

THE STRUCTURE OF A MODERN SCHOOL – CASE STUDY

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Abstract. The aim of this article is to test and apply the developed methodology of research on the correlation between the physical learning environment and education, analysing Vilnius Geroji Viltis Progymnasium. The article analyses functional-spatial structure and usability of the selected school (applying the principles of post occupancy evaluation (POE), and analyses the school culture and the needs of school community groups, which are compared with modern Lithuanian educational goals and objectives. The functional-spatial structure of the analysed school is compared with the general school model of the 21st century formed in the author's previous research, which distinguishes 7 features of the physical learning environment that define the quality of the modern learning environment. It also examines the extent to which the current physical school environment satisfies and meets the school culture and community needs. The article provides guidelines for the implementation of the harmony of school culture (values and needs) and its physical environment, which allows each school to self-assess the physical learning environment and its cultural and 21st century school physical environment characteristics and assumptions and opportunities to meet them.

Keywords: school culture, school school culture, school architecture, general 21st century school model, school community needs, 21st century school environment characteristics, modern educational goals and objectives.

Introduction

Changing learning methods, perceptions of the relationship between the educational process and the physical environment and dependence have led to a review of current physical learning environments. The Concept of Good School (2015) states that learning outcomes and the process of achieving them are equal aspects. The concept emphasizes that the most important feature of a successful school shall be a proper implementation of the school's mission, which includes good learning outcomes and a rich, memorable, meaningful, and enjoyable life experience at school. Factors that contribute to the fulfillment of a school's mission are considered to be the learning environment, education, the school community, learning, leadership, and management. However, it is emphasized that these factors are only prerequisites for implementation of the school's mission, and the achievement of the best learning outcomes is determined by learning in different ways and organizing school activities in different ways. Thus, it can be concluded that the application of different learning methods and the organization of learning activities is not possible without development of a suit-

able physical environment, so the latter becomes no less important than the learning process itself and its results. However, it should be remembered that the learning environment and the physical learning environment are two different things. According to the Organisation for Economic Co-operation and Development [OECD] (2013), the educational environment consists of 4 parts: 1. teacher, 2. student, 3. learning content and 4. place (premises, equipment, methodological tools, etc.). The physical learning environment includes precisely that fourth part of the educational environment.

The mismatch of learning spaces not only with modern educational goals and objectives, but also with the needs of school building users is a pressing issue that is very common these days. According to Woolner and Cardellino (2021), school buildings reflect modern but not educational architecture, so schools are designed without regard to the local context and replicating the industrial classroom model. The creation (or redesign) of schools would be more beneficial if as many people from different professions and members of the school community as possible were involved in the whole design process (Woolner

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& Stadler-Altman, 2021), as they know best what these spaces should be. It is equally important to provide teachers themselves with knowledge about learning spaces and their uses (Bradbeer et al., 2019). In the Lithuanian context, the topic of the connection between school architecture and educational regulations is still poorly analyzed; therefore, the article aims to update the research regarding this connection.

Research conducted in foreign countries confirms that the physical learning environment is related to learning outcomes, and that the modern learning space has a positive impact on learners' achievements, as it facilitates learning, makes it more attractive, accessible, and enables meaningful experiences (Bakó-Biró et al., 2012; Duthilleul et al., 2018; Mäkelä, 2018; Mäkelä et al., 2014; van Merriënboer et al., 2017; Monsur, 2015; Pedro et al., 2017; de Souza & Kowaltowski, 2017; Stadler-Altman, 2015; Uline & Tschannen-Moran, 2008, etc.).

The research methodology of Vilnius general education schools was developed in order to analyze the relationship between the physical learning environment and the coherence of educational attitudes. Therefore, the aim of the article is to check, test, and apply the developed research methodology in the analysis of Vilnius Geroji Viltis Progymnasium. The following tasks are set to achieve the goal:

1. Identify school culture and the needs of community groups and compare them with modern Lithuanian educational goals and objectives;
2. To analyze the functional-spatial structure by observing the indoor and outdoor spaces of the school;
3. Analyze the extent to which the current physical environment meets school culture and the needs of community groups;
4. To compare Vilnius Geroji Viltis Progymnasium with the general school model of the 21st century, identifying how much the current physical school environment corresponds to it and what the opportunities may be to meet this objective in the future;

5. Based on the obtained results, to form guidelines for the relationship between educational provisions and the physical school environment.

The guidelines for linking educational settings and the physical space of schools created in this work form a theoretical and methodological basis for a school architecture that meets the needs of the school community.

1. Structure of school analysis

In order to analyze schools in terms of the correlation between the physical learning environment and education, a research methodology consisting of 2 stages was developed (see Figure 1).

During the first stage, the following research is carried out in a consistent manner: the school culture and needs are identified, and are then compared with the goals and objectives of 21st century education. Later, the functional-spatial structure of the school is determined, the usability of physical spaces is studied, and the level of compliance and coherence is explained in comparison with the established school culture and needs and the general model of the 21st century school.

During the first stage, the analysis of school culture was performed based on formal school records: the school's mission and vision statements, the school's strategic and action plan and, in part, school community group surveys. Many studies presenting the analysis of the physical learning environment (Sanoff, 2008; Clark et al., 2013; Cleveland & Fisher, 2014; de Souza & Kowaltowski, 2017) emphasize the importance of the post-occupancy evaluation in school buildings (POE). During the research, the methods of information collection often used during the POE process were used to analyze the needs of the school community and to analyze the functional-spatial structure of the school: excursions, observation and questionnaires. The needs of the selected school community were identified using survey, grouping, and comparison

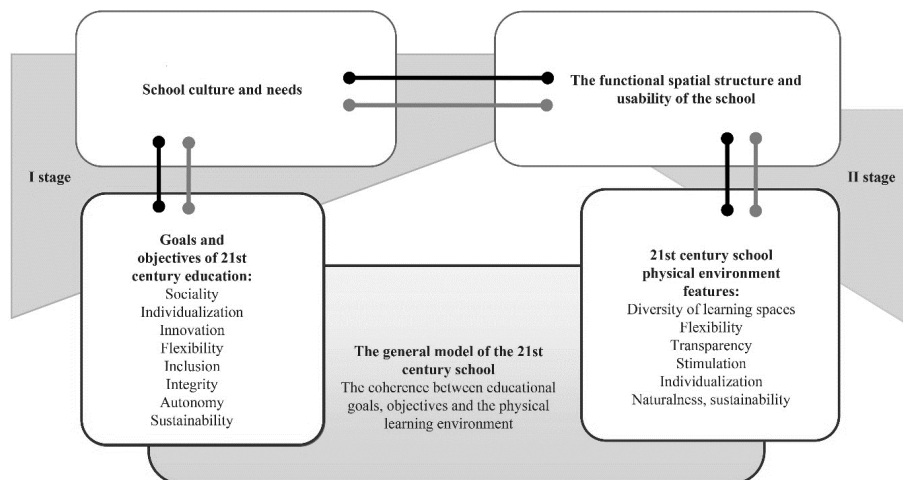


Figure 1. Structure of research on the connections between school culture and the physical learning environment

methods distinguishing the main groups: school management, teachers and students. Differentiated questions presented to school community groups were developed based on Dovey and Fisher (2014), Sanoff (2008), OECD (2013) and Duthilleul et al. (2018) questionnaires for school communities, in order to analyze the current situation of the physical environment of schools and identify directions for modernization, taking into account the needs of the school community. The prepared questionnaires were submitted to the students of grades 6–8 of Part I of the basic education program; the surveyed members of school management and teachers were randomly selected.

Using methods of observation and analysis of excursion graphic material, the physical environment of the selected school was analyzed according to the established functional characteristics of school spaces, identifying specialized and common learning (teaching) spaces, common school spaces, student aid spaces, school management and staff spaces, and other spaces. Thus, the location and distribution of these functional groups in the school territory and building are analyzed. The functional-spatial structure of the building, distribution and organization of functional zones, differentiation of spaces, interfaces, accessibility, connection of indoor and outdoor spaces, etc. are studied by analyzing school territory and building plans. Usability was investigated based on the analysis of the functional-spatial structure of schools and the results of surveys, examining the extent to which the existing physical environment of the school meets and satisfies the needs of school community groups.

During the second stage, using the comparison method, the culture and community needs of each selected school were compared with the Lithuanian 21st century educational goals and objectives, and the physical school environment was compared with the general 21st century school model, observing compliance or non-compliance. Comparison of the analyzed schools with the 21st century school environment characteristics was performed by identifying the current situation of the analyzed school, the needs of community groups, and determining the ability of the school's physical environment to meet these expectations.

The general model of the 21st century school was based on a systematic analysis of the literature in the author's previous research. Such a general model of the 21st century school includes the characteristics of a physical learning environment in line with modern educational attitudes (see Figure 2).

The general model of the 21st century school presented, regardless of the needs of each particular school, shows that modern educational goals and objectives are being implemented in every learning space in the school and school-wide setting. The diversity of spaces and their flexibility have a direct impact on modern education; they are essential features of school spaces that allow the physical learning space to be organized according to the changing needs of the school community. There are other environmental factors in the school building and throughout

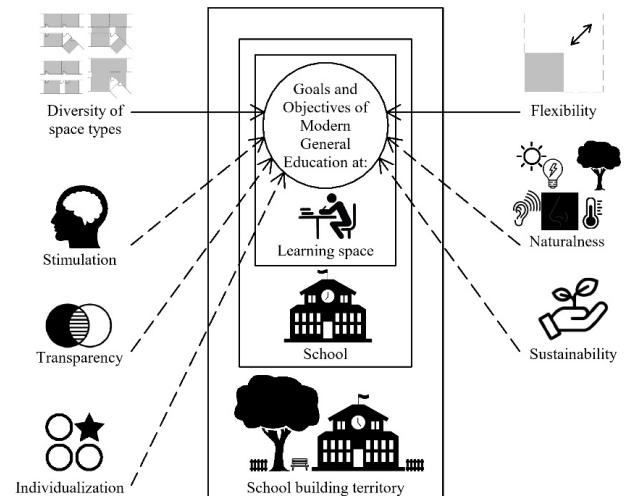


Figure 2. The general model of the 21st century school

its territory that are not directly related to pedagogy, but contribute significantly to the well-being and educational atmosphere of the school community, such as naturalness and its sustainability, stimulation, individualization, and transparency.

The school's compliance with the characteristics of the 21st century school physical environment and its potential to meet them and meet community expectations is done by analogy with the Likert scale. The structure of the scoring is as follows: fully compliant / satisfactory – 5, almost compliant / satisfactory – 4, moderately compliant / satisfactory – 3, mostly non-compliant / non-compliant – 1. This provides quantitative data for comparing and evaluating the results of the study.

In the article, Vilnius Geroji Viltis Progymnasium – a school built in 1967 according to a typical project – was chosen as the object of the investigation (see Table 1). The schools built according to this project are predominant in Lithuania, therefore it is relevant to analyze them. Lithuania has the largest number of schools with the status of a progymnasium (486 schools), therefore the school implementing the basic education program was selected for the study.

2. School culture and functional-spatial structure

School culture, according to Jucevičienė (1996), is a system of essential values that guides the organization of the school and is recognized by its members, influences their behavior, is supported by the history and myths of the organization, and manifests itself through traditions, ceremonies, rituals and symbols. School culture defines the ethos and characteristics of a school or class, the interpersonal communication, and the educational environment organized by the teacher so that it facilitates learning (Todd et al., 2019, p. 8). School culture is one of the four elements of the educational environment, alongside the physical learning environment, student motivation and behavior, and the organization of school activities (Gislason,

Table 1. Basic school information

	Address	Skroblų street 3A, Vilnius
	School activities	primary and basic education
	Number of students	639 (299 students in primary education, 340 students in basic education)
	Year of construction	1967
	Author of the project	a typical school project No. 1/4603 prepared by Gipropros
	Total area of the school	7 126 m ²
	School plot area	38 068 m ²

2015, pp. 114–115). In the author's previous studies, the systematized goals and objectives of Lithuanian modern general education were identified and presented in the table below (see Figure 3). It is the theoretical basis for creating a physical learning environment, while the needs of school community groups determine practical transformations of the physical learning environment that would meet their expectations and satisfy the pedagogics implemented in the school.

The culture of Vilnius Geroji Viltis Progymnasium is directly related to modern Lithuanian educational attitudes in the educational process and its outcomes through sociality, individualization, innovation, flexibility. It could be partly related to integrity and inclusion, but does not

emphasize the aspect of autonomy and sustainability. The school emphasizes security of the physical environment and openness to change, thus creating a distinctive, unique school culture. The needs of school community groups are related to all statements of the 21st century education, including the physical learning environment.

Geroji Viltis Progymnasium is located in a plot surrounded by multi-apartment residential buildings; therefore, it is an integral part of the apartment buildings, as if it were the center of a community. The school plot consisting of three parts is divided by the inner street of the residential quarters. In the first part of the plot there is a school building, in the second part there is a fenced basketball court, in the third part there is a fenced school stadium (see Figure 4). Such plot organization solutions cause inconveniences related to the accessibility of the stadium and basketball court and the safety of students. From south to northwest, the school is naturally separated from the surrounding area by a small slope, sustaining walls, and growing bushes. Being almost in the city center, the schools and the surrounding areas stand out for their abundant vegetation.

The school building conditionally divides the surrounding area into four parts, forming three smaller, partially closed courtyards and one larger open area, freely accessible to the surrounding community, which has the function of a transit and recreational space. To ensure the safety of the youngest students, one of the school's courtyards is fenced and has a separate entrance to the building; this yard is intended for elementary school pupils. However, this yard is full of warped paving tiles, resulting in

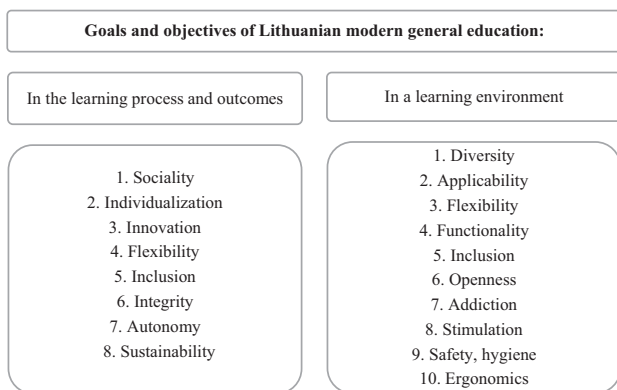


Figure 3. Systematized goals and objectives of Lithuanian modern general education

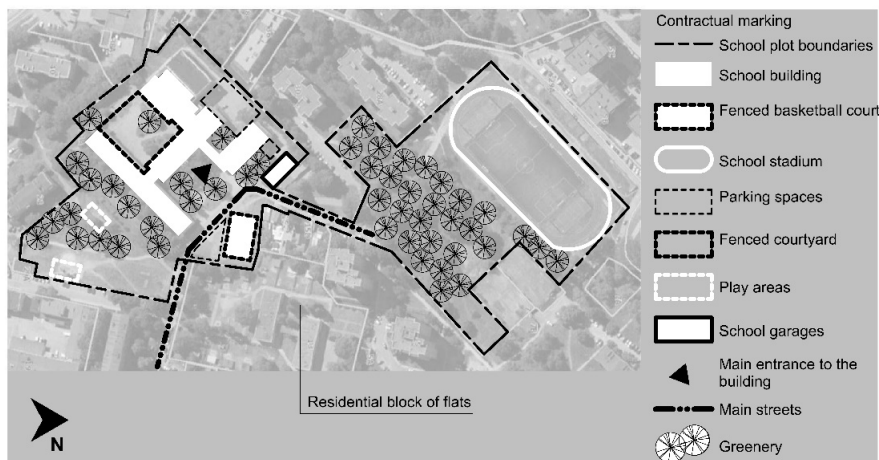


Figure 4. Vilnius Liepkalnis Basic School plan of the site (prepared by the author)

pits that lead to student insecurity. The southeast yard is a representative school space through which the main entrance leads to the inside of the school building. This yard is not separated from the street by any means or equipment. The sidewalk along the street is extended by paved paths to the main entrance to the school, so the latter creates the impression of openness to the community. However, this entrance is not distinguished by any clear visual means indicating basic access to the school, and so leads to confusion and ambiguity.

The school building is connected to the outside through two existing entrances and large school windows through which the green areas of the school are perfectly visible. The school consists of four buildings connected by corridors and a gallery (see Figure 5). Two three-floor blocks are intended for classrooms, one two-floor block is intended for a school hall and a dining room and one block – for a gym. The structure of the school building does not have a clear connection logic. Dispersedly connected rectangular blocks form long paths of student flow, long corridors. Attempts have been made to correct the unfavorable and complex structure of the flow movement with as many as 4 school entrances designed, of which only two are now commonly used. By a long and narrow gallery, the canteen and the school hall (1) block is connected to the classroom (3) block, to which the gym (2) is further connected. The classroom block (3) is connected perpendicularly through the staircase and drum to another classroom block (4).

The classroom block (3) at the connection with the gym shares the same core with the school, from which you can access the same volume of the gym, the canteen through the gallery, and the other classes on the second and third floors of the building. However, this core connects less and less space on each floor until it disappears and becomes just a spacious hall on the third floor. A corridor system of space interconnection prevails in the whole structure of

the school, but the corridors expand and become spacious halls in some places, but in the school these spaces are not used at all. All educational spaces are strictly separated and connected only through the corridor. Such a spatial structure does not provide for the diversity and different uses of learning spaces.

In the school building, the functional differentiation of spaces basically corresponds to the logic of building zoning, but it is also possible to notice random scattering of some functional groups of spaces (specialized learning rooms in the elementary education block, common school areas (museum) in the outermost corner of the block) (see Figure 6). For elementary classes, the building furthest from the main entrance to the school is used, but students of elementary classes have a separate entrance dedicated only to them, a fenced yard; their classrooms are located on two floors of the school building. School staff premises, student aid spaces, and a part of the common areas are concentrated in the central volume of the school; other common areas are conveniently located around the main entrance and are easily accessible. All student aid spaces are concentrated at a single point, on the third floor of the school building, next to a narrow corridor where students do not have the opportunity to gather during breaks, thus not interfering with the people working in the classrooms. Despite several not very convenient and logical solutions, the functional groups of school spaces are composed in an orderly, logical, and convenient way.

Noisy spaces such as sports, school halls, canteen and choreography classrooms in schools are usually grouped in separate volumes and separated from the classroom block by corridors, and the technology classroom is located at the end of one of the school blocks, near the gym, school hall and canteen. These spaces can be accessed without entering classroom blocks, giving the school community

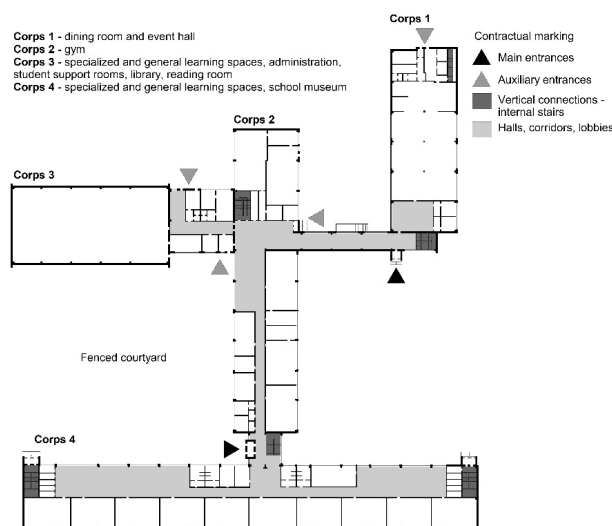


Figure 5. Structure of Vilnius Geroji Viltis Progymnasium building

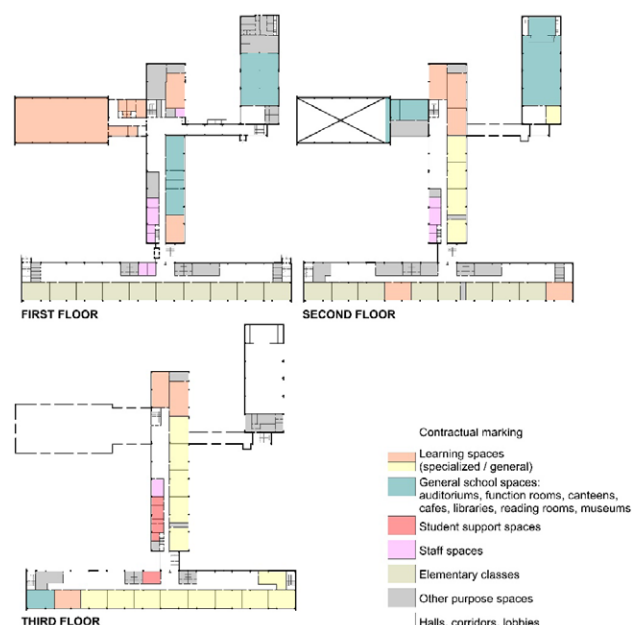


Figure 6. Location of the functional groups of Vilnius Geroji Viltis Progymnasium

the opportunity to use them unhindered even during lessons.

At school, classes are arranged on one or two sides of an extremely narrow corridor of just 2 meters width. There are four extra spacious and bright halls in the school, the size of which is equal to the size of the classrooms. These spacious areas are repeated throughout all the floors of the school building, yet they are now unused, with only a few benches and one table tennis table and a few student lockers.

3. Interface of school culture and needs with the functional-spatial structure of the building

Surveys of school management and teachers show that the compliance of the current physical school environment with the school's vision and mission is assessed only moderately. Most students appreciate the current physical environment of the school.

The current physical environment of the school only partially satisfies the school culture. The basketball court across the street from the school and the school stadium, narrow corridors, inadequately equipped indoor and outdoor spaces, which, when worn, endanger the health of the community, do not meet safety requirements. The unfenced school plot and the common school spaces easily accessible to the community guarantee the development of sociality and respect. Uniform and closed classrooms (the room enclosed by blind walls only with windows to the outside) and unused spacious halls do not encourage communication between school members, and the use of heavy, old school furniture in many classrooms hinders collaboration, the application of different forms of learning, and does not meet the individual needs of students. The latter are also dissatisfied with the school's indoor and outdoor spaces, which do not ensure flexible education and use of spaces. The school does not have innovative and diverse spaces or modern learning and work equipment that would lead to better quality education.

Vilnius Geroji Viltis Progymnasium does not adequately meet the needs of school community groups. The current school environment lacks a stimulating environment that could stimulate students' creativity. The school does not have flexible spaces, functional, interesting and

ergonomic furniture. However, there are a lot of exhibitions with students' work, and students are often involved in creating the school environment.

The progymnasium has many opportunities to develop and emphasize school values and to meet the needs of school community groups. Communication, collaboration, adaptability, diversity of spaces, and respect for each other in the school could be promoted by appropriately used spacious halls and outdoor spaces where students have a lot of activity, variety of games, openness, partnership, and are able to adapt the school spaces to the needs of the surrounding community. The large and green school territory could be used not only for active and passive recreation, but also for learning by creating outdoor classes there. In order to ensure the safety of students and maintain a balance between the school's openness to the surrounding community, transit roads in the surrounding community could be separated from student recreational areas, which would remain accessible to everyone by using various visual means (shrubs, trees, sustaining walls, swings, climbing frames, etc.) which could be separated from student recreational areas. The safety of the school would be ensured by completely renovating the indoor and outdoor spaces of the school. Flexibility, diversity of spaces, high quality learning would be ensured by flexible partitions, reorganization of spaces, connections, fencing, updated learning and work equipment such as mobile and ergonomic school furniture, and the creation of a stimulating physical environment for students.

4. The physical environment of the school and the characteristics of the school environment in the 21st century

The subsection presents the level of compliance of the current physical school environment with the seven key characteristics of the 21st century school environment. It also seeks to identify the extent to which the current physical environment of the school has the potential to cope with the 21st century school characteristics and meet the needs of the school community.

The physical learning environment of the Vilnius Geroji Viltis (see Table 2) does not correspond to the characteristics

Table 2. Correspondence of the environment of Vilnius Geroji Viltis Progymnasium to the characteristics of the physical environment of the 21st century school

Properties of the physical environment of the 21st century school	How much does the school qualify now?					What opportunities the schools have for the future?				
Diversity of types of learning spaces	1									5
Flexibility		2								5
Stimulation		2								5
Individualization			3							5
Transparency	1									5
Naturalness			3							5
Sustainability			3							5
In total	15					35				

of the physical environment typical of a 21st century school, but by substantially transforming and reorganizing spaces according to the needs of community groups, the school has a good chance of becoming a 21st century school. The aspects of the diversity and transparency of spaces are the least fulfilled in the school, the aspects of flexibility and stimulation are much more fulfilled. Most schools can be associated with the characteristics of the 21st century

school environment through individualization, naturalness and sustainability.

Figure 7 shows the guidelines for the implementation of the links between the culture and the physical education environment of Lithuanian general education schools. These guidelines can be used to create 21st century educational settings and educational spaces that meet the needs of the school community.

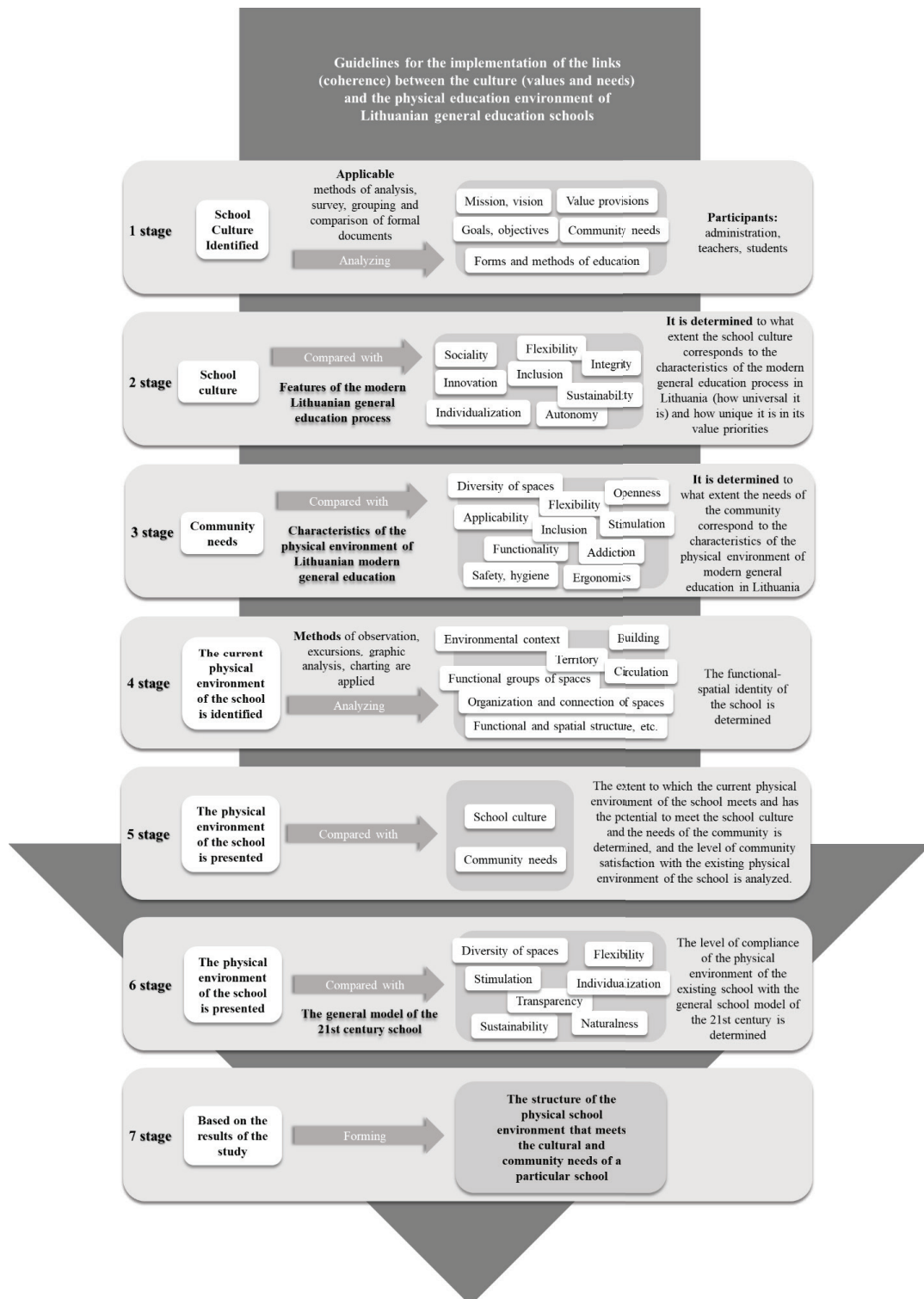


Figure 7. Guidelines for the implementation of the links between the culture and the physical education environment of Lithuanian general education schools

5. Discussion

The article analyzes the architecture of schools, the functional spatial structure of schools and their artistic expression as a derivative of educational regulations, all of which have received little attention in Lithuania so far. Based on the results of the analysis of systematic literature sources obtained in the author's previous research, the general 21st century school model shows the principal structure and essential features of the physical learning environment that corresponds to and stimulates modern education. The developed research methodology presented in the article and its application in educational practice could lead to the creation of a more effective physical learning environment, which would ensure more effective education. Guidelines for the implementation of the harmony of school culture and physical environment could activate the correlation between pedagogy and the physical environment by supporting it in Lithuanian general education schools, and by encouraging self-evaluation of schools according to the established factors determining the quality of the physical learning environment. In order for the research to be objective and comprehensive, it is important to involve as many stakeholders as possible in the research process by applying the developed research methodology: educators, pedagogues, members of the school community of sociologists, architects. In order to provide accurate questions that leave no room for interpretation, it is recommended that questionnaires prepared for school communities be submitted to sociologists for approval.

Conclusions

The research of Vilnius Geroji Viltis Progymnasium has shown that a developed research methodology helps to identify the needs of school culture and the community group within the environs, allows for assessing the compliance of the existing physical school environment with community expectations, as well as creates preconditions for the transformation of the current physical school environment guidelines and a school that fits the model.

Based on the results obtained in the study, the following are guidelines for the implementation of the links between Lithuanian general education school culture and the physical education environment (see Figure 7). They indicate the processes (tasks, stages, actions, results) on how to achieve coherence between education and school architecture, which determines the school culture and the therefore effective physical learning environment that meets the needs of the learning community:

1. School culture is identified (by analyzing the school's mission, vision, goals, objectives, values, applied educational methods) and the needs of the school community;
2. The identified school culture is compared with the characteristics of the learning process corresponding to the goals and objectives of modern general education in Lithuania, in order to meet the level of compliance;

3. The identified needs of the school community are compared with the characteristics of the physical environment corresponding to the goals and objectives of modern general education in Lithuania, analyzing the level of compliance;
4. The structure of the existing physical environment of the school is determined by (surrounding context, school territory, building, functional structure, groups of school functional spaces, structure of spaces, spatial structure, organization and connection of spaces, circulation of flows, etc.);
5. The structure of the school's existing physical environment is compared to the school's culture and community needs by analyzing the level of compliance and satisfaction;
6. The structure of the school's current physical environment is compared to the general school model of the 21st century, analyzing the level of compliance;
7. Based on the results of the research, a model of a physical learning environment that meets the needs of the culture and community of a particular school is formed.

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