

FUNCTIONAL IMPLICATIONS OF THE ELEMENTARY SCHOOLS ARCHITECTONIC PLAN FORM

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Abstract. *A comprehensive analysis of complex factors affecting the contemporary approach in the process of planning and organization of elementary schools particularly addresses the issue of form of the architectonic plan, as one of the indicators of functional quality accomplishment*

According to the defined set of criteria in the field of functional requirements, two basic forms of the architectonic plan typology have been evaluated – a compact and developed. The obtained results indicated the advantages and limitations, both in application of the compact and the developed architectonic plan. On the basis of the comparative analysis of the determined functional implications, it was concluded that a compact architectonic plan of an elementary school is a design providing a wider range of qualitative potentials.

Key words: *function, space, architectonic plan, elementary school.*

1. INTRODUCTION

For better understanding of the spatial relationship of different pedagogic facilities in elementary schools, it is necessary to view the planned areas from the aspect of their function within variously conceived forms of architectonic plan. On this basis, the structures of spatial relationship of the dominant facilities may exhibit different and specific functional characteristics of the teaching areas, depending the fact whether the position of certain facilities, that is, the manner of their grouping and interlinking has been accomplished in the:

- compact form of the architectonic plan,
- developed form of the architectonic plan.

Apart from facilitating specific organizational forms of the teaching area, the level of development of the architectonic design of an elementary school can, to a considerable degree, determine the functionality of the spatial plan, as well as the plan's transparency and adaptability of the architectonic bulk to future changes.

In respect to a variety of influential factors, each of the basic form of an elementary school architectonic plan exhibits certain functional values.

2. SPECIFICS OF CONTEMPORARY FUNCTIONAL ORGANIZATION OF ELEMENTARY SCHOOLS

In the case of an elementary school, as a specific type of building, it is necessary to prioritize the contemporary pedagogical methods in organization of educational process out of the vast complex of influential factors which may, to a smaller or larger degree, predetermine the functional model of an architectonic structure.

The contemporary pedagogical patterns require essential transformation of pupils from objects of education to subjects of education, starting from those organizational forms whose focus will be in accordance with the individual abilities, that is, age and development characteristics and needs and interests of the pupils, ending with the diverse social forms of pedagogical work, which can, as N. Havelka claims, *"proceed along several lines, several working stations, whose results become integrated into a unified individual or common, group production"* [3]– individual or group reports, concrete results, additional interpretations, supplements of reports, closing discussion.

Accordingly, one of the primary roles in conceptualization of architectonic design of elementary schools is to enable the schools to support a multitude of contemporary pedagogical patterns, creating in this way conditions for development and shaping of a wide range of pedagogical methods.

Therefore, spatial-functional levels in the school environment are realized within multiple relations:

- pedagogical at the relation teacher – pupil/pupils and
- social at the relation pupil/pupils – pupil/pupils.

It is the functional quality of an elementary school architectonic plan itself, that can be observed as an intermediary element in the complex forms of pedagogical communication and social interaction, between the demands of programs, teachers, pedagogical methods and pupils.

In this context, while conceiving architectonic organization of contemporary elementary school, it is necessary to form a space which would represent a framework for uninterrupted progress of a contemporary pedagogical process. The goal is "to create a dynamic and variable learning environment appropriate for the children's individual interest, development level and programs" [5]. This area should be dynamic, alterable and flexible, and to equally serve pedagogical, cognitive, but also free, individual activities of the pupils. In the process, such spatial relationships should be provided, so as to give the pupils choice, both in choosing the pedagogical activities or some other forms of their engagement.

The social aspect of the elementary school area must be pointed out. By its structure, form and volumetry of immediate physical environment, it is necessary to create conditions for the pupils to express their orientation and attitude towards their immediate social environment, through their behavior in space. It is necessary to plan a space allowing a higher degree of privacy in specific zones, and which, by its structure, provides an adequate visual communication between users.

Flexibility of the elementary schools area is a very important requirement, as, apart from the provision of a flexible structure of the very teaching area, its flexibility towards other complementary facilities should be provided. In doing this, one should anticipate the development of the pedagogical process in the future, and allow for an easy transformation of space thus facilitating new phenomena and methods in the pedagogical activities organization.

As the contemporary school attempts to establish a multidisciplinary pedagogical environment where various levels of pedagogical communication can be accomplished, it requires flexibility, not only in the spatial, but also in the temporal sense. It is a tendency that the physiognomy of architectonic concepts of elementary schools is not only in function of the present day pedagogical processes, but also of the future ones.

3. FUNCTIONAL ANALYSIS CRITERIA

In the process of planning and organization of an elementary school, the choice of one of the mentioned forms of architectural plan depends on a large number of relevant factors resulting from the mutual relationship of functional requirements. These factors may be identified through a number of criteria on whose bases it could be possible to evaluate and select the optimal form of an architectonic plan in respect to the defined context.

Functional implications of developing and formation of elementary school architectonic plan are directly determined by spatial characteristics of a program-defined functional range of pedagogical facilities. Accordingly, it is possible to observe and qualitatively assess an elementary school architectonic plan on the basis of the criteria referring to:

- flexibility and transformability of formed space
- potential for mutual differentiation of certain functions
- potential of extension of the physical structure with new, complementary facilities
- rationality of design
- links of the teaching facilities to the immediate environment
- potential of using certain facilities independently from the school working regime
- open view of the area and course of movement in it.

Flexibility and transformability of the elementary school area are an important precondition for the contemporary pedagogical process. Spatial connecting of complementary functions occurs as result of not only one pedagogic activity requirement, but also for some other activities.

Apart from connecting, in some cases there is a need for functional differentiation of space. The need for differentiation may arise from the varied age of the pupils or diversity of programs.

If a need for expansion of school should occur, the form of its architectural plan can to a great extent suggest potential and manner of its extension.

It is important to stress that the pedestrian pathways are mostly rational, so very often the shortest paths to a certain function are selected. Considering the functional requirements, the maximum permissible distances, as well as other influential factors, it is necessary to plan the optimum design that will place all the users of the school space in an equal position.

Rationality of an architectural design can be viewed through the surface area intended for horizontal and vertical communication and the total surface area of the structure. The form of the architectural plan can significantly affect the layout, required length and thus surface area of the communications.

The contemporary teaching concept and the need for creation of a flexible space determine the need for connecting the teaching facilities with their immediate environment, both external (connection with the natural environment, summer classrooms) or internal environment (surrounding social and teaching facilities).

There is often the need for using certain school facilities, mostly social in character, by the local community. Their disposition within the architectonic plan and its form itself may facilitate or aggravate the ease of use, irrespective of the working regime of the school structure.

Open view of the internal space and clearly defined and viewable communication are a significant factor determining the functional quality of an architectonic design and provides an easy usage of the building for the users. In this sense one must particularly stress the potential of establishing a desirable visual link with the surrounding, internal or external space.

4. ARCHITECTONIC PLAN FORM ANALYSIS

In the general case, each organizational form of architectonic plan must be in the function of the universal development of the pupils. By consistently observing the contemporary pedagogical requirements, simultaneously, in every architectonic concept, individual differentiating characteristics can be expressed, thus predetermining the interior and exterior functionality of an elementary school.

On the basis of the adopted criteria, it is necessary to perform an analysis and valorization of two basic typological forms of the elementary school architectonic plan – the compact and the developed ones.

4.1. Compact architectonic plan form

In the compact architectonic plan form, the internal character of multi-purpose usage of space prevails. Transparency of the elementary school architectonic plan is necessary in terms of acceptance of new organizational-pedagogic innovations (pedagogical methods and sources, working approaches...), and their projections in the existing spatial framework.

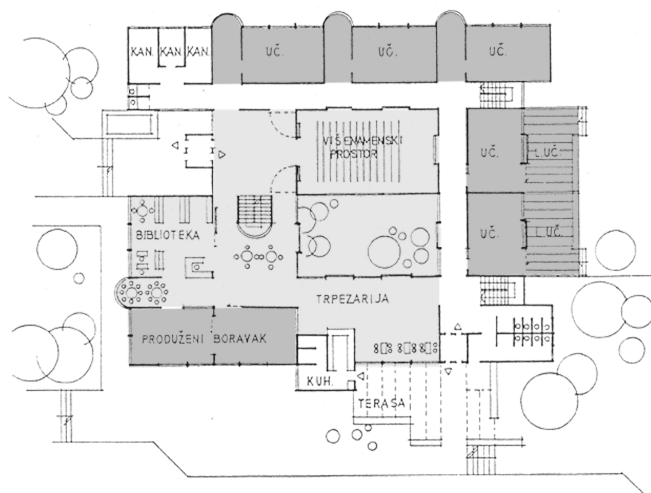


Fig. 1 Elementary School, Zaječar, Serbia, M. Anđelković

An important characteristic of the compact form is the total connectedness of complementary teaching areas and the potential of their integration into a single area. Owing to this, in such form, it is possible to create much more flexible architectonic models than in the developed form. High degree of flexibility of this form, when spatial transformation is required, is contributed by the continuity of teaching and social units. Such dispositions, in the conditions of potential association of teaching units to the variable zone of social functions makes possible creation of spatial structure with the optimal degree of flexibility. Simultaneously, the high level of physical diversity provides the pupils a sort of support in promoting various levels of interaction.

The compact architectonic plan form provides only partial pedagogical differentiation to the various age categories of pupils. In the process, a fairly equal position of teaching units designed for different ages is accomplished, as well as specific zoning, according to the type of activity.

In its nature, the compact form is introvert, and its variability in terms of extension of the structure is lower than that of the developed form. It is a very complex problem to extend such a building in a way which would not be detrimental or disruptive for its physiognomy, at the same time making the extension equal to the already existing units, both in terms their quality and in terms of their position in respect to other units.

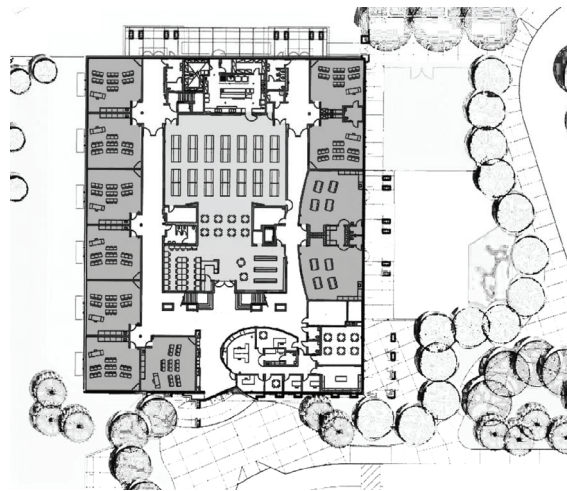


Fig. 2 Richards Ranch Elementary School, Lodi, California, USA 2004
Rainforth Grau Architects

A more compact type of grouping of the spatial units, reduces the need to design long communication corridors.

In such form, there is an expressed potential for connecting the teaching units with the immediate internal surrounding. However, connecting the facilities with the exterior natural environment, and such connections can be established only to a certain, limited degree.

The compact form suggests an introvert character of the building. High level of flexibility hinders functional differentiation of certain facilities, and their usage irrespective of the working regime of the school, so it can be said that from this aspect, the compact design is relatively disadvantageous.

Degree of visual overview of the space and course of movement in it is very high in such designs. They are characterized by the organization of the spatial course providing an appropriate visual communication between users.

4.2. Developed architectonic plan form

The developed architectonic designs are most suitable for those needs where there is a clearly divided position of individual pedagogical facilities in the elementary school spatial structure. The external character of multi-purpose usage prevails in such spaces. Apart from the fact that it must be in the function of the requirements of the universal development of the pupils by its overall organizational form, the quality of the developed architectonic design can particularly be prominent on the exterior of the elementary school, making it stand out as a socio cultural source for the needs of the local community.



Fig. 3 Heinz Galinski School, Berlin, Germany, 1995
Arch. Zvi Hecker

Functional quality of school in the spatial constellation defined in this way is the expression of individually shaped physical structures of pedagogical facilities. The composition of the interior space of a school is most frequently contributed by the linear arrangement and mutual interlocking of teaching units, as opposed to the social and other accompanying functions.

From the aspect of internal flexibility of the school area, such designs may be considered unfavorable. The developed form reduces the potential to establish spatial and functional connections between the teaching and social units. The potential of a wider mutual combining and connecting of social and teaching functions is minimal.

Implementation of the developed form is more corresponding to the pedagogical concept of differentiation in respect to the age and developmental characteristics of the pupils. The physical conditions for accomplishment of various levels of interaction between the participants of the education process are reduced to small zones within the school area, that is, to the relatively independent spatial frameworks of pedagogical facilities. The potential for differentiation and subdivision of individual functions is prominent, as well as the spatial-functional pedagogical differentiation of the younger from the older pupils.



Fig. 4 William A. Diggs Elementary School, Waldorf, Maryland,
SAD, 2006, Arch. SHW Group LLP

The developed form of the architectonic plan enables a relatively easy expansion of the structure with no significant disruption of its physiognomy. In this, it is possible to render the expanded area equal to the already existing one.

High capacity of such structures contributes to the development of long communication and the more complex spatial linking of individual facilities, so such solution can be considered less rational than the compact one.

While the potential for internal flexibility and connecting of the teaching units with their internal environment is reduced, the potential for establishment of stronger functional and visual connections with the exterior environment becomes more prominent. The accent is on the harmonized connection of the teaching units with the exterior, with the natural environment.

The quality of the developed architectonic design is reflected in the potential for total separation of the internal communication network from the external entranceways which would be used irrespective to the school working regime. The prominent differentiation of pedagogical facilities enables their fully autonomous service.

The developed form aggravates establishment of clear visual links inside the structure. Open view of the internal space and communication course is much lower than that of the compact plans.

5. CONCLUSION

The influential factors from the range of functional requirements, at the lower levels primarily determine the structure of the spatial relationship of individual facilities, while at the higher levels predetermine the architectonic design of the entire elementary school. In the case of elementary schools, the form of the architectonic plan has direct functional implications, whose values define the organizational-pedagogical quality of school environment.

Therefore, functional implications of a compact architectonic plan exhibit special quality in terms of flexibility and transformability of the created space, open view of the

space and communication paths inside it, and rationality of the design. As for other criteria, such form architectonic plan represents a correct design.

Positive functional implications of a developed architectonic plan, regarding the potential for differentiation of individual functions, extension of the physical structure with new programs and usage of certain facilities independently from the school working regime. In terms of the criteria comprising flexibility and transformability of the created space, open view of the space and movement courses, the design is unfavorable, particularly in cases when the schools have a high capacity.

In both cases, there is an optimal possibility of connecting of teaching facilities with the immediate environment. According to this criteria, functional qualities in compact solution were expressed in the interior, while in the developed design they are reflected in the harmonized connection with the external environment.

Comparative analysis of functional implications of these two basic typologic forms of the architectonic plan suggests a conclusion that in terms of the qualitative requirements, that is in terms of providing the adequate organizational-pedagogical qualities of the school environment, it is possible to give advantage to the compact architectonic plan of elementary schools. Yet, in each individual design case, certain functional qualities and advantages of application of developed architectonic forms should not be neglected.

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FUNKCIONALNE IMPLIKACIJE FORME ARHITEKTONSKOG PLANA KOD OSNOVNIH ŠKOLA

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Sveobuhvatno sagledavanje kompleksnih faktora koji utiču na savremeni pristup u procesu planiranja i organizacije osnovnih škola posebno izdvaja pitanje forme arhitektonskog plana, kao jednog od indikatora za ostvarenje funkcionalnog kvaliteta.

Prema definisanom skupu kriterijuma iz opsega funkcionalnih zahteva, vrednovane su dve osnovne tipološke forme arhitektonskog plana, kompaktna i razučena. Dobijeni rezultati ukazali su na prednosti i ograničenja, kako u primeni kompaktnog, tako i u slučaju razučenog arhitektonskog plana. Na osnovu komparativne analize utvrđenih funkcionalnih implikacija, zaključeno je da kompaktan arhitektonski plan osnovne škole predstavlja rešenje koje obezbeđuje širi okvir kvalitativnih predispozicija.

Ključne reči: *funkcija, prostor, arhitektonski plan, osnovna škola*