Turkish Journal of Computer and Mathematics Education Vol.12 No.10 (2021), 1556-1563

Research Article

The Use of Computer Technologies in the Professional Training of Bachelors of Arts in the Context of Distance Learning

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Article History Received: 10 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 28 April 2021

Abstract: In the context of a pandemic and the introduction of quarantine measures, the issue of proper organisation of the educational process without interfering with the curriculum becomes especially relevant. Distance learning is a way to solve this problem, but for this type of learning to be effective, it is necessary to understand what digital technologies will help to master the educational programme. Therefore, the purpose of the study was to identify which of the modern digital technologies are the most effective for distance learning, and based on the analysis to develop a model of online training for bachelors of arts. The study applied an analysis, which helped to evaluate modern digital technologies in terms of efficiency for use in distance learning, and modelling, which helped to create an optimal learning model in terms of distance learning. The analysis considered the concept of "distance learning" and the system of its implementation in the educational process. Six main stages that will ensure a rapid and effective transition to distance learning were identified, which almost all educational institutions in Ukraine had to face. It was found that the provision of digital technologies and the necessary technical equipment is one of the most pressing issues of the modern education system. The analysis of online resources has shown that at the present time the mastering of the curriculum of art specialities is significantly complicated by the transition to distance learning and a number of shortcomings. The practical significance of the study is that the developed model of online learning is ready for implementation, and the recommendations can be used when developing an educational programme for distance learning.

Keywords: Webinar, Information and Communication Technologies, Virtual Space, Video Conferencing.

1. Introduction

As of today, information and communication technologies (ICT) have covered all spheres of life: from recreation to artificial intelligence, which performs the work of ordinary people [1]. The education sector is not an exception, the introduction of digital technologies has allowed expanding the sources of information, establishing constant contact of bachelors with teachers and other bachelors, as well as continuing study during the quarantine [2]. One such measure was the termination of classes within the educational institutions and the transition to distance learning, which is carried out using modern digital technologies and the Internet. Therefore, it is important for a modern teacher to know the educational trends defined by the use of digital technologies and be able to use them. It is important to understand the capabilities of ICT to adapt them to the educational process so that their use contributes to the effective mastering of the curriculum [3; 4].

The current stage of development of vocational education is characterised by the process of digitalisation, caused by the globalisation and the transition to digital economy and digital society [5]. Today, building a digital economy and digital education are significant priorities of the national policy of Ukraine (Portnova 2018). The new generation of students (Generation Z) lives in a digital environment that shapes digital technologies, including educationally significant ones: telecommunications technologies, distributed ledger systems, artificial intelligence, robotics components, wireless technologies, virtual and augmented reality technologies, cloud technologies, technologies of electronic identification and authentication, digital technologies of specialised educational purpose, Internet of Things, etc. Trends in the digital transformation of vocational education require teachers to have a high level of ICT competence for the successful implementation of professional activities.

Either way, it is teachers who are called to further prepare the younger generation for life and work in modern digital society [6-8].

Therefore, today ICT competence is one of the leading competencies in teaching at all levels of continuing education [9]. This is also relevant for the training of art specialists, including future musicians. The ICT can be used used in the study of the following subjects: computer arrangement and multimedia technology; elementary music theory; solfeggio; harmony; vocals; conducting; vocal techniques and work with an ensemble; conducting practice; basics of vocal and choral arrangement, etc. The ICT competence of bachelors of arts implies the integral personal quality of a person, which is manifested in the following: the ability based on knowledge, skills, and university experience, to solve professional problems with ICT and digital skills; readiness for the appropriate use of ICT, taking into account the specifics of the field of professional activity (Mykulina 2018). The digital educational process in the university should be based on a new branch of pedagogical science – digital didactics. It is a scientific discipline that deals with the organisation of the learning process in the digital educational environment [10; 11].

At the moment, education systems around the world are taking steps to organise education in the context of the coronavirus pandemic (COVID-19). Due to the introduction of the self-isolation, educational institutions had to face unexpected difficulties in the process of emergency implementation of distance learning, mainly due to insufficient technical equipment and poor preparation of both teachers and students to work in new conditions. These and other problems challenge the critical education system (Lupak 2018; Portnova 2019). At the same time, along with the obvious challenges and problems, the new format of education provides a wide range of opportunities and prospects for change and improvement of educational systems, for which the critical situation creates forced conditions [12-14].

Therefore, the purpose of the study was to identify which of the modern digital technologies are the most effective for distance learning, and based on the analysis to develop an online learning model for bachelors of arts.

2. Materials and Methods

The study was carried out in two stages. At the first stage, the concept of "distance learning" and the features of its implementation in the educational process were considered, as well as the main modern digital technologies used for the organisation of distance learning. In accordance with the objectives of this stage of study, the analysis was conducted, which is the most common and universal method used by scientists. The analysis of the subject under study provides an opportunity to deconstruct the phenomenon into its components and consider them according to various criteria corresponding to the research objective. At the second stage, an attempt was made to build a universal model that will help to most effectively implement an online course in any subject of the educational programme of bachelors of arts. For this purpose the modelling was used, and also the basic principles of building an online course were applied.

The basis of distance learning is a carefully designed and planned learning process in the electronic information and educational environment (EIEE). It is supported by a methodically sound and purposeful sequence of teaching and control materials, which ensure the achievement of learning objectives in the e-learning format (Hertsovska and Vozniak 2018). The key in this process is pedagogical design as a way to design an online course, which is the need for appropriate and motivated use of digital technologies in distance learning (Zinchenko 2020). The study considers the nine basic conditions that a teacher needs to build and implement an online course:

1. A learning model has been developed and adapted for distance learning, which can be of several types: exclusively e-learning; blended learning in a different ratio of full-time and online formats; e-learning with the introduction of webinars.
2. Correct choice of pace in mastering the developed model of training which can be both strictly regulated, and to allow passage of certain parts of the course in an arbitrary order.
3. Bachelors, the number of which may vary from subgroup to the whole course.
4. Pedagogical technology, i.e., a set of individual pedagogical methods and techniques of teaching, the use of which should contribute to the development of the educational programme and lead to the result planned by the teacher at the end of the course.
5. The purpose of assessment in the course is defined, i.e., determination of the degree of readiness of the bachelor of arts to a new material, the organisation of adaptive training, analysis of the learning outcomes, the accumulative assessment system, identification of lagging bachelors, etc.

6. The role of the teacher in the process of distance learning, as the teacher can actively interact with students or, conversely, passively use the online space – it depends on the model chosen by the teacher.
7. The role of the bachelor of arts in the process of distance learning. The bachelor, like the teacher, can be an active participant in the online class, i.e., answer questions, tell the topic of the report, solve problems, etc. Or vice versa, passively listen to a lecture, memorise and record new material, etc. – it depends on the type of activity.
8. Organisation of interaction between the teacher and bachelors and between bachelors with each other. In the context of distance learning, it is especially important to properly organise the process of synchronisation between all participants, because the distance makes it difficult to establish contact and ensure active participation of all students in the lecture.
9. Provision of feedback, which is important not only for the teacher to understand the degree of achievement of the goal set, but also contributes to a positive emotional state of all participants in the educational process. Because in the context of distance learning, which has become forced due to the pandemic, it is important for every teacher and bachelor of arts to receive support in this stressful situation [15].

Properly selected course materials, based on the goals and objectives of learning and the characteristics of the educational process in the online environment, will provide an educational result, and the teacher – positive feedback. This approach implies that online learning is primarily a cognitive and social process, not just a transmission of information via the Internet. Online learning is not possible without an IT infrastructure that requires significant investment. This includes an internal or external online learning platform, as well as quality online courses that provide effective training and support for bachelors of arts studying remotely.

3. Results and Discussion

3.1 The Concept of Distance Learning and Features of its Implementation in the Educational Process

As mentioned above, given the threat of coronavirus infection, most universities and colleges have decided to switch to distance learning as part of quarantine measures. In this regard, all face-to-face classes, including lectures, practical and even laboratory in the presence of virtual counterparts, were transferred to the online environment (Khalifaeva et al. 2020). Teachers were forced to organise the classes using distance learning technologies based on different ways of transmitting electronic content and available communication tools for bachelors of arts and teachers in the EIEE. The forced transition to distance learning showed that not all universities were ready for such a radical restructuring of the educational process in the shortest possible time (Mahdy and Zaghloul 2020). It was due to different levels of information infrastructure, provision of disciplines with electronic educational resources and readiness of teachers to use digital platforms and services in education. Important requirements for the system of emergency training system were its reliability, bandwidth of the Internet channels, ease of transmission and placement of content, availability of services and platforms for teachers and students [16].

Distance learning means the organisation of educational activities with the use of distance educational technologies. It involves the use of information and telecommunications infrastructure for transmission of information and indirect synchronous or asynchronous interaction of bachelors and educators. To use distance learning, the teacher must have active teaching methods and help bachelors to form their own learning styles online, master the capabilities of the online learning platform and the necessary software, overcome the difficulties and barriers of e-communication. To effectively manage an online course, teachers need to use tools to encourage students to master the curriculum, to develop discipline and skills in meeting deadlines, to conduct timely assessment of bachelor's theses and provide prompt feedback. There are several stages in the organisation of distance learning:

1. Determining the purpose of starting e-learning. Within the framework of education, such a goal is the mastering of the curriculum by the student and the assessment of the results by the teacher, which is done in various forms: module test, credit, exam, etc. The result of this stage is a defined goal and key indicators by which the success of the implemented learning model will be measured.
2. Determining the necessary software for the organisation of distance learning and providing it to all participants in the learning process. As a rule, electronic tools such as webinars, knowledge management system, e-course designer, etc. are used for distance learning. To use these tools, every teacher and bachelor of arts must have at least a personal computer and a webcam. As a result, the teacher determines the most effective ways and tools to transmit information to students and to state the fact that all participants in the learning process are able to join it from the standpoint of technical equipment. If someone does not have all the necessary equipment, it is necessary to find an alternative way to solve the problem.

3. Drawing up a curriculum, adapting the traditional model of learning to distance learning, using all the possibilities of digital technology. The result of this stage will be an online curriculum, which will be transferred from the usual face-to-face courses to online format.
4. Preparing all the necessary materials in accordance with the programme, as well as take care of providing students with additional online sources of information. The result of this stage will be a fully completed training programme, which will be ready for use without the prospect of significant changes in the implementation process.
5. Conducting a trial run of distance learning. It is clear that e-learning is now a completely new way of teaching for most educational institutions, so it is impossible to avoid mistakes and problems with the implementation of distance learning. Therefore, the result of this stage will be the actual implementation of the teaching model created by the teacher while receiving feedback from the students. The feedback should help to understand how clear and easy to learn is the new system of education.
6. Assessing the effectiveness of distance learning. When evaluating the effectiveness of a new educational technology or a model, it is necessary to compare the learning outcomes obtained with the application of this technology, with the learning outcomes in the traditional model of education. This will help to understand how effective the chosen learning model is. But such a comparative analysis usually does not provide valid statistically significant conclusions given that it requires: strict experimental design; materials identical in content and different in format; the same control and measuring materials and conditions for the final certification; a fairly large sample, formed randomly for each model (technology) of learning; exclusion of the influence on the results of the experiment of external factors that reduce the validity of the experiment [17].

In addition, this analysis defines efficiency as the success of bachelors and does not take into account other factors of a positive result. A positive result is not an absolute category, and can be measured based on the interests of different participants in the learning process. For teachers, a positive result is really success in teaching, and for bachelors, in addition to success, motivation and involvement in the learning process play an important role, which directly affects the results of bachelors of arts. For the university administration, such indicators as the percentage of bachelors who have completed the course, reducing the workload of teachers and increasing their productivity, market coverage and the amount of extrabudgetary funds come to the fore. For the founder – the Ministry of Education and Science – the emphasis is shifted towards the quality of education, human resources and reliability of IT infrastructure, the global competitiveness of Ukrainian education and the implementation of national and federal projects.

Evaluation of the effectiveness of online learning or the use of distance learning technologies can be done through the prism of these targets, but such an assessment is appropriate in a planned transition to new models of the educational process. In extreme conditions of sharp reformatting of educational process in the conditions of limited internal and external resources absolutely other criteria of an estimation come to the fore. They can be divided into 4 areas: assessment of the context (preconditions) of change, assessment of the feasibility and cost-effectiveness of change, assessment of the processes of change and results (products), direct and indirect. The result of this stage will be the detection of errors in the implemented online learning model in order to eliminate all the shortcomings, as well as understanding how effective the developed system is, and whether it is necessary to make any changes and what exactly.

Thus, the concept of "distance learning" and the system of its implementation in the educational process were considered. Six main stages were identified that will ensure a rapid and effective transition to distance learning , which almost all educational institutions of Ukraine had to face through quarantine measures. Unfortunately, the provision of digital technologies and the necessary technical equipment is currently one of the most pressing problems of the modern education system, and the current circumstances have contributed to the statement of this fact.

Analysis of Modern Digital Technologies used in the Process of Distance Learning

Digital technologies are an integral part of most types of intellectual, managerial and production activities of man and society. The development of IT in modern conditions is based on the use of computer technology and related methods and tools for automating information processes. From school age, the computer becomes the main tool in learning, and most creative work is not written with a pen on paper, but is created in appropriate electronic programmes; in geometric progression the number of users of electronic messengers and various social projects increases. Today, more and more communication between people is carried out in the virtual space of information and communication technologies. And music could not stay away from the technological progress. Digital technology has covered almost all stages of creation of musical composition. With the help of a computer, a person can make a recording without leaving home, on amateur equipment, process in a special

programme with various effects, then compress to MP3 format and start distributing the "recorded hit" via the Internet. Music and computer technologies are part of IT and, like information technologies, are included in the pedagogical process in almost all disciplines related to the cultural development of the individual [18].

Computer music software can be divided into three main groups. The first group includes programmes that work with the sound wave, these are various multimedia players designed to play audio and video files; various audio editors that can change the sound waves; as well as disc-burning software. Such programmes are used not only in the music industry, but also in other areas of human activity. The second group includes sequencer programmes that combine many functions. A sequencer is a hardware device or application programme for recording, editing, and reproducing a sequence of MIDI (Musical Instrument Digital Interface) data, mainly formulaic rhythmic figures and melodic phrases. Recently, sequencers have become versatile programmes for working with both MIDI and audio, but initially they worked only with MIDI commands. And the third group of programmes are music editors, which are used to type music text, almost in the same way as Microsoft Word is used to type text. Examples of such programmes are ABC Music Notation, Musette, GNU LilyPond, Canorus and many others.

Computer technology has its application in music and can serve three important purposes. Firstly, professional musicians with their help get the opportunity to verify their intentions in the process of creating a melody, to hear the composition not in the imagination, but in reality. It is very useful for mastering the skills of arranging music. Secondly, many musical works are not written for concert performance, music for movies, background melodies for radio programmes, dance music constantly accompany people. Such melodies are a pleasant accompaniment, background, but it is hardly expected to get the same aesthetic pleasure from them as from the famous masterpieces of classical or jazz music. All these works can be quite worthily voiced exclusively by electronic means, without unnecessary labor costs. Thirdly, many people are gifted with musical abilities, but do not have professional training, their knowledge and experience is not enough to perform their works on their own so as to interest the recipients. Computer technology enables such people to fulfill their dreams and creative potential.

The creation of a digital educational environment and the widespread use of modern pedagogical technologies on its basis provided, in terms of distance learning, universal access to educational material for students [19; 20]. The study aims to develop a model of online learning for bachelors of arts. The developed training system was created using a variety of digital technologies and distance learning tools in order to master the learning material, for self-study and learning with the help of a tutor, for feedback and for performance monitoring. Next, the study considers the most effective online ways to master the curricculum in accordance with the outlined stages of implementation of distance learning, starting from the stage of providing all participants in the learning process with technical equipment.

1. To organise distance learning, a personal computer (PC) is needed, which can be a desktop, laptop, netbook, tablet PC, and even the phone can be used in the absence of the above devices. A video or audio communication between a teacher and a student requires a webcam. Laptops typically have a built-in webcam (but not every one), and a desktop computer requires a webcam as an add-on. As evidenced by the practice of the spring period of self-isolation, the ZOOM platform has become the most stable in terms of ease of use for group classes, which provides the ability to simultaneously connect about 100 devices. The conveniences of the ZOOM platform for online training of bachelors of arts are as follows: real-time discussion, communication; interactive board with an opportunity for presentation of materials (joint viewing); a chat with messages, transfer of files; monitoring of attendance (using the "Participants" function; monitoring of the teacher (invitation to the conference by a representative of the administration); archiving of the class (using the conference recording). In addition, a platform for conducting online classes can be such programmes as: Skype, Microsoft Teams, Discord, etc.
2. To create a database of additional online resources that will help the student not only to consolidate the knowledge gained in lectures, but also to obtain extra information, the teacher can use the capabilities of cloud data storage, such as Google Drive. This service allows storing large amounts of information, as well as provides the ability to share and edit files, so everybody has the opportunity to use it. The "cloud" can be filled with scanned lectures designed for the traditional face to fasce learning model, e-learning literature (while some textbooks are sometimes missing in university libraries), useful links, and more.
3. For visual presentation of the material the teacher should use a multimedia presentation, which combines many tools for working with information. The use of presentations in the practice of distance learning contributes to the development and conduct of multimedia classes. The use of such a technology in the educational process increases motivation to learn, because it uses a new form of material for bachelors of arts, and this fact contributes to better learning and better memorisation. Multimedia technologies allow combining a

multicomponent environment into a digital representation and secure long-term storage of large amounts of information. The use of the presentation helps to visualise the theoretical material, using illustrations and audio, video materials. For example, when studying a subject such as solfeggio, the teacher has the opportunity to use audio recordings of musical fragments, or supplement lectures with images, and so on.

The use of presentations improves the quality of teaching, as the teacher has the opportunity: to cover a large amount of material studied, to demonstrate models of various objects and processes, to use digital educational resources, to form various competencies through the introduction of IT. Multimedia allows brightening up classes, make game moments in the explanation of new material, as well as in the survey. Especially relevant is the use of presentations in the preparation of reports or conferences in the form of distance learning.

4. Another form of presentation of the material is a webinar. It is an electronic form of the seminar, which is part of the mastering of the material of any subject in higher education. Webinars and multimedia presentations complement each other well, because usually webinars are accompanied by a visual demonstration of the material. During a webinar, there are always two sides – the lecturer and the listener, but the listener sees the lecturer, while the lecturer has the opportunity to communicate with the other party in most cases only through online chat, where the listener can ask related questions. This form of presentation of the material is the most effective for a full presentation of the topic being studied. The webinar can be saved, and students would have the opportunity to review it, which helps to memorise the material.
5. To assess the effectiveness of mastering the studied topic, there are several online platforms, different in form and purpose. For example, the "Let's test" service will help to create testing in accordance with the material presented in lectures and will automatically check the correctness of the answers provided. It is also advisable to use an interactive work sheet (IWS), which is a convenient digital tool for distance learning. IWSs are more often used at independent work or for practical work. An IWS is created using a service in Google docs, and has a convenient and easy-to-use technology. First, an IWS is created and published in an e-learning environment, then a copy is created. The sharing settings set the ability to edit for "any user who has a link", then the bachelor of arts renames the created copy of the sheet and begins to perform tasks. After completing the task, the IWS is published to an e-learning environment (site/blog/general chat) using a URL. Work sheets created by different students can be discussed, commented on, evaluated, and so on.

Notably, for students majoring in arts, there are a number of disadvantages when using programmes for online conferencing. For example, none of the above allows high-quality conducting, because the image usually lags behind the sound, and the more participants in the video conversation, the lower the quality of signal. Conducting is the management of a choir or ensemble. Unfortunately, none of the modern video communication programmes is able to provide quality performance, because it does not allow even two people to sing at the same time. The implementation of the educational programme of such a subject as vocal causes less difficulties in its implementation with the help of online tools, for example, the teacher has the opportunity to control the singing, the final performance, etc. But there are also some problems: the teacher is not able to make recommendations and comments quickly and simultaneously with singing, because the specifics of programmes for online video and audio communication. When one user speaks, the other will not be heard. Therefore, synchronous processes in such programmes are almost impossible. Solfeggio is another subject that causes problems at the stage of implementation in the framework of distance learning. Classes in this subject are held in a group, but the student's hearing and singing are assessed only individually. The problem is how to optimise the teacher's time, when in full-time training for 40 minutes it is necessary to work with a group of 4-6 types of tasks and see the activity of students at the same time, because online it is all lost. And therefore the teacher spends 3-4 times more time to check each student, which significantly slows the process of mastering the curricculum.

Thus, an analysis of modern electronic technologies that must be used in the implementation of the online learning model has been conducted. The analysis showed that the system of distance learning has many advantages that contribute to the effective mastering of the subject being studied. For example, the distance learning system allows to: create a knowledge base to store e-courses, tests, videos and other educational content in one place, at any convenient time, bachelors of arts can access the cloud and repeat the material passed; control the quality of education through various forms of knowledge assessment; online platforms provide the opportunity to collect detailed statistics that can be created automatically, which significantly saves teacher's time; keep in touch with bachelors of arts almost around the clock (if necessary), it can be an internal chat or forum – a place where bachelors can exchange ideas, write what material was useful, what needs improvement, what other topics will need e-courses, etc. But now the modern education system is at the initial stage of mastering all the possibilities of distance learning, because the need to use it arose only in quarantine.

4. Conclusions

The beginning of the 21st century was marked by the introduction of computer and communication technologies in all spheres of human activity. Global changes have also taken place in the way information is transmitted and presented, digital technologies have penetrated into music and education. Advances in recording, music composition technology, combined with new opportunities in the media have created areas of music development and dissemination that did not exist before, and require such knowledge that musicians who have received an academic musical education, for the most part, do not have. Despite the active introduction of modern computer technologies in the field of music art, in the practice of general music education they have a weak use. This is due not only to the insufficient equipment of these educational institutions with technical teaching aids, but also to the lack of appropriate training for music teachers.

Modern education is characterised by the fact that for the first time in the history of pedagogy there is a generation of teaching aids that operate on the basis of ICT, creating conditions for the intensification of the educational process, enrichment of pedagogical and technological tools of teachers. This equally applies to the professional activities of a teacher-musician, leader of a vocal-instrumental ensemble. In addition, the use of digital technologies in the training of a specialist depends on the mastery of information competencies, and thus, successful professional future. The transition to distance learning has shown that online tools for mastering the curricculum are currently inadequately adapted for bachelors of arts. In the process of their use a number of shortcomings were identified, primarily related to the reproduction of synchronous sound during classes that require simultaneous participation of several students. The study states that for art specialties the adaptation for online services was extremely difficult and caused a lot of damage in such subjects as vocal, solfeggio, conducting and others.

The analysis revealed that the education system is currently in the process of development of distance learning. Thus the issues related to the development and implementation of online learning tools are promising areas for study in the academic literature.

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