

History, Modern Trends, and Prospects of Distance Education Development*

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Abstract. Modern reality faces new challenges in the education system. One of the most important ones is distance learning applying in the educational process. The article discloses historical points of distance education, the transformation of its conception, modern state, development trends, and prospects. Also, the relevant data on the mentioned topic is provided and up-to-date tools for methodic of distance learning are offered.

Keywords: Distance Education, Development, Prospects, Trends.

1 Introduction

The article aims to make research on distance education development. It can be subdivided into tasks:

- to identify historical points of distance education;
- to describe transformation on its conception;
- to characterize the modern state of distance education;
- to disclose development trends and prospects for distance education;
- to analyze relevant data on distance learning;
- to make substation for applying of nowadays tools for methodic of distance learning.

2 Materials and Methods

In the article, there were used general scientific and special research methods to solve the determined aim. There are a statistic, techno-economic, graphical, system and structural analyses, economic modeling, expert estimation. Theoretical and applied papers on the research topic were studied [1-23], official statistics data also.

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3 Main content. Substantiation for history, modern trends, and prospects of distance education development

3.1 Identifying the historical points of distance education

Identifying the historical points of distance education (DE) is a very important part of the current research. It should be noted that it starts in the United States. One of the earliest uses of distance learning (DL) began in 1873. That year “The Society to Encourage Studies at Home” (SH) produced print-based correspondence. SH was founded by Anna Eliot Ticknor with the purpose to offer ladies of all classes the opportunity for education. Thirteenth Annual Report Society to Encourage Studies at Home in 1886 mentioned it as “to induce among ladies the habit of devoting some part of every day to study of a systematic and thorough kind”. Students could take individually planned courses amid daily responsibilities. The courses incorporated communication between the instructors and students to help ensure success. The school existed for 24 years and gave graduation to over 7000 students [1].

Then in the early 1900s, radio technology offered more public access to DE via audio broadcasts. Synchronous delivery became available in the 1950s when the telephone was introduced. This allowed for the bridging of multiple phone lines to have a phone conference. Television expanded DL from the 1960s to the 1980s when video technology became available. Technology has continued to evolve and also included a microwave, and satellite transmission [2]. More recently, synchronous and asynchronous DE has occurred through the use of personal computers [3]. The capabilities of the Internet are also expanding and open up greater access to educational resources and training specialists due to the convenience of working and learning at home [4].

3.2 Describing the transformation on DE conception

The article considers DE as a viable learning method in terms of ensuring equal access to education for all people in any geographical place and time. A literature review was conducted using EBSCO, ERIC, and other educational search engines, as well as keywords related to DE and access to education. The result of this study is to determine whether distance learning is a viable option to expand access to education to everybody everywhere.

The conception of DE can be represented by various formats that can be applied to realize it. They can be as simple as printed course paper delivered via the postal service or as complex as using real-time video conferencing equipment. There are two main types of DE: asynchronous and synchronous. Asynchronous one occurs when there is a pause in the communication between the teacher and the student. Correspondence course-work recorded lectures, and websites, where information for students can be placed, are examples of asynchronous DE. The synchronous method occurs when the students interact in real-time with a teacher or each other. Examples of synchronized DE are conference calling and live video conferencing at home or a distance learning center. DE technologies are illustrated in Fig. 1.

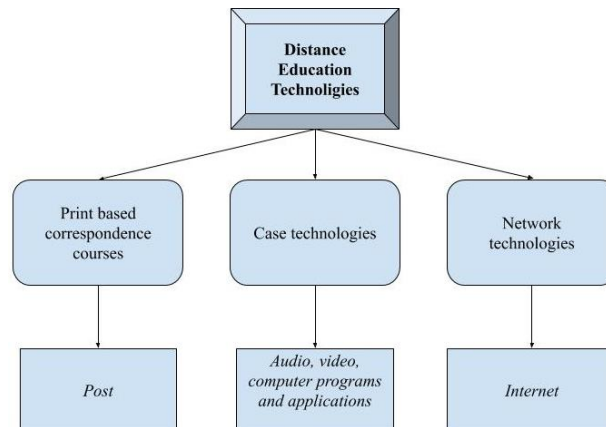


Fig. 1. DE technologies

The oldest form of DE is the print-based correspondence courses. This is the form when educational packets are sent to and from the student and educational institution via the postal service. Due to the history of this DE format, correspondence courses are usually well organized into separate manageable units of study [5]. Correspondence courses offer convenient access to information materials and are easy to fit into one's lifestyle. These courses are very affordable and require no use of technology. The student must have a high level of self-discipline for this format as there is very short-term interaction between the student and teacher [6]. The student must set aside an adequate amount of time to complete the course requirements by predetermined timelines.

Another version of DE is the use of audio and videotapes. Over time, these have been replaced with CDs or DVDs but have a similar style of delivery. These methods of learning require a minimal level of experience with technology. The CDs allow the user to learn through the single sensory function of hearing while DVDs use both visual and hearing senses. The DVDs can be generated from a simple video camera set up to record the classroom instruction or as advanced as a full-scale quality digital production. A major advantage of using CD or DVD technology is that CD or DVD players are typically easily accessible making special equipment unnecessary. Another plus is the benefit of being able to access the material as many times as needed with the opportunity to review one specific section or the entire lecture [7]. One of the largest drawbacks of using CDs or DVDs as a method of learning is the inability to interact with the teacher or fellow students [8; 9]. It should be noted again that for this style of learning students must be diligent in performing the work continuously or procrastination will be a significant problem for them [10].

Asynchronous delivery can occur through a cable feed to an individual's television at home or via microwave/satellite signal to a specific off-site location that is equipped to receive the content. This type of DL takes place at a specific time on a specific cable channel or at a particular location due to the broadcast requirements. An advantage of this form of delivery is that the information is usually more up-to-date than printed

correspondence courses. Another benefit is the opportunity for experts to record lectures and share with students current events related to the subject matter. The students who attend an offsite location indicate that the interaction with other students is a positive benefit. Conversely, disadvantages of this type of asynchronous delivery include equipment failure and the lack of flexibility in taking a course, i.e. set time and set place [11]. Even though this delivery technique lacks immediacy in regards to the non-verbal interaction, that takes place in a traditional classroom along with the lack of live dialogue between the student and teacher, students have evaluated this teaching technique positively [7].

Another type of asynchronous delivery includes the use of interactive CDs or web-based internet courses with a computer. This method allows students to have access to the tremendous amount of learning resources that are located on the web. Students can use email, chat rooms, and discussion boards to interact with classmates and/or the instructor [12; 13]. Another benefit of this type of learning is that students can take time to digest the information and then make logical responses with their postings or comments [5; 14].

Even with these benefits, there are some disadvantages mentioned. These include the cost of the technology such as computer hardware and software along with unreliable Internet service. One must also have the computer skills necessary to install software, create and save documents, add attachments to emails, and post comments on a discussion board. If these are not present, the student's learning experience will be hindered [6; 14; 15]. Students who do not have these skills may have difficulties at the beginning of the course but often become proficient rather quickly, and in the end, indicate that learning these computer skills was an added benefit of taking the course. Individuals who have taken Internet-based courses state a readiness to do it again in the future [14].

Live video conferencing allows for asynchronous DL experience. This technology offers both audio and visual interaction in the learning environment. Students can be dispersed in many different locations but can interact live with their instructor and other students. There are various formats for real-time video conferencing: some require the student to be in a premise equipped with satellite equipment, while others allow them to do the same from home.

The pre-arranged satellite facilities offer students the ability to interact directly with other students at their same satellite location. It also allows for video/audio communication with the main classroom where the instructor is located. Many satellite centers can be connected with the same instructor simultaneously. A major benefit of this format is the technology provided for the students and they have no personal technology expenses. Satellite facilities are commonly used in today's educational arena.

A more convenient method of video conferencing is now available from the student's home or office. Students need a computer, camera, microphone, and high-speed internet to connect to the classroom. In some instances, special software is required. This method has become available due to the enhanced availability of the Internet. It offers more flexibility than the satellite centers, however, students have an increased expense in equipment.

Also, it should be mentioned that DE offers equal educational opportunities that everyone deserves. Still, now some face barriers that limit their access to education. In some cases, access to education depended on race, religion, gender, etc., and in other cases, there are financial reasons. A person's health can also lead to limited access to education, while in other situations the geographical location in which he lives can cause problems. Finally, legal requirements may affect the offer of courses in many schools. In the United States for many years African American students were not allowed to go to education establishments (EE) with other students, and many specialized EE typically did not have the funding that other EE had. *Brown v. Education Board* decided to eliminate segregation, but equal access to education is still a problem. In many cases, unequal access is in the K-12 education range, but in some others, it occurs at the college level [16].

The ability to pay for education also poses many barriers to students. In the arena of higher education, a student is not allowed to attend college if he/she cannot pay for it. For sure there is financial assistance, but in many cases, a student cannot claim enough help to make education accessible. The student might be able to pay the tuition but cannot afford the housing fees that go along with attending a university. If the student has the opportunity to live at home with their parents, a possible solution to this problem may be receiving their college education via DE.

In the K-12 system money also plays a big role in the quality of education one receives. Schools that have adequate financial resources can pay for the staffing expenses to retain quality teachers. These districts are also able to provide for proper instructional materials which are crucial in creating a proper learning environment [17].

Another area that may cause disparities in education is the health status of the child. In some cases, the child may require special isolation techniques for the safety of the child, other students, and teachers. The student can be very capable of learning and doing their work but cannot be in the school environment. These children may miss a lot of school for a variety of reasons and it can take a lot of time for them to catch up and learn the material they missed. This time requirement causes many parents to have concerns that their child will be held back in school or not reach their full potential. In other health-related issues, the student may need a specially trained instructor that is not available in the local school district. If a special instructor is not brought in, the parents will have to settle for an inferior education [18].

The geographic location in which one lives may also cause limited access to quality education. Many people live in metropolitan areas while others are in very rural communities. Individuals who live in a rural community are much more likely to receive a limited education compared to those in a metropolitan area. The state of Kentucky in the United States has reduced these limits by investing in videoconferencing abilities to connect thriving urban centers to isolated regions of the state. Australia has experienced similar education access problems so it also implemented videoconferencing technology in 1997. It worked so well in Australia that their efforts received the International Teleconferencing Association's Excellence Award [19].

Act "No Child Left Behind" (NCLB) requires "highly qualified" teachers to teach subjects in schools to improve student performance. To ensure that every student received a quality education, a shortage of qualified teachers arose. In an attempt to fulfill

this requirement, some school districts had to form an online environment to satisfy the requirements included in the NCLB. The greatest shortage of teachers was in rural schools. Therefore, 46% of their constituencies use DE versus 28% and 23% in urban and suburban areas. Many of these schools report the use of two-way video conferencing, while others use asynchronous computer learning over the Internet to overcome this obstacle [20]. These DE methods are creative ways to use technology and meet the requirements of education law.

DE can be a possible solution to accessing education and ruining barriers that were mentioned above. In almost every scenario, the reason for limited access to education is due to a lack of qualified teachers, whether due to lack of funds or geographical location. For lectures from another school, you can use direct video conferencing. This would allow experts in the field to lecture on specific topics similar to the methods used in Kentucky [19]. DE will allow these areas to maximize resources and offer quality education to their students. DE occurs in the education process when the teacher and student are separated by distance and/or time [7; 21].

3.3 Characteristics of the modern state of distance education

Modern DE based on the Internet is steadily moving forward, attracting more and more attention of people and gradually demonstrating significant dynamics of its development. But there are also some problems. Based on the modern conditions of the development of DE in the world, combining many years of experience and research practice in distance education, the article enlightens the features of its development and the importance of multimedia course programs applying.

During the research, the problems that exist in DE were indicated, and the improvement of countermeasures was analyzed. Throughout history, access to quality education has been a problem for many people. Many reasons could contribute to accessibility problems, including race, economic status, health status, religion, gender, age, and the general geographical region in which a person lives. These barriers have historically prevented many people from receiving equal educational opportunities. With the development of technologies, DE becomes a formidable adversary and could potentially create “a playing field” in terms of access to education. To determine the viability of this educational “delivery” method, the transformation of DE conception (its historical evolution) has been studied. This extensive literature review provided an introspective analysis of the types and components of DE. It also revealed the strengths and weaknesses, as well as the factors associated with considering DE as a means to increase the accessibility to education.

Recently, the popularity of DE among higher education administrators has grown significantly. More and more students are taking advantage of the flexibility and accessibility that distance learning offers. This growth, however, has been “an ambiguous blessing”, as it is due to the use of the Internet without taking full advantage of the personalized education and training that telecommunications and computer communications offer. Thus, many institutions ignore the most valuable aspect of digital technology in education. In most cases, colleges and universities offer a universal curriculum using information and communication technologies. This curriculum model is a

relic of the industrial era when standardization of products and services was highly valued in advanced economies. However, today in many sectors the economy of the United States, Western Europe, highly developed parts of Asia, and even metropolises in Russia have already passed into the post-industrial era or are in the process of completing such a transition [22; 23]. In such a developed economy, those who are oriented to clients and modern economic demands receive far more rewards than those who comply with a predetermined industrial scheme. However, the standard curriculum development model that still is offered by many educational structures as part of the universal curriculum completely ignores these fundamental needs of students.

There are successful periodic pilot projects for DE development but often the use of the Internet potential in education has been limited to several courses. It is still not paid appropriate attention to the unique ability to adapt courses to the needs of individual students. Currently, most online courses have inflexible structures and do not contain functions that allow different responses to students based on variables such as educational preferences and prior knowledge of the subject. Personal initiative and the ability to think creatively and autonomously are the most valuable skills in the modern post-industrial economy. Unfortunately, the promotion of such skills lacks a rigorous curriculum for many online courses

Today the applying of the Internet potential for DE on standardized curriculum models should be redesigned to allow educational establishments to improve the educational conditions for their students and provide lower costs for courses. Also, there should be a specific system of interaction between data, instructor (teacher), and student (learner).

L. Schlosser and M. Simonson [20] say that four main components define nowadays distance education:

1. DE is different from self-learning when it is institutionally based. Self-study will take courses for relaxation and will not have a specific period for completion.
2. The teacher and student should be separated in terms of geography or time (that is also mentioned by R. Barhi, J. Brozovsky [21], and G. DeBurg [7]).
3. Interactive telecommunications should be available for students to communicate with learning resources and the teacher.
4. An environment that facilitates learning through the availability of appropriate resources.

If the learning environment has these components, DE will provide an optimal learning environment for students. The vital aspect of successful DE delivery is communication. Students should be able to communicate effectively with their teachers and peers to maximize their learning experience.

3.4 Disclosure of development trends and prospects for distance education

One of the most important trends of DE development is openness. It means that an educational establishment opens its goals, learning objects, educational resources or teaching courses, educational methods, the ways of management, and educational facilities.

DE differs from traditional education and pays more attention to the cultivation of

innovation ability. There is the premise of ensuring the educated having the basic ability of learning. Then a “lenient entry, stringent exit” approach is taken. At the same time checking the education quality is not put at the entrance of a model. In teaching management, many educational opportunities are provided for as many people as possible instead of taking the principle of survival of the fittest. In educational methods, the working reality of serving staff with different professional backgrounds and working hours must be considered. Alternative education services should be provided, in particular, a variety of educational resources should be optimized and combined to serve the educated [14].

The other trend of DE and the also competitive prospect is flexibility. It means:

1. There is the ability to accept and satisfy the individual requirements of students and to give greater autonomy to them. The student can learn in the way which was chosen by him to improve learning efficiency, and therefore change the passive learning to active acceptance. In DE the student is responsible for the individual learning progress. Learning evaluation is to focus on the progress of learning rather than the success or failure of their examination results. The learning of students requires their cooperation with teachers so that the content of the learning is in line with job requirements. The learning of educated people is mainly an autonomic one, while the school is to provide more learning conditions and services.
2. DE has wide coverage, flexible means of communication. All educational resources are free from the constraint. Therefore, it is possible to provide education services for students anytime and anywhere.
3. DE units can achieve various forms of cooperation of many higher education units, and complementary advantages, fully playing the role of higher education.

The prospects and advantages of the DE popularity are based on the first two items. It is because of the DE openness, will it be possible to provide educational opportunities for people with different bases and different experiences. At the same time, also due to the flexibility of distance education, people with different backgrounds and different occupations can get extra education. Therefore, distance education is rather popular. Using the Internet DE provides the learners with the greatest wealth of information. So the learning is changed from the process of passive recording of the information into the process of learner's selection of information [5]. From the material sense, e-learning breaks the constraints of time and space. Schools do not need to arrange classrooms for students. Also, there are no problems with the accommodation for the students. Teaching activities are out of geographic restrictions, and extend to the country and the world, achieving the sharing and optimization of educational resources. Besides, because online learning information is in the form of an email, a copy of the information is simple, rapid, and economical, saving a lot of book costs.

3.5 Analyzing the relevant data on distance learning

At present, the whole DE market is growing rapidly and has great potential. However, distance education in many countries is still in the development stage. The real development of DE in the digitalization aspect just started in 2000. So far, there are still many

uncertainties about different forms of DE and the future direction of its development. There are several major problems highlighted after analyzing.

DE is taught through the medium of courseware. In the process of the courseware production, teachers provide static content, and the multimedia production staff digitalizes it. It leads to the phenomenon that the professional one does not understand the technology, while the one who understands technology is not a professional. Therefore the improvement of the instructional design and the quality of course-ware is an important area of DE.

In distance education, the Russian current national policy is very loose. According to relevant regulation of the Ministry of Education, there are pilot institutions that can implement self-management, having autonomy in enrollment, the decision of assessment methods, deciding of the professional direction. Particularly it is appropriate to adopt the policy to DE for many professions.

In the world, DE can be a breakthrough in obtaining 253 professions for current students, if experts [10] scientifically substantiate it. However, there is still disagreement in education in terms of promoting DE and the future direction of its development. The adapted distance education policy has given various “pilot” educational establishments significant autonomy. However, some experts say that there are not so many “pilot” institutions in Russia. Until now, Russian online colleges are “pilot” institutions that teach the future scientific method of distance learning.

Most of the current distance education projects are carried out using the cooperation of educational establishments and businesses. The companies are optimistic about the great development prospects of DE in Russia, so they have invested abundant capital and technologies in this market.

Therefore, at present, money is not the main factor for distance education [9]. At this stage, the biggest problem is the lack of talents. DE is a systematic project, which requires a combination of human and material resources from schools, businesses, society, a combination of traditional teaching methods and modern educational technology, and a combination of education and business operation activities. It requires not only skillful professionals but also management personnel who are familiar with teaching steps and the methods of business. In the current period of initial development, the talents who have far-reaching vision are needed especially.

Lack of resources is currently a common problem in the education industry in Russia. In this regard, the need arose for the formation of new additional resources and IT technologies in educational institutions. Often schools and companies duplicate training programs, which leads to a large waste of resources. At the same time, this leads to uneven use of software resources, some of which are directly applied to traditional “paper” lesson plans. These products will affect the learning effect and loss of the benefits of education based on information technology, which will adversely affect the promotion of DE.

The authors were made research on relevant data of DE digitalization and profitability [23]. Moreover, it should be mentioned that DE could not be only the way to overcome the mentioned social and economic problems for making education more affordable to students but also become a very effective project for education establishment. Fig. 2 is illustrated as an average bill for DE on six basic commercial models.

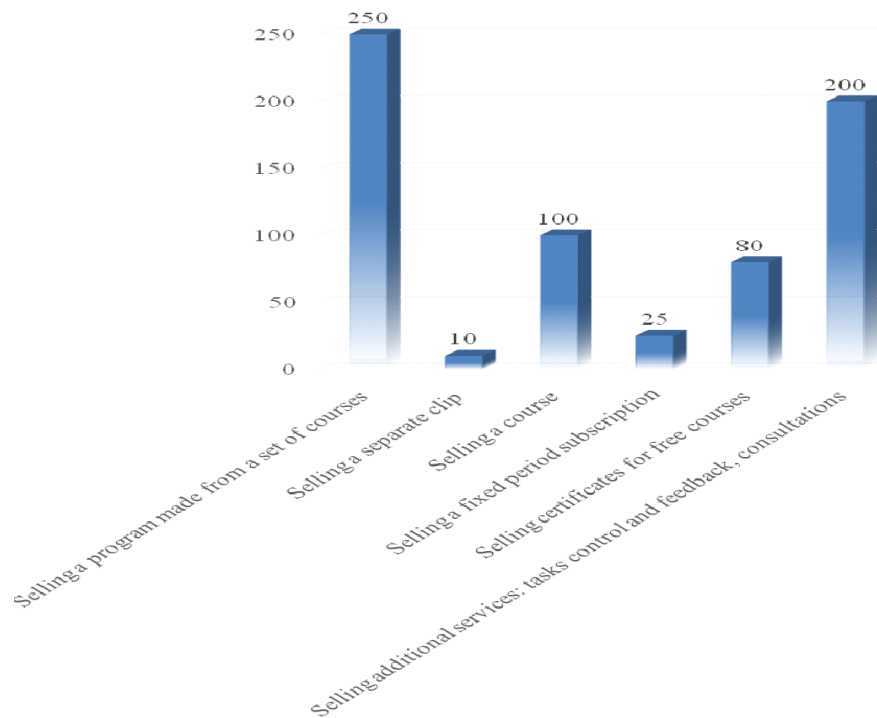


Fig. 2. An average bill for DE on different models

Due to the large distances between educational centers in the Russian Federation online DE is becoming increasingly popular. The courses share is given in fig. 3.

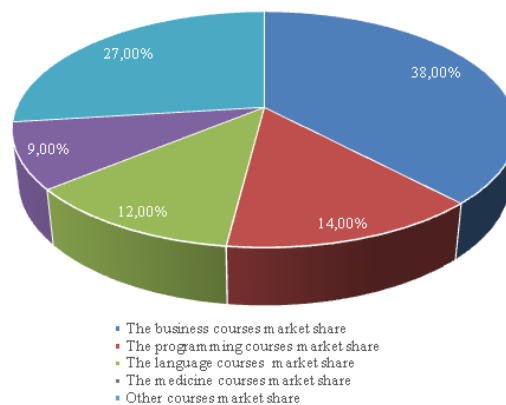


Fig. 3. The different courses market share in the DE total cost structure in the Russian Federation

The mentioned research [23] also allowed suggesting the DE economic aspects mathematical model based on e-learning prospects. DE must be economically successful for its sustainable functioning and it must receive profit from its activities. As the mathematical model of such activity the authors take equations:

$$\begin{cases} \frac{dz}{dt} = \alpha(U - z)z - \gamma z \\ \frac{dN}{dt} = KUo \left(1 - \frac{N}{No}\right) - BN \\ \frac{dp}{dt} = \gamma \left[\frac{A}{P} - Bp\right] \end{cases} \quad (1)$$

The upper equation of the system (1) is a simulation model for a student's knowledge level z dynamics, α and γ are coefficients of student's remembering and forgetting of information that one is received during the educational process. U is the requirements level for the student. The solution to this equation is:

$$\int_{Z(o)}^{Z(t)} \frac{dx}{x^2 - (U - \frac{\gamma}{\alpha})x} = -at = \int_{Z(o)}^{Z(t)} dx \frac{1}{U - \frac{\gamma}{\alpha}} \left[\frac{1}{x - (U - \frac{\gamma}{\alpha})} - \frac{1}{x} \right] = \frac{1}{U - \frac{\gamma}{\alpha}} \ln \frac{z(o)[z(t) - (U - \frac{\gamma}{\alpha})]}{z(t)[z(o) - (U - \frac{\gamma}{\alpha})]} \quad (2)$$

Thence:

$$\frac{z(o)[z(t) - (U - \frac{\gamma}{\alpha})]}{z(t)[z(o) - (U - \frac{\gamma}{\alpha})]} = e^{-a(U - \frac{\gamma}{\alpha})t} \quad (3)$$

The solution of equation (3) is:

$$Z(t) = \frac{z(o)(U - \frac{\gamma}{\alpha})}{z(o) \left(1 - e^{-a(U - \frac{\gamma}{\alpha})t}\right) + (U - \frac{\gamma}{\alpha})e^{-a(U - \frac{\gamma}{\alpha})t}}$$

if $U > \frac{\gamma}{\alpha}$, that $\lim_{t \rightarrow \infty} Z(t) = (U - \frac{\gamma}{\alpha})$ (4)

The lower equation of the system (1) describes the dynamics of the education cost P depending on the demand $\frac{A}{P}$ and supply BP . A and B are the coefficients of supply and demand. Multiplying the right and the left sides of this equation by P , the authors get:

$$P \frac{dp}{dt} = \frac{d}{dt} \frac{p^2}{2} = \gamma[A - BP^2] \quad (5)$$

As a result of integrating equation (5) it will be received:

$$\int_{P(o)}^{P(t)} \frac{Bdp^2}{Bp^2 - A} = 2\gamma Bt = \ln \frac{Bp^2(t) - A}{Bp^2(o) - A} \quad (6)$$

On solving equation (6) it will be a result:

$$P(t) = \sqrt{\frac{A}{B} + \left(p^2(o) - \frac{A}{B}\right)} e^{-2\gamma B t} \quad (7)$$

that makes:

$$\lim_{t \rightarrow \infty} P(t) = \sqrt{\frac{A}{B}} \quad (8)$$

The middle equation of the system (1) describes the dynamics of the students' number that are studying at a given university on DE. It is a need to transform this equation into the form:

$$\frac{dN}{dt} = KU_o - \left(\frac{KU_o}{N_o} + B\right)N = -\left(\frac{KU_o}{N_o} + B\right)\left(N - \frac{KU_o}{\frac{KU_o}{N_o} + B}\right) \quad (9)$$

Here $U_o = \text{const}$ is the intensity of advertising at the given DE structure, N_o is the maximum number of students who have the opportunity to study at the given university, B is the probability of student deduction and leaving from DE. The solution to equation (9) is:

$$N(t) = \frac{KU_o}{\frac{KU_o}{N_o} + B} + \left(N(o) - \frac{KU_o}{\frac{KU_o}{N_o} + B}\right) \exp\left\{-\left(\frac{KU_o}{N_o} + B\right)t\right\} \quad (10)$$

That makes:

$$\lim_{t \rightarrow \infty} N(t) = \frac{KU_o}{\frac{KU_o}{N_o} + B}.$$

University income for the period $T\Delta$ is:

$$\Delta = \int_J^{J+T} (pN - p_o Z) = \left\{ \sqrt{\frac{A}{B}} \times \frac{KU_o}{\frac{KU_o}{N_o} + B} + p_o \left(\frac{\gamma}{a} - U\right) \right\} T \quad (11)$$

in which p_o is the expenditure of e-education structure funds per unit of knowledge, $J \gg 1$.

3.6 The substation for applying of nowadays tools for methodic of distance learning

To implement modern distance education, schools must first build the hardware platform of modern distance education, which mainly includes configuring audio and video equipment, audio-visual classrooms, FM radio, computers, and other media facilities. It is necessary to install satellite antennas, VBI, and IP receiver equipment, set up an applicable computer network, and launch a remote ATM video broadcast system, and increase the building of an Internet technology-based distance education site.

In the construction of a multimedia distance teaching platform, the software is the

core key. The software system of distance teaching includes system software and application software. The operating system is the core of system software. With the support of the operating system, language processing, database, and other system software teachers and students can use these services. In the process of building a distance teaching software platform, it should be facilitated students' access to learning sources.

DE software and a hardware platform have been formed in many educational establishments. However, there is a large lack of training resources, which is also the key to whether DE can get good results. Creating resources for distance learning requires not only significant investments but also a large number of people who have teaching experience and knowledge in the field of software development. There were very few such specialists, so it is very difficult to develop new resources for distance learning [8]. Therefore, existing education establishments must be adapted to local conditions for creating distance learning resources. The following basic methods should be followed:

1. The collection, transformation, integration of traditional teaching resources. The early DE accumulated a large number of texts, tapes, videos, pictures, and other forms of resources. Through modern information technology, they can be transformed and integrated into distance learning resources suitable for multimedia and computer network teaching.
2. The collection of sharing resources. Many shared resources online are completely free, or free of charge within the specified time, or are free in a certain function. It can be gathered a variety of free sharing resources through various channels to enrich the distance teaching resource library.
3. Buying or sharing multimedia network resources. If the necessary training resources are more mature and development is uneconomical, one can buy them. Some educational resources can be obtained through the exchange, and one can also share resources with other educational institutions.
4. The new development of resources such as electronic lesson plans and online courseware. In distance teaching, the teaching center is changing from the "teaching" by the teachers in traditional teaching into a student's "learning". Students become the subject of teaching. But the leading role of teachers in the teaching process is still very important, and without it, teaching is difficult to carry out. Therefore, when one designs a teaching platform and teaching resources, one should remember that it should also enhance the training of teachers quality. This mainly refers to the required qualities teachers possess in distance education, which includes:

A. Creation of new ideas and concepts of training and active study of new teaching methods. This is true for many teachers, especially older teachers, as they are used to traditional classroom activities and have accumulated rich teaching experience in this regard. It is difficult for them to adapt to this new learning environment primarily because of the need to master new ideas and concepts. They will be excluded from the new teaching methods in psychology, still using traditional teaching methods, which will make it difficult to improve the quality of distance learning. Therefore, teacher training should be strengthened to improve their understanding of distance learning, help them change educational ideas, positively tune in to a new learning environment,

and learn new teaching methods.

B. To the master of the basic knowledge and basic skills in distance teaching. To fully play a leading role in distance education, teachers should not only update the concepts of education but also master the basic knowledge and basic skills of online distance teaching, which mainly include: computer basics, multimedia teaching theory, the making of multimedia courseware, basic network knowledge.

Modern DE resource is supported by modern information technology, which is an important tool and method achieved by open students. Students should be comfortable taking distance learning, mastering basic knowledge and skills of DE online, which include: using basic computer skills, basic Windows/Mac operations, browsing the Internet, the ability to participate in a BBS discussion, to upload a file, to send and receive an e-mail, as well as to use multimedia training programs. If students participating in DE and they do not have the necessary knowledge of modern information about computer networks, modern distance education will not be successful. Thus, the main priority of successful modern DE is education and training in modern information technologies to develop students' self-learning ability to learn gaining access to modern educational resources.

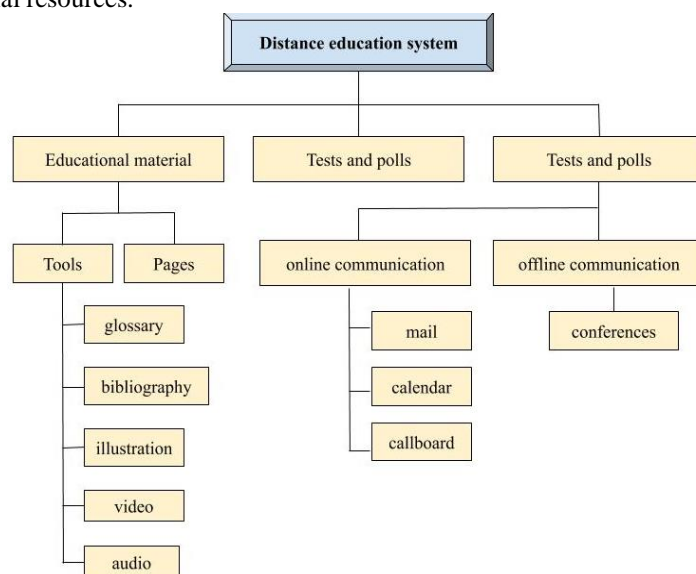


Fig. 4. DE System

5. The reform of teaching materials. The traditional materials are paper-made and relatively old, basically for face to face classroom teaching. To adapt to different levels of individual learning needs a variety of media materials must be prepared. At the same time when preparing new textbooks, more efforts should be devoted to the development of digital materials based on training in computer networks. An important principle reflected in the training materials is a guide for students, as well as for instructions on how to get other related materials, training resources, and how to get advice. This should be presented in the training materials.

6. Reform of forms of education. The goals of modern open education are that anyone can get any course of study anytime, anywhere. But the level of knowledge, training time, places of students' learning in DE are not the same, therefore, in the organization of training, as a rule, collective learning centers are used. Collective learning is mainly based on group learning.
7. Expand educational ideas. Since the staff, finances, and materials of an individual school are limited, this affects its professional level. The adoption of such a concept as joint schools will help schools not only complement each other, share resources but also increase school size and improve work efficiency, reform teaching management, and achieve modernization of teaching management methods. The achievement of the modernization of teaching management mainly starts from the reform of administration contacts management and the strengthening of curriculum management, establishing a scientifically integrated question bank and the scoring system, enabling assessment computerized. Computer scoring is fast and accurate and can step on the questions for analysis, to improve test reliability and validity. The results of computer coring can result in timely importing into line query system to facilitate the opening up students in timely cross-probing.
8. The education departments at all levels should attach great importance to support the development of distance education. The key to whether innovation can be beneficial to health lies in the attention and support of the market, but in many ways still needs the support and coordination of the relevant government departments. Awareness of distance education of leading personnel determines the degree of support for distance learning and also determines whether distance learning can develop rapidly. This requires that leading cadres have ideas of modern education and increase their awareness, regularly participate in training on the achievements of modern education, free their minds, and change their ideas.

It should be mentioned that during DE students must be involved in the learning activity. There can be used web-sites for project ideas (Fig. 5 – for students from the Russian Federation).

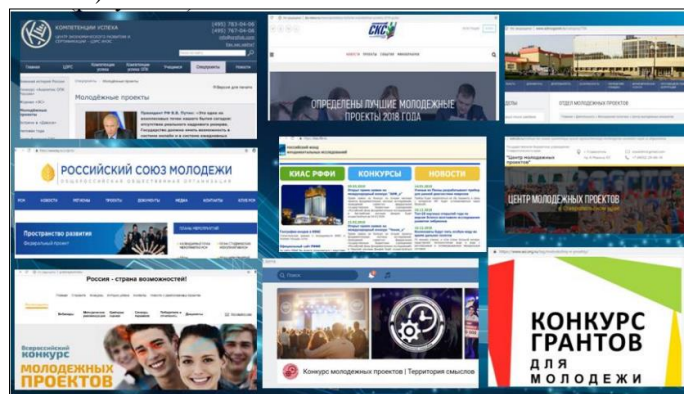


Fig. 5. Examples of web-sites for projects ideas and applying (Russian Federation)

Students and teachers can prepare their visual blocks and presentation for DE online

(Fig. 6).

The innovations could be found with sites of Mashable, The Verge, TED, Trendwatching, Techcrunch, Producthunt, AXIOS, Trendhunter, News. Google, Springwise, IdeatoValue, MoreInspiration, CoolBusinessIdeas, Trendcentral, World Future Society, Copenhagen Institute for Futures Studies, TheFutureLaboratory, TrendOriginal (Fig. 7).

This list can be continued for DE at the further publications.

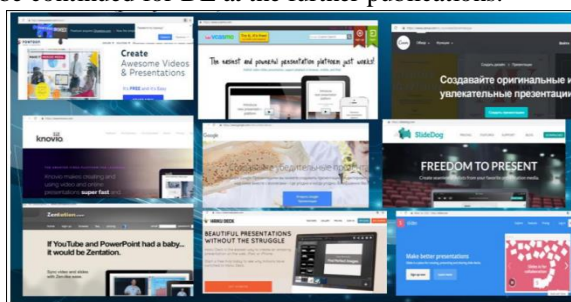


Fig. 6. Examples of websites for video and presentations

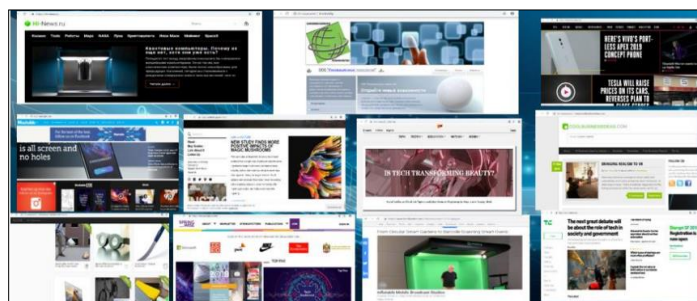


Fig. 7. Examples of web-sites for modern trends and innovations

4 Conclusions

DE develops very fast all over the world. It has reach history and a large potential for applying. It makes education an affordable area for many people but also it can be a profitable one. Internet-based DE is an emerging industry with full development potential. DE in modern universities will be continuous, rapid development in the coming years. The education system must use its advantage of specialized computer courses, as well as the advantage of the talented teachers, to produce more and more training courses and related software for distance learning on the network, and do everything possible to make a proper contribution to the cause of distance learning at education establishments, thanks to which DE in Russia will develop energetically and healthily, and modern educational tools benefit millions of students and the vast majority of educated people. The suggested mathematical model is very important for the evaluation of DE effectiveness.

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