying natural materials and principles of biophilic design (which represents a holistic approach to the design of interiors and exteriors, where the core of interest is the person and the impact on their mental and physical well-being and health; in combination with an approach that takes into account the long-term impact on the natural environment, this is environmental design that strengthens the health of the individual [Janková 2017]) or restorative environmental design (which is a building design paradigm that combines sustainable building practices with building practices beneficial to the health of residents [Burnard, 2014]) it is possible to help to reduce children's absence from schools and improve health and psychological well-

being and increase work performance and improve the results of not only adults but also children. The contact with wooden elements undoubtedly has an impact on people's emotional and physiological well-being (Kotradyová, 2015, 2016). The presented article is a partial result of doctoral research aimed at studying the positive influence of wood on the psyche of children and on educational processes in general. The study examines, analyzes and compares selected interiors of kindergartens in Slovenia designed by the studio KONTRA Arhitekti (former MODULAR Arhitekti) led by doc. Mojca Gregorski, who also focuses on the topic of educational facilities at the scientific - research level. The partial research presented in this paper provides the results from the locations of Loče, Poljčane, Šoštanj, Polzela and Škofja Loka. One of the goals of this research is to identify and summarize the opinions of teachers and educators, to present information about the educational potential of these institutions, to classify their atmosphere as perceived by the respondents, and to find out to what extent wood as a material has an impact on the educational processes.

## METHODS

The empirical research included the use of a questionnaire in the local language. Due to the language barrier, it was impossible to conduct research using the oral interview method; for this reason, it was not possible to focus on children, but only on teachers and educators. The questionnaires always used questions to which the respondents could choose the answers Yes, No or I don't know. For all the questions asked, the respondents were asked to explain their choice (yes, no, I don't know) using key words. The case study presents the research carried out in six selected kindergartens (Tab. 1) designed by the well-known Slovenian architectural studio KONTRA Arhitekti (formerly MODULAR Arhitekti), represented by Mojca Gregorski, Matic Lašič and Miha Kajzelji, who create recognized wooden-structure architecture. Due to anti-pandemic measures, access to the buildings was significantly limited, which subsequently directly affected the quantity and the quality of the data obtained.

**Tab. 1.** The subject of the research were the following kindergartens in Slovenia. (Source: Authors, 2021)

Kindergarten	Address	Location
Vrtec Loče	Šolska ulica 2	Loče
Vrtec Poljčane	Dravinjska cesta 28	Poljčane
Vrtec Šoštanj	Kajuhova cesta 8	Šoštanj
Vrtec Polzela	Glavni trg 1	Polzela
Vrtec Škofja Loka	Partizanska cesta 1e	Škofja Loka
Vrtec Bršljin	Kočevarjeva Street 42	Novo Mesto

Four of the kindergartens in question were analyzed "in situ", the Kindergarten in Polzela sent the results of the questionnaire-based survey electronically due to anti-pandemic measures, the Kindergarten in Bršljin refused to participate in the research. 65 teachers and educators participated in the study. The area of focus of the selected case studies was the atmosphere of schools and the proportion of exposed wood on surfaces in the interior of kindergarten buildings. The interviewees were asked questions as to whether wood as a material affects the degree of concentration, the mood, or the emotions of the child users. They were also asked to explain and describe in the questionnaire their observations and subjective feelings resulting from working with children in wooden buildings with an educational function.

## RESEARCH

### Vrtec Loče

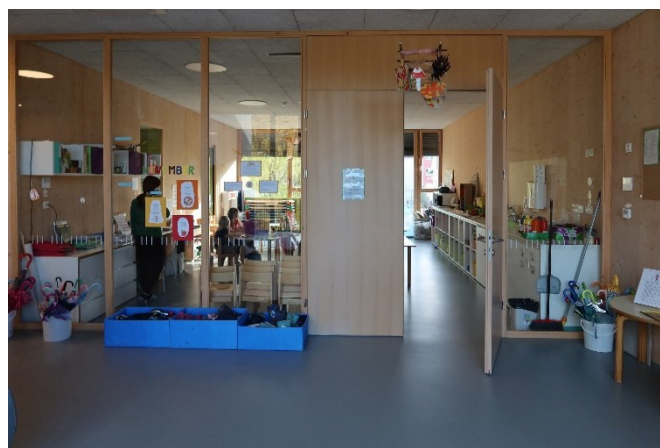
The kindergarten located in the village of Loče, near the village of Poljčane, was built in 2018. The investor financing the state kindergarten in Loče is the city of Slovenske Konjice. The kindergarten was designed as a building with almost zero energy consumption, with a wooden skeleton structure forming a two-story wooden building of a compact shape; the wooden facade is a hint of its supporting building material (Fig. 1). The layout consists of five playrooms and a gymnasium (Fig. 2). All playrooms are connected with each other, have direct access to the exterior and a view of the surrounding nature. The interior has a strong educational character because the wood used in the interior touches on the themes of nature protection, the ecosystem, and educates users on sustainable behaviour and the environment. The material of visible wood is widely represented in the interior, not only in the visible layer of load-bearing walls, but also in ceilings, furniture, door, and window frames.

Educators and teachers most often stated that this visual material feels like being in someone's home, the school looks more welcoming, the wood "warms the space up", it is pleasant to touch. Staying in the premises is very pleasant, wood calms and relaxes a person; the phrase "positive energy" was often used to name the feeling. With respect to the high likelihood of children screaming in such spaces, it seemed to the respondents that the presence of wood has a calming effect and does not significantly echo the sound as in the case of classic brick walls. According to the interviewed teachers, children of preschool age notice and observe everything; they even count the slats in the false ceilings or compare the knots. The survey also showed that kindergarten employees are also influenced by the positive effects of wood.

The fact that employees, educators, teachers feel comfortable in an environment with elements of wood also contributes to the positive atmosphere of the environment and the joy of children visiting this environment (this fact has also been proven in hospitals: if doctors feel good in the workplace, it has much better effects on patients than a top-class equipped room). As to negative connotations, we caught the answer that this natural material can allegedly cause or aggravate allergies. When asked what they would like to change in connection with the kindergarten's architecture, we did not catch any other negative associations with wood, only concerns about fire protection, which seem irrelevant to us. Other reservations about the architecture were: non-functional layout of the playrooms, lack of changing tables near the door, non-functional terraces on the first floor that are not covered, lack of flexible relaxation areas for individual relaxation.



**Fig. 1.** Kindergarten in Loče, wooden facade connecting the interior wood with the exterior. (Photo: Jakub Hanták, 2021)



**Fig. 2.** Hallway space and a view of the playroom with exposed wood in the form of CLT panels. (Photo: Jakub Hanták, 2021)



## Vrtec Poljčane

Another researched interior was a kindergarten located in the village of Poljčane, just a few kilometers from the previous kindergarten building in Loče. The kindergarten was built in 2014 as a state institution and the investor was the municipality of Poljčane. Its concept is completely different from the previous example, but the architects are the same. The school is situated on a narrow, nearly 200-meter-long plot; the playrooms are optically interconnected, and each has a door leading to the garden outside. In addition to the window view of the garden, children have a view of the landscape thanks to the absence of a windowsill, which results in the blurring of the line between the interior and exterior (Fig. 3). The peculiarity of the building is the structurally demanding folded wooden roof made of CLT panels, designed based on the principle of an inverted roof. An interesting feature of the halls and corridors and classrooms is the high headroom; in the classrooms you can see half-floors (unfortunately with barriers, outside the principles of design for all) that are popular with children, intended only for healthy children. The individual areas are optically connected with other classrooms through "peepholes". (Fig. 4). There are wooden elements in the form of ceiling boards, partitions in interiors, stairs leading to the "children's mezzanine" (Fig. 5), or a perforated interior wall in the entrance hall that improves the acoustic conditions there (Fig. 6).

In the questionnaire, in connection with wood, we encountered answers that wood appears to be warm and natural, allows children to feel relaxed and open. The wood material has a stimulating effect on children and is important for their proper development and growth. The questionnaire indicated that the teachers perceive the wooden material as a material that evokes warmth and is natural; some respondents even claimed that, in addition to the feeling of warmth, wood gives a feeling of tenderness, beauty, calmness or even stability. Wood has a calming effect on teachers, and in this context, they emphasize the importance of visiting the forest as a place where one can mentally relax. In general, they perceive wood as a warm material. Children feel better because of the feeling of home; wooden walls are softer and warmer to the touch; children are proud of the kindergarten and like to go there. When asked what they would change in relation to the school's architecture, respondents offered no objection to wooden materials. Minor reservations were mentioned regarding the position of the coat hangers in front of the classrooms, or the large distance between the first and last classroom.



**Fig. 3.** Playroom space with a view of nature that takes into account the height of children (without a windowsill). (Photo: Jakub Hanták, 2021)



**Fig. 4, 5.** Above: Playroom space with "children's half-floor". Below: Wooden staircase leading to the "children's half-floor". (Photo: Jakub Hanták, 2021)



**Fig. 6.** Wooden perforated cladding, improving the acoustic conditions in the entrance hall. (Photo: Jakub Hanták, 2021)

### Vrtec Šoštanj

Another object of study is a kindergarten in the village of Šoštanj, the state educational facility built in 2014, with the municipality of Šoštanj as the investor. The exterior design of the building does not indicate at all that it is a wooden structure (Fig. 7). On the contrary, the interior pleasantly surprises with wooden elements (Fig. 8). The architecture of the kindergarten is designed as a two-story building with simple volumes, consisting of cubes of playrooms or classrooms shifted in height and plan, between which there are spacious play terraces below and above each other. The questionnaire again captured statements that characterize wood as a material that has a very warm and soothing effect. Teacher Taja Kidrič claims: *"Man has always been connected to the forest, trees and nature. The forest and trees have always offered us protection and food, wood certainly has a good effect on psychological well-being"*, he continues: *"Wood has a very positive effect; the space seems more open, warmer and comfortable; wood as a material brings well-being to children, which indirectly affects their concentration during educational processes"*.



**Fig. 7.** Kindergarten in the village of Šoštanj, the design of the facade of the school does not indicate that it is a wooden building. (Photo: Jakub Hanták, 2021)



**Fig. 8.** The interior of the playroom or classroom is largely filled with wooden materials. (Photo: Jakub Hanták, 2021)

### Vrtec Polzela

The kindergarten in the village of Polzela was built in 2014, it was designed as a wooden extension to the existing kindergarten in the village; the investor was the municipality of Polzela. The roof of the kindergarten consists of several gables which are a natural continuation of the existing building (Fig. 9). The original building can be characterized as a prefabricated wooden structure with elements of brick walls; unfortunately, there is no visible wood in the interior. It can only be found in the new extension to the building. The roof is made of prefabricated sandwich wood panels used in the construction of shopping centres, which is an innovative and low-cost solution. The construction took only four months, including the modified outdoor playground. The extension expanded the original kindergarten with five new playrooms (Fig. 10), a gymnasium, a teacher's room, and an intergenerational centre. The questionnaire indicated that the wooden material has a warm effect not only on children but also on teachers and educators; its colour and texture calm them and gives them a feeling of a natural environment or a feeling of greater cosiness. When asked if they would change anything related to the architecture in their school, respondents offered no objections to wood as a material. Their reservations were directed exclusively towards construction-architectural solutions or technical installations.



**Fig. 9.** Kindergarten in the village of Polzela, the continuing morphology of the gables, expanding the former kindergarten building. (Photo: Miran Kambič, 2017)





**Fig. 10.** Interior of the kindergarten in the village of Polzela, panels with exposed wood induce a feeling of warmth in the users. (Photo: Miran Kambič, 2017)

### Vrtec Škofja Loka

The kindergarten in Škofja Loka was built in 2019, on the site of the former barracks at the foot of Kamnitnik hill. The construction of the kindergarten was financed through the public sector, and it is a state kindergarten. It is designed as a two-story building of simple volumes, consisting of cubes of play classrooms shifted in height and plan. Between the cubes, there are spacious play terraces below and above each other, just as it was in the case of the kindergarten in the village of Šoštanj. The used wooden building material, which forms the primary essence of the building - a wooden building, is indicated by the wooden facade of the exterior (Fig. 11). In the interior, there is wooden look material on load-bearing walls, ceilings, furniture and window and door frames (Fig. 12), even in the flooring of playrooms (Fig. 13). Wooden elements can also be found in the interior furniture, which is supplemented with various wooden play elements, e.g. in the form of climbing poles (Fig. 14).

The questionnaire respondents are convinced that the wooden material in the interior of their school calms the children; it is not only the premises as such, but also the materials used in the premises which can make the children feel at home without appearing formal. The respondents also stated that wood and wooden surfaces have a positive influence on the children's concentration, because they have a warm, homely, and calming effect. Such statements were repeated many times despite the fact that the questionnaire was filled out by different respondents. Wooden surfaces are warmer and more pleasant to the touch, wooden material calms children and this is one of the prerequisites for their concentration on education. There was even an opinion that Montessori pedagogy promotes the use of wood and other natural materials in the environment of kindergartens; children are said to be able to calm down also when in contact with wooden toys. When asked if they would change anything about the architecture of their kindergarten, respondents had no objections to wood as a material. Their reservations were directed exclusively at the construction-architectural solutions, which are not the subject-matter of this article.



**Fig. 11.** Kindergarten in Škofja Loka, wooden facade indicating the supporting wooden visual material. (Photo: Jakub Hanták, 2021)



**Fig. 12.** Hallway space and a view of the playroom with CLT load-bearing panels with a fine finish. (Photo: Jakub Hanták, 2021)



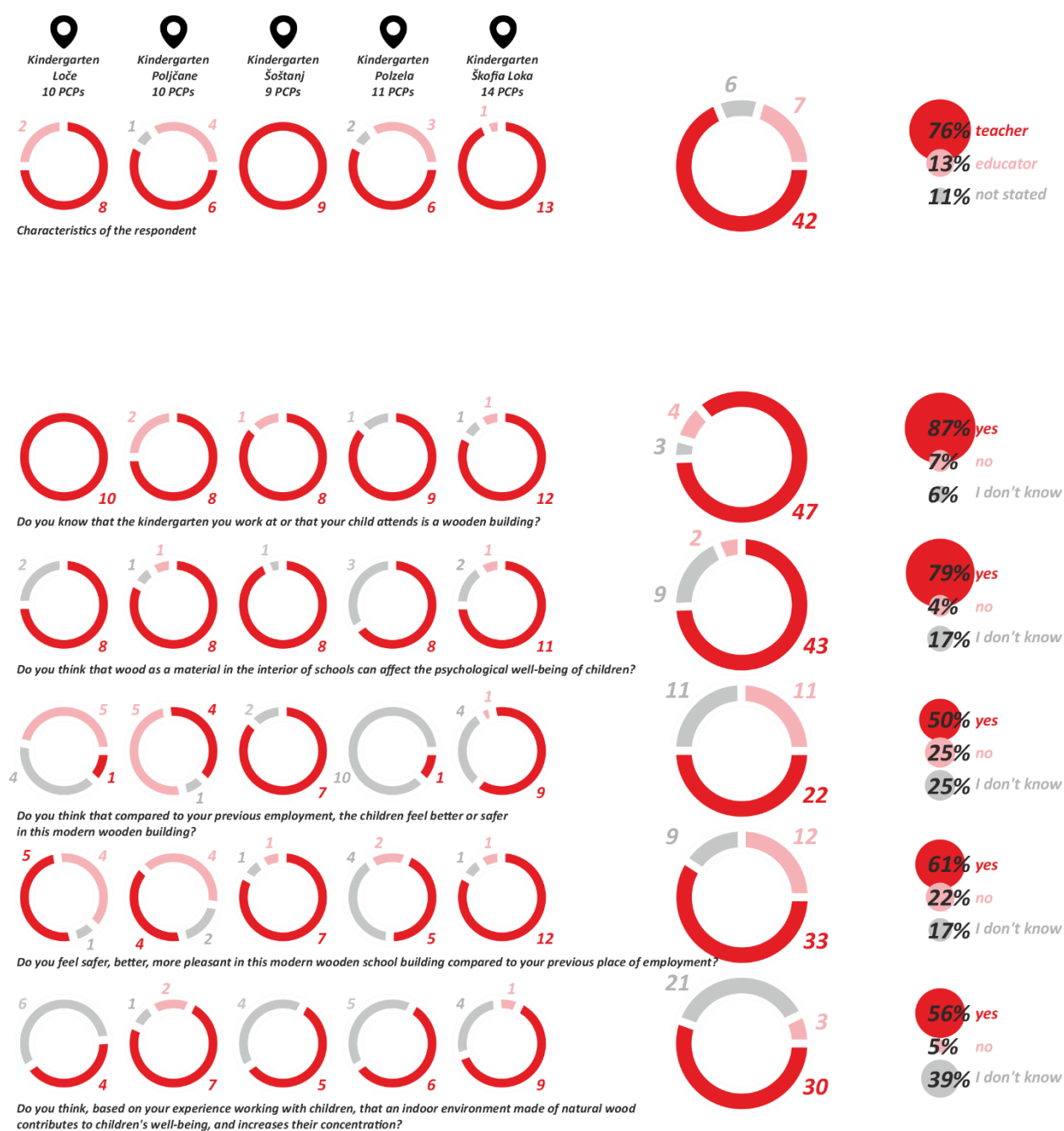
**Fig. 13.** Playroom space with wooden floor. (Photo: Miran Kambič, 2019)



**Fig. 14.** Interior furniture in the form of climbing poles. (Photo: Miran Kambič, 2019)

## RESULTS AND FINDINGS

**Tab. 2.** Graphic interpretation of the obtained results from Slovenia (PCPs - participants). (Author: Jakub Hanták, 2021)



Kindergartens in this article were chosen because they characterize designing that uses the principles of biophilic and restorative environmental design. Based on theoretical knowledge and conducted case studies, several following findings can be derived. The presence of visible solid wood regarding the architecture of kindergartens seems desirable, which has also been confirmed by the results of the questionnaire (Tab. 2). The partial results from the questionnaire show that up to 79% of the interviewed teachers think that wood in the physical environment applied in the premises of their kindergarten affects the psychological well-being of children. More than half of the respondents are convinced that wood as a material increases children's concentration during educational activities, because the presence of wood makes children feel calm and this is one of the basic prerequisites for their concentration in the educational process.

## CONCLUSION

The theoretical starting points and previous research activities, which partially touch on this topic, have offered other stimulating questions with which we would like to expand our research. The biophilic and restorative environment of kindergarten interiors should meet the needs of today's children in terms of their progress and development. And not only because contact with nature is gradually disappearing from the traditional and existing interiors of kindergartens, but also because such an environment can teach the children, make them responsible and prepare them for life with respect for both nature and for themselves. Based on the field research abroad, we have found that the questionnaire respondents are convinced of the benefits of using wooden material in the interiors of their kindergartens. They perceive wood as a far better choice than the use of conventional materials that make the interior impersonal, cold, or even hostile to the child users.

An interesting result of our research was also the finding that the Slovenian education system does not recognize crèches. Slovenian children attend kindergartens from an early age (from the first year of life - up to the age of six), and they are divided into two grades. This systemic solution does not stress children with a change of the environment, and already at an early age, when their perception of the world is most sensitive, they find themselves in an environment that, thanks to the materials in the physical environment, positively shapes them. However, we still feel that our research has some shortcomings as we have examined the effects of wood material only on a sample from Slovenia. We would like to expand our research with a survey of wooden kindergarten buildings in Austria and

the Czech Republic and compare it with designs of Slovak kindergartens. The result will be a comparative study that synthesizes knowledge regarding the influence of wood as a material on educational processes in the context of the Central European region.

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