

FLOOR DESIGN IN LEARNING SPACES: SHOULD THE PLANNING AND IMPLEMENTATION PROCESS BE CHANGED AFTER THE PERIOD OF COVID-19

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Abstract

Each architectural space is defined by a certain surface or floor design presenting the final trespassing structure. Planning floor design and selection of materials directly depends on the functionality of the architectural space, with specific requirements to meet different standards such as protection against microbes, viruses, and bacteria. The COVID-19 pandemic forced accessibility, social gathering, lifestyle, and working environment to be changed to reduce the infection. As educational systems begin to resume operations amid, there is a complicated requirement on how learning will take place, to prevent any possibility of virus transmission in schools. This paper deals with the issue of the influence of selected floor covering materials and construction solutions in learning spaces, with a focus on how the existing school buildings can be adapted to meet the newly required safety measures, allowing students and teachers to feel safe and supported during the school day. Furthermore, the paper aims to address the following research questions: How much awareness was raised on this issue during and after the COVID-19 period? Do we need new laws, rulebooks, and standards for designing learning spaces for higher education? The COVID-19 pandemic has made the built environment an important source of prevention and control, architects and researchers have thus been seeking countermeasures since the beginning of the outbreak. Achieving sustainable floor covering design is very important to create optimal learning spaces while maintaining the recommended social and distancing guidelines.

Keywords: floor design, planning, learning spaces, selection criteria, COVID-19

1 Introduction

Floor covering in architecture presents the final trespassing structure, the surface above the floor as a structural component of a building, a surface that allows people to walk and place their furniture.

Each architectural space is defined by a certain floor, with authentic design, structure, and material. Defining those elements directly depends on the requirements and functionality of the building. The type of floor, as a structural detail, according to the national law, needs to be indicated in the plans of each architectural project.

In principle, the floor covering is constructed after all other professional works are done, while the warm floors are preferred to be made after the walls are painted with the final color. The floor in the buildings consists of different floor covering designs and materials, therefore during the construction process very important elements are the joint details of these surfaces, mainly aluminium and PVC are used as materials for covering these joints.

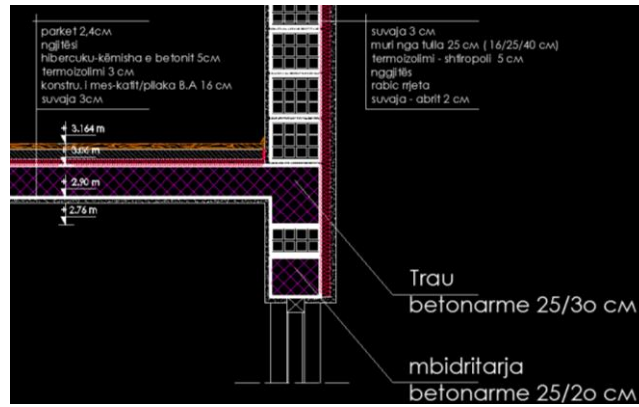


Figure 1. Floor as a structural detail of building and the floor covering element, Book “Konstruksionet Arkitektonike 2” (2020), Enis Jakupi, page 32

On the floor, in most cases, it is stepped on with different shoes. There are also cases when are stepped without shoes, but during the process of floor design, we always choose the materials, considering that they will always use it with shoes. (Figures 1 and 2)



Figure 2. Different type of shoes and their tread on the floor, Book “Konstruksionet Arkitektonike 2” (2020), Enis Jakupi, page 34



Figure 3. Floors pictures made in residential building, living room, Book “Konstruksionet Arkitektonike 2” (2020), Enis Jakupi, page 34

The floors in all types of buildings must have acoustic resistance, they necessarily must meet some conditions required by different international norms and standards. It often happens that a building has different functions, and so that can be used sustainably without hindering the operation of the other space. It is very important to choose the covering materials sustainably. (Figure 3)

2 Determination of floor covering materials and architectural requirement

The choice and determination of the covering floor materials depend mainly on the type, requirements, and needs of an architectural space. The choice of floor covering material depends on:

- Function of the architectural space,
- Movement intensity,
- Hygienic conditions,
- Thermal / heat conditions,
- Availability of materials,
- Surface where the floor is made,
- Financial capacity

Before deciding on the type of floor that we will use, we must consider the main requirements that they must meet, such as flat surfaces, resistance to melting, to provide acoustic and thermic insulation, and easy to clean and maintenance, etc. (Figure 4)

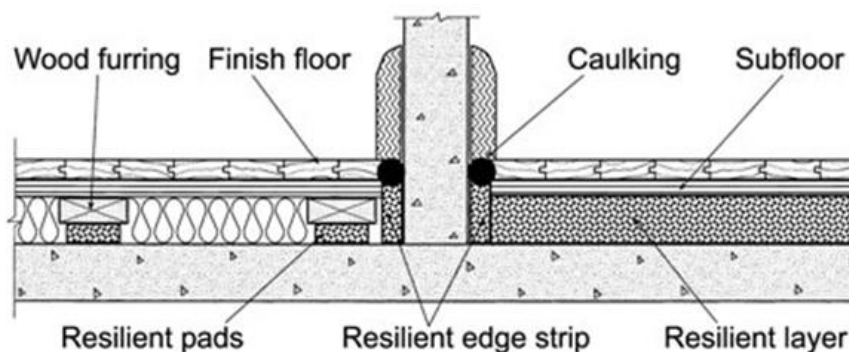


Figure 4. Floor component surfaces, Book “Konstruksionet Arkitektonike 2” (2020), Enis Jakupi, page 39

When we are analyzing the use of the final materials for floor covering, presented are the main criteria that must be met: Aesthetics, masking, covering installations, space volume, moisture, fire protection, seismicity, acoustic, durability, light reflection, maintenance, and also protection against microbes (including bacteria and viruses).

3 COVID-19

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease has spread globally since 2019, resulting from the pandemic COVID 19 (2020-2022). Common symptoms include fever, muscle pain, salivation and sore throat. [3][4] While most cases result in mild symptoms, there are also a lot of cases with pneumonia, multi-organ failure, or with tragic results. [https://sq.wikipedia.org/wiki/COVID-19]

Were presented with some new requests and principles for social distance and isolation, education process in schools and universities was interrupted. (Figure 5)

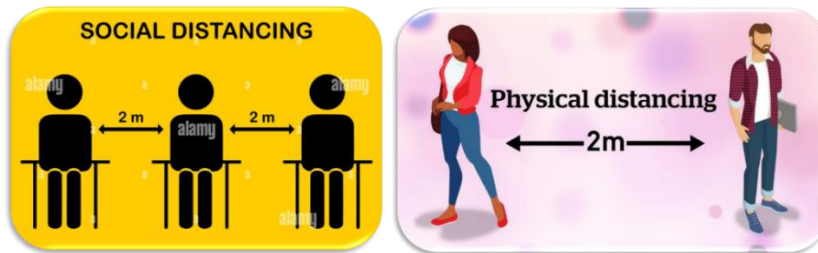


Figure 5. Requests for distance, source internet

Online learning in our country was not very effective, there was a need to go back to classrooms. The learning spaces were disinfected, and new rules and guidelines for ventilation, social distance, etc. Unfortunately was no sustainable research done for this newly created situation. In that period we got the idea for this research, the need to create new architectural concepts that will be used in the process of architectural design. The research question was how should a learning space be designed in the future to be more sustainable with special emphasis on biological and other disease. (Figure 6)



Figure 6. Holding the exam during the pandemic, hall A1 – UT – FAS, Scientific meeting, Classes on primary education during the pandemic.

The first thoughts that came in our mind were the lectures in the subject Physics in Architecture and Ecology about the energy resources, the need for saving and modern life, thermal comfort, environmental pollution and what we need to do for future without masks. If we do not become aware in this direction, masks will become our daily routine trying to protect ourselves from viruses that spread quickly and with fatal consequences. (Figure 7)

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Mirëpo në anën tjetër duhet të kujdesemi për ambientin (nëna Tokë e cila ka filluar të mërzhitet) e kjo na çon tek:

- Jeta kursimtare: kursimi i energjisë, i lëndëve të para etj.
- Bujqësia organike dhe bujqësia urbane
- Zhvillimi i energjisë së rinovueshme (alternative), sidomos i burimeve të vogla të energjisë që e prodhojnë energjinë aty ku konsumohet
- Zëvendësimi i lëndëve sintetike me lëndë organike nënprodukte të bimëve dhe kafshëve
- Rilokalizimi i bujqësisë dhe i degëve më të domosdoshme të industrisë
- Ekonomia shtëpiake
- riciklimi etj.

Kurse në anën tjetër me vetëdije dhe pa vetëdije ndotim ambientin në çdo pjesë të sekondës

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Figure 7. Slides from the 2016 lectures, Master studies, Physics in Architecture

Thermal physics is a scientific discipline of Physics, that deals with the study of heat, respectively the form of heat energy. As we know the largest amount of all the energy that exists in the Earth is derived from the Sun. About half of the solar energy coming towards the earth reaches its surface.

The earth receives **174 petawatts (PW) from solar radiation (also called “insolacion”) in the upper atmosphere.** Approximately 30% of this amount is returned to the universe, while clouds, oceans, and land mass absorb the remainder. In the 19th – 20th century, the world economy and our country's economy too, had a great development thanks to fossil resources (coal, oil, natural gas, etc.) which were used in transport, energy production, medicine, cosmetics, pesticides, detergents, etc. Like all natural resources, fossil resources in the next few years will reach the maximum (peak) of their historical production. According to the International Energy Agency's report on world energy, published in 2010, conventional oil has already reached its peak in 2006, accompanied by higher oil prices and natural gas. If free energy enabled and supported industrialization, urbanization, and globalization its reduction and have a negative impact on those world trends.

To achieve sustainable economic development in developing countries, significant investments are needed in environmental protection and infrastructure.^[5]

In the future we have to take care of the environment (because Mother Earth is starting to get bored) by:

- Saving energy and raw material,
- Organic and urban agriculture,
- Development of renewable energy,
- Replacement of synthetic materials with organic,
- Relocation of agriculture and other important branches of industry,
- Recycling, etc.

On the other hand, we consciously and unconsciously pollute the environment every day of our lives. If the degradation of the environment will continue in this form in the future, we as a society, will have negative consequences for our general health. Our social life will be identified with masks on our faces and poor health.

4 Analysis and concepts

Analysis of the laws, and regulations for architectural design – construction frameworks, requirements and previous experiences:

- Law on construction, spatial and urban planning, by-laws for design and urban planning, law on higher education, etc
- In the national legal framework there are criteria for every detail of the process of building design. Are they taken into account by the architects and planners?
- What is the role of the state inspectorate!
- Theoretical practice, school J.H. Pestaloci – Skopje.

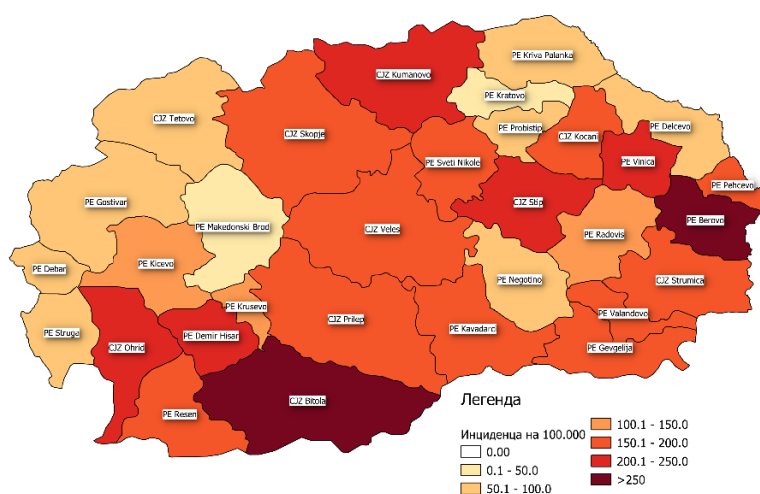


Figure 8. Incidence per 100.000 inhabitants, COVID,19-25.04.2021, RNM, PUBLIC HEALTH INSTITUTE OF THE REPUBLIC OF NORTH MACEDONIA

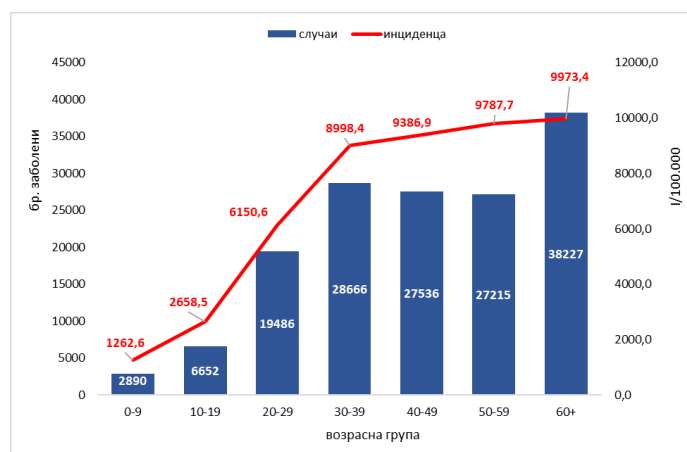


Figure 9. Distribution of patients with COVID-19 in RNM, group by age (n=150.672), PUBLIC HEALTH INSTITUTE OF THE REPUBLIC OF NORTH MACEDONIA

From the medical data and the state health inspectorate, it can be concluded that the virus COVID-19 was distributed in all types of materials, so the selection of the right material to protect from this virus is very difficult. From the earliest experiences at the Pestaloci School-Skopje, in the 70s, an interesting analysis was made on the distribution of the “yellow” disease virus. The findings were that due to lack of care from the school cleaners the disease has spread to most children. The school cleaners were careless, while they were cleaning the bathroom have contaminated the sink that was used by the children to drink water, using the same cleaning tools in different school areas. All this leads to the fact that this type of case, it is requires collaboration between researchers in different fields. (Figures 8 and 9)

Conclusion

- New legal framework and criteria are needed for the floor design in learning spaces!
- Architectural design for higher education must differ from primary and secondary school!
- Floor design without joints and easy to clean!
- Floor design with new smart materials, protective against bacteria, viruses, and microbes!
- The main recommendation, highlights the need for further analysis and research in this field!

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