

The computerization of education



**ASSIGN
BUSTER**

Introduction

Development of computers in the modern society and associated with it computerization of education is characterized by a massive proliferation of information and communication technologies (ICTs). ICT can be used for information exchange and interaction between a teacher and a pupil in the modern education system. As such, not only the teacher must master the ICT technology, but also to be an expert in applying it in his or her professional activities. “ It is a technological world in which children are often more comfortable than their parents and teachers”.[1]

Computerization of educational achieves two strategic objectives. First, it improves the efficiency of all types of educational activities through the use of ICT tools and technologies. Second, it improves the quality of training enhancing it with a new type of thinking which is relevant to the requirements of the information society. Using methods and means of information, future professionals must be able to get answers as to what information resources are available, where they are, how they can be accessed and how they can be used to improve their professional activities.

In our research paper we will cover the following aspects of ICT

Positive and negative aspects of using information and communication technologies in general education

Review the role and place of ICT in the building of the information society

Review the areas of effective application of ICT tools

Review methods of ICT application to address appropriate needs of the educational process, monitoring and measurement of learning outcomes, extracurricular activities and research, in primary school educational institutions

Review requirements for ICT facilities

Review the market of available ICT tools and products.

What is ICT?

Information and communication technologies (ICT) are a combination of the hardware and software designed to implement information processes through the utilization of the computers and network technologies. “ The purpose of ICT in education is generally to familiarise students with the use and workings of computers, and related social and ethical issues”. [2] The main focus of the research however will be dedicated to the electronic means of educational purpose, which are a subset of software tools of ICT. These include application software and electronic media, specifically designed for the educational use: a system supporting the process of learning (electronic textbooks and encyclopaedias (including network), electronic laboratory etc.). There are several venues of ICT tools utilization in the education system:

In general educational institutions (primary schools, high schools, etc.)

In the supplementary education (instructor-led language schools, etc.)

In home-based learning (extracurricular activities, etc.)

To further narrow down the topic of the research the main accent will be applied to the area of general Primary school education with emphasis on the general education of the primary education processes.

According to Andrew A. Zucker who writes in his ‘ Transforming Schools with Technology: How Smart Use of Digital Tools Helps Achieve Six Key Education Goals’ 2008, the ICT will be successful if technology is aligned with six major education goals. Those goals are to:

increase student achievement

make schools more engaging and relevant

provide a high-quality education for all students

attract, prepare, and retain high-quality teachers

increase parental and community support for students outside of school

require accountability for results

ICT methods and techniques

Methods and techniques of ICT in teaching are aimed at developing skills in information activities of pupils and their ‘ information’ culture. There is a number of different teaching methods that could be employed in this area, some of them are: illustrative, reproductive, research based, corrective knowledge, incentive, motivational, etc. These methods could be tremendously enhanced by the use of ICT techniques.

For example, the illustrative methods could be enhanced by using multimedia which can distinctly improve the mental activity of students due to increased visibility and emotional richness (animation, sound, video and other multimedia effects). When a teacher develops the multimedia instructional materials, he/she may use Irish local history material that enhances the educational lesson as pupils would be able to relate more to the topic which is familiar to them.

Reproductive methods of education benefit through the use of learning systems offering the high level of customization on a personal-oriented education in which pupils are able to build individual educational path depending on their personal skills and abilities (perception, memory, thinking, etc.). Through the utilization of the ICT the studying process can be enhanced without adding extra burden on the teachers/their schedule. The effect of novelty and overall attractiveness of the computers to the pupils serve as an additional means to stimulate and motivate learning, improve pupils' interest in studying.

ICT allows and provides a venue to enhance further training through the utilization of the gaming form of training. The value of these games is very high. Indeed, the skills of non-verbal communication channels (facial expression, gesture, posture, etc.) are important in the daily lives of pupils, and will have even greater significance in future active social and professional activities. The ability to correctly convey the meaning of the message, not only in a form of words but also in ' a general expression of the body' is very useful to pupils in life.

ICT and Students

General Education and ICT

Usage of ICT in teaching of general education courses aimed at improving the learning process within a given scientific field of knowledge. ICT ultimately improves the quality of instruction in schools by increasing the interest of pupils, providing the ability for a highly customized and personalized curriculum, ability to intensify the learning without the increase of working hours of the teachers. It also should be noted that there is a trend of increased usage of project – team work – especially in the area of research assignments. ICT is an instrumental tool in this area, with its interlinked computer technology and networking capabilities, creating a unique real time integration of sub-projects, making it possible to enhance interdisciplinary links between the general education courses.

Usage of ICT tools in the management of the educational process is oriented at improving the governance process. There are several areas that could be managed by ICT; personnel management, management of logistics, management of the educational process, management of information resources. ICT modules were developed for each of these areas. To improve the process of personnel management – a ‘human resource’ module, to improve the management of logistics – a ‘warehouse’ module, ‘schedule’ module for the education process, etc.

Supplementary Education and ICT

Within the area of the supplementary education ICT covers two main areas: ICT as an object of study and tool aimed at enhancement of the mental abilities of children and as means of governance process improvement. The <https://assignbuster.com/the-computerization-of-education/>

main difference between the system of the supplementary educations of children and primary education system is the lack of mandatory uniform educational standards. This feature brings a qualitative change in the methods of application of ICT, and provides teacher/school with the choice of the educational means/tools. Given that children come willingly to the supplementary education organization (as opposed to schools, where children come on a mandatory basis), the teacher pays special attention to methods of stimulating and motivating of learning. In selecting of the right content of the education, the teacher addresses the needs and interests of pupils more actively in response to innovations in the field of ICT development. Thus, the content of education does not duplicate the primary-school science, but rather broadens and deepens it. Of course, the teacher can use all known methods of teaching, but priorities are given to the stimulating and motivating learning, research activities and games based learning techniques. ICT tools used in the management of the educational process in institutions of supplementary education oriented to improving the work with gifted children in different areas. Albeit this area boasts special features worth mentioning, specifically the fact that the organizations that provide a supplementary education are in its vast majority are of a commercial nature. As such they naturally imply a more active cooperates/collaboration with the social environment: children and their parents. In each such institution many teachers develop their own programs and techniques which are worthy of compilation and distribution, which may contribute to the further ICT tools development and, above all, the networking technologies.

Home-based education and ICT

ICT tools in its home-study application are oriented on individualization of the learning process of pupils and their social adaptation. Embedded training technologies in such systems are reproductive in nature, their main purpose is to help pupils to prepare for all sorts of tests/quizzes or exams and basically directed at repetition of school material. In addition, by having a computer at home, the pupil is able to more efficiently complete homework (preparing research for instance, etc.). In this case, ICT tools are the means of individualization of learning and improving the educational activities of students. As a means of social adaptation of pupils, ICT tools fulfil the need of social adaption of pupils while students communicate with each other over the Internet. Networking technologies is a powerful tool of social activity, mobility and responsiveness. Having a home Internet access and computer equipped with the ICT client allows children to receive an opportunity to participate in online projects, gain access to various research and data resources as well as an opportunity to demonstrate social activity. The student must be prepared to accept and assess information and develop a correct perception of any information he/she runs into, which helps developing critical thinking which should be given a particular attention by teachers and parents as this is one of the ultimate goals of any educational system.

To summarize the use of ICT tools in general education is primarily aimed at improving the existing teaching technologies and management. It should be noted that ICT bolsters pupil's ability in the area of data mining, analytical thinking and strengthens their research abilities while working with vast

amounts of information available and given a timeline for the completion teaches pupils to effectively manage their own time and the value of team work collaboration. ICT tools are effective in improving interest of students and creation of individualized learning methods. Application of ICT in the educational process, especially at home, requires development of critical thinking, which should be monitored and encouraged by teachers and parents. Application of networking and distributed technologies in the general education facilitates the integration of various types of best teaching practices under the ICT umbrella.

ICT – Computer-assisted education

With every passing day Information and Communication Technology (ICT) is being adopted into various fields of educational activities. Both external drivers related to overall advent of ubiquitous informational society and internal factors such as wider adoption and spread of the computer technology in schools contribute to this adoption. Steps are taken by the governments to further encourage the adoption through appropriate funding, standard setting and training. In the vast majority of cases, the use of this technology positively affects productivity of teachers as well as the effectiveness of the learning process. The word 'technology' is of Greek origin and means 'the science, the collection methods and techniques for handling or processing of raw materials, semi-finished products and convert them into objects of consumption. Current understanding of the word includes the application of scientific and engineering skills used to solve practical problems. In this case, information and telecommunication technologies can be considered as such technologies, which aim to process

and transform information. Information and communication technology (ICT) is a general term describing various techniques, methods and algorithms for data collection, storage, processing, presentation and transmission of information. This definition intentionally does not include the word 'usage'. Usage of information and communications technology presents yet another facet of technology – a set of information and telecommunication technologies in education, medicine, defence and other fields of human activity that is part of overall concept of information technology. Each of these areas of information technology imposes its own limitations and peculiarities. This concept includes the full range of techniques, methods, techniques and approaches to achieve the objectives of computerized education.

The cornerstone of the ICT tools is a personal computer equipped with a set of peripherals known as a hardware platform and a set of educational programs known as the software or applications. The main categories of software are system programs, applications and tools. System programs are operating systems (OS) as well as various utilities or service programs. Applications are the tools of the information technology – software that enable user to work with text, graphics, tabular data, etc. With the advent of computer networks, students and teachers have a new unique opportunity to receive/send information anywhere in the world. A global telecommunications network of the Internet makes it possible to instantly access information resources (digital libraries, databases, file storage, etc.), the most popular of which is of course the World Wide Web. The internetworking capabilities allow people to communicate and exchange

data using e-mail, instant messaging clients, mailing lists, newsgroups, chats, VoIP and teleconferencing technology. The latest development introduced tools for collaboration and cooperation which are instrumental part of the distributed computers enabling students to interact virtually with each other anywhere in the world.

Technology continues to evolve and we as a society seem to be entering the age of ubiquitous computing. It is impossible to assess at this stage how cloud computing and the development of the concept of ubiquitous computing would affect the area of education, but there is no doubt that many of these technologies have the potential to significantly improve the quality of training and overall students' education.

At the same time, however, despite of the massive positive impact, in some cases, the use of the information technology has no effect, and in rare cases, such use has a negative effect.

Concept of the information society, which includes education, gained significant boost in the early 90-ies and was taken seriously by the governments of the developed nations. Albeit the concept is not new, and was first introduced by Fritz Machlup in 1973, in his book ' The production and distribution of knowledge in the United States', which suggested that the information society is the highest stage of societal evolution.

Positive and negative aspects of computerized education

It may seem that the use of ICT is always warranted in all areas of educational activities. Certainly, in many cases it is. However, it has a

number of negative aspects. Positive and negative factors of ICT should be taken into account by pedagogues.

Pros are

improving methods and techniques of selecting and shaping the content educational material

introduction and development of new specialized disciplines and fields of study associated with the informatics and information technology

changes in teaching of the traditional school subjects

improving education of pupils by increasing their level of individualization and differentiation

introduction of new forms of interaction into the learning process that changes the content and nature of the teacher and pupil relationship

creates tools assisting in optimization of the education management

creates and supports the integration trend of subject areas and the environment,

Allows high level of customization.

Raises level of activity of the student develops the ability of alternative thinking, building skills to develop a strategy to find solutions

Allows predicting the results of decisions based on the simulation of the studied objects, phenomena, processes and relationships between them.

<https://assignbuster.com/the-computerization-of-education/>

Cons are:

In spite of the obvious pros the use of ICT can lead to several negative consequences. In particular, most often one of the benefits of ICT is referred to the individualized learning. However, along with the advantages there are also major shortcomings associated with the total individualization. It limits to the minimum the live interaction between teachers and pupils, pupils with each other and surrogates it with interaction with the computer. Due to limitations of the current technology the only interface of this communication is a keyboard rather than speech. The main interface of the human mind – ability to speak – gets shutdown. The lack of practical dialogic communication hampers the development of the language and overall affects negatively development of the thinking process. Another significant drawback of this surrogate relationship is the curtailment of social contacts, the reduction of social interaction and communication, individualism.

Certain difficulties and negative aspects may arise from the use of the ICT tools that provide teachers and students considerable flexibility in finding and using information. Often confusing and complicated methods of presentation may cause the diversion of the pupils from the studied material due to various inconsistencies. Moreover, the nonlinear structure of information exposes the student to the temptation to “ follow the suggested links that which can derail the purpose of the exercise in its entirety. The use of information resources published on the Internet, often leads to negative consequences. Most often, the use of ICT tools triggers plagiarism – cut and paste of the readily available projects, essays, reports, research papers, etc. which does not enhance the effectiveness of learning process.

<https://assignbuster.com/the-computerization-of-education/>

ICT tools can be not only a powerful tool for the formation and development of children but conversely, promote a 'standard' pattern of thinking and inert attitude to work. In many cases, the use of ICT and real time availability of data deprives and prevents students from conduct real experiments by their own hands, which adversely affects the learning. And last but not least, the health aspect of pupils must be taken into the most serious consideration as the excessive of ICT equipment could negatively affect the health of a child.

Methods of ICT application in the education process

ICT tools can be used as a mean of support in the traditional methods of education. In this case, ICT enhances the training process, provides a venue for certain level of customization of learning and allows for partial automation of routine work of teachers related to accounting, organization and grading.

On the other hand, ICT could lead to a drastic change of educational process, forcing the revision of methods and forms of organization of educational process. Induces the construction of integrated courses based on the use of information content in each school disciplines.

The need for specific knowledge which is either not available in a single individual subject, i. e. interdisciplinary knowledge is needed or there is a need for a 'deep dive research' – a need to explore a number of concepts, theories and laws that cannot be obtained in a standard teaching .

The need for the reproductive abilities. A need to prepare for the quiz which has time limitation.

The need for creative thinking. Development of the optimization skills. Most cost-effective solutions or the most optimal variant of process

The need to develop tailored personalized qualities. Formation of students' sense of responsibility towards others, towards themselves.

All of the above reasons and factors suggest that the use of ICT tools in teaching students on a " bigger is better" principle may not lead to visible improvement in the efficiency of education. ICT use requires a balanced and well-reasoned approach.

Information Society and ICT

Using the amount of knowledge as a criterion it was determined that the amount of human accumulated knowledge is skyrocketing and is doubling every 5 years since 1970.

Source: University of Stellenbosch ' The MIKM and the Revolution of the Knowledge Economy'

Using this figure as the amount of accumulated human knowledge as a criterion for awarding the public status of the information society is justified, because according to some estimates, since the beginning of our era, the first doubling of the accumulated knowledge of mankind took place in 1750, the second - the beginning of the twentieth century, the third - already by 1950 year. Since 1950, the total amount of knowledge in the world doubles every 10 years, since 1970 - every 5 years. The history of the information society contains the history of the origin and development of new types of human activities associated with computers. Such growth resulted in an

appearance of a specialized group of people employed exclusively in the information industry (operators, programmers, system analysts, designers, etc.). Obviously, the emergence of new scientific and professional areas requires specialized training with not only the specialized content but also particular methods and means of education. Therefore it is not a coincidence that computer based education achieves two strategic objectives. It improves the efficiency of all types of educational activities through the use of ICT and improves quality of training through a new type of thinking the relevant requirements of the Information Society. The computer-based education is an integral part of the information society. The transition of modern society to an information era of its development advances as one of the major challenges facing education, the task of forming the foundations of an information culture of the future specialists. Society's need for skilled personnel possessing a necessary skillset becomes a leading factor in educational policy. Today, it is virtually impossible to find a school which would not have ICT implemented in some form.

In today's world everything is interconnected. It is obvious that computer-based education and information society development are closely linked, constantly affecting each other.

Here are several of these areas of overlap

changes in content and functions of education, forms and methods of teaching activities

positive impact of ICT tools and information on the development of creative abilities

<https://assignbuster.com/the-computerization-of-education/>

educational impact of information technology

the emergence of the possibility of using multimedia technologies in education

further development of continuing education in the information society

Development and widespread use of electronic models of learning

the establishment of developmental education based on the information resources of society

a combination of traditional and innovative ways of learning in the information society

formation of information culture of teachers to work in all forms of educational process

generation of new approaches to the management of the institution and assessing the quality of teacher work

globalization and integration of educational services in the information society

Information technology in school education

Types of audio-visual and technical equipment used in teaching.

The birth of ICT did not happen overnight and was preceded by a rapid development of various non-computer devices known as technical and audio-visual training aids. For the extended period of time, technical means of

training were attributed only to the hardware: slide and movie projectors, television sets, tape recorders and CD-players, as well as specially designed teaching materials and aids such as filmstrips, cassettes and compact discs. These learning tools at different stages of development of the education system were the main tools for improving the efficiency of storage, processing, transmission and presentation of educational information. In the absence of computer equipment they have played the role of information and communication technologies.

A hundred years ago, with Thomas Edison invention of phonograph, the first incarnation of ICT was born. At that time with the advent of the ability to record, store and playback audio all the problems of education were seen to be solved; today of course, it is obvious that not all such problems have been solved completely.

Throughout the last century a variety of teaching tools were introduced; each time resulting in more advanced informational support system of the learning process, which in turn positively impacted the effectiveness of teaching. At present, any educational institution possesses a subset or a full set of the following:

audio recording and playback (tape, CD-players)

voice/data transmission systems (telephone, fax, teletype machines, radio communication systems)

video/radio broadcasting equipment (television, radio, educational television and radio, DVD-players)

optical and photographic equipment (cameras, slide projectors, overhead projectors)

Printing, copying, scanning and other equipment designed for documentation and reproduction of information (copiers, microfilm, microfiche)

computer facilities used for the electronic submission, processing and storage of information (computers, printers, scanners)

telecommunications systems for the transfer of information through communications (modems, network wire, satellite, fibre optics, microwave and other communication channels)

Analogue Equipment:

Audio - tape recorders, microphones, amplifiers, speakers, recorders, radios, language equipment, tapes, records)

Graphic and photographic tools - cameras, slide projectors, overhead projectors, filmstrips, slides, images on the tapes

Projection equipment - cameras, projectors, films

Movies and TV facilities - TVs, monitors, cameras, camcorders, VCRs, video players, video projectors, video tapes).

Digital equipment:

Audio - digital voice recorders and players, digital CD-ROMs

Graphic and photographic tools - digital cameras, laser and magnetic disks, storage memory card

Projection Technology – multimedia projectors

Movies and TV facilities – digital video recorders, DVD-players and DVD-players, laser and magnetic disks, electronic memory card)

Computer tools – Computer multimedia tools to record, process and playback sound, recording processing and visualization of text, graphics and photographic facilities; recording, processing and playback.

With the advent of the internet the computer serves as a cornerstone of the ICT and enables a number of features which were unavailable in non-interneted world; telecommunication between people, real time collaboration and real time access to information resources. Computer technology gives unique opportunity to combine different technologies and different means such as sound, text, photos and video into one cohesive venue of delivery. However, introduction of computer technology brings an interesting point. At first glance, it would be logical to include other technologies and tools of relevance to the processing and presentation of information used in education. However, at the same time, the universality of the computer brings the educational technology to the whole new level and questions the usage of all non-computer based tools with the exception of the book perhaps, as they are losing relevance. Today, for obvious reasons, it is practically impossible to find a modern educational film-strip or phonographic disks.

As such, the implementation of computerized education will lead to increased use in of advanced information and communication technologies.

Therefore, our research was concentrated on all aspects on the ICT: computer hardware and software, as well as their practical content.

Hardware

Computers and devices, commonly referred to as hardware, is a platform of any ICT system and should be carefully selected with the idea of being part of the educational process behind. Despite its apparent youth, computers have a fairly rich history. The idea of automating calculations which gave rise to the creation of the first computing devices is not new and has been entertained for a long time.

The first operational summing machine was built in 1642, Blaise Pascal, a French physicist, mathematician and engineer. Despite the fact that the initial calculations were performed by mechanical devices and tools, such devices can still be considered as tools of information processing and, consequently, the predecessors of the computers used in various fields of human activities, including teaching. Even four decades ago the computation was widely done by mechanical calculators, and electro-mechanical proto-computers. However, because of its bulkiness, difficulty of use, high cost, low-speed of information processing and a number of other reasons a computer could not find a proper application in the field of education at that time. A rare exception is higher education, the availability of computers in which justified the need for training in a number of professions such as computer science.

Moreover, teachers and students work usually with one computer. It is in these universities sprung up first experience of computerized education.

However, the real large-scale introduction of computers into all educational activities took place in the early 80-ies of the last century; PCs stressed the word 'personal' i. e. one computer - one person approach; its compactness, speed, relatively low cost, availability of a large number of devices that extend the capabilities of personal computers, all that contributed to the raise of PC in every facet of our lives, including education. The main direction of PC development was on expanding capacity to process information. Gradually, the hardware evolved and allowed people to create, store, process and transmit text, graphics, photos and video clips and sound.