The Development of Entrepreneurial Competencies among Students of Various Age Groups within the MOOCs Environment

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***Abstract*—This article is dedicated to exploring the peculiarities of developing entrepreneurial competencies among students of different age groups in the Massive Open Online Courses (MOOCs) environment. A model for teaching entrepreneurship in the MOOC environment has been developed. Additionally, the model involves the implementation of pedagogical approaches to the development of entrepreneurial competencies using digital platforms and tools. An educational experiment involving 150 students aged 16 to 60 from Russia, Kazakhstan, Belarus, Romania, and Bulgaria was conducted on the open educational platform Coursera. The study's results indicated that the correlation of learning outcomes for the older generation was significantly lower than that for the younger generation, regardless of the training type. It was concluded that online courses are effective for both young and elderly respondents, but their learning perception differs. This article can be useful for developers of educational business courses in the MOOC environment that aim to expand the age characteristics of students.**

***Keywords*—age differences, e-learning, entrepreneurial competencies, Information and Communication Technologies (ICTs), Massive Open Online Courses (MOOCs)**

I. Introduction

Current circumstances in the world and the quarantine restrictions once again proved that distance education, particularly the use of the Internet, allows people to continue learning and discover new disciplines. In the 21st century, global society is changing rapidly, and the development of Information and Communication Technologies (ICTs) makes the world more integrated and accelerates the communication process [1]. Many people think that distance education is a new phenomenon in educational methods, but it is not. Distance learning began in the early 18th century, but not in the form it is known today. It started with the desire of Caleb Phillips from Boston to recruit students from anywhere in the country to study stenography by exchanging letters. After that, various correspondence schools and distance courses were established at universities, mostly institutions in the United States and Europe (University of Chicago, University of Iowa, University of London, St. Andrews University) [2]. The term "MOOC", which stands for Massive Open Online Course, represents a relatively recent phenomenon within the realm of distance education. It has gained significant popularity in recent years. Openness is the key feature of MOOC-based learning [3]. The history of MOOCs traces its origins to the early 2000s when online education began to gain popularity, and researchers embarked on the quest to identify means for the mass dissemination of education via the Internet. It is available to anyone. People agree on the degree and nature of their participation in accordance with their individual needs and desires, regardless of whether these needs are determined, for example, by personal interests or work requirements [4]. The Massachusetts Institute of Technology (MIT) has made a significant contribution to the field of education through its involvement in the open movement and the Massive Open Online Course (MOOC) movement. Initially, they launched the MIT OpenCourseware project, which provided free access to materials from most of their courses. Additionally, MIT played a key role in the creation and dissemination of Creative Commons licenses, enabling authors to share their works. In the realm of MOOCs, MIT, along with other institutions, founded the edX platform, which offers thousands of online courses to millions of users. They also created Small Private Online Courses (SPOCs), which are smaller and more closed online courses, and continuously implemented new teaching methods to enhance the quality of e-learning. These initiatives have significantly expanded the accessibility of education and fostered innovation in this field [5].

Heutagogy is an approach to teaching that emphasizes self-learning and independent material processing by students [6]. In the context of Massive Open Online Courses (MOOCs), this concept assumes particular significance, as MOOCs contribute to the accessibility of education for a wide audience and can be an effective tool for implementing heutagogical approaches. MOOCs provide students with the opportunity to independently select courses and topics of interest to them and to utilize various sources of information to acquire knowledge. The utilization of heutagogical principles in MOOCs can stimulate students towards active self-learning, fostering the development of their self-organization skills and critical thinking, thereby enhancing the quality of teaching and education [7].

This way of teaching was a rather long and inconvenient way to provide education, but with the development of science and technology, distance education moved to a new level. With the advent of radio and then television, these

technologies were introduced in the learning structures of educational institutions. However, it was the advent of the Internet that revolutionized the sphere of distance learning, which was accompanied by the creation of online courses, programs, and various platforms. It allowed for communication and exchange of materials between teachers and students and learning in both synchronous and asynchronous modes. Synchronous and asynchronous learning represent two distinct approaches to the organization of the educational process, particularly within the context of distance education [3]. Synchronous learning entails real-time interaction between students and instructors, akin to a scenario where they are physically present in the same classroom. This can be realized through video conferencing, online webinars, chats, and other tools that enable participants to engage, pose questions, and exchange opinions in real time. Conversely, asynchronous learning implies that students have the flexibility to learn at different times, without the requirement of simultaneous participation. In this case, educational materials, assignments, and content are delivered to students in an online format, allowing them to work with these resources at their convenience. Naturally, the first representatives in the niche of distance education were universities and companies from the United States (University Without Borders, the British Open University, the Southeastern University, and the University of Alberta) [8].

The early development of distance education in Russia began in the 1990s. This was the time when efforts to harmonize the term "distance education" at the legislative level began. In 1997, a nationwide experiment on the introduction and popularization of distance learning in state and non-state educational institutions started. The experiment ended in 2002. Its participants tested various e-learning technologies at their educational institutions. Specialized training materials were created and tested by the higher educational institutions. Now, many Russian higher educational institutions are offering their courses on international online platforms. Domestic massive open online courses are being created [9].

The rationale for conducting this study is rooted in the contemporaneous relevance and significance of distance education within modern society, particularly in the context of the widespread popularity of Massive Open Online Courses (MOOCs). Global quarantine measures have underscored the importance of leveraging the internet and online technologies for learning and personal development.

Learning based on distance education technologies has several advantages over conventional learning methods. While the latter implies direct attendance at educational institutions, courses, training, etc., distance learning can cover a large audience, regardless of age, residence, and occupation. This learning format better allocates students' time, which makes it possible to gain more knowledge. Knowledge and time are essential resources for a modern person. Distance learning increases the amount of knowledge and saves time in obtaining it. In modern conditions, distance learning is becoming increasingly popular among web users. In addition, there are a large number of alternative e-learning methods, most of which are costly and challenging to implement. Regions with low digitalization of education require more loyal demands for innovating citizens' education. Learners and educators in such regions may lack access to contemporary digital educational resources or may not possess the requisite skills. In this case, MOOCs are valuable tools. In this particular context, the incorporation of Massive Open Online Courses (MOOCs) may be considered a valuable instrument, given their capacity to provide readily accessible education and information through online platforms. This facilitation of the learning process consequently enhances educational accessibility, especially for inhabitants residing in regions characterized by constrained educational resources.

This paper aims to determine the MOOC effectiveness in terms of obtaining thorough knowledge across age differences within the population. The research question is "What is the effectiveness of Massive Open Online Courses (MOOCs) in facilitating deep knowledge acquisition across diverse age groups?" The hypothesis is "The use of MOOCs in educational settings can significantly enhance the acquisition of advanced business knowledge across various age groups, surpassing conventional teaching methods."

The secondary research questions are: 1) Which business courses in the MOOC market are most engaging for individuals aged 16 to 60? 2) How does an entrepreneurial knowledge enhancement program using MOOC courses (experimental group) compare to traditional education (control group)? 3) How effective are MOOCs in improving practical entrepreneurial knowledge among individuals of different age groups?

II. Literature Review

At this stage of human development, our society is considered to be an information society. It is clear from the name that its foundation now and in the foreseeable future will be information and information technology. According to the forecasts of the World Bank, in countries that develop technology and educational systems, the distribution of national resources will appear as follows: natural resources and productive capital—5% and 18% of national resources, respectively, and intellectual capital—77% [10].

Computer-assisted education dates back to the 1960s, but it began to develop during the spread and popularization of the Internet. At this point, the availability of a large number of pedagogical methodologies and teaching trends on the Internet creates the problem of choosing the most effective ones for students [11].

Irrespective of its form, education consistently entails an interaction between an instructor and their pupil. In the case of distance learning this interaction is taken to a new level because of the specifics of teaching, communication, and studying the material. These represent two distinct perspectives on a single situation, each of which highlights its unique characteristics and positive aspects of the educational process. Every year many studies are conducted showing the current state of distance education. Usually, the results of such studies are the basis for further optimization of distance learning [12, 13].

Despite all the benefits of e-learning, many students may suffer from feelings of isolation or detachment from the community that consists of the teacher and the rest of the students. The lack of interaction between students and the teacher can negatively affect their learning and cause

negative emotions such as anxiety, sadness, and depression. In addition to feelings of loneliness, students may sometimes have questions that they are unable to answer on their own, which will hinder their progress in learning. Research on overcoming barriers between participants in the learning process is aimed at solving such problems [14].

A. Distance Education

The theory of distance education serves as a fundamental basis for my research on MOOCs. Distance education is defined by the separation of students and instructors based on geographical principles and the utilization of various technologies to facilitate communication and learning. Evolving from historical periods of distance education, which included the use of postal services, radio, and television, it has transformed into a more accessible and effective means of education owing to the Internet and digital technologies.

Distance education is a system that has its functioning features and is often fixated on its problems, values, and processes. In many aspects, they are important and necessary, but the development of distance learning is taking place in a world where cultures and ideologies constantly clash, where education and employment are no longer stable and secure, and where universities are under unprecedented pressure. For further development of distance technologies, it is worth considering whether the community understands the purpose of distance learning as well as how political, economic, and technological pressures on universities affect the further development of distance education, and how innovations and new technologies in education affect distance learning [15].

Distance education is an educational modality in which students and instructors are geographically separated and employ various technologies for communication and learning [16]. The concept of distance education has historical antecedents and is associated with the utilization of postal services, radio, and television for educational purposes. Early forms of distance education included correspondence by mail, wherein students received instructional materials and submitted assignments for evaluation [17]. Subsequently, radio and television were integrated into the educational process. However, these methods had limitations in terms of interactivity and accessibility. With the advent of the Internet and digital technologies, distance education has become more accessible and effective. It has found extensive application in various domains, including higher education, corporate training, medical education, and many others. This has enabled students to access education from anywhere in the world, ensuring accessibility and flexibility [18]. The effectiveness of distance education depends on a multitude of factors, such as content quality, teaching methods, student motivation, and support. Research indicates that under the right conditions, distance education can be as effective as traditional education [18]. Furthermore, it enables learners to develop self-regulation and self-reliance skills. MOOCs represent a relatively recent phenomenon in the realm of distance education, which has gained popularity in recent years.

The model of distance education makes it possible to follow the idea of "education for everyone everywhere." Previously, education was seen as a privilege of the elite, as an element to divide the community into social strata. In some countries, getting an education, especially higher education, is rather difficult and expensive. This problem can be solved through distance education [19].

B. Open Educational Resources (OER) and Massive Open Online Courses (MOOCs)

A worldwide trend in the development of education, and especially distance education, is the proliferation of Open Educational Resources (OER). OER are understood as educational interactive courses which are available on the Internet. OER users have access to online courses in different spheres, literature (articles, textbooks, tutorials), videos, tests, communication with a teacher, and many opportunities for effective education. Open educational resources along with other methods of distance learning can make the existing educational system more flexible and efficient in meeting the needs of society [20].

The next stage in the development of online distance education was the emergence of such a phenomenon as Massive Open Online Courses (MOOCs). It follows from the name that the main purpose of such resources is to provide academic courses from the world's leading institutions of higher education to a wide audience from all over the world via the Internet. In addition, intermediate and final control of knowledge as well as communication with the instructor is provided [21].

The online phenomenon of MOOCs has been gaining momentum over the past two years or so. It combines social networks, the assistance of a recognized expert in the research field, and freely available online resources [22]. MOOCs are based on the active participation of several hundred to several thousand learners, regardless of age and gender. It independently organizes their participation according to the learning objectives, prior knowledge, skills, and shared interests [23]. These peculiarities may follow some conditions of a traditional course, for example, consistency and the presence of a teacher. Nevertheless, this process features natural competition and increased motivation [24]. Each MOOC provides a predetermined schedule and weekly topics for consideration. However, MOOCs generally do not imply fees, preconditions other than Internet access and interest, and definite expectations regarding participation and official accreditation [22].

In Russia, the active development of OER and MOOCs began in the early 2010s. Such projects as "Lectorium", "University without Borders", and "Universarium" were created at that time. Later the National Open University (NOU) "INTUIT" was established as well. Thus, "Lectorium" is a non-profit academic project created in St. Petersburg, which is aimed at creating educational materials in the format of open online courses, video lectures, and teaching materials. In 2014, the creators of the project began posting academic courses from the world's leading educational institutions [25, 26]. Since the online phenomenon of MOOCs reached its peak of inflated expectations in 2012, according to the well-known Gartner cycle, it has become a more widely accepted and prevalent phenomenon since 2018 [27].

Access to high-quality educational resources through MOOCs is particularly beneficial for students without access to traditional education. Considering online and blended

learning as tools for developing skills such as critical thinking and self-management is deemed significant. The authors underscore the importance of these aspects in fostering students' entrepreneurial spirit and emphasize how technology utilization can render entrepreneurship education more effective and accessible [28]. Researchers note the particular efficacy of MOOCs for digital entrepreneurs who may not have the opportunity to attend traditional courses. Moreover, the system can personalize learning by recommending MOOCs and resources tailored to the needs of each entrepreneur. Practical orientation is achieved by combining theoretical knowledge from MOOCs with practical assignments and projects. Finally, the system incentivizes the creation of an online community for digital entrepreneurs, where the exchange of ideas and experiences is possible [29, 30].

However, at the same time, such approaches are predominantly local and require further detailed examination. The side effects of MOOCs' impact on enhancing entrepreneurial competencies define the potential for further experimentation. While MOOCs offer flexibility, they also have their limitations. The absence of personal interaction and personalized feedback may limit the development of key skills. The superficial nature of study and lack of motivation for some students pose challenges. Inequality in the quality of MOOCs and possible technical issues compound these limitations, necessitating careful selection and technical accessibility [31, 32].

From the literature review presented above, it can be inferred that the primary gap in the literature lies in the insufficient number of studies addressing entrepreneurial competencies across age differences among learners, including older age categories. As many studies tend to confine their investigations to entrepreneurship education for specific age groups, often focusing on youth or students, our research is aimed at examining the entrepreneurial competencies of students ranging from 16 to 60 years of age. Additionally, many works limit themselves to theoretical aspects of entrepreneurial competency development. The gap resides in the inadequate exploration of practical aspects, such as effective entrepreneurship teaching methods, the integration of entrepreneurial skills into the real business world, and so forth.

III. Materials and Methods

A. Theoretical Framework

Research on the development of entrepreneurial competencies among learners, considering age differences, in the context of MOOCs can draw upon various theoretical foundations within the realms of education and entrepreneurship. One of the pivotal theories that can be instrumental in this study is the Distance Learning Theory [33].

The Distance Learning Theory examines the processes of teaching and education that occur without the physical presence of the teacher and the learner in the same location. In the context of MOOCs, this is particularly relevant, as MOOCs provide the opportunity for distance education on a global scale.

B. Research Design

An experimental design employing a survey method was utilized in this study. The study had several successive stages:

- The first stage relates to the relevance of the studied issue and a review of available research on mass online courses for students and people of all ages. (August 2022). Researchers initiated the study by analyzing the existing literature and research about Massive Open Online Courses (MOOCs). The primary objective of this stage was to discern the areas that have already been investigated and to identify the aspects that remain insufficiently explored.
- The second stage of the study generated the research grounds of the paper: a sample of respondents was selected, testing determined the choice of the MOOC program for teaching an experimental group of respondents, etc. (September 2022).
- In the third stage, tasks were formulated for two groups of respondents, and the experimental group of students received training (November–January 2022–2023).
- The fourth stage implied a survey of respondents on the acquired material within the framework of traditional training and MOOC courses (February 2023). This phase facilitated the collection of data regarding how learning was perceived and its effectiveness in both groups.

Each of these stages plays a pivotal role in conducting the research, enabling researchers to systematize data and draw conclusions regarding the distinctions between education utilizing MOOCs and traditional instruction.

C. Sample

To select respondents of different ages, several sources were utilized. Initially, researchers reached out to Kazan University, presenting documents and selecting students majoring in economics from the 1st to 4th years. Fifty students were recruited there. Additionally, an announcement inviting participation in the experiment was posted on YouTube. This led to the recruitment of another 100 participants with higher education and professional experience. Electronic mail from participants contained necessary information: contact details, age, and occupation. In total, a sample of 150 individuals was formed (Table 1).

Table 1. Distribution of participants into groups based on age

Group	Age	Average age (SD)
Group 1	16–25	18.6; (11)
Group 2	25–40	28.3; (9)
Group 3	40–60	44.8; (14)

This distribution of participants allowed dividing all respondents into groups by activity type: those who studied according to the traditional system, and those who studied according to the innovative one. Then each group was divided into control and experimental equally (25 participants each). The division was conducted randomly by generating numbers. These procedures formed two groups: control (n = 75) and experimental (n = 75).

In this context, the main basis for selecting participants is the "age criterion" and their voluntary willingness to take part in the experiment. The age range of 16 to 60 years encompasses both students and professionals at different stages of their careers. Such heterogeneity allows for a more comprehensive exploration of the research topic. Additionally, this age range enables a more thorough representation of individuals from different generations, which can make the results more representative and

generalizable. The age groups encompass an active working audience, which may render the research findings more applicable to business education and practical implementation.

D. Instruments

The students of the experimental group received a list of courses on the Coursera digital platform to choose from (https://www.coursera.org/). Google Forms were utilized at the onset of the study so that students could identify the course that interested them the most. According to the survey in Google Forms, the overwhelming majority of respondents were interested in the following business course: "Business Strategy" from professors of the University of Virginia. The specialization of this course is the potential and ways to create a business strategy and learn the business basics. As the course creators described, the lessons were designed to address several issues necessary for successful business creation. The issues included thinking, ideas, planning, actions, strategy, etc. The course consisted of 5 separate blocks:

- Foundations of Business Strategy
- Advanced Business Strategy
- Business Growth Strategy
- Strategic Planning and Execution
- Business Strategy in Practice (Project-centered Course)

The courses include audio and video materials, real-life stories from famous business people around the world, business case analyses, and prototypes of building a business. Students had the opportunity to communicate with the course developers in personal chats. The course is free after registering from the student or corporate mail.

Students had two weeks for each course to complete. They worked on the materials independently at home in their free time and, additionally, time allotted by university teachers (2 hours 2 times a week). At the end of each course, each student took a mini-test on the knowledge of the material. After the entire program, students received a digital certificate and were asked to participate in the repeat survey. At the same time, students of the control group attended classes at Kazan University. They studied similar topics using the traditional teaching method (lectures, notes). The teachers were scientists and doctors of Economics.

Then all the respondents who did the courses wrote a competency test. All of them passed the test and that demonstrated their academic performance in economic knowledge. The testing included the "Business Practice Test" [34], a Computer Test (CBT), and an online controlled test. There were 100 questions with multiple answers (4 answer options). The maximum number of points was 100 (1 for each correct answer to the questions). The tested students had 2 hours to complete the tasks. The purposefully created expert commission assessed the knowledge gained after mastering the course. The commission conducted a benchmark assessment of Bloom's taxonomy. In this study, Bloom's taxonomy levels were assessed based on students' responses to tasks or test questions that were designed to evaluate their competencies within each of these categories. They evaluated six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation [35].

If there were invalid data, such as responses exceeding the time limit or tasks not completed on time, an appropriate approach was applied for their handling: the inclusion of invalid data in the analysis. In our case, the amount of invalid data was minimal, and the responses were included in the analysis, with the presence of invalid responses noted as an additional confounding factor that could potentially impact the results.

E. Data Analysis

The questionnaire was tested for reliability using Cronbach's Alpha. The interpretation of Cronbach's alpha values is as follows: (0.9, 1] = excellent; (0.8, 0.9] = good; (0.7, 0.8] = acceptable; (0.6, 0.7] = questionable; and (0.5, 0.6] = unsatisfactory. The cumulative Cronbach's alpha value for the questionnaire was 0.92 with values of 0.92, 0.94, 0.92, 0.86, 0.96, and 0.95 for the six parameters in the order they were mentioned above. Therefore, the questionnaire is reliable and can be used for a survey.

The effectiveness of the developed knowledge exchange and remote communication complex implemented on a sample of the experimental group was also tested. The authenticity verification of the obtained effectiveness according to the Kolmogorov-Smirnov method was applied for this purpose.

Initial data:

$\{x_1, x_2, \ldots, x_n\}$—vector of data obtained among students of the control group;

$\{y_1, y_2, \ldots, y_m\}$—vector of data obtained among students of the experimental group.

Next, the values were calculated, and then a benchmark for comparison:

$$\text{T-criteria} = \sqrt{-\frac{1}{2} ln(\frac{\alpha}{2}) \times \frac{n+m}{nm}}$$

To test the hypothesis, a significance level of 5% is employed.

Bloom's taxonomy was employed to determine the level of understanding and proficiency in MOOC technologies among students of various age groups [36]. This system constitutes a structured method for assessing and classifying different levels of cognitive actions that individuals can exhibit during the learning process and problem-solving [37]. The taxonomy levels can be expressed on a scale from lower to higher levels as follows: knowledge, comprehension, application, analysis, synthesis, and evaluation.

The Kolmogorov-Smirnov criterion (or Kolmogorov-Smirnov test) is employed to test the hypothesis that an observed sample (dataset) conforms to a specific theoretical distribution. It assesses the degree of congruence between the empirical distribution of data and the theoretical distribution. Additionally, the criterion has been utilized to examine discrepancies between score distributions in different groups. If the results significantly differ, it may indicate the presence of statistically significant distinctions between the groups.

F. Statistical Processing

Statistics were processed using elements of computational and descriptive statistics. The statistical data processing program used was IBM SPSS Statistics 26.

The following analyses and calculations were conducted to

conclude percentages and effectiveness.

Score Distribution Analysis: An examination of the score distribution was carried out for respondents in both the control and experimental groups.

Mean Scores: Mean scores were computed as the average values of scores obtained by participants in both groups.

Percentage Ratio: Assessing the percentage ratio aids in understanding the proportion of participants who achieved specific threshold score values.

Kolmogorov-Smirnov Criterion: This criterion was employed to examine differences between score distributions in different groups.

G. Ethical Issues

Participation in the study was voluntary for all respondents. Each participant was aware of the study conditions and signed a consent to the personal data processing. Only one specialist had access to downloading responses from the website to process the questionnaires. The Ethics Commission of the university granted permission to conduct research and process student data.

IV. Result and Discussion

The survey conducted with the practical business questionnaire showed that the respondents of the experimental sample were more effective within the framework of the learned material. At the end of the course, they better navigated business strategy and economic theory, as evidenced by the group's mean scores. The students in the control group showed significantly lower outcomes.

It was observed that the calculated chi-squared value was X2 (1, N = 150) = 0.97, p = 0.36547 (Non. Sig. $p > 0.05$), whereas the statistical value of the chi-squared with the Yates's correction was X2 (1, N = 150) = 0.8357, p = 0.37595 (Non. Sig. $p > 0.05$). Table 2 presents the mean value, maximum value, and standard error of the mean.

Table 2. The student survey results (N = 150)

Criterion groups	Marginal row totals
The control group	73.4 (74.1) [0.431]
The experimental group	86.2 (87.9) [0.446]

It was noted that about half of the respondents in the control group received scores above average. This indicates a relatively average efficiency of the traditional format business course. At the same time, 78% of respondents in the experimental group, regardless of age, scored more than 80 points on the test.

The study of Bloom's taxonomy level revealed that in the studied age groups, there was a decrease in Bloom's level in each category. From this information, it is evident that the level of Bloom's taxonomy in the experimental group for each age category was higher than that in the control group. This indicates that the use of MOOCs in education facilitated the development of higher-order cognitive skills among students, irrespective of their age (Table 3).

Since the results of the experimental group, which underwent training based on MOOC technologies, exhibited significantly higher levels of Bloom's taxonomy compared to students taught through the traditional instructional system, this points to the fact that the use of MOOCs facilitated a deeper understanding and absorption of the material by the students in the experimental group.

Table 3. The age correlation of bloom level results (N = 150)

Criterion groups	Period	The Bloom's taxonomy level
The control group	16–25	75.5 ±0.74
	25–40	75.1 ±0.53
	40–60	74.8 ±0.16
The experimental group	16–25	86.7 ±0.84
	25–40	84.8 ±0.59
	40–60	84.3 ±0.35

p-value: $p > 0.05$

Correlation of results of the older generation was significantly lower than that of the younger generation, regardless of the training type. This indicates the importance of the age aspect in the context of new technology introduction. In other words, online courses are effective, both for the younger and older respondents. However, their perception of the information received is very different.

The studied course was tested using the Kolmogorov-Smirnov criterion. It also revealed its effectiveness in the context of learning information (Table 4).

Table 4. The effectiveness test of the developed program according to the Kolmogorov-Smirnov criterion

Test number	Test 1	Test 2	Test 3
Numerical indicators	0.23	0.23	0.06
The hypothesis	Rejected	Rejected	Not rejected

p-value: $p > 0.05$

Table 4 contains the results of the analysis of the effectiveness of the developed educational program using the Kolmogorov-Smirnov criterion. In this case, the Kolmogorov-Smirnov criterion is utilized to compare the distribution of two sets of data. The table presents numerical indicators—0.23, 0.23, and 0.06, respectively, which are the outcomes of the calculation of this criterion for three distinct test scenarios.

For Test 1 and Test 2, the hypotheses were rejected. This is attributed to the fact that the comfort level of students who completed the digital course differs from the level typical of traditional methods of distance learning, and these differences are not linked to uniform distribution values. In Test 3, the hypothesis is not rejected. According to this hypothesis, the comfort level assessment results in the experimental group are on par with those in the control group.

The introduction and use of distance learning methods is one of the most current areas of research in the field of education. This should be addressed to make this valuable tool more accessible to a wider audience of students [38]. Studying the popularity, effectiveness, and accessibility of distance learning, constantly requires research that will depict the situation in real time. For many, the lack of full-fledged communication between teachers and students is a stumbling block. To solve this problem and to involve more people, new methods of interaction between the participants in the learning process are being developed [39]. Integration of modern technologies in any sphere of human activity is a complex and painstaking process that requires taking into account different factors, not only social ones. Many studies have already been conducted on this topic, which allows one to judge their effectiveness [40]. There are also studies on identifying the relationship between motivation for learning, learning strategies, self-efficacy, internal attribution, and

learning outcomes. Their goal is to model how the above parameters may depend on each other. It has already been shown that learning outcomes are influenced by a combination of self-efficacy and learning strategies on the one hand, and self-efficacy, internal attribution, and motivation on the other hand [41].

All the above studies, like ours, allow one to assess the situation regarding the use of the World Wide Web for education. Now traditional educational institutions must constantly adopt distance technologies to create competition in the general education market and prevent the isolation of their education system. In modern educational systems, learning is an ongoing and long-term process, and Internet education has led to a continuous connection between education and work at all stages of life [14]. This is precisely what the results of this survey reflect. All three groups of respondents mainly resorted to e-learning to solve problems with work and obtain additional knowledge and skills. The first group (the group of students and schoolchildren) can also be considered here since learning is their main occupation, which is the foundation for their development.

The e-learning approach offers a deeper immersion in the process of learning itself that provides self-determination for the student, given that the student takes responsibility for learning. The student not only acquires knowledge, but also builds a learning plan, and structures the knowledge; in short, learns how to learn [39].

Analyzing the outcomes of studies such as this one, it can be contended that the prevalence of distance learning methodologies among the participants is reasonably elevated. For example, a survey was conducted among students at two schools in Nepal, according to which 50% of the 150 respondents believe that online distance learning is better or comparable in effectiveness to traditional classroom-based learning. All the respondents used the internet for learning regularly, which demonstrates the objectivity of the study [42]. The study among Russian university students showed the same trend. A survey was conducted among 80 people between the ages of 18 and 38 who had completed their higher education through full-time, part-time, and distance learning to find out their views on the potential of online distance learning. As many as 38 of the respondents were positive about online distance learning, 18 respondents were neutral about it, and 24 participants found this method of education unacceptable for learning. It is worth noting that these results refer to education in higher education institutions, but they allow one to assess the perception of online distance learning among people of different ages. In this respect, they agree very well with the data that were obtained in this survey [43].

Moreover, the proposed assumption about the dependence of age and Internet activity is confirmed by the study about the influence of age and gender on the perception of distance learning [44–46]. According to this study, gender and age have little effect on the final learning outcome, but the effectiveness of some tools directly depends on the current Internet use experience, which affects the speed of learning. However, for this study, an important point was also the specifics of the perception of new technologies by different age groups.

The analyses of various studies have shown that the results of this survey agree well with the theories that describe the behaviour of users of online distance learning. The survey data are not out of line with the current trend in the popularity of online distance education and can easily be used for further research in sociology or psychology [18]. These results could form the basis for a follow-up study that would help assess the impact of the coronavirus pandemic on people's desire to get an education online.

Based on the discussion provided, it is worth noting that the current study presented in this article is characterized by several limitations. Firstly, it should be acknowledged that conducting research within the confines of a single platform may limit the universality of the conclusions drawn, as platform characteristics may influence the results and their applicability in other contexts. Additionally, it is important to recognize that a small number of participants (respondents) may lead to limited representativeness and hinder the generalization of the results to a broader audience or population. Furthermore, the utilization of only one business course may impact the overall representativeness of the findings, as alternative approaches or programs could yield different conclusions. An additional factor limiting internal and external validity is the presence of unreliable data, such as responses exceeding temporal constraints or tasks not completed within stipulated time frames. This may distort the results and complicate the analysis of instructional effectiveness.

The results show that after the experiment, students in the control group achieved an average score of 73.4, whereas those in the experimental group attained a mean score of 86.2. In addition, they performed better in the acquisition, retention, and recall of knowledge of business strategy and economic theory at the end of the course. It was noted that about half of the respondents in the control group received above-average scores. This indicates a reasonably average efficiency of the traditional format business course. At the same time, 78% of respondents in the experimental group, regardless of age, scored more than 80 points on the test. In this study, the levels of Bloom's taxonomy were assessed based on students' responses to tasks or test questions designed to evaluate their abilities within each of these categories.

V. Conclusions

This research shows the demographic distribution of users of educational platforms, reveals the motives for using online distance learning, and confirms the results of studies about Internet technologies in distance education. Based on the results obtained in this study, it is possible to do a comparative analysis between the residents of other countries and to study the population's needs in education.

In the future studies, it is possible to repeat the study to show the impact of quarantine on the intensity of the use of e-learning resources. This study can also be improved to get more detailed data. For example, one could get more information about what is most often studied with the help of online distance learning, which resources are more readily chosen by users, and whether there is a connection between the studied discipline and the student's employment. Thus, this study has an impact on the development of educational programs and is valuable for those involved in educational

courses within the MOOC environment, contributing to more effective entrepreneurship skill acquisition across groups with age differences.

Limitations include geographic constraints, which may impact the overall representativeness of the results, as well as a limited volume of data, which may result in an incomplete picture or restrict the conclusions of the study. However, our research has advantages such as broad coverage of the topic, allowing for a deeper understanding of the issue, as well as the use of innovative methods that can contribute to the development of the research field and introduce new approaches to addressing the problem.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: OA. Data curation: AC. Formal analysis: BS. Funding acquisition: SV. Methodology: BS, SV. Project administration: OA. Visualization: AC. Writing—original draft: OA, AC. Writing—review & editing: BS, SV. All authors had approved the final version.

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