

## STUDENTS' ASSESMENT OF ENVIRONMENTAL CONDITIONS IN UNIVERSITY BUILDINGS – THE RESEARCH REPORT

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### Abstract

The paper presents the results of research aimed at preliminary analysis of the students' assessment of environmental conditions in selected university buildings in Poland. The study was conducted using questionnaires designed for this study. The questionnaire-based interviews were conducted in five university buildings in a few academic centres; the respondents were students attending classes in the buildings (N = 184) under study. The data were analysed both quantitatively and qualitatively with the use of behavioural mapping and space syntax analysis. The research results indicated students' behavioral and emotional engagement with the places of study, their assessment of the functional performance of these facilities and proposals for improvement of the existing environment (in particular the creation of individual learning space and the "student space" in general), as well as the emotionally-charged and personalized image of individual buildings. Theoretical introduction into the subject matter of research is the paper „Space for university students: specific requirements for <self-learning> environment – theoretical approach”.

**Keywords:** Architecture; Behavioural Mapping; Environment; Questionnaire-Based Research; University Buildings; Space Syntax Analysis.

## 1. INTRODUCTION

The paper presents the results of a pilot study aimed at analysing the assessment of environmental conditions in selected university buildings in Poland. The places selected for the research were didactic buildings that make up the learning environment in the strict sense of the word, with the exception of other types of learning facilities at universities (such as dormitories or libraries). The research focused on the behavioural and emotional aspects of the students' assessment of the architectural environment. Therefore, they can only be considered as part of a possible, more extensive Post-Occupancy Evaluation; firstly – due to focusing on the evaluation of one user group (students) only, secondly – due to omitting technical or functional analyses in a more detailed and specialized way in these studies. The research was conducted between 2016 and 2017, using questionnaires

designed for this purpose. The first report from this research was presented at BIWA2 conference and published in the post-conference book [1]; the presented report is an extended version of it and discusses the results of the research (behavioural maps and spatial analysis of the buildings under survey) that were not published before.

### 1.1. Purpose of the present study

The main aim of the research – in terms of both theoretical studies and practical applications – is an attempt to search for regularities and explanation of the relations that occur between the shape of the spatial structure and the patterns of behaviour in that space and the ways of its conceptualization (descriptions). The subjects of interest are the issues related to the *active perception* of architectural space, which takes place under real conditions in a built environ-

ment. In order to fill this need – the research focused on the problem of participants' *engagement* with places of the study. The study based on the theoretical model of engagement composed of three subtypes (*affective/emotional*; *behavioural* and *cognitive*) [2]. And thus, the method of research was designed to test different forms of students' engagement with learning environment treated also as the indicators of the active perception. The research deals with affective descriptions and assessment of places, behavioural engagement (such as "hang-out" places) and recognized meaning (conceptualization) of the places.

## 2. METHOD

### 2.1. Target places

The subject of the study consisted in 5 didactic buildings belonging to 4 different universities (Cracow University of Technology, Academy of Fine Arts in Cracow, Lublin University of Technology, Warsaw University) in 3 cities (Cracow, Lublin, Warsaw). The selected facilities included: two buildings of the Faculty of Architecture at Cracow University of Technology (B1 – on Warszawska Street and B2 – on Podchorążych Street); the headquarters of the Academy of Fine Arts on Matejko Square in Krakow (B3); the building of the Eastern Innovative Centre for Architecture in Lublin (new part of the Faculty of Civil Engineering and Architecture at Lublin University of Technology – B4) and the seat of the Faculty of Psychology at the University of Warsaw (B5). Only two out of the five selected buildings were designed for the universities which are located there; one of them is the nineteenth-century building of the Academy of Fine Arts in Cracow; the other is the building belonging to Lublin University of Technology. The remaining three buildings have been adapted to their current functions [1].

Building 1 (B1) is the former headquarters of the Faculty of Architecture at Cracow University of Technology located in the "campus" on Warszawska Street amidst several other university buildings (other departments' facilities, library, canteen, little café, kiosk, photocopy services, etc.). The building was constructed in the nineteenth century as one of the elements of the military barracks of Archduke Rudolf. It stands in the centre of a symmetrical composition of similar brick buildings; the whole complex (despite the introduction of a number of newer architectural interventions) have preserved a historic and quite monumental character. The interior of the

campus is filled with high greenery and organised lanes with park benches as well as car and bicycle parks. Nowadays, the building is only partially used by the Faculty of Architecture; some of the rooms are occupied by other CUT units.

Other building belonging to the Faculty of Architecture at Cracow University of Technology being a subject of survey (B2) is located on Podchorążych Street. Currently it is the main building of the Faculty; there are its headquarters likewise most of the teaching units here. This place boasts an interesting history – there was a royal residence here as early as in the Middle Ages, then it was rebuilt during the Renaissance as Palace in Łobzów and then in the nineteenth century the building was rebuilt for the Officer Cadets School [3]. In the 1980s, the building was entered in the register of monuments, and in 1993 the renovation work was carried out (arch. Andrzej Kadłuczka) to protect the building, expose its historical traces and to adapt it to the needs of the Faculty of Architecture. The building is surrounded by a bit run down high park greenery and separated from the city by a high mesh fence. The area is also occupied by spacious car park in front of the building and a partly undeveloped courtyard at the back. The open entrance to the area is located only at one point at the front, on the axis of the building. In the functional sense, the building is roughly divided in the middle of the symmetrical plan between two faculties: Architecture and Physics, Mathematics and Computer Science. The last floor – an adapted attic of the building – belongs entirely to the Faculty of Architecture housing large design rooms, drawing and sculpture rooms.

The building of the Academy of Fine Arts (B3) is a monumental nineteenth-century Academy building located in the core of the city centre of Cracow on Matejko Square; it overlooks the Grunwaldzki Monument and the Barbican. The original building was designed by Maciej Moraczewski between 1878 and 1879, then it was extended and redesigned several times. In the interwar years the 3rd floor was built (arch.: Józef Gałęzowski and Adolf Szyszko-Bohusz) and in recent years a new wing was added facing Paderewski Street (arch: Jacek Budyn, Andrzej Getter, 1989–2001), a courtyard was built over to form a lecture hall together with the accompanying spaces in the interior (arch.: Jacek Budyn, Andrzej Getter, 2014; interior design: Janusz Kuchejda 2012–14). The building houses the headquarters of the Academy of Fine Arts in Cracow, as well as the Departments of Sculpture, Painting and Stage Design

(in the neighbouring tenement). It constitutes an impressive and somewhat complex spatial layout in which the teaching rooms (unfound in any other building under study) are also located in the basement and on the converted attics. It is also the oldest and most “noble” – in both historical and artistic terms – building of higher education institution in this group of buildings.

The building of the Eastern Innovative Centre for Architecture in Lublin forms the new part of the Faculty of Civil Engineering and Architecture at Lublin University of Technology (B4). It was constructed between 2011 and 2013 (arch. Jan Wrana et al.), thanks to EU funds. The building is an extension of the existing building housing the Faculty of Civil Engineering and Architecture, but it clearly breaks away from the existing context of the campus at Lublin University of Technology (whose buildings date from the 1970s) with its modern cubic form (“form of a spatial sculpture” [4:150]). The building was designed as “a modern school of architecture, but also as an «innovative centre of architecture» – a place for meetings and scientific conferences, as well as for continuous research cooperation with centres from Poland, Ukraine and Belarus” [1]. For these ambitious purposes, the building was equipped with a 200-seat hall located on two upper floors and quiet work rooms which can accommodate scientist and visitors coming from outside. The most striking feature of the building is an internal patio – an open space connecting individual storeys and covered with a large skylight. As declared by the authors of the design the building was intended to create a “friendly place not only for learning” but also for “«keeping» students” [5:105].

The building of the Faculty of Psychology at the University of Warsaw (B5) is located in Stawki Street in Muranów district in Warsaw. This building was built just prior to the outbreak of World War II (arch.: Tadeusz Ćwierdziński, Roman Sołtyński, 1938) [6] for elementary school, which – however – was never opened because of the outbreak of war. During the war (the building was located in the ghetto area) it housed the seat of the SS in its walls and overlooked the so-called the Umschlagplatz. It witnessed the tragedy of the Holocaust, and later after the demolition of the ghetto it remained one of only a few undamaged buildings in Muranów. Also today, the urban context of this place is deeply connected with history; the Monument-Wall commemorating the Umschlagplatz is well visible from the windows of the Faculty of Psychology building. After the war the

building was used by a pedagogical school, and in the 1980s it was adapted for the purposes of the Faculty of Psychology. Today the building is almost entirely occupied by the Faculty of Psychology, constituting its only building. After the war, a sports hall complex was added to the building of the former school which is now used as a university gym; in the last few years the original pre-war sports hall of the school was rebuilt as a modern lecture hall. The building is adjacent to a large garden with a small fountain and benches arranged around it; there is also an internal courtyard and car park for employees. The building houses the headquarters of the Faculty, teaching spaces and staff rooms; there is also a library, a reading room, a cafeteria and a photocopy service.

## 2.2. Participants

All subjects were students in the buildings under study. A total of 184 completed questionnaires (N = 184) were collected (after the rejection of a few incomplete ones); including 52 concerning the building of CUT in the campus on Warszawska Street (B1), 44 – the building of CUT on Podchorążych Street (B2), 41 – the building of the Academy of Fine Arts in Cracow (B3), 31 – the building of the Faculty of Civil Engineering and Architecture of Lublin University of Technology (B4) and 16 – the building of the Faculty of Psychology at the University of Warsaw (B5). In the group of respondents there were students of: architecture – 111 (80 people from CUT + 31 people from LUT), sculpture – 30 (AFA), landscape architecture – 16 (CUT), psychology – 16 (UW), painting – 11 (AFA). Most of the subjects were women – 132 people (71.7%), while men comprised 52 (28.3%); the sex distribution was similar in each group of subjects (related to each study site). In terms of the year of study – the most numerous group consisted of the fifth year students (uniform master’s degree programme or second semester of second-cycle study programme) – 80 people (43.5%); followed by the third year students – 49 people (26.6%), the second – 28 people (15.2%), the fourth – 25 (13.6%); and two first year students [1].

## 2.3. Procedure

The study was conducted using a questionnaire technique. The questionnaire was composed of questions specifically aimed at people attending classes in the buildings under study and included verified building plans. The questionnaires consisted of the same items and a set of specific plans elaborated for each of the

five analysed buildings. The questions were divided into three groups including: general information (1) such as the year and field of study, the years spent in the analysed building and sex; mark on the plan and comment/describe type of instructions (2) and a short set of questions (3). The second part (2) contained the plans of the building which was the subject of the questionnaire, the respondents were asked here to mark various types of places important for them (such as “hang-out places”, “favourite places”, “disliked places” and “important spots” not included in the plan). The drawings included showed all rooms of the buildings (except for cellar and some technical rooms), doors, windows, and the most important equipment; some of the more complicated building plans were supplemented with selected descriptions to facilitate students’ orientation on the plan. This section also asked for a short description of one “favourite place” marked on the plan and one “disliked place”. The third part (3) of the questionnaire consisted of 8 questions one of which was closed-ended question concerning the assessment of the building’s functional performance (9); where the possible answers ranged from “very good” through “good”, “quite good”, “rather bad”, “bad” to “very bad”. The other items were focused on the “strengths” (10) and “weaknesses” (11) of the building, as well as the suggestions on how to improve the functioning of the building (12). The following three questions were constructed on the basis of the unfinished sentences method, encouraging students to make any associations and express their emotions: “When I think of this building ...” (13); “I associate this building with...” (14); “What I like most here...” (15). The last task in the questionnaire was: “List 5 adjectives that best describe the building” [1].

#### 2.4. Data Analysis

The data (N = 184) were analysed both quantitatively and qualitatively. SOFA Statistics software was used for quantitative data analysis; qualitative data were analysed using various types of content analysis methods and space syntax methods. The students’ responses to the second set of questions (marked on the plan) were summarized in the form of behavioural maps where aggregate responses for “hang-out places”, “favourite places” and “disliked places” for individual building plans as well as the aggregate maps of all marked places for individual plans were created. These data – developed on the basis of the information declared in the questionnaire forms – generated the image of the frequency of hanging out

in certain places, the popularity and attractiveness of certain places, as well as the map of the most unpopular places in the buildings. Spatial analysis of selected buildings using space syntax technique was also performed. Three buildings (B1, B2, B4) which share the same type of study (faculty of architecture) were selected for this purpose. Analyses of individual plans were performed for all three sites; as a result, maps of the distribution of the most and least “integrated spaces” (the concept informed by the theory of space syntax [7]) in the system were created. These maps were then superimposed on previously created behavioural maps summarizing the results of students’ responses within the scope of the declared “places”. Collating the results of the space analysis and behavioural mapping resulted from questionnaire data (qualitative methods), was to verify the actual impact of the shape of the architectural space on the (declared) behaviour and emotional attitude to the analysed environment.

### 3. RESULTS

#### 3.1. Behavioural Engagement

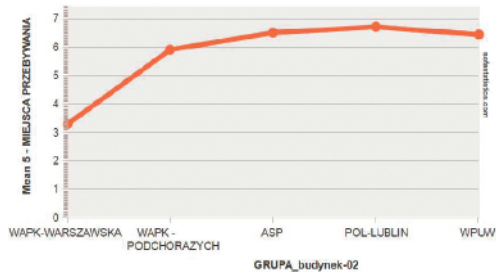
The measure of behavioural engagement in places was denoted by the number of marked points, in particular, the number of “hang-out places” (Fig. 1) and the number of “favourite places” (Fig. 2). These two variables, as shown by the results of the study, indicate statistically significant correlation ( $p < 0.001$ , Spearman’s  $R = 0.245$ ). Detailed results for the number of marked places (“hang-out”, “favourite”, “disliked” and “important” spots), counted as the sum of selections on each plan (floor) for each building is shown in Table 1. The diversity of respondents on the basis of sex – in terms of number of marked places – did not show any significant differences. Women in comparison to men indicated slightly fewer “hang-out” places (5.47/5.52), “favourite” places (2.82/3.02) and “disliked” places (2.03/2.56); however, they marked more “important spots” (1.01/0.69).

Based on the selected places, “behavioural” maps for individual buildings were developed. The maps present the specific location of these places (“hang-out”, “favourite” and “disliked” respectively) on the building plan. An analysis of the maps created in this way shows the distribution of the places of activity and preferences (also the emotional relation to places) with reference to “favourite” and “disliked” ones. There are places more likely to be occupied by students in each of the analysed buildings. Excluding the places where classes are conducted, the most com-

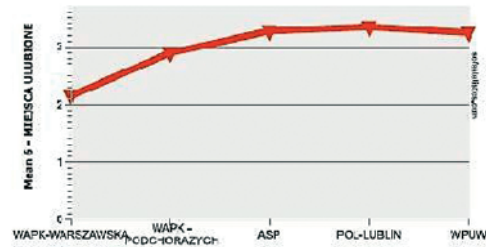


**Table 1.**  
Summary of the number of places marked on the building plans

Building	“Hang-out” places		“Favourite” places		“Disliked” places		“Important” places	Sum of “places”
	MEAN	MODE	MEAN	MODE	MEAN	MODE	MEAN	MEAN
B1	3.29	3 (N=12)	2.15	1 (N=23)	2.25	1 (N=22)	0.71	8.4
B2	5.91	3, 4 (N=9)	2.89	2 (N=10)	2.16	1 (N=13)	1.05	12.02
B3	6.51	5 (N=9)	3.27	2, 3, 4 (N=8)	2.05	0 (N=12)	1.1	12.9
B4	6.71	2, 8 (N=4)	3.35	1 (N=8)	2.39	1 (N=13)	0.74	13.19
B5	6.44	3 (N=4)	3.25	2 (N=6)	1.94	1 (N=16)	1.13	12.25



**Figure 1.**  
Chart of the average number of marked “hang-out places” for individual buildings [1]



**Figure 2.**  
Average number of “liked/favourite” places [1]

mon areas of activity are semi-public spaces such as halls and corridors. These locations occur in individual buildings in a more focused (B1, B2) or distributed (B3) layout, and are located on different floors and in different parts of the plan – more (B4) or less (B2, B5) centrally. Among all the marked places, the ones that stand out are “favourite” places which are usually located far from the main entrance, at the edge of the communication space, usually on the upper floors of the building (the last and the penultimate one). The phenomenon is illustrated by compiling “behavioural” maps for two plans (floors 2 and 3) of building B1 (Fig. 3); there is a noticeable increase in the number of marks on the upper level (+3), which is the penultimate and most populated floor of the analysed building.

### 3.2. Functional Performance Assessment

The students’ general assessment of functional performance of the buildings were illustrated by their answers to the question: “how do you assess the functional performance of the building?”. The results have shown a clear, statistically significant ( $p < 0.01$ ) dependence on the assessed building. They remained at an average level close to 4.00 (B1 – 4.00; B2 – 4.07; B3 – 3.66; B5 – 3.56), denoting the response “rather well”; the only building that was assessed differently was B4 rated “well” (4.94). The most common (modal) value for this variable in the case of buildings B1, B2, B3 and B5 proved to be “quite well”, whereas in the evaluation of the new building of the Eastern Innovative Centre for Architecture (B4) the modal value was equally “quite well” (4.00 [N = 11] and “very well” (6.00 [N = 11]). For this building, the range of variation was from “rather poorly” (3.00) to “very well” (6.00), whereas the ratings for most of the assessed buildings B1, B2, B3) start with “poorly” (2.00). In the whole study sample only one person rated the functional performance of the building (B5) as “very poor” (1.00); in the case of two buildings: B1 (building of the Faculty of Architecture at CUT on Warszawska Street) and B5 (building of the Faculty of Psychology at the University of Warsaw), no one in the study sample evaluated these buildings “very well” [1].

Location holds a strong position among the well-appreciated elements of the building in almost all cases (except B4); it is the most commonly mentioned strong point of the building. The strength is also green – either inside the building (B4), in the closest environment (B1, B2) or the garden (B5); its lack becomes the weak point of the building (B3). The important factors of building functionality assessment were also natural light, lighting (also artificial), the size of the rooms and the building layout’s clarity. An important element of the building’s strength is the external appearance (B1, B2 and

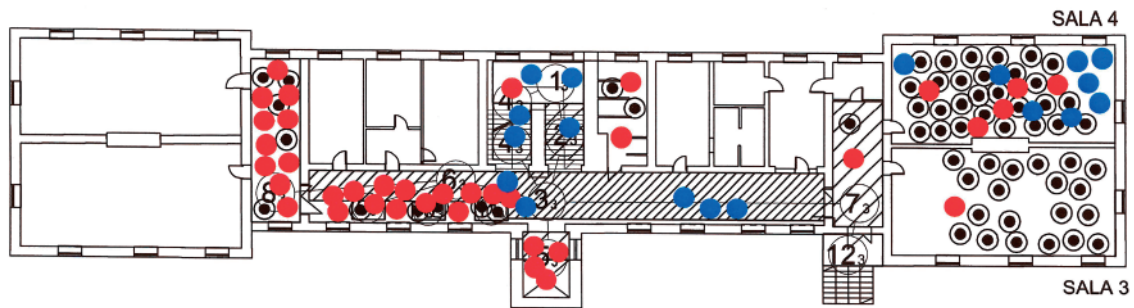
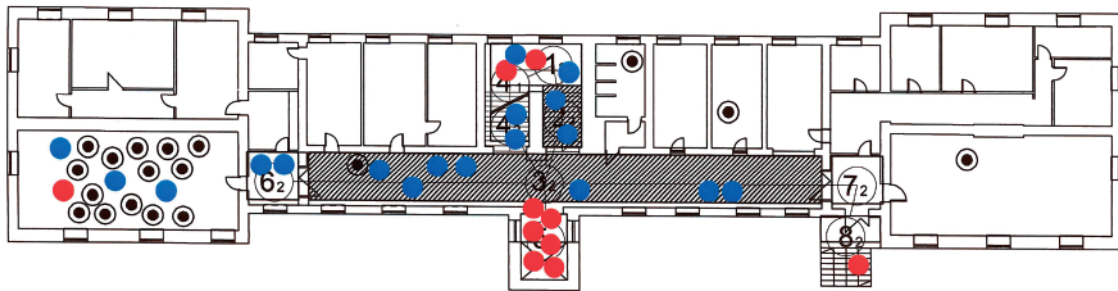
**B1 +3****B1 +2**

Figure 3.

Exemplary aggregate behavioural maps showing places of “activity/ remaining in a place” (black), “favourite” places (red) and “disliked” places (blue) for two selected floors (+2, +3) of B1 building



Figure 4-5.

Examples of the most liked places in buildings under study: (4) drawing room in the building of FA CUT (B2) and (5) the corridor with sofas in the Faculty of Psychology (B5) [1]

above all B3). Among the weak points of the buildings, the respondents often mentioned the technical infrastructure (elevators, not enough outlets, Wi-Fi, air conditioning, heating, ventilation) and sanitary (toilets, washbasins, sewage), bad furnishings

(uncomfortable furniture, no tables) and no places offering food. However, most often the element of the building assessed badly (also referred to as “elements for improvement”) is the lack or shortage of places designed for rest and individual or group work

**Table 2.**

The emotional engagement with places – “positivity” is a measure of the mean number of favourite places and positive associations with the buildings

Building	FP: Favourite places MEAN	POS: Positive associations	NEG: Negative associations	NEU: Neutral associations	POS-A: POS/ POS+NEU+NEG	POSITIVITY POS-A + FP/10
B1	2.15	13	23	44	0.16	0.375
B2	2.89	22	27	36	0.25	0.54
B3	3.27	14	12	39	0.21	0.54
B4	3.35	13	4	40	0.22	0.55
B5	3.25	17	18	8	0.39	0.72

– spaces apart from didactic classes. These issues – titled frequently as “work areas” and “places for rest” – occupy the first place on the list of students expectations of how to improve the learning environment. This problem is also noticed by the respondents studying in the newly erected building (B4); in their opinion (20/31) there is a lack of individual work areas for students in the building.

### 3.3. Emotional Engagement

The number of favourite places (also associated with behavioural engagement), as well as the unrestrained statements that completed the sentences: “When I think of this building ...” (13) and “I associate this building with...” (14) were recognised as the measure of emotional engagement with places (Tab. 2). The outcomes are similar for buildings B2 (0.54), B3 (0.54) and B4 (0.55), and more discriminated for B1 (the least positive – 0.375) and B5 (the most positive – 0.72). Answers to the question: “What I like most here...” pictured the qualitative and emotional map of analysed buildings as phenomenologically understood places. As far as the last question is concerned, responses – especially those from students of architecture – often coincide with the marked “favourite places”; art students (B3) often wrote about the atmosphere and specific experiences related to the perception of the building, while building-related social experiences were recorded in the questionnaires of psychology students (B5) more often than in other groups. Some of the statements that completed the sentence “When I think of this building...” were very emotional and related to positive feelings (e.g. “I am proud/ I am happy to study here”), nostalgia (because of the elapse of time and the end of study), good experiences (e.g. “I think of people I met here who influenced my personal development”); in some other statements a strong negative attitude has been revealed (e.g. “when I think of this building, I want to escape from here”/ “I feel ashamed of this building”).

The results on the number of favourite places vary, among others, according to sex distribution; thus, the people studying in a given building are not on unanimous group. However, in all the buildings the most favourite places are those positively associated with learning and work or relax. An example of the first type of places is the drawing (Fig.4) and sculpture room and design studios in the adapted attic of the FA CUT building on Podchorążych Street (B2), the lecture hall at the Faculty of Psychology (B5), some studios at the AFA building (B3), the model house and the library in the EICA building in Lublin (B4) or the only renovated hall (N) in the FA CUT building on Warszawska Street (B1). The second type of places are places to relax or individual study. In building B1, there is the “expo” café in the basement, student government’s office called the “base” or a place separated from the mainstream of movement by display boxes with dried plants on the third floor. In building B2 these are definitely the corridors (in the part of the building belonging to the Faculty of Architecture) arranged with tables and chairs and the drawing room in the top floor (Fig.4). The favourite places in building B4 are situated in open spaces of the upper floors attached to the atrium, the places usually offer nice external views. The most liked places in the building of the Faculty of Psychology (B5) are both in the corridor on the top floor where colourful sofas were set (Fig.5) and in the faculty garden in front of the building. And thus, the other significant factor of choosing “favourite places” especially those dedicated to relax seems to be the nearness of nature. It may be a place within a building with just a view of nature (B1, B4) or a place outside the building adjacent to green surroundings (B1, B2, B5).

### 3.4. Meaning

The set of data describing the significance given to a place was developed by analysing the content of unrestrained statements that completed the sentence:

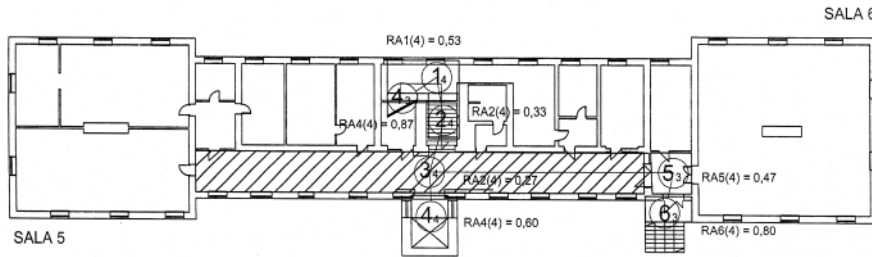
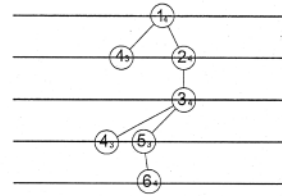
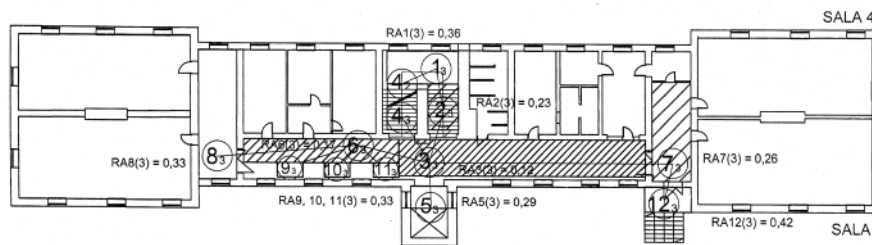
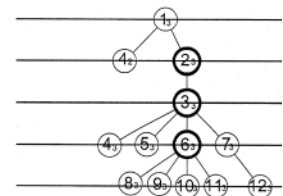
**Table 3.**  
Aggregate adjective list describing the buildings with respect to “positivity” factor and “content” factor

		POS	NEU	NEG	TOTAL
B1	Shape and size	1	23	0	24
	Form	11	19	8	38
	Performance	12	1	14	27
	General impressions	14	13	34	61
	TOTAL	38	56	56	150
	Mean number of words	0.73	1.08	1.08	2.89
	T/N (N1=52)	25.3%	37.35%	37.35%	100%
B2	Shape and size	-	13	2	15
	Form	28	2	1	31
	Performance	15	-	7	22
	General impressions	30	6	20	56
	TOTAL	73	21	30	124
	Mean number of words	1.59	0.46	0.65	2.7
	T/N (N2=44)	58.87%	16.94%	24.19%	100.00%
B3	Shape and size	0	16	1	17
	Form	18	7	2	27
	Performance	5	0	30	35
	General impressions	25	22	19	66
	TOTAL	48	45	52	145
	Mean number of words	1.17	1.09	1.27	3.53
	T/N (N3=41)	33.11%	31.03%	35.86%	100.00%
B4	Shape and size	0	19	0	19
	Form	14	25	0	39
	Performance	17	0	5	22
	General impressions	24	23	7	54
	TOTAL	55	67	12	134
	Mean number of words	1.77	2.16	0.39	4.32%
	T/N (N4=31)	41.04%	50.00%	8.96%	100.00%
B5	Shape and size	0	1	1	2
	Form	1	0	5	6
	Performance	1	0	6	7
	General impressions	10	10	27	47
	TOTAL	12	11	39	62
	Mean number of words	0.75	0.69	2.44	3.88
	T/N (N5=16)	19.35%	17.75%	62.90%	100.00%

“I associate this building with...” and a list of adjectives developed from the responses to the last question in the survey. What is clear from the statements that completed the above sentence is that almost a half of all respondents associates the buildings with didactic classes and studying in general (B1 – 31/52; B2 – 24/44; AFA – 10/41; EICA – 11/31; FP UW – 2/16). What might be less expected, every building under survey has been described with a certain group of adjectives revealing its special meaning for the users. For example, the building of the Faculty of Psychology (B5) has been frequently associated with “history”, World War II (7/16) and with a sense of

antiquity in general (5/16); on contrary, the new building in Lublin (B4) – has been associated with modern architecture and “the future” (10/31). The AFA building (B3) has signified to its users primarily “history” and “historical art” (10/31) but also a “labyrinth” and a “hive (5/31). The B2 (FA CUT on Podchorążych Street) has been associated with “history” – a “palace” and the “Officer Cadets School” (10/44) while the B1 (the same Faculty building on Warszawska Street) has signified basically a “school” (6/52) associated “with a rigid educational system” or “classrooms” that “resemble primary school classrooms” [1].



**B1 +4**B1 +4  
k = 7**B1 +3**B1 +3  
k = 13**Figure 6.**

An example of a space syntax analysis – map of the most “integrated” spaces in the building plan (B1 – level 3<sup>rd</sup> and 4<sup>th</sup> of the building). The presented plans differ with the arrangement of left end of the corridor which is sub-divided with a glass door and furnishing (on the 3<sup>rd</sup> floor). It makes a spatial model more complex and discriminated offering more opportunities for individual behaviour (spaces described as “8/3”, “9/3” and “10/3”).

While analysing the results, all the adjectives were introduced in a two-variable model designed for this purpose: (1) “positivity” (positive, negative, and neutral) and (2) “thematic content” (“shape and size”, “form”, “functionality” and “general impression”). This is how the exemplary adjectives appearing in the questionnaires (such as “monumental”, “gloomy” or “neglected”) were classified and count. This classification has revealed different profiles of positivity: building B2 received the most positive adjectives in relation to all terms used to describe the building (pos: 1.59/ neu: 0.46/ neg: 0.65); building B5 received the most negative adjectives (pos: 0.75/ neu: 0.69/ neg: 2.44); in turn, building B4 was described with the greatest number of neutral expressions (pos: 1.77/ neu: 2.16/ neg: 0.39) (Tab. 3).

### 3.5. Students’ engagement with places vs space syntax of building plans

Based on the record of part of the content declared in the questionnaires on building plans such as

“hang-out”, “favourite” and “disliked” an additional database describing the environment was created in form of “behavioural maps” for every analysed buildings. Additionally, for 3 out of the 5 analysed buildings (B1, B2 and B5) maps of the least and most “integrated” space were created – i.e. sociofugal and sociopetal space which is estimated along with a measure of space configuration in the system based on the space syntax analysis method (originally inspired by Hillier & Hanson [7]; [8]). These maps (Fig. 6) were then superimposed on the created behavioural maps in search of perceptible correlations.

When the behavioural maps and maps of integrated spaces are superimposed, one can notice a clear relation between “spaces of integration” with a distribution of patterns of behaviour (“hanging out”) and – what seems even more interesting – with the distribution of “favourite” places in the building. As shown by the comparative analysis of these two types of maps, the “favourite” places are usually those parts of “hang-out” areas that are located in the niches (in the periphery) of the most “integrated” spaces, which



Figure 7–8.

Examples of favourite places in building B1: (7) the place on the edge of the most possible integrated space (in floor +3) as related to space-syntax and behavioral analysis (shown in Fig. 3 and 6); (8) favourite area in front of B1

are usually open passageways in practice. This suggests that students like especially those places that are close to the core of students' life in the building – in a sense open to the biggest number of possible connections – but at the same time constituting an semi-island enclave within this space, providing a minimum of privacy, such where one can stop by and behave in a more unrestricted way. (Fig 7–8, 9–11).

#### 4. DISCUSSION

As a result of the content analysis of the questionnaires, a significant amount of data describing the existing learning environment in the five analysed buildings was developed. The data was analysed quantitatively and qualitatively, and also by cross-analysis with space syntax of the buildings plans. As a result of the quantitative data analysis, several significant correlations were identified at the static level. These results refer both to the assessment of individual buildings (the assessment of functional performance) and to the relations between particular variables.

As regards the comparative assessment of individual buildings, a “functional performance” profile seems to be a significant result, with a considerable predominance of the new building of the Faculty of Architecture in Lublin (B4). The assessment and description of this building is significantly different in terms of quantity; not only in terms of higher functional assessment measured in points (4.94, with an average of 4.00 for other buildings), but also due to higher average scores in terms of the number of all marked places and individual places: “hang-out”, “favourite” but also “disliked” ones. This might indi-

cate that the effect of newness – also visible in the descriptions of the building, associations and selected adjectives – has translated into a quantitative result. The effect of novelty might also influence the emotional attachment with places; among the favourite places in all the buildings under the survey – most of the spaces are freshly redesigned to match their functional needs (for example the lecture hall and the rearranged corridor with sofas in building B5 or the renovated classroom N in building B1). However, the high assessment of functional performance – as resulted from the study – does not always indicate the emotional engagement and warm feeling towards a building. This might be seen in descriptions of the buildings summarized in the form of list of adjectives. The descriptions of B4 – of the highest functional assessment – contained the smallest amount of emotional expressions. They were dominated by very neutral (50%) or negative statements (over 40%), only less than 9% of the terms used to describe this building were positive. The reverse example may be given by the Faculty of Psychology building in Warsaw (B5), a place which raised the most emotional engagement of its students while having a lowest functional assessment in the analysed group of buildings.

The analysis of the correlations between variables did not show a statistically significant relation between the functional performance assessment and any other factor apart from the building itself, including the relation between the functional performance assessment and the “elements for improvement”. This last result was, however, correlated with the number of years spent in the building, and therefore rather with the knowledge of the building, than its assessment. Along with the passage of time spent attending class-

es in a given building, the number of perceived elements for improvement increases. Such an interdependence was not observed in terms of the relation between the time spent in the building and its functional performance assessment or strong and weak points of the building. Among the observed interdependencies, the relation between the number of “hang-out” places and “favourite” places occupies an important position (where the higher number of “hang-out places” is related to more “favourite places”). This relation vaguely explains the summary of the “places” marked on the plans in the form of behavioural maps as well as the confrontation of the developed maps with the results of the space syntax analysis. The impact of behavioural engagement (“hang-out places”) is also visible in emotional assessment of building as a whole, and thus, it is not only a number of “favourite places” but also a set of positive associations with the building. Moreover, the behavioural engagement (“hang-out places” as well as “favourite places”) of students seems to be coordinated with the spatial arrangement of building plans which is revealed by overlapping behavioural maps on the integration maps resulted from the space syntax analysis.

The other significant finding of the study was the importance of building locations. This content group occupied a high place in the rankings of “strong” and “weak” points of the place. By writing about “location”, students usually meant transport links and situating a building in a certain position towards the city centre. In turn, immediate surroundings and places outside the building often appeared (with the exception of B4) among “hang-out” and “favourite” places. What might be surprising, only in the case of building B4 in Lublin, the respondents did not refer in any way to its location, surroundings and outer appearance (even though the new façade of this building has an expressive, sculptural form) in their responses. As far as the B4 building is concerned, the absence of noticeable relations with the outside may result from: (a) lower assessment of the building’s surroundings when compared to the other target places; (b) focus of all attention on the new absorbing interior of this building; and/or (c) too short “life” of the building to create lasting relations at the urban level.

The number of reservations are due here. The interpretation of the results of this exploratory study – especially when space syntax analysis versus behavioural engagement is considered – warrant caution, related to the limitations of the study. In particular, the limited number of analysed places, as well as the

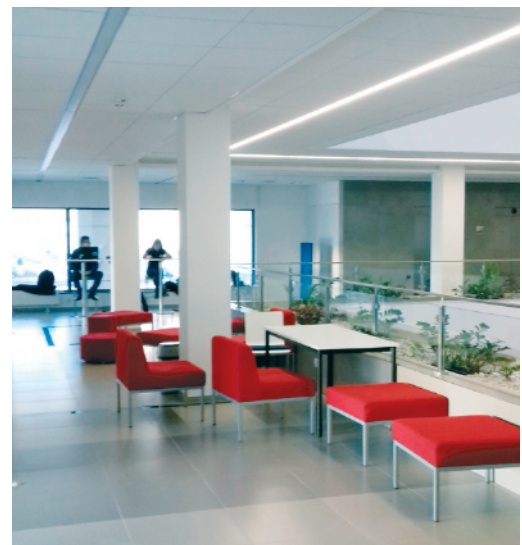
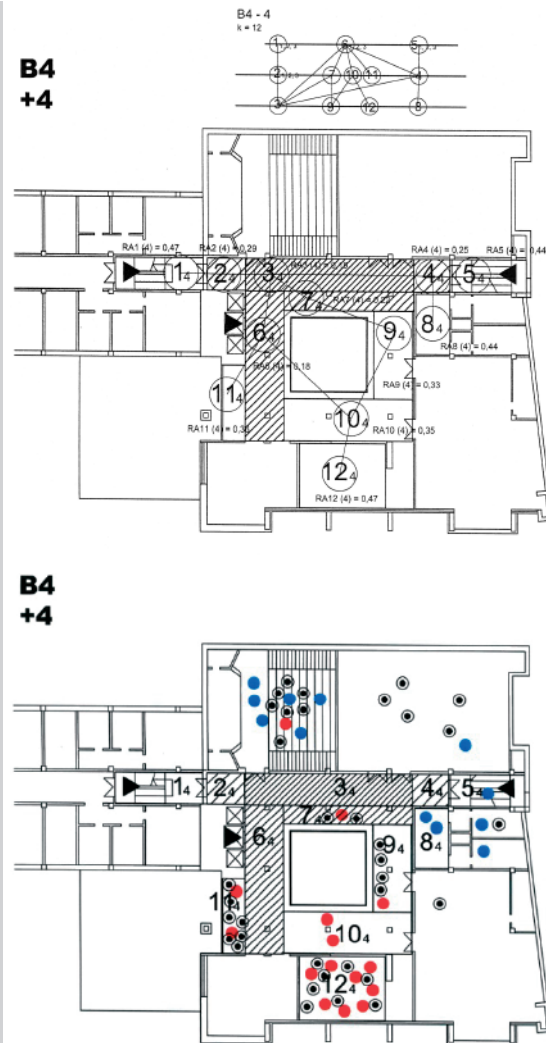


Figure 9–11.  
An example of one of the most liked places in building B4 as related to space syntax analysis (B4 - floor +4)



small size of samples are notable limitations. Subsequent studies researching the impact of the space arrangement and people's behaviour are necessary and can be continued to further examine the results of the current study. Further studies on learning environment problem as such also seem crucial as to make necessary and easy to conduct interventions justified by a better understanding of students' experience at school environment.

## 5. CONCLUSIONS

The results of the study have shown how students evaluate their academic environment and how they feel the modern university buildings should look like. The learning environment – as revealed in the study – is a complex one. University buildings are not isolated islands separated from life outside the school walls, and a number of academic needs collide in their interior spaces. Most of the students recognize the important relations with the city from the perspective of their academic buildings: functional, historical and natural ones. Students are usually conscious users of these spaces, which was indicated by the places of their behavioural and emotional engagement, and their “expert” analyses in terms of functional performance assessment. It is quite clear from these analyses that school buildings should be more than just a set of teaching rooms where students attend classes. They should rather be a place of meeting and exchange where students can feel “at home”. The bitter statement found in one of the questionnaires responses that “the building was designed for employees rather than students” is a relevant representation of real experiences and true feelings towards physical environment which should support students' engagement. “Student space” considered as one postulate (including “work area”, “rest areas”, “student storage facilities”) appeared about 120 times in the survey – almost three quarters of the students who participated in this study believed that there was not enough space for students at their school. This paradoxical conclusion may be surprising if one assumes that university buildings are designed primarily for students.

The needs of students are changing dynamically; an individual work area is no longer just a chair and some place on a table (although a number of responses show that even this is often difficult to find); nowadays it is usually a quiet semi-private space with a socket (and Wi-Fi) to which you can connect your laptop and stay in touch with others. Students do not

want to be locked up in traditional school classrooms today, they want to be able to work both individually and in groups. They also expect a friendly atmosphere that will positively affect the quality of their academic experience. In a sense, the results of the research agree with some of the findings of previous studies (presented in theoretical introductory paper that precedes) – such as the one concerning the classification of the significance of specific learning environment features from the students' point of view. The top position of that rank, right after courses profile and teachers' academic standing is taken by “computer availability” and “availability of quiet places” and “individual work areas” [9]. It shows that, no matter the differences between Polish and western universities – nowadays students have similar needs all over the world. What they lack in this regard – as the presented analysis of their responses shows – is a relevant, motivating learning environment. The one that is open – in spatial, functional but also in social terms – and at the same time associated with coexisting privacy enclaves, creating places that can be personalized to some degree.

A conviction about the real impact of the *place* and the cultural context of the *situation* on the quality of this experience accompanied the concept behind the conducted research. It is believed though that educational buildings represent a kind of environment which provokes a specific type of open social experience. This experience – as also confirmed by the results of the study exceeds expectations linked to the simple formula of “being educated”. It is not only that the concept of “<learning>”, in different contexts” increasingly supplants the traditional formula of “education” [10] it also demonstrates the real impact of place built up of more than only physical attributes. It is in particular composed of other people and people's beliefs of what it is; the fact that was revealed in one of the responses in the questionnaires, such as this: “When I think of this building, I think it is a place where I meet my intellectual and social needs [...], I remember the people I met here and who influenced me ...”. And this is also indicative for the fact that the relation between student and his physical environment is mediated by other people – primarily teachers and other students. Together with the building's architectural features they create what may be truly called learning environment.



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