ARCHITECTURE AND CHILDREN.
THE SPACE AS A YOUTH EDUCATION ENVIRONMENT

PhD. Thesis – Summary

In view of obtaining the scientific title of PhD.
In Politehnica University Timisoara
In PhD. domain: Architecture

Author arch. Brîndușa Raluca Havași
Scientific coordinator
Prof.Arch. **Teodor Octavian Gheorghiu** PhD.

February 2020

1. INTRODUCTION

Context

It is estimated in Romania, that *"over 80% of schools were built up to 1970"*, and 2% only after 1990; and *"the built environment of schools in Romania is far behind the educational process that they house"*[1]. The Geospatial Informational System for Education provides information about facilities, the state of furniture, the access of children with disabilities, the seismic hazards, the capacity of the schools, inaccessibility of transport, distribution within urban-rural areas, among others. The percentage of schools that **do not have** a library, laboratory or sports hall reaches 60-72% of schools in rural areas[2].

The aim and the objectives of the study

The study *Architecture and children. The space as a youth education environment* was inspired by the mission of UIA (Union Internationale des Architectes)[3], and by the need to understand the interaction between the built environment and those who enliven it, who absorb its message, who are modelling it and transform it continuously, children and young people. Because this reciprocal impact of architecture on children and young people proved to be so vast and impossible to be dealt with in a research limited in time and space, we decided to limit the area of investigation, to the school architecture and to the primary and secondary school children.

We wanted to draw the portrait of an „ideal school" – *the dream school!*, as it emerges from the opinions of student users, and to compare this image with that of the other users, the teachers in Romania. We wanted to identify what is lacking in today' schools, so that children and young people would enjoy school. Why should we involve students in the remodelling of their school? What happens when we put to task their imagination and practical abilities, to transform a shabby classroom into *my dream classroom* – „an ideal classroom"? What would be the impact of this involvement on students' attitude towards the school and how can it influence their responsibility towards their learning environment?

[1] Mihăescu O., *Educație prin arhitectură. Școli sustenabile în România – O abordare de proiectare bazată pe evidențe prin metoda evaluării post-ocupaționale*, coord. ştiinţific: Prof. Dr. Arh. Ana-Maria Dabija (manuscris nepublicat), Rezumat publicat, 2016, p.21
[2] Guvernul României, Infrastructură în Educaţie, http://sig.forhe.ro/# , accessed on 19.01.2020
[3] UIA – Union Internaționale des Architectes Mission, Architecture and Children Work Programmes, Built Environment Education Network https://www.architectureandchildren-uia.com/mission, accessed on 19.01.2020

After studying the literature, mainly from abroad, we thought that it will be necessary to find out what school users think about schools in Romania, through three studies:

1. *The school of my dreams!* [4], a survey addressed to primary and secondary school students during 2015,
2. *My dream classroom!*[5], a post-occupancy evaluation following the pilot project of renewing the classroom with the help of the students, both at its theoretical and practical stage, during school years 2015-2016 and 2016-2017,
3. *My School – together for a better school*[6], a survey for primary and secondary school teachers, in June-July 2019.

On the basis of what the literature and the practical studies tells us, we thought we could recommend a series of steps to be kept in mind when running this users' consultation process, in view of elaborating the brief of the school renovation/modernization project, and then in the implementation and post-occupancy evaluation. The subject of participatory design through consulting and involving the users has just began in Romania. It opens the way to really understand the impact the users' involvement on renewal and modernisation of educational infrastructure. This is the object of some long term national strategies[7], which do not consider consulting the users. This work is intended to be a source of inspiration as well as proof that the interaction of users with the built environment could be done starting from their needs, and by their direct involvement, from bottom to top, and that it could have positive effects, both for users and for the school building.

Beneficiaries

Students, teachers, principals and school administrators are the direct beneficiaries of this study, as they will experience the participatory process as a direct way of modelling the physical space of the school, where they spend the best part of their active time. The architects involved in the projects of renewing and modernising the schools are also direct beneficiaries, as they will obtain the instruments and the theoretical framework, for running the process of consulting and involving the users. Parents and school neighbouring communities are indirect beneficiaries, through children and young people. City councils and decision makers could also benefit for maximizing the investment in school infrastructure.

The structure of the thesis

The thesis is structured in seven chapters, which are gradually approaching, through different angles, the continuous interaction that exists between school architecture and its users.

The first chapter, *The introduction*, states what the aim of the research is, what are its objectives, beneficiaries, methods, limitations and possibilities of further studies, along with

[4] Havasi, B., Negrisanu, D., Simionescu, O., THE SCHOOL OF MY DREAMS! ANALYSING ASPECTS OF PARTICIPATORY SCHOOL DESIGN INDICATED BY 188 PRIMARY, SECONDARY AND HIGH-SCHOOL STUDENTS FROM SIX SCHOOLS IN THREE CITIES OF ROMANIA, in *Proc. 6th International Multidisciplinary Scientific Conference on Social Science and Arts (SGEM 2019)*, Vienna, Austria, April 2019, Vol. 6, Issue 6.1, pp. 585-592, https://doi.org/10.5593/sgemsocial2019V/6.1/s17.070

[5] Havasi, B., Negrisanu, D., Dragoi-Banciu, E.-R., THE CLASSROOM OF MY DREAMS! THE IMPACT OF INVOLVING SECONDARY SCHOOL STUDENTS IN THE REFURBISHMENT OF THEIR CLASSROOM IN 'FINE ARTS HIGH SCHOOL' OF TIMISOARA, in *Proc. 6th International Multidisciplinary Scientific Conference on Social Science and Arts (SGEM 2019)* Vienna, Austria, April 2019, Vol. 6, Issue 6.1, pp. 545-552, https://doi.org/10.5593/sgemsocial2019V/6.1/s17.065 ,

[6] Havasi, B., Szitar-Sârbu, M.-A., Simionescu, O., MY SCHOOL – TEACHERS VIEWS ON SCHOOL PHYSICAL ENVIRONMENT IN ROMANIA, *in Proc. 6th SWS International Scientific Conference on Arts and Humanities 2019*, Albena, Bulgaria, Vol.6, Issue 1, August-September 2019, pp. 423-430, https://doi.org/10.5593/sws.iscah.2019.1/s21.054

[7] Guvernul României, Strategia de Modernizare a Infrastructurii Școlare 2018-2023, https://www.edu.ro/sites/default/files/Strategie%20SMIE%2023.04.2018.pdf, accessed on 19.01.2020

the structure of the study.

The second chapter, *Architecture and Children*, analyses the spontaneous interaction between the built environment and its users, children and young people, during their formative years of their abilities, knowledge and attitudes towards their environment.

The third chapter brings to the fore *The School - The space as a youth education environment* and the messages that it conveys through the very built substance, as a third teacher[8]. On the basis of worldwide studies, we investigate the impact of the school building and facilities on students' results and on their engagement towards the school and learning. How does *School Infrastructure in Romania* appear in statistics[9] and what is the aim of the *Strategy for Modernising Educational Infrastructure 2018-2023*.

The fourth chapter, *The School of my Dreams!*, presents the results of the study with the same name, which analyses the answers of primary and secondary school pupils, in six schools in three main towns in Romania: Timisoara, Cluj-Napoca and Bucharest. Following a guided discussion on pictures of unusual schools from all over the world, 188 students answered through drawings and written answers on postcards the question: *How do you imagine the school of your dreams?*

The study *My dream classroom! De-a arhitectura in my school!*, is presented in chapter five, and analyses the answers of a post-occupancy survey, given by the secondary school students which were involved in the pilot project of renewing their classroom, according to the ideas and with the involvement of students, both in the theoretical and practical phases of the project. The aim of this study is to offer answers and observations to the question: *Why should we involve students in school remodelling?*, and these initiatives are compared with similar ones from other countries.

Chapter six investigates the state of school buildings in Romania, as seen by the teachers, and what they expect from the physical environment of the school. The study analyses the results of the survey *My school – Together for a better school*, that was answered by 180 teachers from primary and secondary schools, in rural and urban areas of Romania.

The general conclusions of the study are presented in chapter seven of this work, together with recommendations, personal contributions, limitations and further work possible.

Methodology

Research methodology is based on developing evaluation instruments developed after studying the literature, that we tried to adapt to the age of the users. In order to investigate primary school pupils' perception on the ideal school, we used postcards for collecting written and drawn answers. The analysis of the answers combines the method of quantitative analysis and qualitative observation. Trying to take the experiment a step further, we extended it to secondary and high school students. Their answers led to defining the best methods for future surveys according to different age groups. On the basis of the school evaluation used by Tanner[10], we devised a questionnaire, which was tested and used by secondary and high school students, participating in the program *De-a arhitectura in my school!* [11], in several schools in Romania. In the study *My dream classroom* we tested the school evaluation survey and the post-occupancy evaluation survey for students. The online survey *My school – Together for a*

[8] Nicholson E., *The school building as third teacher*, in Chapter 4 of *Children's Spaces*, de Mark Dudek, Architectural Press, Elsevier, 2005, p. 44

[9] Guvernul României, Infrastructură în Educaţie, http://sig.forhe.ro/# , accessed on 19.01.2020

[10] Tanner K.C., The influence of school architecture on academic achievement, *Journal of Educational Administration*, Vol.38, No.4, 2000, p.309-330

[11] DE-A ARHITECTURA ÎN ŞCOALA MEA, http://www.de-a-arhitectura.ro/proiecte/de-a-arhitectura-in-scoala-mea/, accesed on 04.02.2020

better school, used the quantitative analysis, and gave good results, offering a general view on what teachers from primary and secondary schools want from the physical space of their schools in Romania.

2. ARCHITECTURE AND CHILDREN

"What is architecture?
Short answer: Architecture is the built image of ourselves".[12]

The impact of built environment

First investigations on the way in which people interact with built environment started in 1950s, when several research groups studied hospital design, and in particular, the design of psychiatric units. In the following years, 1960-70, we saw the development of what was to become the environmental psychology.

The shape of the room and the height of the ceiling, the texture of walls, the hardness of surfaces, the views toward interior or exterior spaces, the sounds, air quality and temperature, the light, all these influence us more or less consciously, notes Goldhagen: *„it can even influence our feeling about who we are, of belonging or not to that place".*[13] Meyers-Levy identifies in her 2007 study the influence of the room height on the way people think. The results of the study show that where the height is greater, people feel freer and tend to make more abstract connections, whereas, where heights are less, people feel more confident and tend to look at details more concretely, which could be desirable in certain circumstances: *"... ceiling height, ..., can affect the manner in which individuals process information and thus their responses.".*[14]

Among the conclusions of the 2003 Report of Heshong Mahone Group, we find that the visual environment is particularly important for learning, that large and pleasant views, which include vegetation or human activities or far away objects support learning[15]. K.C. Tanner notes that students who attend schools with poor or badly kept exterior spaces have bad results at standard tests[16]. Positive exterior school spaces give the feeling that learning environments are in tune with nature, and encourage children to take good care of plants and animals, through vegetable gardens, birds and butterflies houses.

The 1999 Heshong Mahone Group study analysed the results of standard tests of 21 000 students, in the school year 1997-1998 in three school districts from California, Colorado and Washington. The study reveals that students attending classrooms with more natural light progressed in a school year 20% faster in mathematics and 26% faster in reading, compared with students attending classrooms with less natural light[17].

The way furniture is arranged could influence human interactions. In order to encourage contact and social interaction it is recommended to avoid placing the chairs along the walls, and

[12] Waern R., Wingardh G., *What is Architecture? And 100 Other Questions*, Publisher: Laurence King Publishing, Septembrie 2015,
[13] S. W. Goldhagen, *Welcome to your world, How the built environment shapes our lives*, Electronic Ed. Harper-Collins Publisher, 2017, p.18
[14] Meyers-Levy J., Zhu R., The influence of Ceiling Height: The Effect of Priming on the Type of Processing People Use, *Journal of Consumer Research*, Vol. 34, August 2007, p.174-186
[15] Heshong L., Heshong Mahone Group, *Windows and Classrooms: A Study of Student performance and the Indoor Environment*, Technical Report, California Energy Commission, October 2003, p.109
[16] Tanner K.C., The Influence of school architecture on academic achievement, *Journal of Education Administration*, Vol.38, No.4, 2000, p. 327,
[17] Heshong Mahone Group, *Daylighting in Schools. An investigation into the relationship between daylight and human performance*. Detailed Report. Fair Oaks, California., 1999, http://h-m-g.com/projects/daylighting/summaries%20on%20daylighting.htm , accesat la 30.01.2020,

rather arrange them in small groups in the whole room. Marx, Fuhrer and Hartig observed in a 1999 study, which involved fourth grade students that, when benches were put in a semicircle around the teacher, students participated more in the class and asked more questions[18].

Architecture – a general knowledge subject

Architecture can teach us rules for organising the space we live in, we move in, we act in, be it a house or a school, the rules we make when we built our towns and make them function. Architecture teaches us about our life in a community, about the role of the space between buildings in forging the community and social interactions. It teaches us about the relationship with natural environment and the built one, into which it fits, the specific traits of a region and the mixing of cultures, techniques to use materials and to study how they behave in time, to understand the relationship between building techniques and different cultural tendencies in different ages, the role of natural light in the way we perceive the space, the role of geometry and of proportions in drawing and building, choosing the right materials for soundproofing of buildings, and many, many other things. Architecture can not only establish concrete connections with other subjects, like mathematics, geography, history, technology, civic education, arts and music, but can be the unifying factor of all these disciplines.

Children and space exploration

The architect Cristopher Day notices that children perceive and explore the built space differently from adults, for whom, space has functions clearly defined (the living space, the bedroom, the classroom, etc.) whereas for children, a room can have five distinct places: four corners and the centre. Child eyelevel offers different perspectives than those of an adult.

Built environment and children development

David and Weinstein identity seven aspects which guide the investigation of interactions between children and built environment: 1. Built environment has both a direct impact and a symbolic one on children, 2. Children have multiple perspectives on spaces, 3. All spaces for children should contribute to the development of personal identity, to encourage the development of skills and to offer opportunities of growth, to promote a sense of security and trust, and to allow both social interaction and privacy, 4. There are substantial individual and cultural variations in using and interpreting the space, 5. Wherever possible, children should be active participants in planning and arranging the physical setting in which they live, 6. The impact of built environment should be examined in the social and cultural context, 7. Children are not the only users of the spaces intended for them[19].

Space representation and children

In 1905, Kershensteiner observed that the drawing of a house is one of the most frequently present in children drawings, after human figure and animals. [20] In their experiments, Piaget and Inhelder[21] identify a succession of stages related to age, similar to those observed by Luquet: in the first stage, up to the age of four, called *synthetic incapacity* - the child abandons his own motor activity given by rhythmical scribblings, and begins to pay attention to simple topological relations (he draws next or separately forms or imagines that he associates in his

[18] Marx A., Fuhrer U. Hartig T., *Effects of Classroom Seating Arrangements on Children's question-asking*, Learning Environments Research, Vol.2, 1999, p. 249-263, https://doi.org/10.1023/A:1009901922191, accesat la 01.02.2020

[19] David, T. G., Weinstein, C. S., *Spaces for Children*, Cap. 1 - The Built Environment and Children's Development, Plenum Press, New York, 1978, p.7-13

[20] Krampen M., *Children's Drawings. Iconic Coding of the Environment*, Springer Science+Bussiness Media, New York, 1991, p.77

[21] *Ibidem, p.39-40*

mind), the second phase, between ages of 4-8, called *intellectual realism* – is characterised by the fact that children draw all that they know, even if that couldn't be seen from a certain point of view, (for example, representing both the interior and the exterior of a house), a third phase, around the age of 8-9, called *visual realism* – because, when drawing freely, perspective, proportion and distance begin to be controlled, which means there are advanced concrete mental operations. Levinstein and Kerr observe that houses begin to be less present in children drawings between ages 12 to 14, probably due to difficulty in drawing buildings in perspective.[22]

3. SCHOOL - THE SPACE AS A YOUTH EDUCATION ENVIRONMENT

Eleanor Nicholson spent her life inspecting and supporting school communities in California, USA, and she considers the school building as a third teacher, an alliance between teachers, parents and environment.

The impact of physical environment of classroom

The study finalised in 2015, by a team led by Peter Barrett, independent researcher and Professor Emeritus at Salford University, in 27 primary schools in England, identified 7 parameters in a classroom design (out of 15 parameters analysed): light, temperature, air quality, personalisation, flexibility, complexity and colour, which, taken together, influence by 16% the students learning progress in a school year.[23] If the first three factors – light, temperature and air quality (taken in the naturalness category) influence half of this impact, the next two – personalisation and flexibility (individualisation category), are responsible for a quarter of this impact, as is the case of the last two – the adequate level of complexity and colour (stimulation category). Personalisation is an important factor in the development of individual identity and self-esteem. McMillan explains that "*intimate and personalised spaces are better for absorbing, memorizing and recalling information"*.[24] DeVries and Zan mention that *"when children feel ownership of the classroom, it appears the stage is set for cultivating feelings of responsibility.*[25] The results of the study were summarised in a guide for classroom arrangement, *Clever Classroom. Summary report of the HEAD Project*[26], intended for teachers and designers, where authors offer ideas and practical methods through which the users (teachers), could easily operate many factors, and with small changes, that cost little, could make a real difference.

School Infrastructure in Romania

In *The strategy for educational infrastructure modernization 2018-2023*, a series of strategic values are mentioned, such as, *quality learning environments*, defined as *"physical spaces which are safe, protected and adapted to the age of pupils, designed in order to facilitate teaching and learning, in tune with learning principles"* and *innovative learning spaces*, which

[22] *Ibidem,*, p.80-81

[23] Barret, P., Davies, F., Zhang, Y., Barrett, L., *The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis*, Building and Environment, Vol.89, Iunie 2015, P.118-133, https://www.sciencedirect.com/science/article/pii/S0360132315000700

[24] McMillan, D., *Classroom Spaces & Learning Places: How to Arrange Your Room for Maximum Learning*, Charthage, II: Teaching&Learning Company, Lorenz Corporation, 1997, in *Clever Classrooms*, de P. Barrett, Y. Zhang, F. Davies, L. Barrett, University of Salford, Manchester, February 2015, p.30

[25] DeVries, R., Zan, B., *Moral Classrooms, Moral Children: Creating a Constructivist Atmosphere in Early Education* (Early Childhood Education), Teachers' College Press, 31 Mai 1994, in *Clever Classrooms*, de P. Barrett, Y. Zhang, F. Davies, L. Barrett, University of Salford, Manchester, February 2015, p.30

[26] Barrett, P., Zhang, Y., Davies, F., Barrett, L., *Clever Classrooms. Summary report of the HEAD Project*, University of Salford, Manchester, February 2015, p.3

involve *"the creation of learning spaces specially designed to promote new methods of teaching and learning, including modern technologies"*[27].

Among the 16 recommendations of *The Multidimensional analysis of education and professional development from the perspective of using the data in strategic decision making regarding investment in infrastructure,* we find, in *Recommendation #8: improvement in learning conditions, including training teachers,* who could benefit from specific training, about the impact of physical environment of the classroom on teaching practices and students achievements. These training activities could highlight the importance of natural light, temperature and ventilation in supporting the learning process, but also, the way in which the classroom arrangement could facilitate group activities: *"Such training could prove of great value when the classroom infrastructure is transformed into a teaching resource"*[28].

Why should we involve users in school remodelling?

Initiatives of consulting students about the school environment became a common practice in Northern and Western Europe in the years 2000, when several discussions and debates about the Classrooms[29] and Schools for the Future[30] or Schools for the 21st Century[31] took place. Könings *et all*. find that it is more and more recognised that *"to design educational buildings – whether schools, colleges or universities – without the participation of those who will be most affected by the buildings, raises the chances of making extremely expensive mistakes in the form of buildings that are not fit for purpose, due to a lack of users perspectives informing and guiding the design process"* [32].

In the study published in 2014 by Veloso, Marques and Duarte, the authors come to the conclusion that renewing the schools has a positive impact on school community, through the development of the sense of pride and responsibility towards the school, but this change does not bring about the change in teaching-learning practices, which remain set in a traditional way[33]. The users' perception on the impact of the programme is strongly correlated with the way in which they participated in that process. It is important to define the method of participation in the school design process, not only as a consultation, but as part of discussions about models and practices of learning, to reach a common understanding between teachers and pupils about what learning is or could be[34]. The conclusion of the study is that renovation of educational spaces demands taking into account the needs and objectives of users.

4. THE SCHOOL OF MY DREAMS!

[27] *Ibidem, p. 21-22*
[28] *Ibidem, p.103*
[29] P. Chiles, *Classrooms for the Future: 'an adventure in design' and research*, Architectural Research Quarterly, Published online by Cambridge University Press: 07 September 2004, acceasat la 22.01.2020 https://www.cambridge.org/core/journals/arq-architectural-research-quarterly/article/classrooms-for-the-future-an-adventure-in-design-and-research/2FD9E5CA523BD67CC202C7470A722866 Vol.7, Nr. 3-4, September 2003, pp. 244-261 DOI: https://doi.org/10.1017/S1359135503002215
[30] OECD, *The Schooling for Tomorrow "Toolbox for forward-thinking, innovation, and school system change"*, OECD Forum on Schooling For Tomorrow, Futuroscope, Poitier, France, 12-14 February 2003, Doc. No 10,
[31] Department for Children Schools and Families, *21st Century Schools, A world-Class education for every child*, 2009
[32] K.D. KÖNINGS, C. Bovill, P. Woolner, *Towards an interdisciplinary model of practice for participatory building design in education*, European Journal of Education, Vol.52, Nr. 4, Iulie 2017, pp 306-317,
[33] L. Veloso, J. S. Marques, A. Duarte, *Changing education through earning spaces: impacts of the Portughese school buildings' renovation programme*, Cambridge Journal of Education, 2014, Vol.44, No.3, p.401-423
[34] *Ibidem, p. 418*

The purpose of this study was to find out how students in Romania are imagining their *"dream school* – "the ideal school". We thought that the best way to reach this aim was to collect drawings and written answers on postcards, on which primary, secondary and high school students in Romania gave an answer to the question *How is the school of **your** dreams?* In order to go beyond the day to day shortcomings and inconveniences, we organised a guided discussion, on the basis of pictures of unusual schools, from all over the world. We analysed 188 written and drawn answers from primary, secondary and high school students, from six schools in three Romanian towns: Timisoara, Cluj-Napoca and Bucharest.

Both the quantitative analysis of written answers and the qualitative one of drawings underline the high interest of students of all ages towards the school building and the environment around it. **None of the students wanted to abolish the school**, they wanted it to continue to exist, preferably in an ideal location (pollution free), better, more beautiful, more efficient, more adapted to the needs of its users and technological changes, with colleagues and teachers more accommodating and kind. The challenge that these students present to us is to find the solution of integrating 21st century education in school buildings and classrooms designed and built in 19th or 20th century.

Both the study of literature and this present research recommend consulting the students at every step on their school building. This consultation could have positive effects on short term at school level, for example, the growth of involvement and engagement toward the school, but could also have positive long term effects, regarding the involvement of these young people as future citizens in the modelling of the built environment of their neighbourhood and town where they live in.

5. MY DREAM CLASSROOM! DE-A ARHITECTURA IN MY SCHOOL!

> *"This is the first project in which we work together for a common goal",* Karina, 6th grade

The aim of this study was to identify a change in the attitude and behaviour of secondary school students from Fine Arts High School in Timisoara, after their involvement, on an optional basis, in their classroom refurbishment. With this pilot project *De-a arhitectura in my school! My dream classroom!*, we wanted to go further with consulting the students and to put into practice their proposals for improving a concrete space of their school, in order for it to become an example for the whole school community. Pupils from 6th and 5th year (11-13 years old) enrolled in this extracurricular project. We experienced together the necessary steps for putting their creative ideas into a project, and then for implementing that project. The project run in two stages: 1. the theoretical stage, in the second part of 2015-2016 school year, and 2. the practical stage, during the summer holiday of 2016 and the first month of 2016-2017 school year.

In the first stage, we explored the school spaces with a map in our hand, we visited classrooms and workshops, and we asked ourselves which spaces we like and which we didn't like and why. After the school exploration, we decided that the improvement of school spaces should start with their own classroom, where students spend the best part of their active time. Split into four teams, the students measured, drew, cut and glued, coloured and modelled with paper, cardboard, foil, textiles, and anything we could get our hands on, their proposal for improving the classroom. The four proposals were presented on 7th of June 2016 to the school community - colleagues, teachers, principals, who voted their preferred proposal. This presentation was also an exercise to manage emotions and express feelings.

The second stage, the building site, started with great enthusiasm on 4th of July 2016, on the first day of summer holiday. In the first three days, the whole school was full of noise of hammers, because the boys couldn't stop taking out nails from the old parquet flooring. The

girls were cleaning the walls with a brush and trowel. In the end, everybody did everything. On 3rd of November we inaugurated the classroom in the presence of principals, parents, students, colleagues, teachers, principals, parents, volunteers and sponsors.

Five months after the end of the project and the inauguration of their *Dream Classroom*, 20 students filled in the post-occupancy evaluation survey. 18 out of 20 students said they were proud of their new classroom, 7 said that the sense of responsibility of their colleagues towards the classroom increased. 17 students thought this type of project was a good example for other schools and 15 said they were ready to participate in a similar project in future.

The project *De-a arhitectura in my school! My dream classroom!*, had the effect of increasing the feeling of pride and responsibility of the students towards their classroom. This project was awarded in the section Initiatives for quality architecture in 2016 edition of BETA[35]. The involvement of students in remodelling the school spaces becomes an important means in developing the students' engagement towards their school and in testing their skills in modelling the built environment. Since 2015, 20 such projects were completed in Romania through the program *De-a arhitectura in my school*, and 5 others are on their way. Consulting students and teachers as users, **does not appear** in the 15 recommendations of the *The strategy for educational infrastructure modernization 2018-2023*, produced by Romanian Government.

6. MY SCHOOL – TOGETHER FOR A BETTER SCHOOL!

"The quality of an education system can never exceed the quality of its teachers".[36]

180 primary, secondary and high school teachers in Romania answered an online survey entitled *My School – together for a better school*, between 24th June and 15th July 2019. The online survey used in this study was adapted from the survey for teachers "*School User Survey - Improving Learning Spaces Together - 2018*"[37], produced by OECD, for its Learning Environments Evaluation Programme – LEEP.

The aim of our study was to investigate the way primary and secondary school teachers perceive the physical environment of the school, what they feel they are lacking, what they would need for it to be improved in order to support those teaching methods that should develop abilities and skills for 21 century. We wanted to know how exiting spaces were used, in relation to different teaching methods, how often do teachers use a traditional classroom or other spaces – like a collaborative teaching area, specialized workshops or informal interior or exterior areas. How comfortable are the available school spaces, from the point of view of temperature, noise and how easy is it to control these factors at classroom level. We wanted to know how easy it is to rearrange classroom furniture in order to accommodate different types of teaching and learning - frontal teaching, work in small groups, individual evaluation, collaborative workshop – teams with several teachers. How safe is the school building, where do teachers feel unsafe, and if there are spaces where they could retire to relax? If there were claustrophobic spaces, what views do windows offer, and if there were spaces where teachers could take a snack. If technology for information and communication was available, how often this type of activities

[35] B. Havași, *Proiectul „De-a arhitectura în școala mea! Clasa mea de vis!" premiat la Bienala timișoreană de arhitectură BETA!,* articol pe blogul *De-a arhitectura*, decembrie 2016, accesat la 22.01.2020 http://www.de-a-arhitectura.ro/proiectul-de-a-arhitectura-in-scoala-mea-clasa-mea-de-vis-premiat-la-bienala-timisoreana-de-arhitectura-beta/

[36] Schleicher, A., *What teachers tell us about their work*, OECD Directorate for Education and Skills, *OECD Education Today*, pagina de blog, 25 Iunie 2019, accesat la 28.01.2020 https://oecdedutoday.com/talis-teaching-learning-international-survey-oecd-teachers/

[37] OECD School User Survey: Improving Learning Spaces Together, Blyth, A., Velissaratou, J. and OECD, 2018, Paris OECD Publishing http://www.oecd.org/education/effective-learning-environments/OECD-School-User-Survey.pdf

took place and in what kind of activities this technology was used.

The majority of the answers were provided by public school teachers, from different urban or rural locations, from all over Romania, with teaching experience from 1 to 40 years. The global satisfaction of teachers ranges from 40% - satisfied, to 35,6% - neutral and 24,4% - unsatisfied. Many answers given by teachers in this survey, *My School – together for a better school,* are subjects analysed in the literature. When talking about participative design and involving as many users as possible, this consultation should be real. Adults could become jaded after so many years of unfulfilled promises. The students' participation is vital to counterbalance the teachers' conservatism. The role of architecture in education is essential in developing citizens who could contribute in a knowledgeable way to the improvement of built environment in general, and the school building in particular.

7. CONCLUSIONS

As it was mentioned in Introduction, we tried to draw a portrait of an "ideal school", as it emerges from users' opinions. The result is that the portrait of an ideal school is so complex, that it is impossible to define it for all times and all places, which means that we need to critically analyse, to research and to learn continuously. If we create an environment which is friendlier, through consulting and involving students and teachers, it would lead to better results in school. The only conclusion which is consistent throughout the study is that is necessary to involve all users in defining the brief of the project for each school, with its specificity at any given moment. Up to 10-12 years old, children's innocence is like a breath of fresh air. What a difference between the teachers' desire to have spaces for relaxation and *"my dream school has many computers and tablets. It is a school for most clever children. My school is totally different from the others, because it is out of pixels and megapixels",* as a third year child from Timisoara mentions in his reply on postcard.

In the consultation process of remodelling the school space in tune with the new demands, the role of the facilitator of different groups involved is most important. We are not aware of students and teachers being consulted in Romania in view of changing school spaces which became obsolete or unsuited for new teaching approaches. In Northern Europe in general, and in Great Britain in particular, the influence of the school and classroom environment is analysed with reference to its impact on students and teachers and academic achievement. We couldn't ignore local context, even if there was a similarity of answers that transcends borders. Therefore, the influence of school environment should be studied in each school by a multidisciplinary team, with architects, psychologists, sociologists and educational experts. *De-a arhitectura* Association developed a program for school remodelling based on students involvement. Every school can participate in this program. It could be a participatory model for improving school infrastructure in Romania, by developing the students and teachers abilities to remodel their built environment.

Personal contributions

Besides the conclusions drawn from studying the relevant literature, the personal contributions of this research are the three studies presented: *My dream school!* survey, *My dream classroom!,* post-ocupancy evaluation survey, and *My School – together for a better school,* a survey for primary and secondary school teachers. Our studies tested methods of consulting and involving students and teachers in remodelling their school, and they could serve as examples for similar

initiatives.

There are some practical instruments to be used in further studies:

1. *My dream school presentation*, in digital format, that can be updated and adapted for every school,
2. *The postcard My dream school*, with drawings and written answers, together with different instructions for age groups,
3. *School evaluation survey* – in print, for students and teachers,
4. *Post-occupancy evaluation survey*, in print, to be used after students' involvement,
5. The survey for teachers *My School – together for a better school*, which could be added to with similar surveys for secondary and high school students as well as school principal survey, on the model offered by *OECD – School User Survey*. Taken together these survays could provide valuable information at school level.

Limitations and further studies

This study is not meant as an inventory or a history of schools built in Romania over time. Also, it does not try to identify the direction that the school as an institution will take in future. The main conclusion of this study is that we cannot propose an architectural guide for the renovation of existing schools or the building of new ones. As the literature and our practical studies plainly demonstrate, each school has its own specificity, each generation of users has its own needs, which are changing and evolving more and more rapidly.

This study opens the way to new multidisciplinary research, with experts in education, psychology, sociology, architects, facilitators, school administrators, parents, that only together could design and facilitate the best practices of user consultation, at the level of each school, and who could generate useful and practical information on site and through further analysis.

Acknowledgements

My thanks go to *De-a arhitectura* Association, for their constant encouragement and support in developing the studies *My dream school!* survey, *My dream classroom!* survey, and *My School – together for a better school* survey. I want also to thank my colleagues' volunteer architects and teachers in schools involved in these studies: arch. Jan Vanko and prof. Simona Romaș, stud.arch. Simona Meszaroș, stud.arch. Denisa Bădoi and prof. Dana Boitoș, arch. Suciu Ramona and prof. Georgeta Barna, prof. Alina Iosa, from Timisoara, arch. Iulia Pătru and prof. Manuela Galea, from Cluj, arch. Mina Sava, arch. Monica Lăzărică and prof. Luminița Moise, prof. Ruxandra Cristea, prof. Maria Dinică, from Bucharest.

Special thanks are due to Mina Sava, president of *De-a arhitectura* Association, for her support in *My dream school!* study, from the beginning till the end. I want to thank the teachers and contributors from Fine Arts High School in Timisoara, for their involvement in the project: principal prof. Veronica Adorian, prof. Eugenia-Rodica Drăgoi-Banciu – project coordinator at school level, head teacher prof. Denisa Borlean, Maria-Luiza Ricman – parents' representative, prof. Anca Delia Gyemant – for post-occupancy evaluation survey, interior designer Bogdan Chisăliță, the tradesmen who gave their time freely for finishing the walls and fixing the parquet. I want to thank the sponsors who understood the educational value of this project and who helped generously with materials, money and experts.

Due to the *De-a arhitectura* network of teachers and architects, the online survey *My School – together for a better school* reached respondents all over Romania.

Special thanks are due to my research coordinator Prof.Arch. Teodor Gheorghiu PhD., and to the guidance commission: Prof. Arch. Smaranda Bica PhD., Prof.Arch. Cristian Dumitrescu PhD. and Reader Arch. Liliana Roșiu PhD. I want also to thank the members of the commission

of reviewers: Prof.Arch. Ana Maria Zahariade PhD., Reader Ramona Paloș PhD., Prof.eng. Daniel Grecea PhD. I would also thank: Prof.Arch. Augustin Ioan PhD., Reader Corina Ilin PhD., Reader Bogdan Nadolu PhD., psychologist Teona Caraiani, for their valuable comments in defining the methods of research. Last but not least I would like to thank my PhD. colleagues, my friends and family who encouraged and supported me all these years.

8. SELECTED BIBLIOGRAFY

1. Anthes E., Building Around a Mind. Brain research can help us craft spaces that relax, inspire, awaken, comfort and heal, *Scientific American*, 2009, https://faculty.biu.ac.il/~barlab/papers/media/ScientificAmerican09.pdf , accessed on 19.01.2020
2. Barret, P., Davies, F., Zhang, Y., Barrett, L., The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis, *Building and Environment*, Vol.89, June 2015, P.118-133, https://www.sciencedirect.com/science/article/pii/S0360132315000700, accessed on 19.01.2020
3. Burke, C., Grossvenor, I., *The School I'd Like, Revised. Children and Young People's Reflections on an Education for the future*, RoutledgeFalmer, Taylor & Francis Group, Second Edition, 2015,
4. Chiles, P., *The classroom as an evolving landscape*, in Chapter 6 of *Children's Spaces*, de Mark Dudek, Architectural Press, Elsevier, 2005,
5. Day C., *Environment and Children, Passive lessons from the Everyday Environment*, Architectural Press, Ed. ELSEVIER 2007,
6. Design Council, *The impact of School Environments: A literature review*, The Centre for Learning and Teaching, School of Education, Communication and Language Science, University of Newcastle, UK, 2005,
7. Dudek M., *Architecture of Schools. The New Learning Environment*, Architectural Press, 2014,
8. Eberhard, J.P., *Brain Landscape, The Coexistence of Neuroscience and Architecture*, Oxford University Press, 2009
9. Gavreliuc D., Gavreliuc A., *Școală și schimbare socială, Axiome sociale, autonomie personală și integrarea schimbării în mediul educațional românesc*, Editura Universității de Vest, Timișoara, 2012, p. 159
10. Goldhagen, S. W., *Welcome to your world, How the built environment shapes our lives*, Electronic Ed. Harper-Collins Publisher, 2017,
11. Guvernul României, Infrastructură în Educaţie, http://sig.forhe.ro/# , accessed on 19.01.2020
12. Guvernul României, Strategia de Modernizare a Infrastructurii Școlare 2018-2023, p.18 https://www.edu.ro/sites/default/files/Strategie%20SMIE%2023.04.2018.pdf , accessed on 19.01.2020
13. Krampen M., *Children's Drawings. Iconic Coding of the Environment,* Springer Science+Bussiness Media, New York, 1991,
14. Mihăescu O., *Educație prin arhitectură. Școli sustenabile în România – O abordare de proiectare bazată pe evidențe prin metoda evaluării post-ocupaționale*, coord. ştiinţific: Prof. Dr. Arh. Ana-Maria Dabija (manuscris nepublicat), Rezumat publicat, 2016, p.21
15. Nicholson E., *The school building as third teacher*, in Chapter 4 of *Children's Spaces*, de Mark Dudek, Architectural Press, Elsevier, 2005,

16. OECD, *School User Survey: Improving Learning Spaces Together*, 2018, accessed on 24.01.2020 http://www.oecd.org/education/effective-learning-environments/OECD-School-User-Survey.pdf
17. Parlamentul României, Legea Nr. 1/2011 din 5 ianuarie 2011, *Legea Educației Naționale*, Text actualizat publicat în Monitorul Oficial al României, Partea I, până la 3 aprilie 2018
18. Piaget J., Inhelder B., *La Représentation de L'espace Chez L'enfant*, Presses Universitaires de France, 1948,
19. Robinson K., L. Aronica, *Școli creative. Revoluția de la bază a învățământului*, Publica, 2015
20. Tanner K.C., The Influence of school architecture on academic achievement, *Journal of Education Administration*, Vol.38, No.4, 2000,
21. Tanner C. K., Effects of school design on students outcomes, *Journal of Educational Administration*, Vol.47, No. 3, 2009, p.381-399, doi 10.1108/09578230910955809, accessed on 30.01.2020
22. Veloso, L., Marques, J. S., Duarte, A., Changing education through learning spaces: impacts of the Portuguese school buildings' renovation programme, *Cambridge Journal of Education*, 2014, Vol.44, No.3, p.401-423
23. Wells N.M., At Home with Nature Effects of "Greenness" on Children's Cognitive Functioning, *Environment and Behaviour*, Vol. 32, No. 6, p. 775-795, November 2000, doi: 10.1177/00139160021972793, accessed on 30.01.2020
24. Woolner, P., Hall, E., Wall, K., Dennison, D., Getting together to improve the school environment: user consultation, participatory design and student voice, *Improving Schools*, SAGE Publications, Vol. 10, Number 3, November 2007, p. 233-248
25. Woolner P., *The Design of Learning Spaces*, Continuum International Publishing Group, New York, 2010, p. 39
26. Weinstein, C., The Physical Environment of the School: A Review of the Research, *Review of Educational Research*, Fall, 1979, Vol. 49, No.4, p. 577-610
27. Zhang D., Bluyssen P.M., Actions of primary school teachers to improve the indoor environmental quality of classroom in the Netherlands, *Intelligent Buildings International*, 2019 doi: 10.1080/17508975.2019.1617100, accessed on 30.01.2020