

# Information and Communication Technology as A Requirement for Successful Implementation of Education Managerial Functions

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Received: 17 March 2022; Accepted: 29 April 2022; Published: 30 May 2022

**Abstract:** Working with information plays an important role in the management of any educational institution. The Deputy Director in carrying out information and analysis activities must process large amounts of material. The use of information technology helps make this job easier. This article describes the project on the use of information and communication technologies in the management of additional educational organizations for children and analyzes the main directions of informatization in the management of educational institutions. The effectiveness of the use of information technology in managerial activities based on the use of computer technology has been revealed. Managerial activities of the head include processing a large amount of information. For this information to really help make the right management decisions, it must be objective, arrive on time, and reflect the dynamics of change in management objects. In addition, we need technology that managers can use to process this information quickly and accurately, with minimal effort and time. However, in practice, a number of contradictions are revealed; between the need for computerized management of additional education centers and the ability of educational institutions the development management information systems; between the need to build a computerized management process based on scientific systems and their actual implementation through the development of individual areas - the constituent elements of the system (technical equipment, software, training, etc.), between the need to organize management using new information technologies and the level of training of teaching staff that is not adequate for working with modern software. The object of the study is ICT in the management activities of the leadership of an educational institution. The subject of the work is the process of informing the management of educational institutions. The aim of this work is to develop a variant of the management of educational institutions based on the use of information and communication technologies. This method of work. During the study, a complex of different methods was used: the object of research was studied by the method of systems analysis, the method of excluded and included observations, the study of documents governing the management of educational institutions, expert judgments, and sociological surveys. The practical significance of this work lies in the development of the project.

**Keywords:** Additional Education for Children; Information and Communication Technology; Managerial Functions; Education.

## 1. Introduction

Working with information plays an important role in the management of any educational institution. The Deputy Director in carrying out information and analysis activities must process large amounts of material. The use of information technology helps make this job easier. This article describes the project on the use of information and communication technologies in the management of additional educational organizations for children, analyzes the main directions of informatization of the management of educational institutions. The effectiveness of the use of information technology in managerial activities based on the use of computer technology has been revealed. The process of informatization is one of the promising directions for the development of education today [1]-[2]. The use of information technology in the management of additional education centers provides qualitatively new opportunities for its leaders. New tasks are being solved by the education system: improving the quality of education, its accessibility and efficiency, requiring the modernization of the management of this field, a significant complication of managerial functions, and an increase in the skill level of managers [3]. A current leader must be able to analyze the activities of educational institutions, identify the most significant problems and find effective ways to solve them; build management organizational structures, plan and manage controls, carry out information and analysis activities using modern technology.

Managerial activities of the head include processing a large amount of information. For this information to really help make the right management decisions, it must be objective, arrive on time, and reflect the dynamics of change in management objects. In addition, we need technology that managers can use to process this information quickly and accurately, with minimal effort and time. However, in practice, a number of contradictions were revealed:

- 1) Between the need for computerized management of additional education centers and the ability of educational institutions to develop management information systems;
- 2) Between the need to build a computerized management process based on scientific systems and their actual implementation through the development of individual areas - the constituent elements of the system (technical equipment, software, training, etc.);
- 3) Between the need to regulate management using new information technologies and the inadequate level of training of teaching staff to work with modern software.

The relevance of this topic is due to a number of factors:

- 1) The contradiction between the widespread use of information and communication technologies in modern society and the inadequate development of theoretical and practical methods for their application in educational management.
- 2) The volume of information on the progress and outcomes of the educational process is higher than the level of adequate understanding of this information;
- 3) Mechanical processing without certain standard algorithms does not provide operational data that allows optimal management decision making based on activity results;
- 4) The work of additional educational centers in an innovative fashion requires analysis of diverse educational activities, rapid tracking of the dynamics of change and timely adjustment.

Management generally refers to activities aimed at making decisions, organizing, controlling, managing management objects according to the given objectives, analyzing and drawing conclusions on the basis of reliable information. The object of control can be a biological, technical, social system. One of the various social systems is the education system, functioning at the scale of a country, region, region, city or district. In this case, the subjects of education system management are the Samara Regional Education Office, the City Education Office, and the District Education Office. Additional Education Center as a complex dynamic social system acts as an object of intra-institutional management. As of December 31, 2021, FMC staff is 122 people, 85 of whom are teachers. The management of the institution is carried out in accordance with the legislation of the Russian Federation, the legislation of the Samara region, the charter of the institution and local acts of the institution and is built on the principles of self-government and unity of command. The Institution's primary governing body is the UCM Board. The CSM Council, in accordance with the legislation of the Russian Federation, includes representatives of the teaching staff. Operational management is carried out by the Director of the Institution. The Institution's collegial governing bodies are the General Meeting of Employees and the Pedagogical Council. Teacher has:

- 1) Higher education of 70 (82%) employees, where higher pedagogical education - 41 (48%);
- 2) Vocational secondary education in 16 (19%) teaching staff.
- 3) The highest qualification category was awarded to 10 specialists (12%), the first - 28 (30%).

The study of intra-organizational management is based on the ideas of various common management approaches. Therefore, the research subjects may be different. However, although there are defining characteristics of research subjects in various approaches, all of them in one way or another depart from the understanding of management as a special function in an organization, the implementation of which guarantees the purpose and organization of its life. activities, and is focused on studying the relationship between the structure and properties of the control system components, the external and internal conditions of the organization and their results. Management can be defined as a specialized activity in which the subject, through the completion of managerial tasks, ensures the organization of joint activities of students, teachers, parents, service personnel and their focus on the achievement of educational goals and development goals of educational institutions. Some provisions of the general theory of management of an educational institution:

- 1) Management provides purposeful and integrated activities of pedagogical process subjects.
- 2) Management is aimed at the creation, establishment, optimal functioning, and mandatory development of educational institutions.
- 3) Management is carried out with the help of management actions of analysis, planning, organization, control, regulation.
- 4) Management is effective if it has characteristics such as purpose, consistency, predictability, cycle, democracy.
- 5) Management achieves the goal if: the mechanism is in accordance with the complexity of the object and the ability of the subject; there is a reserve of options for management decisions; final result criteria are used); there is a well-developed feedback system; human factor taken into account.

It is undeniable that the central object of management in an educational institution is the educational process. How it should be done and what its tasks are, management science is not studied-this is the subject of pedagogy [4]. However, how the management should be carried out depends on the characteristics of the technology of the educational process has become a question for the science of managing an educational institution. Difficulties in using information in management are often associated with an excess of information or, conversely, with a lack of it. In the pedagogical system, the lack of information is more often felt in the field of educational activity. In the educational process, we more often receive information about student achievement, the quality of knowledge, but we have less data about the characteristics of personality orientation, its formation in educational and extracurricular activities, character, abilities, etc. For someone dealing with intra-institutional information, it is important to know the methods of collection, processing, storage and use. Leaders, managers in their activities actively use observation, questioning, testing, working with teaching and methodological materials.

With the introduction of technical and computerized means, the time to collect and process materials has been significantly reduced [5,6,7]. Administrative efforts should focus on developing and implementing management information technology, which can be used by heads of educational institutions and teachers [9]-[10]. In the management of a pedagogical system, any information is important, but first of all, the management information necessary for the optimal functioning of the managed subsystem [11]. Management information can be distributed according to various criteria: by time - daily, monthly, trimester, yearly; by management functions - analytical, evaluation, constructive, organizational; by source of income - departmental, non-departmental; according to its intended purpose - directions, fact-finding, recommendations, etc. Analysis of modern literature allows us to draw the following conclusions:

- 1) Management of educational institutions has its own characteristics;
- 2) Management of educational institutions - a kind of management of social systems;
- 3) An important factor influencing the adoption of correct management decisions is the speed in processing incoming information. The use of new information technology in management will help solve this problem.

Trends in the development of modern society, prominent informatization explains the need for the wider use of information and communication technology in the field of education [12]. Informatization of education is the process of providing the educational sector with methodologies and practices for the optimal development and use of modern or, as they are commonly called, new information technologies focused on the implementation of psychological and pedagogical goals of training and education [13]. Modern society is called informational due to the fact that the role and amount of information circulating in it is rapidly increasing, there are all the necessary means for its storage, distribution and use. Information quickly reaches consumers (people or organizations) who are interested in receiving it and is issued in a form that is familiar to them [14,15]. In recent years, information has become one of the most important factors of production and one of the main levers for managing any organization, including educational institutions. Information technology is understood as a process that uses a set of means and methods to collect, process, and transmit data (primary information) to obtain quality new information about the state of an object, process, or phenomenon of an information product). This process starts:

- 1) Improve the education system management mechanism based on the use of automated data banks for scientific and pedagogical information, methodological information and materials, as well as communication networks;
- 2) Improve methodologies and strategies for content selection,
- 3) Methods and forms of organization of training, education, which are in accordance with the task of developing personality in conditions of modernization of society;
- 4) The creation of a methodological training system focused on the development of the intellectual potential of individuals, on the formation of skills for independent acquisition of knowledge, for carrying out information and educational activities, experiments and research, various types of independent information processing activities.

In conditions of educational reform, when educational institutions are moving away from uniformity and providing varied educational services to the population, actively participating in innovative processes, there is an objective need to apply the achievements of modern management in the practice of managing educational institutions [16]. Modern practice shows that managers underestimate the role of theoretical knowledge in the field of management information. At the same time, "the specificity of the tasks being completed has determined the dominant mental, creative nature of managerial work, in which setting goals, developing methods and techniques for achieving them, as well as organizing joint activities, is the main meaning and content of the work of people who involved in management [17]-[18]. The subject of work for them is information, the transformation of which they make the necessary decisions to change the state of the object being managed. Therefore, the means of working with information act as a work tool. The results of their activities are judged by the achievement of the established goals" Given the complexity and information richness of the modern educational system, it is difficult, and in some situations impossible, to analyze and take adequate measures without information and communication technologies, without computer processing and analysis of information [19]. Currently, the use of ICT in the practice of managing educational institutions is mainly as follows:

- 1) Selection of illustration materials for the design of the booth, office (scan, Internet, printer, presentation);
- 2) Exchange of experience, acquaintance with magazines, development of other educational institutions;

- 3) Use of digital cameras and photo editing programs that make image management as easy as taking a picture, easily finding what you want, editing and viewing it;
- 4) Using the camcorder and related programs
- 5) Use of the Internet in management activities, for the purpose of informational and scientific and methodological support of the OS management process;
- 6) Design of booklets, institution business cards, materials in various fields of activity.
- 7) Creating an interesting media library not only for teachers, but also for parents;
- 8) The use of computers in the office work of educational institutions, the creation of various databases.
- 9) Email creation, OS website maintenance.

We also demonstrate the computer skills used in the work of the deputy director in the managerial aspect:

- 1) Information analytical processing, construction of diagrams, graphs;
- 2) Creation of databases, information banks;
- 3) Information storage in folders and files;
- 4) Exchange of information via local network, email,
- 5) Internet;
- 6) Preparation of regulatory document bank;
- 7) Planning;
- 8) Inspection;
- 9) Monitoring the quality of knowledge;
- 10) Reporting and recording;
- 11) Experiment;
- 12) Methodical work.
- 13) Coordination of management activities;
- 14) Creation of a bank of control and measurement materials (tests, control work texts and analytical tables) for monitoring;
- 15) Receive reports;
- 16) Providing advice on scientific and methodological developments;
- 17) Making presentations, distributing development results (copying and sending letters).

Informatization of the management of educational institutions is associated with the adoption of more informed management decisions based on automatic processing of socio-economic, psychological, pedagogical and other information. Yu.A.Konarzhevsky, building a management scheme for an educational institution, basically proves that management is an information process, in which the management system receives information about the system being managed, analyzes it, and based on the analysis of data about the state of the external environment, as well as taking into account the directives of the agency higher education, develop and make management decisions [7]. This solution is aimed at streamlining the controlled system and its transfer to a new qualitative state. The command information enters the controlled system, and the loop is closed (figure 1).

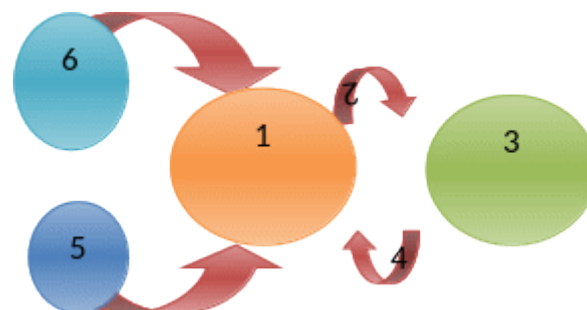


Figure 1. OU-Control Schematic

The object of the study is ICT in the management activities of the leadership of an educational institution. The subject of the work is the process of informing the management of educational institutions [8]. The aim of this work is to develop a variant of the management of educational institutions based on the use of information and communication technologies. 1 – control system; 2 - command information; 3- controlled system; 4 – information about the state of the controlled system; 5 - data on the state of the environment; 6 - directive information from higher authorities, scientific achievements, advanced pedagogical experience. M.M.Potashnik points out the organic relationship of the two roles of managerial information to managers - "it is the basis for making optimal managerial decisions and a means of feedback on the execution of all managerial actions". Thus, information increases the scientific validity of managerial decisions, eliminates unnecessary material costs and labor resources, and contributes to improving the quality and efficiency of

managerial work and production in general. Information serves all types of management activities. In pedagogical analysis, which is aimed at school outcomes and planning and prognostic functions, it plays a fundamental role. Based on analytical justification, strategies are created, models of future team activities; when the organizational and executive functions of management activities are performed, there is a constant exchange of information and processing. An important factor in improving management is information technology, which provides many new opportunities. They allow you to collect and update large amounts of information, are tools for optimizing time and money spent on completing individual management tasks, and help improve the quality of management decisions by providing fast and reliable information about the status of managed objects.

## 2. Method

The purpose, object and subject are determined by the job assignment:

- 1) Mengungkapkan esensi konsep "manajemen" dalam lembaga pendidikan sebagai sistem sosial dan mengidentifikasi general principles of pedagogical systems management;
- 2) To determine the characteristics of the process of managing modern supplementary educational institutions for children in the context of educational informatization;
- 3) Analyzing information support for additional education center management.

The working hypothesis is that the management of educational institutions as a type of social management will be more effective if:

- 1) Suitable material and technical base will be made;
- 2) The level of training of teaching staff will meet the requirements of the informatization process;
- 3) Management will be based on the use of modern technology.

The theoretical and methodological basis of this work consists of: a general methodological and theoretical foundation of management in education, which was considered by Yu.K. Babansky, P.I. Konarzhevsky, P.V. Khudominsky and others. This method of work [7]. During the study, a complex of different methods was used: the object of research was studied by the method of systems analysis, the method of excluded and included observations, the study of documents governing the management of educational institutions, expert judgments, and sociological surveys. The practical significance of this work lies in the development of the project.

## 3. Result and Discussion

### 3.1 Information Technology Application Managed By GBOU DOD TsRTDYU CSM

In order to analyze the information support of the GBOU DOD TsRTDYU CSM (hereinafter referred to as CSM), it is necessary to provide an overview of the educational institution, study the organizational structure of the institution, its materials and technical basis, and characterize the ICT competencies of teaching staff. This educational institution has a functional-linear management structure of educational institutions. The structure of the school management system is represented by 4 levels of management.

- 1) The first level is the UMC Director, UMC Board. This level determines the strategic direction of development.
- 2) The second level is deputy directors, as well as bodies and associations participating in self-government.
- 3) The third level is the teacher who carries out managerial functions in relation to students and parents (legal representatives).
- 4) The fourth level is students, group bodies and student self-government associations.

According to the areas of use of information and communication technology in management systems, OS can be divided into:

- 1) Use of ICT in the process and organization of methodological work with teaching staff;
- 2) Use of ICT in the OS management process;
- 3) Use of ICT in the organization of educational processes with children;
- 4) Utilization of ICT in the process of interaction between educational institutions (teachers) and parents.

### 3.2 Assessment of the level of informatization of an educational institution

ICT-based technical facilities used in the work of an educational institution include: computers, multimedia projectors, scanners, printers, digital cameras, video cameras, multimedia equipment. We also highlight the basic application software, the possession of which is required for every teacher, as well as heads of educational institutions. These include: word processors and spreadsheets, email clients and other means of communication, search engines. To assess the level of ICT - competence of teaching staff, the following methods were used: observation, questioning, survey. A survey of 5 members of the FMC administration shows the following statistics:

- 1) Confident and regularly use ICT – 65%.
- 2) Can do planning using ICT - 63%.
- 3) Setting up teacher councils or seminars using ICT by students - 60%.
- 4) Select software for management purposes - 45%.
- 5) Find the necessary materials - 70%.
- 6) Use of ICT for monitoring and development - 40%.

The pandemic has accelerated the process of information in all areas of our lives. Especially this process affects education. Children and teachers are forced to communicate remotely, managers of all levels of education must organize their management activities online too. In this regard, the question of the professional competence of teachers and leaders in the field of ICT technology becomes acute. We decided to find out how things were going at our educational organization and found that:

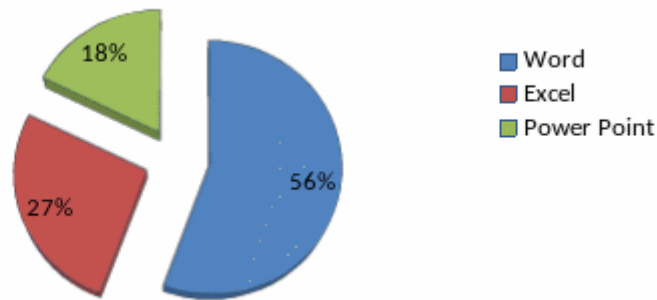


Figure 2. Survey Results - Mastery of the Tik Concept

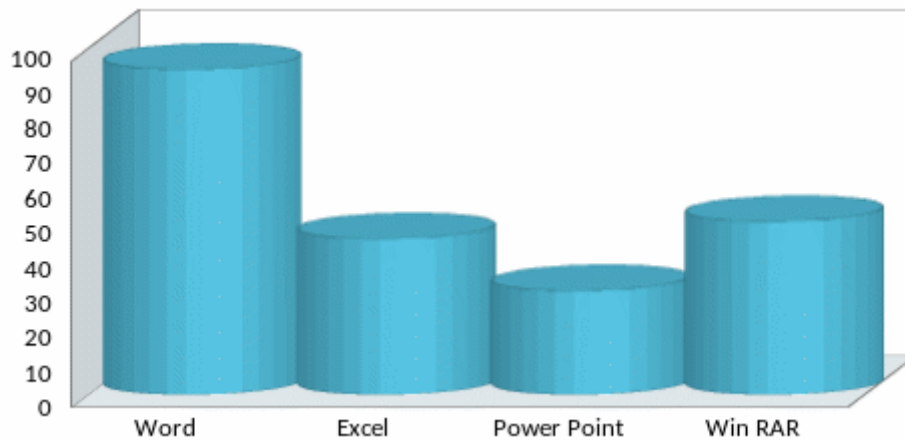


Figure 3. Survey Results - Ownership of Technical Facilities

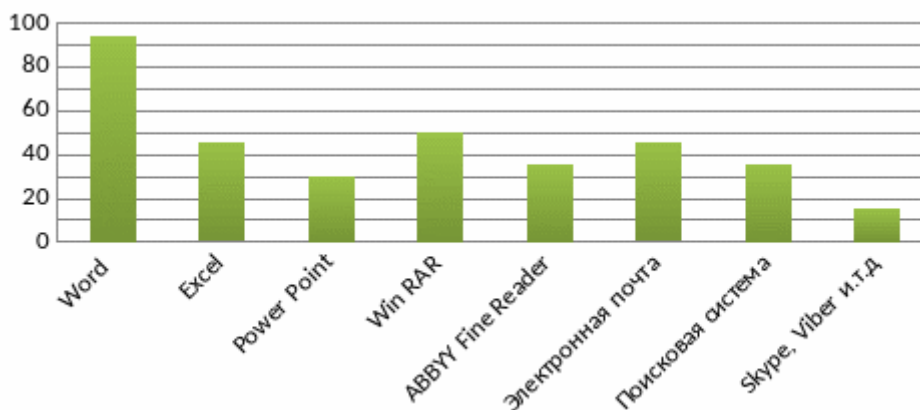


Figure 4. Survey results – Software Ownership

Analysis of the survey results shows that although most members of the administration have basic competencies in ICT, an increase in the level of ICT proficiency is still needed. Information and communication technology (ICT) is used in CSM educational institutions during teacher councils, workshops, meetings for teachers, extracurricular activities, parent meetings, parent conferences. Considering the early state of informatization, it is impossible not to note some of the shortcomings that exist today: a low level of ICT competence. There is no unity of information and education space, there is no information system about administrative activities in CSM, there is no local network, without it there is no connection between computers, so you have to install software products on one or more computers in local mode. The introduction of information and communication technology into FMC practice is one of the administrative priorities in the formation of ICT competencies, viz. the ability to use ICT tools to complete their professional and daily life tasks. As for the administrative regime, it can be represented as an activity aimed at organizing the pedagogical process for transferring the latter to a higher level. It consists of the following stages: gathering information, analyzing it, and making a decision.

In this case, administrative work is organized with the help of a personal computer. For more efficient management, a single information environment is gradually created that meets the relevant requirements. For example, the system database contains the most complete information about all elements of the educational process; the possibility of mutual exchange of information with educational authorities is provided. In their work, the administration uses the standard Microsoft Office packages, which include: Microsoft Word, Microsoft Excel, Microsoft Power Point. According to the presentation of FMC management information support, the following conclusions can be drawn: the material and technical basis and level of administrative pedagogical literacy make it possible to use computer technology in FMC management to an incomplete extent. The volume of information used by educational institutions continues to grow, and new forms of reporting are required. An integrated information support system is required, built on top of the school information space, taking into account all the features and capabilities of this institution. Unfortunately, today it is not possible to speed up this process for the following reasons:

- 1) More than 50% of teaching staff are in the age category - 45-60 years and over and are reluctant to learn something new.
- 2) The average age of administrative workers is 54 years, which also leads to an inadequate level of understanding that it is no longer possible to work "the old way".
- 3) Underdeveloped materials and technical base.
- 4) Conclusion: the use of information technology in management is not used actively as required by educational informatization, teachers need to reassess their skills in the area of ICT application.

### 3.3 Development of the project "Application of information technology in the management of educational institutions"

In recent years, the education system is faced with the need to create a new model of the educational process and educational environment that meets the needs of modern society. Education informatization based on existing domestic and foreign experiences shows that:

- 1) Increased efficiency of the educational process;
- 2) New opportunities open up for wide introduction into the pedagogical practice of modern methodological developments aimed at intensifying and implementing innovative ideas of the educational process.
- 3) The quantity and quality of computers currently available in educational institutions is by no means the only criterion for the effective use of new information technologies. In institutions, specialists with a high information culture should work, who have the skills to work with them, strictly adhere to sanitary standards and rules for using computers, and also know how to introduce children to new technologies. The possession of new information technology will help teachers feel comfortable in the new socioeconomic conditions, and managers will facilitate the work of managing this process.
- 4) In this case, FMC management needs to make a project "Application of information technology in FMC management". This project was presented at the meeting of the Pedagogical Council No. 1 on 30/08/2021 and approved by the team. Teachers realize the importance of using ICT in the management of educational institutions. At a meeting of the pedagogical council, it was decided to combine the efforts of administration, teachers, parents to implement the project.

Project objectives: The establishment of an information culture among all participants in the educational process and the introduction of information and communication technologies in the FMC management process. Project goal: Create a single information space of an educational institution. Prepare personnel for the effective use of information and communication technology in managerial and educational processes. Provide participants in the educational process with free access to computer technology, information resources, and software. Integrating, introducing information and communication technology into management, education and training processes. Create a didactic and methodological material bank, the development of the use of information and communication technologies in the work of FMC Find sponsors to increase the material and technical base. The tasks assigned by the creative team are complex and time-consuming accomplishments. That's why the team plans to implement it over several years, implementing multiple stages. Our project is currently in the preparation stage. All stages and project tasks are shown in Table 1.

Table 1. Project Implementation Stages

Stages	Task	Expected results
Stage 1	<ol style="list-style-type: none"> <li>1. Study the experiences of educational institutions on this topic.</li> <li>2. Analysis of the CSM integrated information space.</li> <li>3. Determine the level of knowledge of teachers and leaders in the field of ICT competence.</li> <li>4. Study of popular literature on improving the ICT competence of FMC employees</li> <li>5. Motivation to improve the skills of FMC employees in the field of informatics.</li> </ol>	<ol style="list-style-type: none"> <li>1. Develop the project "Application of information and communication technology in the management, educational process of FMC".</li> <li>2. Creation of a single CSM information space.</li> <li>3. Improve ICT - competence of teachers and FMC leaders.</li> </ol>
Stage 2	<ol style="list-style-type: none"> <li>1. Use of ICT to improve administration and teacher skills of FMC</li> <li>2. Coordination of activities of all project participants.</li> <li>3. Implementation of ICT in the management, education and training processes at FMC.</li> </ol>	<ol style="list-style-type: none"> <li>1. Formation of an information culture among all participants in the educational process.</li> <li>2. Integration of information and communication technology into management, education and training processes through:</li> <li>3. The use of ICT tools by teachers in the organization of pedagogical diagnostics, educational processes.</li> </ol>
Stage 3	Monitor project results	<ol style="list-style-type: none"> <li>1. Creation of creative reports, photo and video reports, publications of work experiences; placement of materials on CSM websites and on social networks.</li> <li>2. Improve the efficiency of management, education and training processes through high ICT - teacher competence; the software used; individualization of the learning process; increase children's interest in education and upbringing using information resources</li> </ol>

Table 2. Risks and Prevention

1. Inadequate material equipment and technical base with information sources	Use of universal mobile equipment (laptops, multimedia)
2. Lack of highly qualified, interested and initiative teachers.	<ol style="list-style-type: none"> <li>1. Improving the qualifications of working teachers through mini-courses at the institution where the teacher works; holding master classes, exchange of experiences among teachers of municipal institutions.</li> <li>2. Directions for further training.</li> <li>3. The moral and material encouragement of teachers who are creative at work.</li> </ol>
3. The government is not yet fully aware of the effectiveness of using new technology in the management process, namely in saving time.	<ol style="list-style-type: none"> <li>1. Demonstration of interest in the problem of all participants in the educational process (support from public administration bodies, parents, team members, high level of awareness of its importance, relevance of the direction of work)</li> <li>2. High indicator of FMC management by the education process.</li> <li>3. Wide coverage of CSM activities in the media.</li> <li>4. Openness of CSM activities</li> </ol>

#### 4. Conclusion

Implementation of the project will improve the efficiency of management of educational institutions, will unify office work processes, personnel management, planning and monitoring of efficient use of resources. The managerial activity of a modern leader is becoming increasingly intellectual and scientific. Creating conditions for the self-realization of all participants in the educational process, freeing the leader from routine "paper" work and freeing time for creative and scientific activities are associated with the search for new models and technologies for managing their implementation. One way to improve the efficiency of the management of educational institutions is to implement innovations. The introduction of innovation in the managerial activity of a manager requires a great organizational, psychological and physical effort on the part of the manager himself. And the use of information technology tools enables the process of managing educational institutions to be effective, free from routine manual work, and opens up new opportunities for development.

Unlike conventional technical teaching aids, information and communication technologies allow not only to saturate teachers and heads of educational institutions with a large amount of ready-made, rigorously selected, properly organized knowledge, but also to develop intellectual, creative abilities, the ability to effectively independently acquire new knowledge. The use of information technology in the management of educational institutions makes it possible to significantly enrich, qualitatively update the development processes of educational institutions and increase their efficiency. Thus, the introduction of information technology in the management processes of educational institutions, including educational processes, will undoubtedly lead to an increase in the quality and efficiency of managerial decisions and the transition to more efficient forms of work. Improve ICT - competence of participants in the educational process.

- 1) Improving the efficiency of the FMC management process through the establishment of an information management infrastructure.
- 2) Improving the quality of the educational process at FMC through:
  - a. Software used;
  - b. Individualization of the learning process;
  - c. Increase students' interest in cognitive activities using information sources (use of didactic materials, development, computer programs by teachers in the learning process).

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