The Impact of Architectural and Space-Planning Design of Student Accommodation (Dormitories, Campuses) on the Time Budget of The Student Youth

Aleksey Vladimirovich Popov

Abstract: This study is aimed at determining the time budget of the student youth in the Russian Federation living in dormitories in conjunction with the architectural and space-planning design of these buildings. This study is important to optimize the architectural design of buildings and residential complexes for student accommodation. The research objective is to determine the system of functional needs of residents of a student dormitory; determination of the time budget based on the calculated time expenditure; determination of the influence of the space-planning structure of student accommodation on the time budget of the student youth and the directions of improvement of such structure.

Index Terms: campus, student accommodation, dormitory, student quarter, higher educational institution, temporary accommodation, university, academy, institute, higher education.

I. INTRODUCTION

This work has been performed in continuation of the study described in the article "Experimental calculation of the time budget of the student youth in the Russian Federation living in dormitories in conjunction with the architectural and planning structure of student accommodation. This study is important to optimize the architectural design of buildings and residential complexes for student accommodation. The research objective is to determine the system of functional needs of residents of a student dormitory; determination of the time budget based on the calculated time expenditure; determination of the influence of the space-planning structure of student accommodation on the time budget of the student youth and the directions of improvement of such structure."

For the further formulation of an approach to the organization of the architectural environment, determine the composition of premises and their main parameters. In the light of the research conducted within the framework of improving the architecture of temporary accommodation for students and related areas [1, 11-19], it seems relevant to calculate the time spent by modern students on functional processes related to the educational process, campus life and recreation for the further search for directions of optimization of the schemes of functional zoning of student accommodation [20]. For the functional organization of residential complexes and buildings of student accommodation, it is rational to use the following system of functional needs of residents, in which they are structured according to the frequency and periodicity of the necessary fulfillment, thus they can be classified into:

- needs requiring daily fulfillment,
- needs requiring periodic fulfillment,
- needs requiring occasional fulfillment,
- other needs not requiring direct fulfillment and formed indirectly by residents (functional needs of the entire residential complex/building of student accommodation).

Based on the system of needs of residents, a functional model has been developed for the formation of the space-planning structure of student accommodation.

Residents’ functional needs requiring daily fulfillment are the most important group of residents’ needs that all students need to fulfill on average once a day or more often. The group of daily needs includes sleep, passive rest, cooking, meals, toilet purposes (meeting a person’s natural needs), face hygiene (washing a face), body hygiene (shower/bath), a change of clothes and personal care. This group of needs is the most important and often in demand; respectively, zones to meet these needs should be located in a room or as close as possible in a lodging unit. Residents’ functional needs requiring periodic fulfillment compose the next group of needs that is formed by all residents periodically – from several times a week to several times a month: washing personal clothes, drying and ironing personal clothes, body care and hairdressing (hairdresser, beauty salon), the supply of food products, the supply of household goods, cleaning of residential premises, home educational processes, internal communication. Places of implementation of the functions of this group due to the high frequency of visits may be located in a campus, dormitory building, in a living room or in a lodging unit, depending on the type of need.
Residents’ functional needs requiring episodic fulfillment – the needs of a separate part of the residents’ contingent, or the needs formed by various individuals without a clear periodicity: outdoor activities, sports, various gatherings, entertainment, communication-based leisure, storage of personal belongings, medical care, provision of medicines, reception services, ecological recreation, parking of vehicles.

Functional needs of the entire residential complex (building) of student accommodation – the needs formed not by individual residents, but by the whole group of residents of a building/residential complex designed for student accommodation, are separated into a special category: building (student quarter) management, cleaning and maintenance, law enforcement and security arrangements in a building (a student quarter). It is necessary to take into account all the functional needs of the youth for the comprehensive organization of campus life, educational-scientific process and leisure activities of residents and, ultimately, for the formation of a qualified specialist and a contributing member of society.

II. EXPERIMENTAL CALCULATION OF THE TIME REQUIRED FOR THE FULFILLMENT OF FUNCTIONAL NEEDS OF RESIDENTS

In the case of different ways of spending time on the fulfillment of a need by young men and women, within the framework of the study, an arithmetic mean value was conditionally taken for further calculations under the conditional assumption of an equal ratio (1:1) of residents by gender. Quantitative indicators for calculating the time spent on movements were taken on the basis of empirical observations and calculations conducted in the student quarter of Moscow State University of Civil Engineering (MSUCE) [1], in the following buildings:

– OS-1 (26 Yaroslavl Highway, bld. 12, Moscow) – a project without the integration of accommodation units into lodging units, located in the student quarter of the MSUCE;
– OS-3 (26 Yaroslavl Highway, bld. 15, Moscow) – a project with the integration of accommodation units into lodging units, also located in the student quarter;
– B-1 (19 Borisov Passage, Moscow) – a project with the integration of accommodation units into lodging units, located outside the student quarter – in an apartment block.

Based on the study of the national experience of organizing the student accommodation, it can be argued that space-planning and town-planning parameters of the buildings selected for the study are characteristic of the Russian Federation [20-24]. The following model of time expenditure calculation was chosen for determining time expenditure – the time spent on the fulfillment of a resident’s need is the total time spent on the process related to the fulfillment of a need and the time spent on movements related to the fulfillment of a need (to the place of process completion and back).

\[ T_{total \ n} = T_n + t_n; \text{ where} \]

\[ T_{total \ n} \] is the total time that resident spends on the fulfillment of a need \( n \).

\( T_n \) is the time required directly to complete the process \( n \).

\( t_n \) is the time required for movements related to the completion of the process \( n \).

A summary of the works of the above-mentioned authors and in-situ measurements performed are given in Table 1 that illustrates the time spent on the fulfillment of various needs of residents.

These time-consuming indicators calculated empirically on typical Russian examples enable the assessment of the impact of the space-planning organization of student accommodation on the distribution of the time budget of a modern university student.

Thus, it can be concluded that the rational space-planning organization of student accommodation associated with equipping living rooms and lodging units with necessary amenities, in addition to increasing comfort, also entails significant time savings. The determination of such rational space-planning organization of student accommodation seems to be a promising direction for further research.
Table I. Time spent on the fulfillment of the needs of residents

<table>
<thead>
<tr>
<th>Functional need</th>
<th>Time spent directly on the functional process on average (min/week)</th>
<th>The average estimated time spent on moving to the place of fulfillment of a need, if it is located respectively (min/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In the lodging unit</td>
<td>On the residential floor</td>
</tr>
<tr>
<td>Sleep</td>
<td>3,360</td>
<td>No data</td>
</tr>
<tr>
<td>Cooking</td>
<td>420</td>
<td>21</td>
</tr>
<tr>
<td>Meals</td>
<td>287</td>
<td>14</td>
</tr>
<tr>
<td>Toilet purposes</td>
<td>84</td>
<td>42</td>
</tr>
<tr>
<td>Face hygiene</td>
<td>56</td>
<td>21</td>
</tr>
<tr>
<td>Body hygiene</td>
<td>126</td>
<td>7</td>
</tr>
<tr>
<td>Change of clothes and personal care</td>
<td>245</td>
<td>No data</td>
</tr>
<tr>
<td>Passive rest</td>
<td>Individually</td>
<td>No data</td>
</tr>
<tr>
<td>Home study processes</td>
<td>1,950</td>
<td>7</td>
</tr>
<tr>
<td>Washing personal clothes</td>
<td>41</td>
<td>2</td>
</tr>
<tr>
<td>Drying and ironing personal clothing</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Body care and hairdressing</td>
<td>Differently, on average 0.4 visits a week</td>
<td>Not fulfilled</td>
</tr>
<tr>
<td>Supply of food products</td>
<td>40</td>
<td>Not fulfilled</td>
</tr>
<tr>
<td>Supply of household goods</td>
<td>14</td>
<td>Not fulfilled</td>
</tr>
<tr>
<td>Housekeeping</td>
<td>72</td>
<td>Not fulfilled</td>
</tr>
<tr>
<td>Internal communication</td>
<td>Individually</td>
<td>No data</td>
</tr>
</tbody>
</table>

III. DETERMINATION OF THE POTENTIAL OPTIMIZATION OF THE STUDENT’S TIME BUDGET THROUGH THE FORMATION OF COMFORTABLE SPACE-PLANNING DESIGN

In this section, an impact of the space-planning design of the student accommodation building on the time budget of a resident student has been considered and potential reserves for its optimization by architectural means have been identified.

To determine promising functional space-planning solutions of student accommodation, we will make their assessment from the standpoint of the optimal organization of the student’s time budget.

Since the space-planning and functional solutions of the structure of buildings are different and often unique, several conditional options can be taken to illustrate the differences in the formation of the time budget of a student who lives in a dormitory.

Option 1 illustrates a lobby dormitory, which is the most common in national practice: a toilet, washbasin, kitchen and lounge room are located on the residential floor; a shower, study room, laundry and drying room are on the service floor (often on the ground floor). A food and household store, a hairdresser and other service enterprises are located outside the complex – in the urban space of surrounding buildings.

Option 2 illustrates the type that is less common in national practice with the arrangement of part of services in a lodging unit: a toilet, washbasin, shower – in a lodging unit; a kitchen and lounge room – on the residential floor; a study room, laundry and drying room – on the service floor (often on the ground floor). A food and household store, a hairdresser and other service enterprises are located outside the complex – in the urban space of surrounding buildings.

Option 3 illustrates a promising type of student accommodation with the organization of maximum servicing in a lodging unit and in a complex of buildings – a student quarter (campus). There is a studying place in each living room. A toilet, washbasin, shower, washing machine, kitchen, and lounge room are in a lodging unit. A food and household store, a hairdresser and other service enterprises are located in the student accommodation complex.

Option 4 illustrates a promising type of student accommodation with the arrangement of a full-fledged and self-sufficient individual living space – an individual living cell that includes: a studying place, toilet, washbasin, shower, washing machine, open kitchen. Recreation and leisure rooms are on the residential floor; a food and household store, a hairdresser and other service enterprises are located in the
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Based on the previous calculations of the time spent on meeting the needs of residents, one can calculate the time budget for each option, determine the difference and, based on its amount, draw conclusions about the prospects of a particular functional organization model.

A student’s weekly time budget is the main estimate indicator, it consists of study time and extracurricular time. In turn, based on the studies of scientists - teachers Nebesnaya and Gridina [10] that study time is the period spent on studying directly in an educational institution (academic building), including breaks and other related time expenditures, one can take an average of 440 min/day (2,200 min/week in case of a five-day study week).

According to the results of the sociological survey conducted by the author, the average time spent by a student residing in a dormitory on the way to the university will be 82 minutes (41 minutes one way), which is 410 min/week in case of a five-day working week.

For the convenience of further calculations as part of the study, let us introduce the necessary conditional category "conditionally free time" and define it as the time that includes all the time of a student, less the time spent on the main educational process, the way to the university and sleep (Figure 1). The above indicators allow calculating the average value of the "conditionally free time": it amounts to 4,110 min/week.

Figure 1: Total weekly time budget of a student

<table>
<thead>
<tr>
<th>Total time budget of a student (min/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,360</td>
</tr>
<tr>
<td>410</td>
</tr>
<tr>
<td>2,200</td>
</tr>
<tr>
<td>4,110</td>
</tr>
</tbody>
</table>

- Main studies
- The way to the university
- "Conditionally free time"

Figure 2: A diagram illustrating the amount of free time in the "conditionally free time", depending on the functional and space-planning design of student accommodation, is shown in Figure 2.

IV. CONCLUSION

Thus, it can be concluded that the rational space-planning organization of student accommodation related to equipping living rooms and lodging units with necessary amenities, in addition to increasing comfort, also entails significant time savings.
Thus, a promising option of student accommodation, in which all comfort is transferred to a living room and enterprises supplying goods and services to a student quarter, will save a student more than 10 hours (651 minutes) per week, compared to lobby dormitories that are currently popular in Russia, and a promising option, in which amenities are transferred to a lodging unit, will save a student a little more than 9 hours (542 minutes) per week.

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AUTHORS PROFILE

Aleksey Vladimirovich Popov – Candidate of Architecture. He has been working as an associate professor at the Department of Architecture at the National Research Moscow State University of Construction since 2017. From 2011 to 2017 headed the scientific laboratory "Urban Planning and Assessment of the Quality of Living Environment in the Settlements" at the same university. Until 2011 he worked in design organizations. Author of more than 20 scientific and educational works. One of the authors of the joint venture 379.1325800.2018 dormitories and hostels. Design rules (REDD OF RULES).

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