

FUNCTION AND ORGANIZATION OF CHILDREN PLAYGROUNDS IN THE HOUSING ESTATES

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Branislava Stoiljković

University of Niš, Faculty of Civil Engineering and Architecture, Serbia

Abstract. *Playing is extremely important for the physical and mental health of children. As the outdoors playing is especially important, playgrounds, as the most favorable form of open spaces for children's playing, are of immense significance and they are necessary in the housing districts. Children need the playgrounds which challenge their faculties and capabilities and offer the possibility to develop the new ones. Planning and designing of children playgrounds should be performed by the teams of experts, which will honor in the process the numerous standards, recommendations and requirements which determine the location, quality and appearance of the equipment, arrangement of the equipment, kind of material used for the protective surfacing etc.*

Key words: *children, playgrounds, housing estates, designing, equipment*

1. THE SIGNIFICANCE OF PLAYING IN THE DEVELOPMENT OF CHILDREN

Human need to be active, to activate his muscles, to move and perform movements – is very expressed in the period of intensive development of organism, so it is very prominent in children. Playing, is considered by many authors, a basic activity for almost all later learning. The research showed that the play is essential, not only for the physical, but also for the mental health. Playing improves the development of social, emotional and cognitive abilities in children. Pedagogues emphasize the special importance of outdoors playing for children. It offers opportunities for a wider range of games than it is possible indoors: running, bicycle riding, climbing, and interaction with nature.

The change of living conditions in the modern world caused the reduction of children playground space. For the majority urban children, going out into the streets entails numerous dangers, so it is understandable that the parents encourage them to play within houses. In the conditions of collective dwelling, children stay in the open more rarely and shortly. A residence is, primarily because it is a closed space, not a particularly favorable

location for children's playing. The playgrounds are the most favorable form of open spaces for children's playing and that is why they are extremely important and necessary in the housing estates.

2. TYPES OF PLAYGROUNDS

There are three main types of playground: traditional, modern and creative type [11].

The traditional type of playgrounds is the most widespread and it comprises swings, seesaws, slides and other standard equipment. They satisfy the need for physical activity, but do not offer many opportunities for cognitive and social development. These playgrounds limit, to an extent, the potential for outdoors playing and so direct the children's attention and activities to the standard equipment, which deprive the children of the right to explore the natural environment.

The modern type contains the so called composite play structure which comprises various apparatuses and types of equipment inter-connected in a way that they form a unity (superstructure). They are not numerous and expensive. Children love them more than the traditional ones, because they are more interesting and challenging. Also, they promote the educational forms of playing.

The creative (adventurous or exploratory) type comprises various materials—sand, water, vegetation, junk etc. This variety of elements offers a potential for the playing which promotes creativity, exploration, manipulation with different materials. Such playgrounds enable the children to form their own playing objects, and provide a great flexibility in that. They stimulate cognitive, physical and psychical development. The spaces are informal and natural in the playgrounds like this, so they stimulate a high quality of unimpaired playing and exploratory learning.

When designing a playground and choosing a certain type, one should have in mind that children need different potentials for playing and most varied forms of animation so that they could satisfy their social, intellectual and physical needs. Also, different difficulty levels ought to be provided so that children can choose which goals they wish to aspire to and what challenges and excitements they are ready to take. That is why the combined type of playground is the most suitable one, because it contains the space for different kinds of activity: creative playing, natural elements playing, peaceful playing, standard equipment playing etc. In order to make the playground more interesting and more challenging, various small spaces for different types of games should be provided, and also changes of levels, changes of surfacing, places for sitting, shrubbery, greenery, motley of colors and textures etc, because the successful playgrounds do not depend only on the playing object, but on the organization and the landscape of the entire area where the playground is located.

3. DESIGNING FOR CHILDREN PLAYGROUNDS

For the quality playing, and for the safety on the playground, it is very important that a playground is designed for the specific age and that it is not used by the children which do not belong to this age group. Pre-school and school age children differ drastically, not only in terms of physical size, but in terms of their cognitive and social skills. Therefore,

the designs of the specified age playgrounds should be adapted to these differences, in terms of type, level and arrangement of equipment.

One of the reasons of injuries on playgrounds is because children use the equipment which is either too large or too small for them. In the case the younger children use the equipment intended for the older children, they are liable to slip, fall, and injure themselves, because the handles, rungs, and spacing between rungs are too large for them. In the opposite case, when the older children use the equipment intended for the younger ones, they, because their abilities surpass that sort of challenge, often use the equipment in an unpredicted, unexpected and undesirable manner, which gives way for the occurrence of injuries. Also, the injuries occur because the elements and the spacing between them are too small.

The pre-school age children are significantly smaller in size, and with poor motoric coordination in respect to the older children. The equipment for this age should be designed as low and close to the ground, and playing spaces include: crawling surface, low platforms with several accesses, ramps with hand rails, low tables for playing with sand, water, etc, tracks for bicycle riding with different textures, spring rockers, sand pits, low slides etc. The equipment in the playgrounds intended for school age children include: climbers with non-rigid components (ropes or metal rings), balance beams, multi-axial swings, merry-go-round, seesaws, slides, open spaces for running and ball play, and the semi-closed structures for playing and socializing.

Playgrounds offer a potential for individual or group play of children. Playgrounds should enable young children to easily manipulate the objects, explore the space and start the interaction with other children. The playgrounds for the school age children should further the social development of the children with their equipment for individual and group usages. Some equipment such as seesaws, merry-go-rounds and complex structures, which are intended for the use of several persons, develop the cooperativeness in children. The individual usage equipment, (with the exception of swings which should be placed far away from the communication area) can be placed close to one another, or even be physically connected. Such manner of arrangement stimulates children to move from one to another element of equipment, and encourages their mutual interaction.

The playgrounds which are intended for the preschool-age children should be located so that their parents could monitor their play, which is not a necessary precondition for those playgrounds intended for the school age children. However, regardless of the age of children a playground is intended for, the site where it is built has to satisfy certain conditions.

Above all, it should be away from the main traffic routes, because of the dangers children could be exposed to. A barrier around a playground is recommendable, to prevent the children's careless and unintentional running into the streets, though it should not prevent the parental monitoring. When choosing the site, one should take care that it is sunny. With a proper arrangement of greenery, the protection from the sun can be organized, and thus the protection from the wind, dust and noise. Places for waste disposal and carpet dusting should be placed as further away from the playgrounds as possible. When choosing a site for a new playground, it is important to take into account the dangers or obstacles on the way to a playground. Special attention should be paid to the inclination of the site and drainage.

Norms and standards for arrangement of children playgrounds should be primarily based on the definition of usage quality and equipment quality of these spaces. The nu-

merical presentation of presence of the children playgrounds in the housing estates often lacks the true evaluation, in terms of true quality of usage of that space and its satisfaction of users' needs. In the city area, a larger number of different types of various types of children playgrounds is needed, and it is necessary to provide as large a selection possible for the children's playing (the spaces should vary in space size, choice of equipment, degree of attractiveness, specific items, etc.) Size of a playground, as well as its character will depend on which group of children the playground is intended to (individual or all categories), what kinds of games are predicted, what the aims of these games are, what the ways of usage of the contents of that space are [9]. The planned norm for the children playgrounds in a city is $2.0\text{m}^2/\text{inhabitant}$ [8], though the real condition in our cities demonstrates a deficiency of these spaces.

A playground should be organized in different spaces—active, physical activities should be separated from the passive and calm activities. Also, the elements of equipment which are popular and most frequently used, ought to be dispersed in the space in order to avoid crowd resulting from flocking around them.

It should be clear to what age group a part of playground is intended; the design and size of equipment should suggest it. If a playground is intended for all the ages of children, the arrangement of greenery, benches and walkways should distinctly separate the spaces for different age groups [12]. Also, the signs informing the adults about what parts of the playground should be used for a specific age of children could be installed.

The protective surfacing under and around the playground equipment is very important part of injury prevention. A fall on the surface which absorbs the shocks well, will less frequently cause an injury than a fall on a hard surface. The greater the shock absorbency of a surfacing is, the less probability to cause the grave injuries. For the equipment which is used in a way that a child stands or sits on the ground, there is no need for a protective surfacing.

The hard surfacing material, such as asphalt and concrete, is not suitable for application under and around equipment, of any height, unless they are used as a base for some other kind of surfacing. Soil, as the top layer, is also not recommended, because of its weak shock-absorbing properties. Similarly, grass surfacing is also not recommended because due to the wear and weather conditions its shock absorbency can be significantly reduced.

The acceptable materials for lining of a floor include two basic types: unitary materials and loose-fill materials. The unitary materials are rubber and rubber-like materials. These can have different degrees of shock absorbency. The loose-fill surfacing comprises sand, fine gravel, wood chips, shredded tires. They can also have acceptable shock-absorbing properties if they are thick enough. The thickness of such surfacing reduces during usage (wear-off and weather effects), and so does its shock absorbency. Therefore in such cases there should be markers which will indicate the correct thickness of surfacing. In order to prevent removal of such material, it is in most cases enclosed with a low wall or a similar barrier.

The use zone comprises the surface under and around the equipment which requires installment of surfacing. This zone should be free of any obstacles, a child might run into or fall over, and hurt itself in this way.

Use zone for stationary equipment (excluding the slide) should be at least 180cm in all direction around the equipment. If the elements are neighboring, their distance can be 180cm, if the height of the elements is less than 75cm, that is, it can be 270cm, if the height exceeds 75cm.

The use zone in front of the approach to a slide, and on the lateral sides should be 180 cm, and at the exit at least $H+120$ cm, where H is the maximum height of the slide, but not less than 180cm. The exit use zone should not overlap with the use zone of another piece of equipment (Fig. 1).

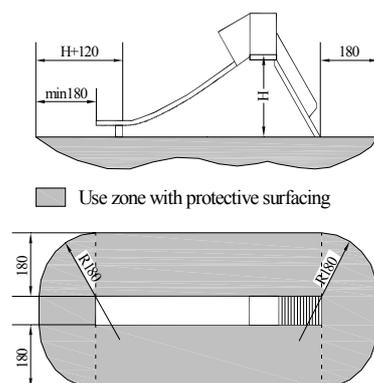


Fig. 1. Use zone for slides

Use zone in front and behind the swing should be larger than the lateral zone, because children might attempt to jump off a swing while it is in motion. It is recommended that it is at least two times the height of the beam the swing is suspended on and must not overlap with the use zone of some other piece of equipment. Laterally, the use zones may overlap. At those swings which can rotate, and thus swing in all directions, the use zone is 180cm plus the length of the element the seat is suspended on (Fig. 2). The use zone of such swing must not overlap with other equipment use zones.

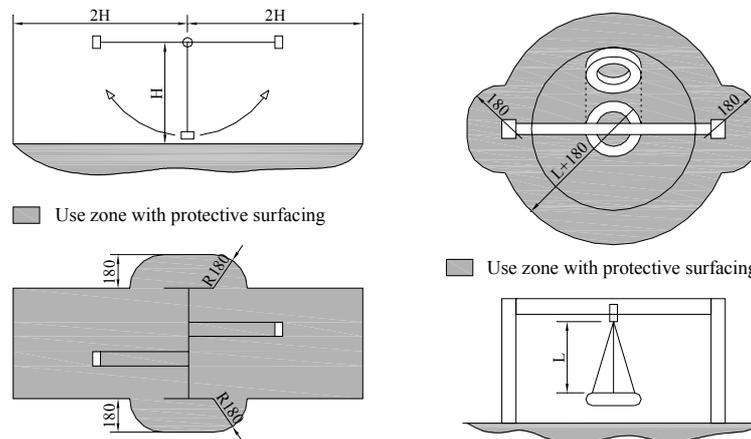


Fig. 2. Use zone for single-axis and multi-axis swings

The use zone for merry-go-round should extend at least 180cm in all directions. It must not overlap with a use zone of some other equipment. The use zone for the spring rockers should be 180cm from the center of the equipment. The use zones for the composite structures are obtained by application of the previously mentioned recommendation for each segment of the composite structures. Swings should not be a part of such composite playing structures.

In the parts of the playground, where crowding is predicted, it is advisable to provide additional communication surface, out of the equipment use zones.

Researches have shown [1] that the highest number of accidents and injuries of children in playgrounds occur because of falling off some element of equipment. The other potential forms of accidents imply impact of swings and other movable equipment, collision with stationary equipment, as well as contact with exposed elements such as screws, bolts, sharp points, hot surfaces etc. Injuries can also be caused by falling of the children caught in parts of clothing, or ropes tied to the equipment; children's heads could become entrapped in too big (or too small) openings in the equipment; equipment could break or overturn and hurt the children.

The playground equipment should not have any pointed or sharp elements which could cut or pierce the children's skin. Pointed edges or corners may occur as a consequence of the wear off or tear off of equipment. All the parts must be smooth and all the corners and edges rounded. Particularly dangerous are the sharp edges at the exit of, and along the slide, because they can cause serious gashes of children.

Elements of equipment must not form the openings where a child head could fit and get entrapped. In general, the openings are the considered dangerous for entrapment when the spacing between the elements is more than 8cm and less than 22cm. This especially applies to the openings which are at a certain height above the ground level. Even at those openings which are low enough that a child can touch the ground with its legs, there is a risk of suffocation due to the child head entrapment in the equipment, because the young children need not have the cognitive or motoric abilities to pull their head out, particularly if they are frightened or panicked.

All the elements which are used for anchoring the equipment must be under the ground or protective surfacing, to avoid the danger of tripping. Low walls, which are often used as a barrier for loose-fill surfacing, or for separation of the parts of playground intended for different age structures of children should be high enough to be seen, and every change of height should be visible. Cables, wires, ropes or similar flexible elements which hang between the playing apparatuses or between the apparatuses and the ground should not be installed in very frequent parts because they can cause injuries at running children.

4. PLAYGROUND EQUIPMENT

The term "climbing equipment" refers to a large number of apparatuses intended for climbing, such as simple arch climber, vertical climber, climbers with non-rigid components, overhead horizontal ladder, dome climbers, balance beams, suspended bridges, spiral climbers and the composite structure with connected platforms. Climbers are in

general designed to be a higher level of physical challenge in respect to the other equipment in the playgrounds.

Climbers should be as easy to climb down as to climb up, which can be performed through provision of an easier, alternative way to climb down. It is particularly important for the apparatuses which are intended for the pre-school age children, since their abilities to descend the apparatuses develop later than those required to ascend them.

The climbers with non rigid components can be made of ropes or chains. The tire climbers also belong to this group. As the climbers with non rigid components do not offer a stable support, they require much more advanced balancing abilities. The connection between the ropes, cables, chains or tires within a climber should be safely fixed.

The simple arch climbers consist of metal or wooden rungs fixed to the convex lateral girders. They can be freestanding or they can provide an access to some other element of the equipment. In the latter case, they should not be the only means of access; the children that can handle the arch climber will use it as an access way, while the younger, or less nimble children will use it as an alternative access.

The spacing between the adjacent rungs should be greater than 22cm, because of the hazard of head entrapment. The axial distance should be not more than 30cm for pre-school children, and for the school-age children not more than 40cm. For the pre-school age children, the rungs should be parallel and at equal distance. The maximum height of such apparatus for the pre-school age children should be 150 cm and for the school-age children not more than 210cm.

Vertical sliding poles should be smooth, of continual direction and without bulging seams. The horizontal distance between them and the edge of the platform or other structure which is used as an access to the pole should be at least 45cm. The pole should be extended at least 150cm above the level of platform or other structure which is used for access. The diameter of the pole should not be higher than 5cm. Vertical poles should be placed so that the traffic from other equipment does not impair descending.

The climbing rope should be secured and fixed at both ends, and without potential to form a loop with internal diameter larger greater than 12cm.

The balance beam should be placed at a height not smaller than 30cm for the pre-school-age children, that is 40cm for the school-age children, in order to avoid the injuries from falling off the apparatuses.

Merry-go-round is the most frequent type of rotation equipment in the playgrounds. Children usually sit or stand on a platform, while the other children or adults turn the merry-go-round. The rotating platform ought to be flat and circular. The difference in the length of the radius of non-circular platforms must not exceed 5 cm. Not one element of the system, including the hand-railing, may project out of the platform radius. The lower side of the platform should be at least 22cm above the protective surfacing. The maximum velocity of the peripheral points on the rotary surface of the merry-go-round should be below 4m/sec and the platform of the merry-go-round must not have the oscillatory (up and down) movement.

A typical seesaw consists of a bar, supported in the center, with a seat at each end of the bar. Its usage is complex, for it requires cooperation of two children, and combination of their movements. Young children, generally, do not have the required skill to use the seesaw effectively. That is why they are not recommended for the children of the pre-

school age unless if they are equipped with the springs which prevent the seats (and children on them) from hitting the ground if the other child takes off its seat.

Parts of tires, or some other material which is good shock absorber can be installed in the ground immediately under the seat of a seesaw, and in this way prevent children's limbs from being squeezed between the seat and the ground, and they can absorb the impact as well. Also, the seesaw can be equipped with a spring mechanism which would reduce the risk of hitting the ground. The hand-rails should be provided for each seat and be such that they can be grasped with both hands. Seesaws should be designed in a way that the maximum angle between the line connecting the seats and the horizontal line should be up to 25° (Fig. 3).

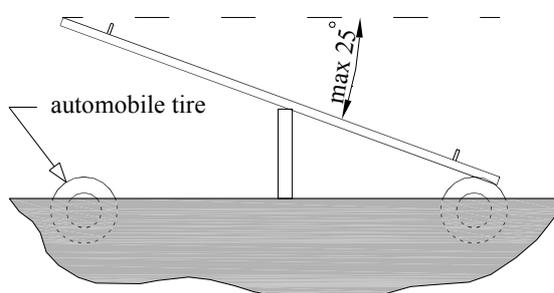


Fig. 3. Classical seesaw

Slides have a straight, wavy or spiral descent, of tube or open slide chute. They can be free standing (Fig. 4), a part of the composite structure, or built on a natural or an artificial inclination (embankment slide). Except for the embankment slide, an access to a slide can be realized via ladders, stepped ladders, stairs, or the slide can be a part of the composite play structure which has some alternative access.

All the slides should have a platform of sufficient length to facilitate the change of body position on its top, from standing to sitting. In case of a free standing slide, it is recommended that the platform of 50cm in length. It should be horizontal and be at least as wide as the slide chute. The railing or a barrier should enclose the platform. Between the platform and the slide chute there mustn't be any opening or interruption. Except the tube chutes, the handgrips should be placed at the entrance of the chute to facilitate the transition from the standing to the sitting position and reduce the risk of falling. All slides should have the exit part which helps the children to keep balance and facilitate transition from sitting to standing. The exit part should be horizontal and parallel to the ground, of minimal length of 30cm. The slides which are not higher than 120cm, the height of the exit part should not exceed 30cm from the protective surfacing. It is recommended that the average inclination of a slide chute is not more than 30° . It means that the ration of height and length should not exceed 0.577. None of the parts on the chute should have an inclination higher than 50° .

The chute of an embankment slide should have a maximum height of 30cm above terrain level. A slide designed in this way eliminates the hazard of fall.

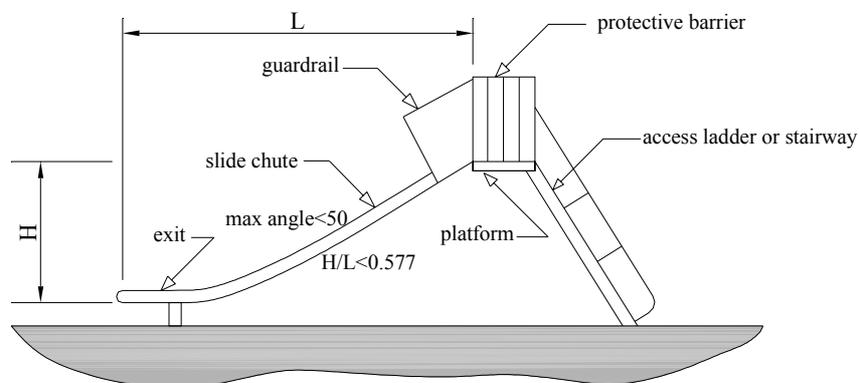


Fig. 4. Standard free standing slide with straight chute

Swings can be divided into two categories: single-axis and multi-axis. The single-axis swings move forward-backward, in one plane and generally consist of a seat, suspended on at least two hanging elements, each of which are fixed to a horizontal bar. The multi-axis swings consist of a seat suspended on a horizontal bar which enables it to move in all directions. In order to protect the children from the accidental or intentional running into the swing trajectory, these should be placed away from other apparatuses. It is recommended that as much as two swings are suspended on one bar.

The seats of the swings should be designed so that they can accommodate only one occupant. In order to reduce the potential of injury, the wooden or metal seats are not desirable, but should be replaced with seats of rubber or plastics, with rounded corners and edges. The vertical distance from the lower part of the seat to the surfacing should be at least 30cm for the children of preschool age, that is at least 40cm for the school-age children. For the school-age children, it is recommended that the height of the horizontal bar should not exceed 240cm (Fig. 5).

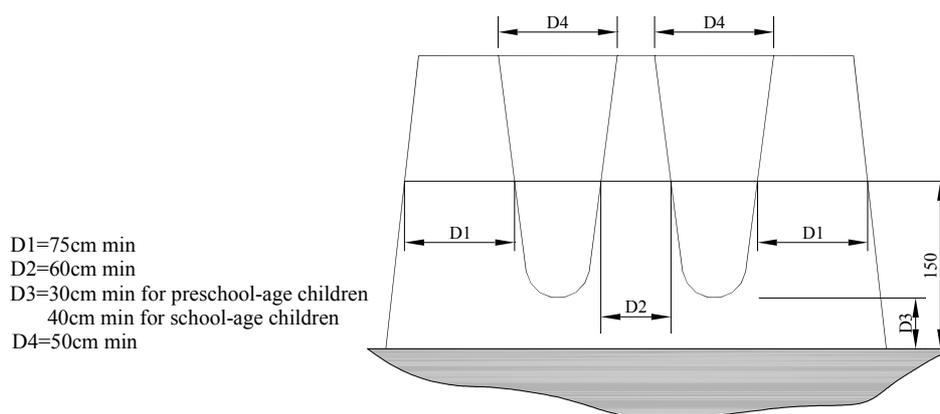


Fig. 5. Minimal distances for single-axis swings

Multi-axis swings most often have a seat made of a car tire (or a plastic seat of a similar form) which is usually fixed in three points on the suspended cables connected on the top in a rotary mechanism which enables rotation and swinging in all directions. This type of swing must not be suspended on the structure which has other swings on the same bar.

Pre-school children enjoy rocking provided by these apparatuses and are the main users of it, while the older children do not consider them too challenging. The seat should be designed in such a way that it can accommodate the appropriate number of occupants. Each seat should be equipped with handgrips and leg rests.

Since one of the favorite entertainments of the children is playing with sand, construction and maintenance of sand pits should be paid due attention. The place where a sandpit is constructed should be insulated through the whole day. The walls of the sandpit should be made of brick, stone, concrete or timber. It is very important that the drainage of the sandpit is constructed properly. The thickness of sand in a sandpit should be 30-50cm, and the wall of sandpit should be 50cm high in respect to the surrounding terrain (in case it is used for sitting. At certain points which are used as entrances to the sandpit, the height of the wall should be up to 20cm. In the case the wall is not intended for sitting, its height should be 20cm. It is possible to place the climbers or concrete "tables" within the sandpits, which can make the children's play even more interesting. The sand in the sandpit should be secured from spoiling (by dogs and cats), and if it is not possible, then it should be exposed to sun, wind and changed often..

Apart from the traditional, standard equipment, playgrounds can be equipped with different types, of various forms, colors and of different materials. The contemporary producers offer equipment which is clear and simple, but also flexible. Children have an active imagination which should be encouraged with very general structures. Potential activities can be diversified, and bounded only by children's imagination. Equipment should be designed in such a way that it provides entertainment for the children, enabling them to invent their own stories.

5. CONCLUSION

It is a widely adopted principle in pedagogy, that children learn the most through play. The quality play comprises motorics, sensations, emotions, intellect, individual growth and social interaction, and the benefits of play for the development of children comprise the cognitive development, development of imagination and creativity, development of exploratory abilities and reasoning, development of manipulative abilities and problem solving abilities..

Children often spend free time indoors. In some cases, it is because there is no open playground in their neighborhood. The insufficient potential for free moving and play in the confined space of the habitats has an unfavorable effect on the psychophysical development of children. For a proper development, it is required that the children can spend at least 3-4 hours outdoors daily.

In order to make the open playgrounds for children be quality ones, they should offer a variety of sensations so that children could choose. The equipment in playgrounds should encourage and affect the appropriate physical development because the children significantly differ in size and abilities during their development. They should stimulate

the positive emotional development and provide for the social development. They also represent an entertaining way of intellectual development.

The significance play, especially an outdoors play has for a correct psychophysical development of children, requires a serious treatment of the problem of designing and equipping the open space playgrounds for children. As, unfortunately, it has not been the case, it is necessary to start from the very beginning, which means that this field in design should be firstly regulated in law (design and equipment, standardization of equipment and material for playgrounds in terms of children safety). This subject would also require a lot more of creativity and inventiveness of designers themselves. Regarding that the development of child personality depends a lot on the quality of open playgrounds for child playing, this problem deserves a very professional approach to its solving and an increased interest of the participants in this process, at all levels.

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FUNKCIJA I ORGANIZACIJA SLOBODNIH PROSTORA ZA DECU U STAMBENIM NASELJIMA

Branislava Stoiljković

Igra je od izuzetnog značaja za fizičko i mentalno zdravlje dece. Kako je igra napolju posebno bitna, igrališta su, kao najpovoljniji oblik otvorenih prostora za igru dece, neizmerno važna i neophodna u stambenim naseljima. Deca su potrebna igrališta koja izazivaju njihove sposobnosti i pružaju mogućnost da razviju nove. Planiranjem i projektovanjem dečjih igrališta treba bave timovi stručnjaka, poštujući pri tom brojne standarde, preporuke i zahteve koji propisuju izbor lokacije za igrališta, kvalitet i izgled opreme, način na koji se oprema raspoređuje, vrstu materijala za zaštitnu podnu oblogu itd.