

PHYSICAL ENVIRONMENT FACTORS AND THEIR IMPACT ON THE COGNITIVE PROCESS AND SOCIAL BEHAVIOR OF CHILDREN IN THE PRESCHOOL FACILITIES

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Abstract. *The problem researched in this paper refers to the promotion of the evaluation system in the designing of the pre-school facilities, and the issue is approached from the pshychological aspect, in order to investigate the potential for improvement of this kind of structures.*

In the paper, the systematization of the physical environment factors and their influence on the cognitive processes and the social behavior of children in the pre-school facilities. The conclusion is that the quality of architectonic design, that is, the quality of organization and materialization of the designed physical environment of the pre-school premises correlates with the positive developmental results of the children.

Key words: *child, physical environment, quality, pre-school facility*

1. INTRODUCTION

The knowledge about the ways the pre-school education and the children staying in the pre-school facilities affect their development, and about the results of this influence, is of high importance for the professional and scientific public, and for the society as a whole.

Although the care of the children outside the home environment, could allow for some negative effects, the results of research in this field reveal that in the majority of cases, there has been improvement in the cognitive, social and emotional development of the children. It has been determined that the developmental results of children occurred as a consequence of the *quality* of the time spent in the pre-school education facilities and their programs.

The usually accepted definition of *quality* in the pre-school education, is that those are the potentials and characteristics of the entire pre-school environment which formulate the developmental needs of the children (Australian Early Childhood Association, 1996.).

However, in the majority of research and the relevant literature, the *quality* of the pre-school education, that is, the *quality* of children care is the term referring to the social environment and organization of the environment. As for the influence of the designed premises and the physical environment, even the earlier psychological research in this field indicated that the designed physical environment in the pre-school facilities, too, affects the development of the children and their behavior.

While the primary parameters of the *total quality* of care of the pre-school children refers primarily to the number of the children and their interaction with the adults, it is well known that a higher quality of pre-school education is accomplished, especially in the social and cognitive domain, in the circumstances where the appropriate design procedure has been applied as well as the appropriate architectonic organization and materialization of space.

The *quality* of pre-school education, therefore, in one part refers to the *quality* of architectonic design, that is the *quality* of organization and materialization of the designed physical environment of pre-school premises.

2. PHYSICAL ENVIRONMENT FACTORS AND THEIR IMPACT ON THE COGNITIVE PROCESS AND SOCIAL BEHAVIOR OF CHILDREN IN THE PRE-SCHOOL FACILITIES

Among the physical environment factors, two groups of factors have been researched and recorded:

- A - social groups of factors which refer to the general characteristics of the pre-school facility and the premises for children stay, with the stress on the
 - Size of the facility and number of children, as well as on
 - The Personnel and system of operation, then
- B - architectonic-constructive groups of factors referring to the ambience and functional characteristics of the pre-school structures, such
 - as technical characteristics of space, and
 - organization of space.

The following results of research of the influence of the social group of factors (A) of the physical environment of the pre-school facilities on the cognitive processes and the social behavior of the children can be emphasized

The size of the facility and the number of children.

- The total size of the facility is a good indication of quality, where *smaller* facilities offer better conditions for children development.
- The optimal size of the facility in respect to the number of children attending it is 60-75 children, which is best both to the development of the children and the quality of personnel performance.
- As for the size of group in respect to the number of children, the best organized are the *groups with the small number of children*, that is, with less than 14 children. In such groups the children demonstrate more initiative and more concentration on the tasks. These results on the other hand directly affect the defining of the size of all the spaces for the children in the structure, and especially of the daily activities premises (Fig. 1).



Fig. 1. The Little School in San Francisco, Mark Horton



Fig.2. Kindergarten in Bad Neuenahr, Hans Jurgen

- By defining the total number of children in the structure, size of the group and the number of children with whom an individual person works, the parameters for definition of the certain spatial relationships in the organization of the structure are obtained.
- Density, that is number of children within a space, has strong impact on the social behavior, in the way that *the higher density leads to the more aggressive and destructive behavior*, and its impact on the social and intellectual abilities and accomplishments is smaller.

Education personnel and working system

- The Open educational system, in the correlation with the clearly defined activities and the corresponding arrangement of the environment, amplify the *increased interest and effort* of the children.
- *The cooperative behavior* of the children is more pronounced in the conditions when the personnel work in the open educational system and with the spatially defined activities and arrangement (Fig. 2).
- *The education personnel is more involved in the work with the children*, and in a more active way, through the participation in the tasks and by giving support, when the space has defined "pockets" for certain activities, as opposed to observation and control of the children which are prevalent behavior in other cases.



Fig. 3. Kindergarten St. Anton in Arlberg, Karl Gitterle

Among the results of the research about the impact of the architectonic-constructive groups of factors (B) of the pre-school facilities on the cognitive processes and the social behavior of the children, the following ones can be emphasized:

Technical characteristics of the space

- The technical characteristics of the structure and the space where the children stay, such as *acoustics, optimal microclimatic comfort, good illumination, non-slippery floor surfaces, pleasant texture of the wall faces and the usage of warm color*, stand in correlation with the positive results at children (Fig. 3).
- High level of *noise in the space* which cannot be avoided, negatively affects the children development and cognitive processes.
- Strong influence of the *external noise*, such as the from the proximity of highway, airport, or other constant sources decrease the potential of understanding what has been said or read by the personnel and further completion of certain tasks.

Spatial organization

- *An option for a child to retire from the intensive stimulation into a special room or part of the space*, for which the terms "stimulation shelter" and "retirement space" or "sanctuary" have been used, is an important precondition for the later development and cognitive processes (Fig. 4).



Fig. 4. De Koperwiek Preschool, Vento, Holland, Herman Hertzberger

- *Effort and concentration of children on the certain tasks* are more present in the spaces with the well defined activities and the appropriate arrangement of the environment which comprises a defined manner of behavior, than in the poor spaces of undefined arrangement.
- A higher level of *inquiring spirit* is in the direct connection with the degree of spatial definition of the certain activities and it is present in the spaces where this definition is accomplished more successfully.
- When the "pockets" as the parts of the space organized for the individual activities are clearly defined and well equipped, the children are more *independently engaged*, without the intervention of the educational personnel, while this intervention is required where the space is poorly defined and equipped (Fig. 5).



Fig. 5. Kindergarten in Frankfurt-Grisheimu, Funk & Schroder

- *The highest level of social interaction*, and significantly higher positive interaction, such as cooperation and sensitivity in comparison to the strong competitive feeling and aggressiveness are more present in the clearly defined and well equipped spaces for the individual activities than in the poorly defined and arranged spaces.
- The optimal layout of the structure is the modified open plan meaning that the space is organized of the units of various size for certain activities, open enough to offer children diverse the potential for playing, while on the other hand offering sufficient enclosed space where the children would feel protected from noise and visual distractions. In such facilities, there are more possible varieties of environment at children's disposal, allowing children to move and *take part in more varied activities throughout a day*, than in the absolutely open plan facilities or closed plane facilities.
- In the modified open plan, *the children are organized in smaller groups*.
- *The participation in the cognitive oriented activities* is more pronounced and the children are more interested for them when they are in the modified open plan facilities. In the absolutely open plan facilities, the children behavior is arbitrary, and

they randomly take part in the certain activities which cannot keep their attention, while in the facilities with the closed plan the transitional type of behavior is dominant and the children move between the activities..

- *The children themselves initiate certain kind of activities and behavior*, and simultaneously more intensively express an inquiring spirit in the modified open plan facilities than in the spaces organized differently.

3. CONCLUSION

The potentials and characteristics of the entire pre-school environment which formulate the developmental needs of the children as the definition of *quality* in the pre-school education, refer in one part to the *quality* of architectonic design, that is, the *quality* of organization and materialization of the designed physical environment of pre-school premises.

The analysis of the physical environment factors in the pre-school facilities which are significant for the development of cognitive processes and the social behavior of the children indicated that one hand, there are the social group of factors (the size of the facility and the number of children, instructors and the working system) and the group of architectonic-constructive factors (technical characteristics and organization of space).

The analysis of the impact of the social factors group, demonstrated that the smaller facilities and smaller number of children in the groups offer better conditions for the children development and for the quality work of the personnel, while the greater number of children leads to the more aggressive and destructive behavior, and that the open educational systems amplify the increased interest and effort as well as the cooperation shown by the children.

The analysis of the technical characteristics of the structure and the space where the children stay, such as acoustics, optimal microclimatic comfort, good illumination, non-slippery floor surfaces, pleasant texture of the wall faces and the usage of warm colors, have proved that they stand in correlation with the positive results at children while the internal and external noise negatively affect the cognitive processes. An option for a child to retire from the area of intensive stimulation into a separate room or space, is an important precondition for subsequent development of children and their cognitive processes. Then clearly defined and well equipped spaces for certain activities offer better conditions for an increased engagement and concentration of children on the certain tasks, also offer conditions for expressing and inquiring spirit of the children, as well as an independent activity and higher level of social interaction. The space organized along the principle of the modified open plan crates the environment for the participation of children in several diverse activities in a day, organizing in small groups, participation in the cognitive oriented activities, and potential that the children themselves initiate certain sorts of activities and behavior and at the same time express an inquiring and exploratory spirit.

Therefore, the causal relations of architectonic design – ambience quality factors in the pre-school facilities, are an important starting point in defining the physical environment where the children stay, and which is significant for the development of the cognitive processes and social behavior of children.

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FAKTORI FIZIČKE SREDINE I NJIHOV UTICAJ NA SAZNAJNE PROCESE I SOCIJALNO PONAŠANJE DECE U PREDŠKOLSKIM USTANOVAMA

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Problem koji se istražuje u ovom radu odnosi se na uspostavljanje sistema vrednovanja u projektovanju dečjih predškolskih ustanova sa psihološkog aspekta, sa ciljem da se istraže mogućnosti za unaprđenje ove vrste objekata.

U radu je izvršena sistematizacija faktora fizičke sredine i njihovih uticaja na saznajne procese i socijalno ponašanje dece u predškolskim ustanovama. Zaključeno je da je kvalitet arhitektonskog projektovanja, odnosno kvalitet organizacije i materijalizacije projektovane fizičke sredine predškolskih prostora u korelaciji sa pozitivnim razvojnim rezultatima kod dece.