

THE COMFORT OF LEARNING SPACES IN STUDENT DORMITORIES IN CROATIA

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_ Iva Muraj

PhD, Full Professor, Faculty of Architecture,
University of Zagreb, Zagreb, Croatia,
iva.muraj@arhitekt.unizg.hr, [0009-0000-5252-7021]

ABSTRACT

The comfort of learning spaces in dormitories significantly impacts students' academic productivity and well-being. Learning environments are places where students learn and develop their skills. The physical location conditions can affect the quality of learning. The actual room is a user-focused environment, and the study room (classroom) allows students to work collaboratively in space. Unfortunately, many of these spaces are not designed with special attention to student needs. The categories of student accommodation in dormitories vary, and consequently, students have diverse learning experiences. The paper is focused on examining the quality and comfort of learning spaces in dormitories in Croatia. The goal was to detect whether student dormitories are places for a pleasant life and productive learning.

This paper presents the results of selected student projects from the Architecture and Technology 1 graduate course, during the academic years 2023-2024 and 2024-2025 at the Faculty of Architecture, University of Zagreb. It discusses the project approach, explores the factors that influence comfort in learning spaces in dormitories, and examines both the positive and negative effects these factors can have. Learning spaces at various locations were compared, and specific characteristics such as size, equipment, noise levels, lighting, temperature, and spatial organization were assessed. Furthermore, the role of university libraries in higher education is evaluated by exploring the learning spaces at the National and University Library in Zagreb. The results offer valuable insights into formal learning environments, helping future design or renovation projects to enhance conditions impacting student comfort and performance.

KEYWORDS _ *Students, Room, Classroom, Library, Survey.*

INTRODUCTION

Learning is a complex process that requires focus, motivation, and adequate conditions to achieve optimal results. The environment in which students learn plays a key role in encouraging concentration and productivity. Optimal learning conditions allow students to develop skills, increase productivity, and reduce stress. Factors that influence the quality of learning can be categorized into several key areas, each having a specific impact on the overall learning experience. The most important factors are lighting, ventilation, sound, thermal insulation, ergonomics, and visual comfort of space. A quality learning space provides a stimulating and motivating environment, which allows students to focus on their tasks and achieve the best results. Many young individuals are pursuing higher education outside their hometowns and need to find housing. A student dormitory is preferred because it creates a unique student atmosphere, promotes a strong sense of community, and is more affordable than private accommodation. In addition to the rooms, the dormitories offer various facilities such as a canteen, a laundry room, a gym, classrooms, and shops. Student dormitories and private apartments should provide comfort and a sense of home. The comfort of learning spaces in dormitories significantly impacts students' academic productivity and well-being. Learning environments are places where students learn and develop their skills. Students use these study spaces every day, and the conditions in which they stay can significantly affect the quality of their studies. The student period can be challenging and stressful, so designing functional and comfortable spaces is essential. Unfortunately, many of these learning spaces are not designed with special attention to student needs, which can lead to reduced comfort and, consequently, lower efficiency in learning. The process of this study is shown in Figure 1.

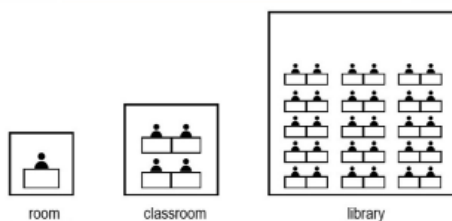


Figure 1. The research process outlines three distinct scales of student learning places.

The comfort of students' learning places is identified through three scales (rooms, classrooms, and library). The actual room is a user-focused environment, and the classroom (study room) allows students to work collaboratively. Furthermore, the role of university libraries in higher education is evaluated by exploring the learning spaces at the National and University Library in Zagreb. Also, the research identifies alternative learning environments. The topic of this paper was chosen because learning spaces are crucial in students' lives. The research questions this paper attempts to answer are: How do students evaluate the conditions for learning in the dormitories? What improvements can be made to enhance learning conditions?

STUDENT DORMITORIES IN CROATIA

The paper examines the quality and comfort of learning spaces in student dormitories in Croatia. It presents the results of selected student projects from the Architecture and Technology 1 graduate course, during the academic years 2023-2024 and 2024-2025 at the Faculty of Architecture, University of Zagreb. In the group topic "User comfort," students individually choose and lead the research direction. The research method is determined in advance in the form of a survey. This paper presents two case studies exploring students' learning environments within university dormitories. Every case study is built upon its research framework. Learning spaces at various locations were compared, and

specific characteristics were assessed. Both studies examine the experiences of students living in dormitories. Students' answers provide a deeper insight into students' learning space preferences because they use rooms and classrooms daily and often visit the library as an alternative learning space. The categories of student accommodation in dormitories vary, and consequently, students have diverse learning experiences. The accommodations range in size and equipment, with options for private or shared bathrooms. Selected student dormitories in Zagreb were built in the 1960s, but many have been renovated recently. In the Croatian university cities of Zadar and Osijek, the selected dormitories are newly constructed buildings from the 2020s that provide a higher level of comfort.

CASE STUDY 1

This study explores whether Croatian student dormitories are a place for a pleasant living environment. The goal was to detect the main factors influencing a student dormitory's overall impression and quality of life. The study "User Comfort in Student Dormitories in Zagreb, Osijek, and Zadar" was conducted by graduate students Karla Ambruš, Iva Burazin, and Mateo Čirjak during the winter semester of the academic year 2023-2024. Four student dormitories in Croatia were selected for research: Stjepan Radić and Cvjetno in Zagreb, and new dormitories in Osijek and Zadar (Fig. 2).

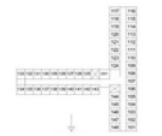
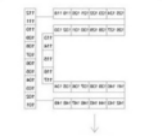
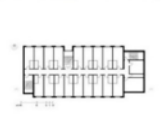
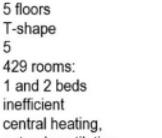
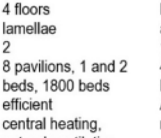
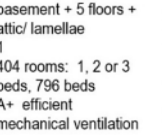
City	Zagreb - Stjepan Radić		Zagreb - Cvjetno	Osijek	Zadar
	Pavilion no. 5	Pavilion no. 11			
Street	Jarunska 2	Jarunska 2	Odranska 8	P. Svačića 1c	Put Stanova 18
Year / Architect	1962: Slavko Lowy	2011 (renovation): Arcitec – Ivšić Ltd.	1955: Slavko Lowy	2022: NFO	2022: SANGRAD + AVP architects
BUILDING					
Aerial view					
View					
Floor plan or section					
Floors	5 floors	5 floors	4 floors	basement + 5 floors + attic/ lamellae	ground floor + 5 floors
Shape	T-shape	3 wings, U-shape	lamellae		3 towers
Category	5	1	2	1	1
Capacity	429 rooms: 1 and 2 beds	417 rooms: 1 and 2 beds	8 pavilions, 1 and 2 beds, 1800 beds	404 rooms: 1, 2 or 3 beds, 796 beds	129 rooms: 1, 2 or 3 beds, 284 beds
Energy rating	inefficient	efficient	efficient	A+ efficient	A+ efficient
HVAC	central heating, natural ventilation	central heating, natural ventilation	central heating, natural ventilation	mechanical ventilation	floor heating, mechanical ventilation
ROOM					
Furniture	old furniture	new furniture	new furniture	new furniture	new furniture
Bathroom	2 rooms with shared bathroom	2 rooms with shared bathroom	room with a bathroom	room with a bathroom	room with a bathroom

Figure 2. Comparison of selected students' dormitories in Zagreb, Osijek, and Zadar.

An online survey with 13 questions about the quality of living in dormitories was conducted from November 25 until December 5, 2023. In total, 133 students participated in the survey: 39 from Stjepan Radić in Zagreb, 35 from Cvjetno in Zagreb, 28 from Osijek, and 31 from Zadar. Four topics were examined: living and studying, socializing, interior quality, and atmosphere. The results regarding “living and studying” are consistent across all dormitories. Osijek ranks first in satisfaction with room size, storage space, and study conditions, with nearly 50% of respondents indicating they are very satisfied. Rooms in Zadar and Cvjetno have the same number of different ratings, while Stjepan Radić has approximately 30% dissatisfied users. The students in Osijek are the most satisfied with the kitchenette equipment and additional social spaces, with 50% reporting they are very satisfied. In contrast, in Zadar, only 13%, while Stjepan Radić and Cvjetno have 26% of individuals expressing dissatisfaction. The furniture quality is the main issue for 30-60% of satisfied users across all dormitories. Rooms in Zadar and Zagreb have an equal ratio of marks, while in Osijek, most students are very satisfied. Natural and artificial lighting in all dormitories is excellent, with over 70% of users indicating they are very satisfied or satisfied. Nearly 80% of users in Zagreb rated room heating positively; however, there has been an unexpected increase in dissatisfaction among users in the new buildings in Zadar and Osijek. The issue lies in the card system used when leaving the room, which causes the heating to stop. The room cooling in Osijek and Zadar received positive ratings, with 20-30% of respondents very satisfied, while the cooling in Zagreb was inconsistent.

Individual responses are particularly significant, so respondents are asked for additional comments at the end of a web survey. The one-sided orientation of rooms in Stjepan Radić creates differences in space usage. The absence of elevators is evident during emergencies (an injured person must be carried down several floors by emergency personnel). Students in the dormitory Cvjetno mainly expressed dissatisfaction with the high summer temperatures indoors. Students in Osijek are particularly dissatisfied with the limited natural lighting in their rooms. There is a lack of sanitary facilities in the common areas. Users have also expressed concerns about the heating system. They report frequent breakdowns, which are unusual for a building constructed in 2022. Students in Zadar report that the three bedrooms are too small for three users. They also comment on the absence of social spaces within student residences.

The survey results conclude that all explored student dormitories have advantages and disadvantages. Certain dormitories in Zagreb have lower quality standards due to the year of construction. At the very least, poor construction quality affects the building's usability. The new buildings offer higher quality standards and aesthetics.

CASE STUDY 2

This study explores learning conditions in student dormitories in Zagreb. Student rooms and classrooms in three dormitories - Stjepan Radić, Laščina, and Cvjetno - were selected for the research (Fig. 3). The study also analyzes the conditions for studying in the National and University Library, one of the most important institutions for students in Zagreb. The seminar “Places for Learning in Zagreb” was prepared by graduate students Marta Grus, Vedrana Luketić, and Ruža Mrkonjić in the winter semester of 2024-2025. The goal is to compare differences in the quality of learning spaces between different locations and institutions and to determine which space characteristics (such as noise, light, temperature, and spatial organization) impact user comfort. An online survey was conducted from 5th to 12th December 2024. In total, 153 students living in the dormitories responded: 75 reside in Stjepan Radić, 56 in Cvjetno, and 22 in Laščina.

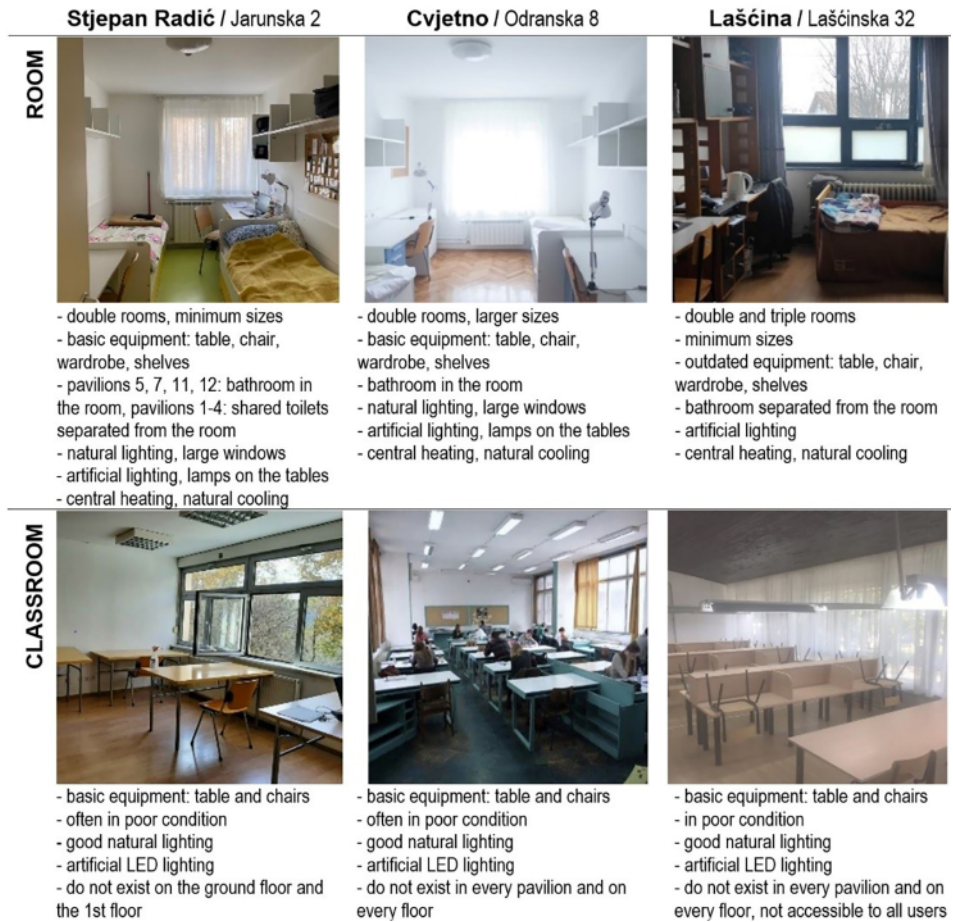


Figure 3. Comparison of rooms and classrooms of the chosen students' dormitories in Zagreb.

Based on survey responses, the room satisfaction is rated 4 for the dormitory Stjepan Radić (31/75) and Cvjetno (24/56), and 3 for Laščina (7/22). Renovated pavilions in the dormitory Stjepan Radić have good ventilation and natural lighting. In unrenovated pavilions, students are unsatisfied with furniture ergonomics and soundproofing. The dormitory Cvjetno shows the best results in most categories, especially in natural and artificial lighting, thermal insulation, and aesthetics as a direct result of the renovation. The dormitory Laščina has the worst ratings in all categories, especially in sound insulation and visual satisfaction. The old infrastructure affects the perception of the quality of room comfort. The assumption was that students living in renovated pavilions would be more satisfied with the experience of learning in rooms, but this factor did not significantly influence the respondents' responses. According to the survey results, the dormitory Cvjetno has the best ratings. Renovated rooms have an average rating of 3.65. It is not significantly higher than the non-renovated rooms, rated 3.61. Another assumption was that the ratings would drop when comparing the best to the worst pavilion categories. Accordingly, category 5 in Stjepan Radić (unrenovated rooms) should have poor ratings, but it was rated 3 (3.12). The differences between categories (1 to 5) are imperceptible, and the best rating was given to the renovated rooms with category 3 (3.38). If we compare the 3rd category of the dormitory, Stjepan Radić and Laščina, the ratings in Laščina are lower (3.03) compared to Radić (3.21). Although these are rooms of the same category, the slightly

lower ratings in the dormitory Laščina are due to the lack of renovation. The rooms classified in the 1st category should take first place in ratings, but Cvjetno still takes that place with an average rating of 3.63. The dormitory Stjepan Radić (1st category) has a rating of 3.17.

Overall, the ratings indicate solid classroom functionality, with possible improvements, especially in Laščina. The dormitory Stjepan Radić has the best results (3.16), which correlates with the availability and diversity of study rooms. However, the lower capacity of classrooms during the busiest hours indicates inadequate space usage. The classroom in the dormitory Cvjetno (although the only one) has a rating of 3.14, probably due to recent renovation. It has good thermal insulation and ergonomic furniture. However, the lack of natural lighting and poor air circulation highlight the limitations. The classroom in Laščina has a slightly lower average (3.03), except for classroom capacity, which reflects the age of the infrastructure and indicates the need for significant investments in infrastructure. The suggestions for improvements involve furniture (more comfortable chairs, larger and more functional tables), and generally better-equipped study rooms. Another important aspect is the size of rooms and classrooms, which is consistently identified as a key need in all dormitories. Sound insulation improvement is highlighted as a crucial factor, particularly in Laščina. Additional recommendations include improved artificial lighting, enhanced airflow in classrooms, and overall renovations of the space.

Conditions influencing 153 students' preferences for working alone or collaborating on projects were investigated. In all three examined dormitories, students prefer single rooms for individual work. In contrast, when studying in pairs or groups, only students from the Stjepan Radić dormitory prefer a private room, while those from dormitories Cvjetno and Laščina prefer to study in the National University Libraries (Fig. 4).

	INDIVIDUAL WORK			GROUP WORK		
	STJEPAN RADIĆ	CVJETNO	LAŠČINA	STJEPAN RADIĆ	CVJETNO	LAŠČINA
room	51	43	19	38	19	9
classroom	20	8	5	17	17	5
library	26	14	4	26	23	11

Figure 4. Learning space preferences for individual vs group work.

The survey also examined the number of students who study in the National University Library. Out of 153 respondents, 67 individuals, or 44%, reported using the library. Many students choose not to study in the library for several reasons. These include the distance from the library, the obligation to pay membership fees, and general satisfaction with their studying conditions in the dormitory. They feel they don't need to study outside their rooms. Figure 5 illustrates the most frequently cited reasons students do not study in the National University Library.

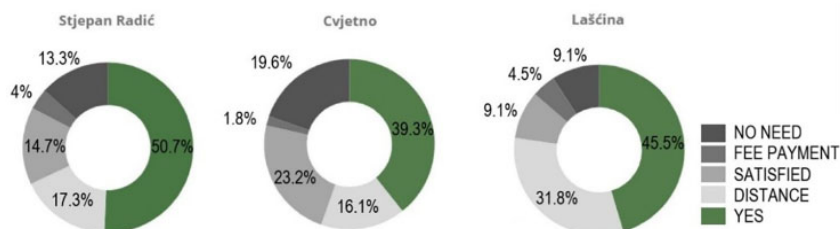


Figure 5. The results highlight reasons why students choose not to study in the library.

The results of the National University Library show higher satisfaction with most comfort factors. Visual satisfaction (4.41) and furniture ergonomics (4.29) are the most positively rated aspects, likely due to the modern interior design and focus on user comfort. Artificial lighting (4.16) and thermal insulation (4.19) received high ratings, reflecting the quality of the space's design. In contrast, soundproofing is rated relatively low (3.15) compared to other factors, which may indicate challenges in achieving silence in spaces with multiple users. Library capacity received solid ratings (3.99), indicating good space availability and satisfaction, though there is still room for improvement. Generally, the National University Library creates a pleasant atmosphere, focusing on aesthetics and functionality; however, soundproofing may need further improvement.

The research results pointed out differences in the quality of the learning space between rooms and classrooms. Rooms in the renovated pavilions Stjepan Radić and Cvjetno received relatively positive evaluations. General issues such as poor sound insulation and uncomfortable furniture were identified. Rooms in the unrenovated dormitory Laščina were rated lower in almost all categories. Although Stjepan Radić has many classrooms, a better spatial arrangement is needed so that the capacity matches the needs of students. In classrooms in Cvjetno and Laščina, there is a lack of adequate space, which puts pressure on existing capacities. Soundproofing, natural lighting, and the visual impression in Laščina may need improvement. Finally, recommendations to improve rooms and classroom environments include improving sound insulation and furniture ergonomics in all three dormitories, optimizing the classroom space in Stjepan Radić, increasing the number of classrooms in Cvjetno and Laščina, and renovating the classroom in Laščina.

DISCUSSION

Both case studies collected subjective perception reports from students and aimed to evaluate the parameters that affect the students' comfort in the learning spaces in the dormitories. Various factors, such as seats, lighting, noise, temperature, and air control, impact students' experiences in rooms and classrooms. Exposure to thermal, sound, and ventilation discomfort can negatively affect health and performance, so the entire building needs renovation. Minor factors such as classroom design, furniture arrangement, ergonomics, and high noise levels also affect students' motivation and interest in learning. Some relatively simple interventions can improve the quick change in the quality of space. Likewise, this study stresses the need to invest in optimizing existing and creating additional learning spaces at the level of the entire building. That design measure of improvement must be planned carefully, implemented over the long term, and requires significant financial resources.

Results confirm the expected difference in comfort between renovated and unrenovated dormitories. The current state of student formal learning spaces in dormitories in Croatia is far from ideal. This study emphasizes the significance of future upgrades. Of course, it is hoped that all the necessary improvement measures will imply a successful transition from existing traditional classrooms to highly modernized and technology-rich learning spaces.

The National University Library is a preferred place for learning. Mean scores for factors such as ergonomics, artificial lighting, visual impression, and thermal insulation were among the highest in the survey, indicating that the library provides the most optimal working conditions. Despite this, many students still prefer to study in their rooms due to the privacy and adaptability of the space.

The study also explored alternative student learning places to determine favorable places for productive learning. Students have different preferences, and the choice often depends on their learning style and concentration needs. Apart from dormitory rooms, classrooms, and libraries, cafes are popular places for many students. Others like to find peace on a park bench. A frequent choice for group study is the private accommodation of colleagues or the halls and study rooms at the faculty they attend. Students also prefer to study on public transport, especially before the exam for the last revision.

CONCLUSIONS

In conclusion, although students adjust their conditions to create a stimulating learning environment, the research emphasizes the need for systematic infrastructure investments. Increasing the quality of rooms and classrooms would improve the study experience and reduce the need to use alternative workspaces. Focusing on key comfort factors in learning spaces would ensure better student satisfaction in the long run.

Students' feedback is valuable for the future design of new student dormitories and renovation of existing ones, as it provides direct insights into possible improvements.

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