

## MODERN EDUCATIONAL SPACE AS A RESULT OF RECONSTRUCTION SCHOOL BUILDINGS

T.A. Gvozdikova<sup>1,\*</sup>  A.A. Bryantsev<sup>2</sup>

<sup>1</sup>International Educational Corporation, 050043, Almaty, Kazakhstan

<sup>2</sup>Scientific research institute «RAS Group Expert», 050062, Almaty, Kazakhstan

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**Abstract.** *The article deals with the important topic of reconstruction of existing school buildings. School plays an important role in the life of every person, and the creation of a comfortable educational space is an important task for architects and designers. The main problems considered in the article are the shortage of pupil places in schools, as well as the discrepancy between the architectural and planning structure of schools and the requirements of modern education. In the introduction the questions related to the infrastructure of the school building are considered, that in the existing today schools it is difficult to organize the educational process that will meet the requirements of modern education. The main issues of reconstruction were studied: such as elimination of physical deterioration of the building, the impact of reconstruction on the change of the educational process. In the main part of the article a plan of reconstruction of a typical school building is proposed. The developed steps will help to create comfortable conditions for learning in existing schools, as well as to adapt the space of schools to the requirements of modern educational programs. In the context of state programs considered in the paper, the measures taken by the state to solve the existing problems are presented. State programs provide for the construction of new school buildings based on public-private partnership, but do not exclude the possibility of reconstruction of the existing stock. The conclusion describes the main conclusions of the conducted research, which suggest that the reconstruction of school buildings can be one of the possible steps to solve two major problems. The authors believe that changing the internal space of existing schools can contribute to the development of motivation among students, improve the level of education, and develop various abilities of students.*

**Keywords:** *School, reconstruction, modern education, school building typology, educational trends, life-long education, informatization of education.*

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**\*Corresponding author**

Tatyana A. Gvozdikova, e-mail: [t.gvozdikova@mok.kz](mailto:t.gvozdikova@mok.kz)

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## МЕКТЕП ҒИМАРАТТАРЫН ҚАЙТА ҚҰРУ НӘТИЖЕСІНДЕГІ ҚАЗІРГІ БІЛІМ КЕҢІСТІГІ

Т.А. Гвоздикова<sup>1,\*</sup>  А.А. Брянцев<sup>2</sup>

<sup>1</sup> Халықаралық білім беру корпорациясы, Алматы, 050043, Қазақстан

<sup>2</sup> Ғылыми-зерттеу институты «RAS Group Expert», 050062, Алматы, Қазақстан

**Аңдатпа.** Мақала қолданыстағы мектеп ғимараттарын қайта құрудың маңызды тақырыбын қарастырады. Мектеп әр адамның өмірінде маңызды рөл атқарады, ал жайлы білім беру кеңістігін құру сәулетшілер мен дизайнерлер үшін маңызды міндет болып табылады. Мақалада қарастырылған негізгі мәселелер-оқушылар орындарының жетіспеушілігі мектеп, сондай-ақ мектептердің сәулеттік-жоспарлау құрылымы мен заманауи білім беру талаптарының сәйкес келмеуі. Кіріспеде мектеп ғимаратының инфрақұрылымына байланысты Қазіргі мектептерде қазіргі білім беру талаптарына жауап беретін оқу процесін ұйымдастыру қиын екендігі туралы мәселелер қарастырылған. Қайта құрудың негізгі мәселелері зерттелді: ғимараттың физикалық тозуын жою, қайта құрудың білім беру процесінің өзгеруіне әсері. Мақаланың негізгі бөлігінде типтік мектеп ғимаратын қайта құру жоспары ұсынылған. Әзірленген қадамдар қолданыстағы мектептерде оқуға ыңғайлы жағдай жасауға, сондай-ақ мектептер кеңістігін заманауи білім беру бағдарламаларының талаптарына бейімдеуге көмектеседі. Жұмыста қаралған Мемлекеттік бағдарламалар контекстінде мемлекет қолда бар проблемаларды шешу үшін қолданатын шаралар ұсынылған. Мемлекеттік бағдарламалар мемлекеттік-жекешелік әріптестік негізінде жаңа мектеп ғимараттарын салуды көздейді, бірақ қолданыстағы қорды қайта құру мүмкіндігін жоққа шығармайды. Қорытындыда мектеп ғимараттарын қайта құру екі негізгі мәселені шешетін ықтимал қадамдардың бірі болуы мүмкін деген зерттеудің негізгі қорытындылары сипатталған. Авторлар қолданыстағы мектептердің ішкі кеңістігін өзгерту оқушылардың мотивациясын дамытуға, білім деңгейін арттыруға, оқушылардың әртүрлі қабілеттерін дамытуға ықпал етеді деп санайды.

**Түйін сөздер:** Мектеп, қайта құру, заманауи білім беру, мектеп ғимаратының типологиясы, білім беру тенденциялары, үздіксіз білім беру, білім беруді ақпараттандыру.

\*Автор-корреспондент

Татьяна Гвоздикова, e-mail: [t.gvozdikova@mok.kz](mailto:t.gvozdikova@mok.kz)

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## СОВРЕМЕННОЕ ОБРАЗОВАТЕЛЬНОЕ ПРОСТРАНСТВО КАК РЕЗУЛЬТАТ РЕКОНСТРУКЦИИ ШКОЛЬНЫХ ЗДАНИЙ

Т.А. Гвоздикова<sup>1,\*</sup>  А.А. Брянцев<sup>2</sup>

<sup>1</sup>Международная образовательная корпорация, Алматы, 050043, Казахстан

<sup>2</sup>Научно-исследовательский институт «RAS Group Expert»

**Аннотация.** *Статья рассматривает такую важную тему, как реконструкция существующих школьных зданий. Школа играет важную роль в жизни каждого человека, а создание комфортного образовательного пространства, является важной задачей для архитекторов и проектировщиков. Основные проблемы, рассмотренные в статье – это нехватка ученических мест в школе, а также несоответствие архитектурно-планировочной структуры школ и требований современного образования. Во введении рассмотрены вопросы, связанные с инфраструктурой школьного здания, заключающиеся о том, что в существующих сегодня школах сложно организовать учебный процесс, который будет отвечать требованиям современного образования. Были изучены основные вопросы реконструкции, такие как устранение физического износа здания и влияние реконструкции на изменение образовательного процесса. В основной части статьи предложен план реконструкции типового школьного здания. Разработанные шаги помогут создать комфортные условия для обучения в существующих школах, а также адаптировать пространство школ под требования современных образовательных программ. В контексте государственных программ, рассмотренных в работе, представлены меры, предпринимаемые государством для решения существующих проблем. Государственные программы предусматривают строительство новых школьных зданий на основе государственно-частного партнерства, но не исключают возможности проведения реконструкции существующего фонда. В заключении описаны основные выводы проведенного исследования, которые говорят о том, что реконструкция школьных зданий может стать одним из возможных шагов, решающих две основные проблемы. Авторы считают, что изменение внутреннего пространства существующих школ может способствовать развитию мотивации среди учащихся, повысит уровень образования, создаст условия для развития различных способностей у учащихся.*

**Ключевые слова:** *Школа, реконструкция, современное образование, типология школьного здания, образовательные тенденции, непрерывное образование, информатизация образования.*

\*Автор-корреспондент

Татьяна Гвоздикова, e-mail: [t.gvozdikova@mok.kz](mailto:t.gvozdikova@mok.kz)

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### **CONFLICT OF INTEREST**

The authors state that there is no conflict of interest.

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### **АЛҒЫС / ҚАРЖЫЛАНДЫРУ КӨЗІ**

Зерттеу жеке қаржыландыру көздерін пайдалана отырып жүргізілді. Автор зерттеу барысында консультациялық көмек көрсеткен Халықаралық білім беру корпорациясының (ҚазБСҚА кампусы) әріптестеріне алғысын білдіреді.

### **МҮДДЕЛЕР ҚАҚТЫҒЫСЫ**

Авторлар мүдделер қақтығысы жоқ деп мәлімдейді.

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### **БЛАГОДАРНОСТИ/ИСТОЧНИК ФИНАНСИРОВАНИЯ**

Исследование проводилось с использованием частных источников финансирования. Автор выражает благодарность коллегам Международной Образовательной корпорации (кампус КазГАСА), оказавшим консультационную помощь при проведении исследования.

### **КОНФЛИКТ ИНТЕРЕСОВ**

Авторы заявляют, что конфликта интересов нет.

## 1 INTRODUCTION

One of the main functions of humanity is to educate and train the new generation, on which the future generally depends. To solve this very important task, professional teachers and educators have always worked to realize the right of every child to education.

One of the world's leading trends in the development of modern education is the transition to continuous, open education, which forms the basis of the information society and is built on the principles of open information space.

The most significant trends in modern education are globalization, informatization, humanitarization, and humanization of the educational process.

Globalization of education is the process of expanding the external and internal boundaries of education. In other words, it is a process of interaction and integration of different educational systems, methods and technologies.

Informatization of education means the process of introduction of information and communication technologies in education and their influence on the process of teaching and education of schoolchildren. The tasks of education remain unchanged, but the technologies are changing. In modern education, the teaching of disciplines in the field of informatization should be conducted as a continuous multi-purpose program, taking into account both individual and social requirements.

Humanization is the realization of the worldview principle, which is based on respect for people, care for them, and belief in their great potential for self-improvement. According to Humanization, human welfare is the ultimate goal of society.

A humanization process in education is a consequence of the process of humanization. The curriculum necessarily includes disciplines of the general cultural plan. Humanitarization of modern education is designed to solve two main problems: educational and social. Education, as a social institution, is designed to provide modern society with qualified specialists.

According to statistical data for June 1, 2023, the deficit of places in general education schools of Almaty is 27 thousand. Today the lack of places in schools is called the most urgent problem in the field of education. One of the reasons for this deficit is considered to be the rate of migration (internal and external) in Almaty. On average, the number of children increases in the megapolis by 12–14 thousand annually.

But, it should be noted that the shortage of places in schools did not arise today. Kazakhstan has already faced this problem about 15 years ago. Since 2007, the program “100 Schools, 100 Hospitals” was adopted, which operated on the basis of public-private partnership. During its implementation it was planned to build 106 new schools, but the program was not fully implemented. In 2013, the Parliament noted the low degree of implementation of the program. In 2020, 100 schools were built in Kazakhstan, and construction continues now. In 2022, the state program “Comfortable School” was adopted. The program is aimed at eliminating emergency schools, so-called “three-shift schools”, as well as at eliminating the lack of pupil places. In addition to the construction of new schools, the existing problems of non-compliance of the infrastructure of existing educational institutions with modern requirements and the lack of pupil places can be solved through reconstruction.

Reconstruction is a complex approach to changing a school building, it is a complex process that involves specialists from different fields. In their works the issues of reconstruction are considered by such scientists as [Mironyuk \(2005\)](#), [Magula \(2000\)](#), [Stepanov \(1983\)](#).

## 2 LITERATURE REVIEW

It is necessary to change approaches to the formation of a modern school building under the influence of various factors and transformation processes in education. Studies of school building typology issues have been conducted by many scientists, such as: E.B. Dvorkina, V.I. Ezhov, V.I. Zherdev, S.G. Zmeul, A.V. Zudin, S.Y. Kuznetsov, S.G. Leibovich, E.V. Pimenova, G.D. Platonov, T.A. Slavina, V.I. Stepanov, V.V. Smirnov, N.B. Fedorova, A.I. Chaldymov and others. Considerable

attention is also given to urban planning issues of school buildings design in the works of scientists A.A. Borovkov, T.M. Bragina, V.E. Bykov, G.A. Gradov, A.V. Mahrovskaya, B.M. Poluya, V.V. Smirnov, V.I. Stepanov.

For the purposes of solving the problem of lack of places in schools of Almaty city and Kazakhstan as a whole, the national project in the field of education “Comfortable School”, approved by the resolution of the Government of the Republic of Kazakhstan on November 30, 2022, has been developed. The main goal of the project is to eliminate emergency educational facilities, three-shift education and shortage of student places in secondary education facilities. In addition, one of the possible options to solve the issue of insufficient number of places in the existing schools of our city can be their reconstruction.

In Almaty city today there are 212 state-owned schools and another 98 privately owned schools. The total enrollment is 320,453 students. Basically, all these schools are built according to standard designs, and according to the shape of the plan they can be divided into several groups. In their shape, the buildings resemble the letters of the Russian alphabet: H, P, G, Sh, Zh.

In 1964, the most widespread type of school building was approved, popularly called “Airplane”. School type 65-426/1 was designed by the Moscow Institute of Typical and Experimental Design under the direction of A. Avrusov. The architectural composition includes two buildings connected by a passage, which in the upper perspective resembles the wings of an airplane, which became the reason for its popular name [Figure 1](#).

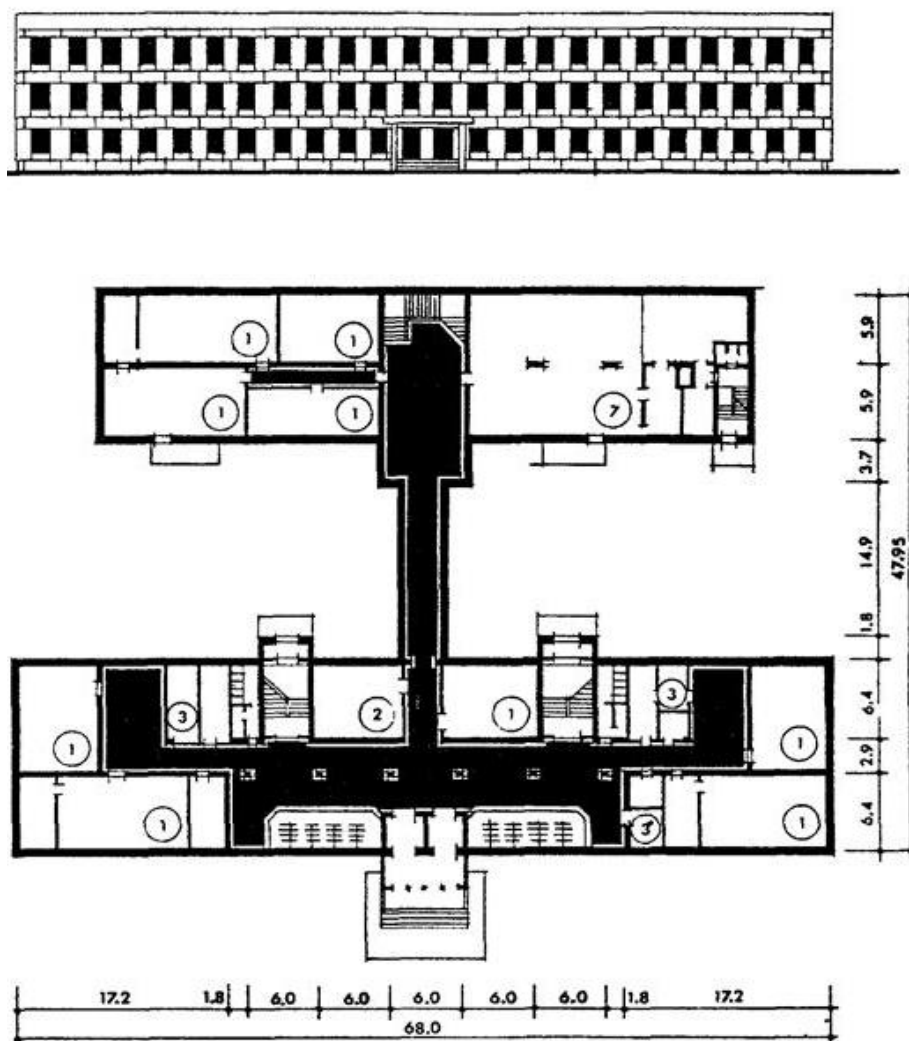
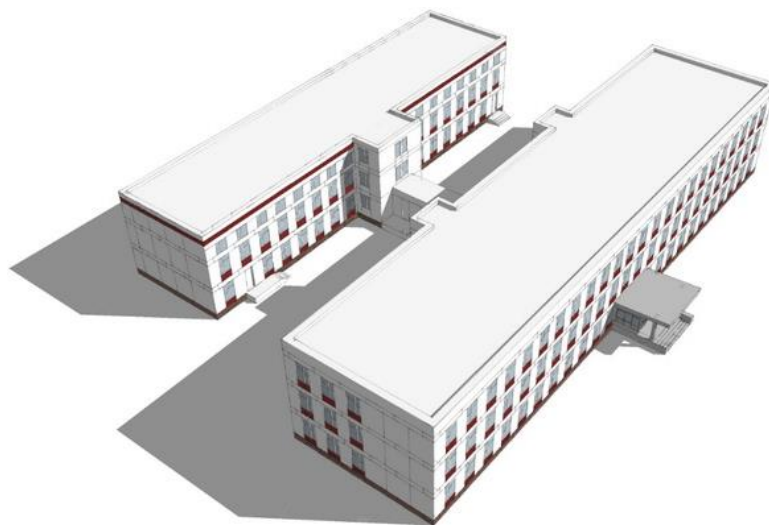


Figure 1 – Typical project of school building 65–426/1 ([Past school buildings: typical designs, 2009](#)).

During research of school buildings in Almaty and their typology, it can be concluded that the most popular are schools built according to the standard project 65–426/1 (**Figure 2**). This is an H-shaped building designed for 960 students, shown on this research is reflected in the article “Current Trends in Education and the Architecture of the Modern School”.



**Figure 2** – 3D model of School type 65-426/1  
(Past school buildings: typical designs, 2009)

### 3 MATERIALS AND METHODS

The actuality of this issue is very high. First of all, there is a clear deficit of pupil places in schools throughout Kazakhstan, as well as existing today schools built on standard designs 50 and more years ago need major repairs, and therefore can be reorganized through reconstruction and redevelopment projects. For example, in the summer of 2023, 260 schools across the country began major renovations, but only 194 of them completed renovations by the start of the school year. It can be noted that there is an interesting opportunity for architects to reorganize school buildings and improve the learning environment through various means of architecture.

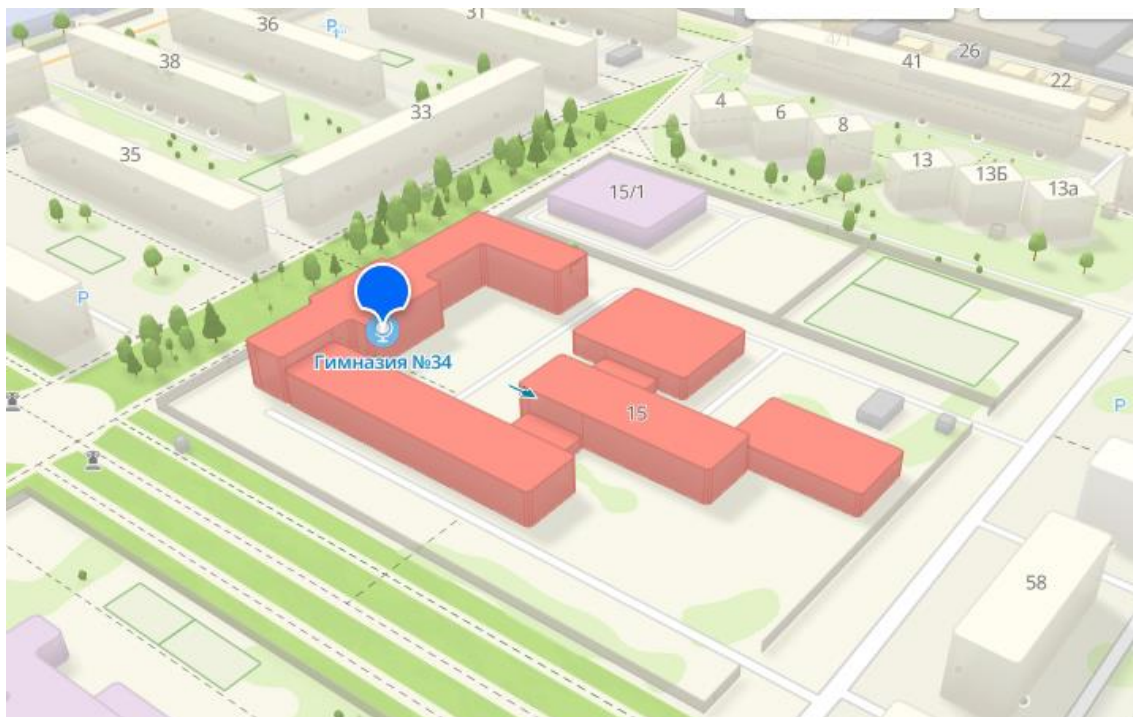
The main method applied in this study is descriptive, it includes to varying degrees the interpretation, comparison and generalization of various publicly available information.

The research analyzed the actual condition of existing school buildings in Almaty, reviewed government programs such as “100 Schools, 100 Hospitals” and “Comfortable School” to address the shortage of school buildings and student places, as well as the issues of mismatch between schools and education requirements.

### 4 RESULTS AND DISCUSSIONS

Reconstruction can be a real step towards solving the problem of shortage of places in the city schools, as follows from the data given earlier, and will also allow to bring the planning organization of school buildings in line with modern educational trends. I propose to consider proposals for the reconstruction of one of the typical schools, multi-purpose gymnasium №34, located at Brusilovsky Street, Almaty, corner of Balotnikov Street, which is shown in **Figure 3**. This school was built and opened as a secondary school in 1983, the status of a gymnasium was awarded later in 1998. The gymnasium building is gallery type, with most classrooms oriented towards the south. The school consists of two and three-storey blocks. This school was built taking into account all norms and requirements of that time, but today a number of shortcomings can be noted. For example, the lack

of classrooms, recreational and school-wide spaces, laboratories aimed at the implementation of programs in science, engineering and technology, robotics. These are the most important problems that can be solved through reconstruction, among others.



**Figure 3** – Multi-purpose gymnasium №34. 8.Google maps. (Past school buildings: typical designs, 2009)

The project proposed for reconstruction includes several basic steps that can be applied in the subsequent reconstruction of this type of school buildings:

1. Connection of blocks A, B and C by organizing an inner courtyard (open or closed) to increase the organization of areas and perimeter of consecrated spaces used for the organization of additional premises: recreations, communications, galleries, passages, etc.

Enclosed courtyard is created in which a conservatory will be organized, in the adjoining room it is recommended to create a living corner. There are several types of conservatories: freestanding, attached to a building and integrated conservatories.

Many researchers prove in their works the beneficial effects of so-called biophilic spaces in buildings. The main principles of creating internal green spaces are the integration of nature and man, the development of a sense of harmony with nature, the use of greenery to maintain the physical and moral health of man. All these issues are widely disclosed in the works of researchers [Butabekova \(2022\)](#), [Ryan et al. \(2014\)](#), [Hanc, et al. \(2018\)](#), [Krundyshev \(2014\)](#), [Akhmedov \(2017\)](#), [Poznyak \(2009\)](#), [Kupriyanov et al. \(2023\)](#) and others.

Modern trends in the field of education are becoming the subject of numerous studies in the field of education, attracting the attention of scientists [Erik D.C. \(2019\)](#), [Lamekhova, N.V. \(2022\)](#), [Komarova I.I. \(2018, 2020\)](#), [Çalik F. et al. \(2014\)](#), [Vereshchagina E. \(2021\)](#), [Gorubshov A.A. \(2022\)](#), [Ostroverkh O.S. \(2021\)](#), [Klochko A.R. and Topaeva P.A. \(2021\)](#)

2. Removal of the corridor as a means of communication by demolishing the partitions between the classrooms on the north side and the corridor (Block B) in order to transform the resulting space into a multi-purpose space for recreation, games, “lines”, location of individual closets (lockers) and additional sanitary facilities.

For the reconstruction of the multi-purpose gymnasium № 34, it is proposed to demolish the



partitions between the classes in the junior block on the northern side. In this way, additional free space will be created.

3. Extending the length of the existing building by organizing an extension to increase the number of classrooms and, consequently, the area of multipurpose space and organizing an additional exit.

For the reconstruction of the multi-purpose gymnasium №34 this cannot be done because of site constraints, but in many other cases it will be one of the possible options.

4. Construction of an extension of complex configuration on the north side of the multipurpose space in order to organize a winter garden and other green spaces for recreation, rooms for parents, psychologist, speech therapist and others.

For the reconstruction of the multi-purpose gymnasium №34, such a space can be created in the junior school block by adding a hexagonal projection on the northern façade. The resulting free space can have several purposes, including serving as an alternative to the assembly hall for the junior high school, as previously there was no separate hall for them.

5. Organization of an independent area in the elementary school lunchroom by extending the depth of the existing building (Block A) and organizing a passageway.

6. Relocation of chemistry, physics, biology classrooms with the organization of laboratories to the upper floors and to free up space in order to create an organized laboratory block, which will help to implement programs in science and engineering and technical areas

7. Addition of a separate new Block E to increase the number of classrooms for high school students.

Block E is attached to the south side of the main building.

8. Active introduction of color into the interior of the school.

The results of the proposed reconstruction project can be seen in [Figures 4 and 5](#).

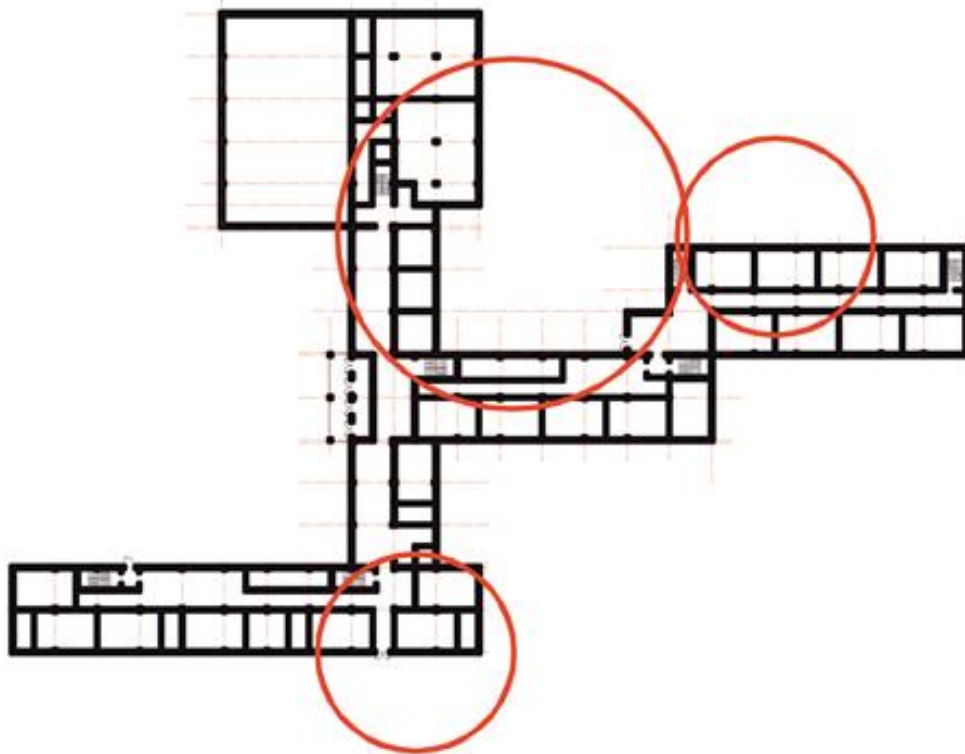


Figure 4 – Plan before reconstruction (author's material)

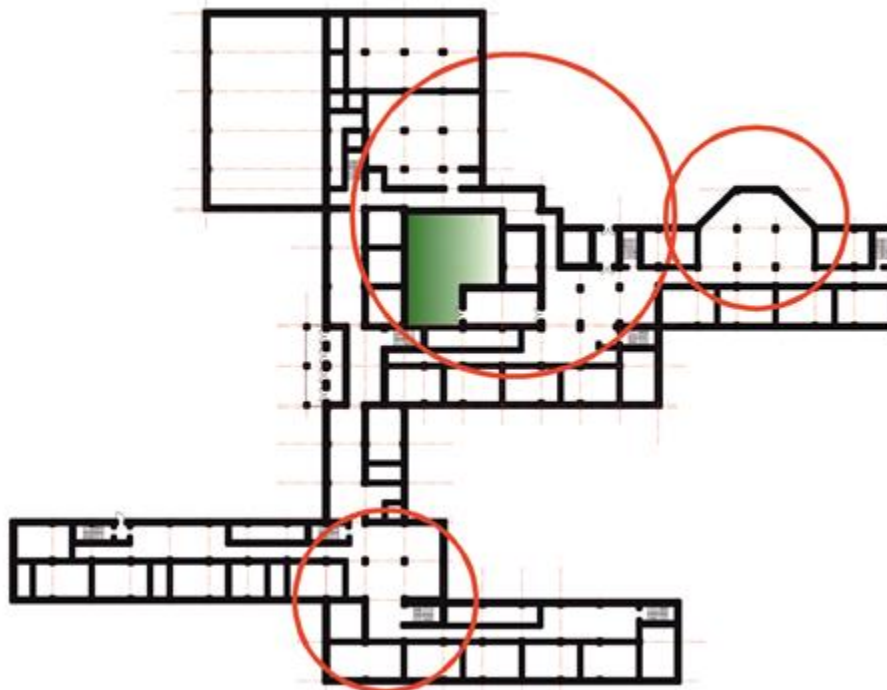


Figure 5 – Plan after reconstruction (author’s material)

## 5 CONCLUSIONS

The aspects studied in this article show that reconstruction can solve complex architectural problems of an existing school. Reconstruction of school buildings is an opportunity not only to transform the space, but also to influence the educational process itself. It allows to adapt the school space to the requirements of modern education and society, it can also allow to increase the classroom capacity of schools, which will reduce the shortage of student places. Besides, with the help of reconstruction it is possible to improve conditions for students and teachers, to create a modern educational space taking into account modern technologies. The result of the reconstruction project is not just a school building, but an educational space designed to be comfortable and meet modern educational needs.

According to the results of the research conducted, we can draw the following conclusions:

1. State programs that are intended to reduce the deficit of pupil places in schools and improve conditions for students and teachers in the context of the requirements of modern education are not implemented in full compliance with their plan;
2. These steps proposed for the reconstruction of the school building can be implemented in a fairly short period of time in order to solve the existing problems in the sphere of general school education;
3. The following step-by-step recommendations can be developed for the reconstruction of other typical general education schools based on architectural assessment that takes into account the volumetric and planning parameters of school buildings.

As a result, it should be noted that the reconstruction of a school building is not only a solution to the problem of physical or moral obsolescence of the facility, but also an investment in the future of our children. With the help of the steps proposed in the article for the reconstruction of the existing gymnasium, it is possible to create a space where students can receive a comfortable and quality education and prepare for the challenges of the modern world.

We can conclude that school building renovation can be an integral part of improving modern education. With the help of reconstruction, it is possible to provide conditions for the formation of future innovators and leaders in existing school buildings.

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