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Synchronous and Asynchronous E-Learning Modes: Strategies, Methods, Objectives

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Abstract. The article deals with the main strategies, methods and objectives of synchronous and asynchronous E-Learning Modes from a scientific and practical point of view. A detailed description of the synchronous and asynchronous online-learning at different historical stages is presented. The task of the distance education in light of the trends of modern society and its role in the implementation of professional and social aspirations of a student is shown. The basic problems of contemporary ICT, the difference and peculiarities of the synchronous and asynchronous methods of e-communication are determined. The general tendencies, content, sources, means, forms and methods of ICT implementation in terms of strict quarantine circumstances are highlighted. Certain ICT tools implemented by higher educational establishments to provide distance learning in the educational institutions are defined. The key ways of overcoming the contradictions that arise in the path of self-improvement of a student in the present are called. The application of ICT tools by the teaching staff as an essential and effective instrument to modernize the educational process is emphasized. Online-learning environments, namely synchronous and asynchronous ones, essential to provide distance education, are mentioned. Various forms of interaction involved in synchronous and asynchronous modes are pointed out. The current practices of synchronous and asynchronous e-learning/teaching in English language are established. The results of the case study of the effectiveness of a/synchronous environments towards better English language learning are evaluated. The analysis of the strategy used in distance learning is presented. The leading instruments and tools for synchronous and asynchronous online-learning are stressed on. The description of "high degree of interactivity" between participants who are separated from each other geographically and in time by asynchronous learning environments is provided. The basic measures for the introduction of distance learning technologies in the educational institution, which do not contradict the principles of pedagogy, but supplement and promote the development of the process of education, are formulated. The preferences of students as for methods used during remote education are noted. Basic challenges for teachers, institutions, and students, provided by both synchronous and asynchronous modes of distance learning, are described.

Key words: digitalization of education, information communication technologies (ICT), online learning environments, feedback, interactive presentations.

Синхронний та асинхронний режими електронного навчання: стратегії, методи, завдання

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Анотація. У статті розглядаються основні стратегії, методи та завдання синхронного та асинхронного режимів електронного навчання з наукової та практичної точки зору. Представлений детальний опис синхронного та асинхронного онлайн-навчання на різних історичних етапах. Показано завдання дистанційної освіти у світлі тенденцій сучасного суспільства та її роль у здійсненні професійних та соціальних прагнень студента. Визначено основні проблеми сучасних ІКТ, різницю та особливості синхронного та асинхронного методів електронного спілкування. Висвітлено загальні тенденції, зміст, джерела, засоби, форми та методи впровадження ІКТ в умовах суворих карантинних обставин. Визначено основні засоби ІКТ, що застосовуються вищими навчальними закладами для забезпечення дистанційного навчання в закладах освіти. Називаються ключові шляхи подолання суперечностей, що виникають на шляху самовдосконалення учня в сьогоденні. Підкреслюється застосування засобів ІКТ педагогічним колективом як важливого та ефективного інструменту

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модернізації навчального процесу. Згадуються середовища онлайн-навчання, а саме синхронне та асинхронне, необхідні для забезпечення дистанційної освіти. Вказано на різні форми взаємодії, що беруть участь в синхронному та асинхронному режимах. Встановлено сучасні практики синхронного та асинхронного електронного навчання / навчання англійською мовою. Оцінено результати тематичного дослідження ефективності а / синхронного середовища для покращення вивчення англійської мови. Представлено аналіз стратегії, що використовується у дистанційному навчанні. Наголошено на провідних засобах та інструментах як синхронного, так і асинхронного онлайн-навчання. Надано опис "високого ступеня інтерактивності" між учасниками зі врахуванням географічної та часової складової у відокремленому асинхронному навчальному середовищі. Сформульовано основні заходи щодо впровадження у навчальному закладі технологій дистанційного навчання, які не суперечать принципам педагогіки, але доповнюють та сприяють розвитку процесу навчання. Визначено переваги студентів щодо методів, що використовуються під час дистанційного навчання. Описано основні завдання для вчителів, установ та студентів, які забезпечуються як синхронним, так і асинхронним режимами дистанційного навчання.

Ключові слова: діджиталізація освіти, інформаційно-комунікаційні технології (ІКТ), онлайн-середовище навчання, зворотній зв'язок, інтерактивні презентації.

Синхронный и асинхронный режимы электронного обучения: стратегии, методы, задачи

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Аннотация. В статье рассматриваются основные стратегии, методы и задачи синхронного и асинхронного режимов электронного обучения с научной и практической точки зрения. Дано подробное описание синхронного и асинхронного онлайн-обучения на разных исторических этапах. Показана задача дистанционного обучения в свете тенденций современного общества и его роль в реализации профессиональных и социальных устремлений студента. Определены основные проблемы современных ИКТ, различие и особенности синхронного и асинхронного методов электронного общения. Выделены общие тенденции, содержание, источники, средства, формы и методы внедрения ИКТ в условиях строгого карантина. Определены инструменты создания ИКТ, внедряемые высшими учебными заведениями для обеспечения дистанционного обучения в учебных заведениях. Называются ключевые способы преодоления противоречий, возникающих на пути самосовершенствования ученика в настоящее время. Подчеркивается применение педагогическим коллективом инструментов ИКТ как важного и эффективного инструмента модернизации образовательного процесса. Упомянуты среды онлайн-обучения, а именно синхронные и асинхронные, необходимые для обеспечения дистанционного обучения. Выделены различные формы взаимодействия в синхронном и асинхронном режимах. Установлены текущие практики синхронного и асинхронного электронного обучения / преподавания на английском языке. Оцениваются результаты тематического исследования эффективности синхронной среды для лучшего изучения английского языка. Представлен анализ стратегии, используемой в дистанционном обучении. Особое внимание уделяется ведущим средствам и инструментам для синхронного и асинхронного онлайн-обучения. Дается описание «высокой степени интерактивности» между участниками, которые отделены друг от друга географически и во времени асинхронной учебной средой. Сформулированы основные меры по внедрению технологий дистанционного обучения в образовательном учреждении, которые не противоречат принципам педагогике, но дополняют и способствуют развитию процесса обучения. Отмечены предпочтения студентов по методам дистанционного обучения. Описываются основные проблемы для преподавателей, учебных заведений и студентов, возникающие при использовании как синхронного, так и асинхронного режимов дистанционного обучения.

Ключевые слова: диджитализация образования, информационно-коммуникационные технологии (ИКТ), онлайн-среда обучения, обратная связь, интерактивные презентации.

I Introduction

Digitalization of education is an integral part of the development of a society nowadays. The use of information communication technologies (ICT), the introduction of distance learning has become a challenge for both educational institutions and students.

Restrictive measures during the period of strict quarantine put the education system in a rapid transition from full-time studying to distance one. Circumstances motivated teachers of educational institutions to move to new activities with the use of ICT, which helped to ensure partnership of all participants of the educational process.

According to the current Regulation of the Ministry of Education and Science of Ukraine "On Distance Education" dated October 16 2020, the organization of distance learning can be implemented by providing education with distance learning as a separate form of education, using various forms of distance learning technologies (full-time, correspondence, network, external, family (home), pedagogical patronage) in terms of strict quarantine and other emergency circumstances). [13]

Electronic technologies (e-learning), including the Internet, distance learning (Distance Learning) and case technologies (case technology), make it possible to form and develop students' abilities for self-education, self-study, and self-esteem of personality. Structural, temporary, volumetric combination of full-time and distance training allows you to improve the quality of the educational process.

For the first time the integration of various forms of education was announced by K.J. Bonk (Curtis J. Bonk) and Ch. R. Graham (Charles R. Graham) in the book "Blended Learning" in 2006. [5]

At present the application of different types of distant learning is explored by modern scholars, namely Shahabadi, Hung, Lu, Zare, Fryer and Bovee who investigated the development of the theoretical and practical background of distance learning and classified its modes. [17], [8], [10], [20], [6]

The aim of the paper is to specify the peculiarities of synchronous and asynchronous E-Learning Modes in order to master methods, define strategies and set objectives of active practice in obtaining knowledge, distinguish the ways of its structuring and introduce the theoretical, experimental and methodological levels of the research.

II Materials and Methods

The research material is based on the works of domestic and foreign scholars in such fields as theory and practice of distance learning (synchronous and asynchronous). The main research methods are: theoretical (analysis of scientific literature on distance learning), empirical (questioning, testing, conversation, pedagogical observation, pedagogical experiment).

The use of ICT instruments is an important and effective tool to modernize the educational process. Learning and free communication via the Internet is not a new way of interaction. But its irreplaceability has become obvious because its importance has increased especially in terms of quarantine. Such tools did not dominate in the work of higher educational establishments, and long-term quarantine forced educators to gain new experience.

In terms of strict quarantine, the methodological board of each educational institution must decide on the use of certain ICT tools for distance learning in accordance with the Regulations on distance learning. [14]

To define ICT tools, it is advisable to organize a broad discussion of the purpose, the main directions of the introduction of remote technologies, the role of each participant in the educational process for its implementation; to analyze the availability of hardware and software to determine the strategy of their use in distance learning, to conduct a survey of participants in the educational process; to appoint members of the teaching process who will be responsible for administering the remote platform or advising and training the staff how to use and operate ICT; to select an educational and methodological council for the examination of distance resources and content of the information and educational environment of the institution and provide offers how to implement the digital resources for distance learning; train the teaching staff on ICT and distance learning technologies, especially in situations when it is necessary to design and create distance learning courses for the first time; to approve a plan for the introduction of distance learning technologies in the educational institution; to post a plan of measures for the introduction of distance learning technologies in the educational institution on its website and / or send it by e-mail to the participants of the educational process [9].

Online learning environments are mentioned to be divided into a triad of synchronous, asynchronous and blended learning ones. Special attention of this study is focused on distinguishing and comparison the learning ways of students in mode of asynchronous and synchronous e-learning.

The mode of "Asynchronous distance learning" appeared in education much earlier than the synchronous one due to the lack of ICT development at that moment. It can be characterized as a teaching method which involves contact between the trainer and the student with a time delay. Online resources used to support asynchronous learning include email, electronic mailing lists, e-courses (e.g. Intuit, Cisco Networking Academy), CD-ROMs, conferencing systems, e-tests, virtual training systems, online forums,

wikis, blogs (Habrahabr), podcasts (PodFM), screencasts (Skillopedia) [12] [19] [21]. One of the models of asynchronous learning is the so-called. peer-to-peer learning (other names: horizontal learning, peer learning, P2P learning). This approach combines self-learning with asynchronous communication between students and teachers. The group of individuals involved in asynchronous learning via the Internet is called the Asynchronous Learning Network. An example of asynchronous learning is correspondence, which appeared at the beginning of the 19th century in the process of mailing educational and methodological materials. In the 1920s and 30s, the first audio recordings were used in distance learning. The first educational films appeared and were actively broadcasted during the Second World War. The Internet, as a conducive environment for asynchronous learning, spread to Western high schools and universities in the early 1980s after significant investment in ICT and teaching software.

In the 1990s, blended university programs emerged around the world, combining synchronous and asynchronous online learning. Today, advanced multimedia and ICT are making a significant contribution to the development of asynchronous learning networks, bridging the gap between the content creator and the consumer. New tools such as learning blogs and wikis provide rich opportunities for the further development of asynchronous communication and learning [11].

Instruments for asynchronous learning. Email. By means of e-mail, you can send assignments, links to materials and tests, materials themselves and class schedules to students. Students can send you finished work via mail. Today, every smartphone owner has an e-mail. If the smartphone is running Android, then the owner's mailbox is registered in the gmail.com domain. To find out the mailbox addresses of students, ask them to open the "Gmail" application and send an email to your mailbox address. For the convenience of working with a group of addressees, you can create an e-mail distribution group, then the letter sent to the address of the group will be delivered to each of its members. You Tube. You can shoot a video of a lecture or a master class and upload it to your own You Tube channel. Send the video link to students for self-watching at a convenient time for them. Social networks allow you to upload videos, send assignments, links to materials and tests, the materials themselves and class schedules. Students, through chats or private messages, can send you finished work and ask questions. Online Courses LMS Moodle <https://moodle.org/> Free Learning Management System (LMS) can be implied to create and use online courses. Moodle has the ability not only to offer students the learning materials, but also test learning, organize collaboration and communication, and monitor learning. [9].

Teacher (Course Developers) Documentation is a free platform for creating and hosting online courses. The platform has a built-in engine for automatic code checking and contains a huge number of courses for IT specialties. [3]

Synchronous learning environments provide real time interaction, which can be collaborative in nature incorporating e-tivities (Salmon, 2013) such as an instructor's lecture with a facility of questions-answer session. [16] However, a synchronous session requires simultaneous student-teacher presence. Synchronous mode instills a sense of community through collaborative learning. [18]

Synchronous learning involves various forms of interaction, namely: students can receive information, work with it independently or in groups, discuss it with other students and teachers; the teacher has the ability to assess the reaction of students, understand their needs, respond to them - answer questions, choose a pace that is convenient for the group, monitor the student's involvement in the process and "return" him to the group if necessary.

The basic differences between synchronous learning and classroom one. While there are clear similarities between face-to-face classroom and synchronous formats, classroom and simultaneous learning are not the same thing. Indeed, both formats assume that the students gather at the same time in a single space, and the teacher, using various teaching aids, explains the theoretical material. In addition, many of the student engagement techniques used in classroom teaching can be transferred to a synchronous environment. However, the differences are no less obvious. Firstly, the classroom and synchronous format presupposes various collaboration tools: the synchronous format is focused on mobile learning tools - the use of mobile applications, chats, online team boards. Secondly, in synchronous teaching, the teacher usually does not have the opportunity to check whether the students are listening to him or her, so the success of the training largely depends on the consciousness of the students [20]. Besides, teaching in a synchronous environment can be more interactive than a traditional classroom course. In classroom teaching, you can

never get every student's opinion, while the use of chats and online whiteboards in synchronous teaching allows the instructor to gather feedback in minutes.

Instruments for synchronous learning. Teachers often use webinars and video conferencing to conduct online lessons. The advantages of using webinars are: the possibility of remote classes, the ability to record lectures, seminars, workshops, an unlimited number of students, the ability to use additional materials. The main functions of the webinars are: presentation demonstration, video viewing, group communication (if participants have microphones), online boards or whiteboards. This is a common space for comments, pictures of all participants, text chat (shared and for personal messages), remote access. The usage of the webinars allows us to show the screen of the speaker. It also gives the chance to conduct polls and voting to provide audience feedback.

Nowadays there exist numerous free and paid tools for video calls and webinars. The most widespread well-known resources commonly used by educators are: BigBlueButton, Zoom, Hangouts, YouTube, Skype for Business and others. BigBlueButton and Zoom provide audio, video, slide, chat and screen sharing in real time and allow you to create a webinar recording for later viewing. Students participate in surveys and can work on a shared online board. The advantages of BigBlueButton are: it is free and there is no need to install it on the participants' devices. There is also the ability to configure the Ukrainian-language interface. The webinar entry is stored in the account of the person who initiated it, and is available for viewing with the permission of the author. To work with different students, you can use various rooms with the same access at different times. In the free version of Zoom, the teacher can use 40 minutes for 100 participants to hold a webinar, but the number of such sessions is unlimited. The advantage is the opportunity to join the webinar without additional registration. If desired, the teacher can install the Zoom program on the device and then plan and organize webinars from the installed application. One more advantage is that there is also the fact that all online meetings can be scheduled in advance and the recording can be downloaded to a computer. Google Hangouts, created mainly for instant messaging, free video and audio calls, is used by educational institutions that are actively implementing Google services for distance or mixed learning. All participants must have Google Accounts to join the video conference. The number of participants is limited. During the quarantine period, Google lifted the previous restrictions and invited educational institutions to involve up to 250 participants in video conferencing. If you have a Google account, you can use the YouTube broadcast and schedule a live broadcast for a limited audience or for the general public. Teachers who are used to using Skype or Viber to organize video calls do not have the ability to save this event as a video file. Only Skype for Business has additional features for organizing and recording video broadcasts. [4]

III Results

For more than 40 years, the Sumy National Agrarian University carries out professional training of highly qualified specialists in the agrarian sector of national economy and provides the graduates with educational and qualification bachelor's and master's levels. Students of all specialties of the institution study English, German and French. They are taught Business Foreign Language, Foreign Language (professional purpose), Profound Foreign language (business course). Foreign Language training is aimed at the formation of the necessary communicative competence in the spheres of professional and situational communication in oral and written forms. The main objectives of the disciplines mentioned above are to acquire practical skills of foreign languages in various types of speech activity including the amount of topics essential for professional needs; to obtain the latest information on specialty using foreign sources and many others.

The university is aimed to prepare highly competitive and experienced professionals who have in-depth professional knowledge, continuous computer training during the period of study and fluent foreign language. Students have the opportunity to choose full-time, part-time or distance learning. Strict quarantine terms forced the university to implement distance learning and create online learning environment.

Establishing the current practices of synchronous and asynchronous e-learning/teaching in English language, this study evaluates the effectiveness of a/synchronous environments towards better English language learning at Sumy National Agrarian University (SNAU).

Participants in this study consisted of four groups of students of SNAU: those who learn Profound English (PE) and the ones who attend Business English (BE) course. The observation of communication and performance lasted for approximately 3 months (Spring 2020) and 2 months (Fall 2020). The number of active

students in PE and BE was 200 and 100 respectively. The study is qualitative. Much data was collected via and opinions of the students. To evaluate the strengths and weaknesses of a/synchronous mode, this study was aimed to address the following research question: “Name three positive and three negative features of both synchronous and a/synchronous modes”.

Figure 1 presents the most popular strengths of synchronous mode of learning mentioned by the students. Figure 2 demonstrates some negative aspects of synchronous mode pointed out by the students. Figure 3 shows beneficial moments of asynchronous mode underlined by the participants of the educational process. Figure 4 describes the weaknesses of asynchronous mode stressed by the students.

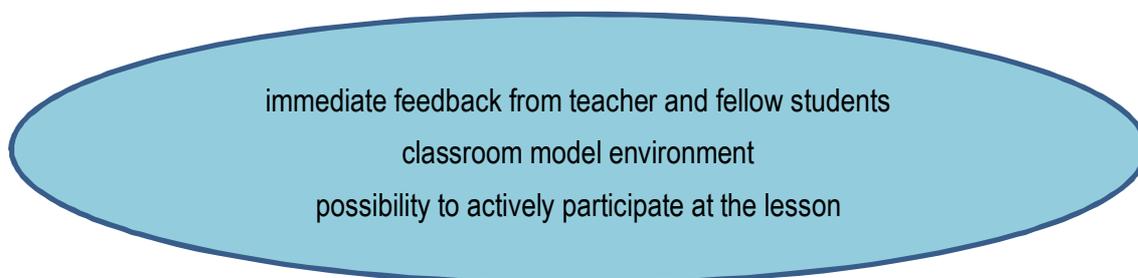


Fig.1. Strengths of synchronous mode of learning

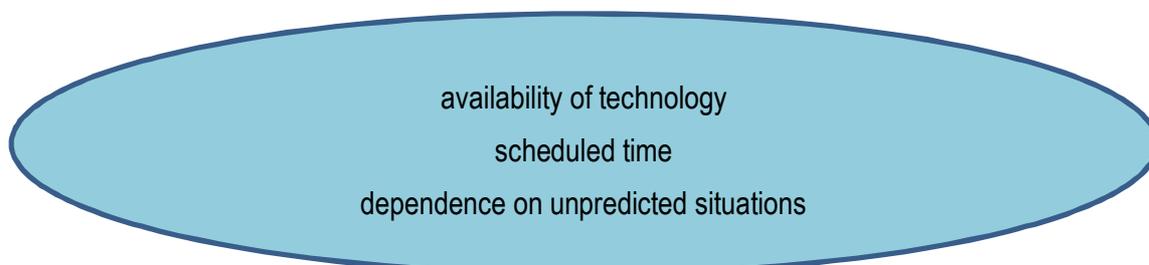


Fig. 2. Negative aspects of synchronous mode of learning

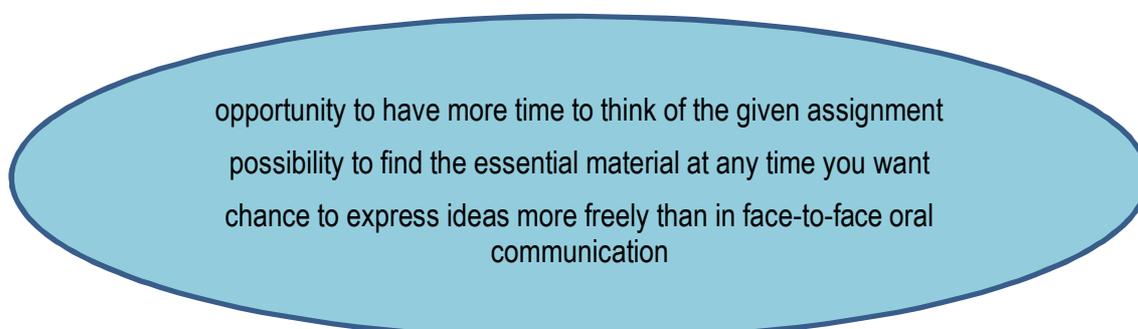


Fig. 3. Beneficial moments of asynchronous mode of learning

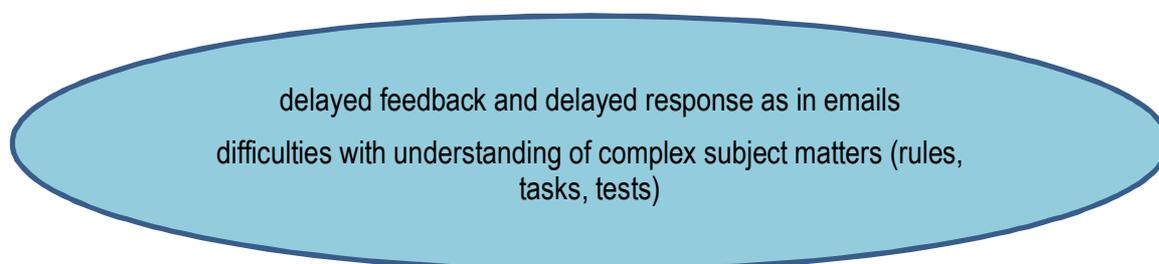


Fig. 4. Weaknesses of asynchronous mode of learning

Hence, the responses of the students to the question whether English language can be better learnt in synchronous or asynchronous mode is very interesting: 80% of the participants said that they prefer synchronous mode of communication, whereas about asynchronous mode 20% of the students responded positively. These results show a psychological aspect of the willingness 80% of the students to talk to or see

the teacher and a wish to interact directly, as they used to in their traditional classrooms. However, 20% of the respondents are ready to work without immediate assistance and feedback from teacher and fellow students. Students' opinions clearly demonstrate that the improvement of the speaking skill via synchronous session is easier to be reached and they have a desperate desire for that as well. At the same time, when coping with the written compositions, they were positive about asynchronous mode.

IV Discussion

According to Lu, the effectiveness of the synchronous mode is considered to be more efficient in comparison with asynchronous one: in real time the concentration of listeners' attention is higher. In addition, in a synchronous mode, students are more likely to complete the course. 85% of students successfully complete the CORe online synchronous program, while the average percentage of students who completed asynchronous training on Harvard University's Edx platform is 5% [10].

In the book "The Blended Synchronous Learning Handbook" Bonk and Graham note that students prefer synchronous learning. It became easier for remote students to get help with their studies, and students in the classroom received additional tools to study new material. While students enjoy learning at their own pace, they still need face-to-face or online meetings to discuss a subject or ask questions. [5] Shahabadi stresses that teaching foreign languages, a blended learning mode is best to be implemented: an asynchronous mode for studying grammar and writing assignments and online communication with a teacher to develop speaking skills. For instance, an e-course can be supplemented with a webinar, with the emphasis on oral important points, when an opportunity is given to ask a question to the teacher, and problematic points are spoken out. While choosing a platform for blended learning, one must be sure to have a possibility to combine synchronous and asynchronous modes within the same course [17].

The asynchronous learning model is more flexible than the synchronous one, and with the perseverance and self-discipline of the student, it provides the student with serious advantages, providing us with an access to the course and its educational materials at any convenient time from any geographic point, subject to an Internet connection, the ability to choose disciplines and the sequence of their study [2], [21]. This opportunity increases the availability of the course for various groups of students, including full-time students, working specialists, foreign students in foreign countries [19]. Thanks to highly developed ICT and modern software, asynchronous learning environments provide with a "high degree of interactivity" between participants who are separated from each other geographically and in time [11]. Research shows that the initial time required to design an asynchronous course is comparable to the traditional synchronous learning model. However, most asynchronous courses have the potential to attract many more students than traditional lecture models. Another benefit of asynchronous learning (and as technology evolves, many synchronous learning models) is that it has an almost complete course record. All materials, correspondence and interactions can be archived electronically. Participants can come back at any time and revise training materials, lectures and presentations [15].

According to S.R. Hiltz and Sh. Hrastinski, the asynchronous principle of teaching has a positive effect on the professional and personal formation of the student due to his or her active interaction with other subjects of the learning process, the possibility of presenting ideas to other students and their subsequent development in the process of discussion. Experimental studies S.R. Hiltz in American educational institutions have demonstrated that in the process of asynchronous learning, students working in online groups have a higher level of motivation and, accordingly, knowledge of disciplines than those working individually [11]. Swedish researcher Sh. Hrastinski concluded that due to the fact that in the process of asynchronous interaction, students have more time to think and process information, asynchronous interaction between students in the process of e-learning develops cognitive skills better than interactions in synchronous learning conditions, when the student is given little time. on reflection and must be answered quickly [11].

Asynchronous learning presents several challenges for teachers, institutions, and students. The development and initial setup of an asynchronous learning system can be costly. Rasi and Vuojärvi conclude that institutions must provide the network infrastructure, including servers, audio and video equipment, software, and technical support, necessary to develop and maintain an asynchronous learning environment. Technical support includes initial training and setup, user management, data storage and recovery, and hardware repairs and upgrades [15]. Research shows that teachers are hesitant to teach in asynchronous

learning environments due to the lack of sufficient technical support in their institutions. To participate in asynchronous learning, students must also have access to internet-equipped computers. Although personal computers and Internet access are becoming an increasingly common tool for acquiring knowledge, this requirement can still be an obstacle for many students and teachers. Among other things, students must also have computer skills and knowledge of the technologies required to participate in an asynchronous curriculum [9].

V Conclusion

All types of training (both online and offline) can be divided into two large groups: synchronous and asynchronous. This division is based on the synchronization of receiving and sending information between subjects and objects of interaction. Synchronous learning can be described as a mode where information is received and transmitted almost simultaneously. This includes lectures, webinars, live broadcasts on social networks, chats. They are the tools which help the listener (reader) to receive information immediately and have the opportunity to ask a question or complete the teacher's task. Asynchronous learning assumes the delay in receiving information. This can include reading textbooks, articles, blogs, websites, interactive presentations, taking e-courses, tests, assignments and exercises, watching a recorded video, or listening to audio recordings. It is clear that the choice of means should always be related to educational goals, but this is only in theory. In practice, the organizers of online learning are most often guided not by goals, common sense or scientific knowledge, but by their experience and habits. So the synchronous mode is more understandable for most representatives of the generation born before the digital age, or for those who are poorly versed in ICT. Besides, people with a predominance of extroverted traits prefer the synchronous learning. Hence, the digital generation chooses teaching and learning via asynchronous mode. Such people are less attuned to social interaction in the classical sense. It is easier for them to write than to speak in words, to read or listen to a recording, to watch a video, than to attend a lecture. They have their own rate of reception and transmission of information.

Using only synchronous or asynchronous training leads to reduced efficiency. For example, people who prefer their own pace, or those who need live communication to assimilate information, will perceive the same learning content very differently. The ideal solution is certainly to combine or use both modes in parallel. Classical academic teaching usually offers a synchronous mode (lecture) as the main, and asynchronous as an additional one. The same principle is most often tried to be applied to other training formats, for example, corporate training and distance courses. At the same time, in corporate training and additional education asynchronous training should be used as the main type in modern conditions, as it is more flexible, allowing you to study at a convenient time, anywhere. Rather, synchronous learning should perform additional functions of clarifying difficult points, increasing motivation and involvement in the learning process.

Simultaneous use of both the learning management system and the opportunity for video conferencing allows us to set up distance learning in synchronous and asynchronous mode and make distance learning flexible, which will meet the needs of all participants in the educational process.

The experience of teachers has shown that providing distance learning, creating a favorable educational environment of mutual support of all participants in the educational process provide with effective distance teaching and learning, using ICT in other forms of learning and implementing blended learning, choosing convenient digital tools, forms and methods, digital educational resources for receiving and improving the quality of educational process.

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