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The role of Massive Open Online Courses in transforming academic education and university experience

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Abstract

The study aims to investigate the level of motivation and entrepreneurial competencies of students using online distance courses in entrepreneurial learning. Based on the Massive Open Online Courses (MOOCs) program, an experimental group of respondents took the course "How to Start Your Own Business" (March–May 2022), and their results were generated and compared with the control sample. After taking a 12-week course to improve entrepreneurial ability among students (in particular, paying attention to the motivational component of the study), one can note significant shifts in the internal positive motivation of experimental group students after taking this course. Thus, their percentage component increased to 43% compared to 25% initially ($p = 0.3585$). Simultaneously, substantial structural changes were observed in the analysis of students' entrepreneurial abilities, demonstrating improvements across nearly all assessment items. Future research directions should include studying the integration of MOOCs into academic programs and their impact not only on motivation, but also on success and long-term programs examining the impact of MOOC implementation on the post-graduation success of university students.

Keywords Business incubators · Entrepreneurial competencies · Entrepreneurial education · Entrepreneurial university · MOOC · Online course

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1 Introduction

Entrepreneurial intentions serve as the most reliable predictor of an individual's engagement in business endeavours (Wu et al., 2019). The business landscape is constantly evolving, accompanied by shifts in skills and knowledge necessary for students to achieve success in the future. Students must be prepared for a world characterized by ongoing changes, competition, and global challenges (Li & Wu, 2019). Research has demonstrated that factors such as family education, market accessibility, governmental policies, and regional cooperation between education and state entities are significant determinants of youth success in business. These factors should be taken into account when developing educational programs for business schools and universities (Gianiodis & Meek, 2020).

Contemporary education extensively employs diverse methods and resources to impart essential theoretical knowledge and practical skills to students. One of the most popular means of higher education worldwide has been Massive Open Online Courses (MOOCs). MOOCs offer the opportunity to create a flexible electronic learning environment that supplements existing course materials and utilizes a combination of various teaching methods (Stracke et al., 2019).

One of the advantages of MOOCs lies in their ability to allow students to spend more time outside the classroom, fostering their flexibility in choosing subjects and promoting a positive attitude towards learning. Additionally, MOOCs provide access to assessment for all students through open access to educational resources (Albelbisi & Yusop, 2020).

MOOC implementation facilitates student self-regulation by allowing for the customization of the educational curriculum based on their existing knowledge level, while tasks can be modified to align with their interests, skills, and capabilities. This promotes the development of independent learning. As a result, it can lead to increased efforts exerted by students towards their learning, greater engagement in the learning process, and improvement in their academic performance (Al-Rahmi et al., 2019).

Research in the field of entrepreneurial education indicates that approaches to teaching entrepreneurial skills are evolving towards self-directed learning. Modern universities also emphasize the practical application of competencies and engagement with the business sector through internships and practical research (Alkaabi et al., 2022; Hägg & Gabrielsson, 2019).

Today, entrepreneurial universities in the United States play a significant role in the higher education and scientific research system. They serve as hubs of fundamental science, with many ranking highly in global rankings, such as Harvard and Stanford (Audretsch, 2014). In Western Europe, the development of entrepreneurial universities has a relatively brief history and is achieved through the reform of traditional universities (Zhuplev & Blas, 2021). An interesting example is Germany, where the development of entrepreneurial universities is linked to the formation of regional innovation systems (Kaya et al., 2019). Regions may vary in their innovation potential, ranging from high to moderate, leading to the establishment of universities that focus on technology transfer and high-tech

enterprises (Abdallah & Alkhrabsheh, 2019; Fuerlinger et al., 2015). Castro (2019) noted that the informatization of key processes must be accompanied by several other fundamental and structural changes in education. They believe that one cannot rely solely on Information and Communications Technologies in the context of the main driver of change, one should also pay attention to changes in teaching styles, changes in approaches to teaching, and changes in access to music information. However, the rhetoric of change is linked to the symbolic function of technology in society, which is uncomfortable with teachers' professional judgments (Raja & Priya, 2021).

Sweden can serve as an example of successful collaboration among businesses, authorities, and the education system in shaping entrepreneurial universities. One notable illustration is Lund University, which pioneered the integration of practical entrepreneurship courses and has become one of the most scientifically oriented universities in this field. The Swedish model stimulates innovation, fosters entrepreneurial spirit, and provides the training of highly skilled professionals essential for the country's growth (Hägg & Schölin, 2018). Moreover, France's experience in the establishment of entrepreneurial universities is distinct and exceptional. French universities are part of the poles of competitiveness, but scientific institutions still play a decisive role in conducting advanced scientific developments. Among the most outstanding competitiveness clusters are Sophia Antipolis, Mineralogic, Aerospace Valley, Optitec, and Lyon Biopôle. The dominant role in forming entrepreneurial universities remains with the state (Pierronnet, 2018). The emergence of entrepreneurial universities in Western Europe reflects a close connection between these institutions and the specific economic needs of the country, taking into account its cultural and historical traditions. This process leads to the development of entrepreneurship, fostering innovation, the training of skilled professionals, and contributing to the economic progress of the country (Cho & Lee, 2018).

Contemporary entrepreneurial education is undergoing significant transformations in the context of the growing popularity of online learning. The online format provides students with ample opportunities to acquire management skills, engage in business courses, and participate in other relevant programs, thereby enabling a more flexible mode of education (Abdallah & Alriyami, 2022). Currently, entrepreneurial education is actively adapting to emerging technologies, which offer broad prospects for students to achieve success in the business sphere (Anwar & Abdullah, 2021). Some even begin to start their businesses in their free time while still studying. On the other hand, distance education becomes a challenge with the low competence of educators and the lack of sufficient materials for teaching using the Internet (Kawamorita et al., 2022).

In the long term, the contribution of entrepreneurial universities through educational, scientific, and entrepreneurial activities can lead to the emergence of new production factors that will contribute to the socio-economic development of the region, in particular, and the country as a whole (Karpunina et al., 2014). In the transformation process, Kazakhstani universities are in an intensive search for innovative educational and scientific activities and mutually beneficial formats of cooperation with the regions. Many of the approaches used in Kazakhstani universities have been successfully implemented in some European universities (Carayannis &

Morawska-Jancelewicz, 2022). However, it is important to highlight that the potential of the technology of mass online courses in improving the professional and personal qualities of students is still not extensively studied, particularly in relation to the unique characteristics of the region being investigated.

1.1 Literature review

The term entrepreneurial university in the last decade has become firmly established in the categorical apparatus of specialists dealing with issues of university management. The concept of entrepreneurship remains subject to varied interpretations, influenced by researchers' perspectives and approaches, despite its long-standing history. The definition of entrepreneurship largely relies on how they perceive this issue and the position they take in their research (Kazhikenova et al., 2021). The concept of entrepreneurship has not only evolved over time but also exhibits variations based on cultural, economic, and social contexts. This provides room for a wide range of approaches and definitions that reflect the multifaceted nature of this concept and its role in society (Mehmood et al., 2019). Thus, according to Bauman and Lucy (2021), the main difference between an entrepreneurial university compared to a traditional academic institution is the emphasis of curricula on economic development, innovation and creativity, as well as on maximum support of an entrepreneur.

The most comprehensive definition of entrepreneurship, endorsed by many researchers, was given by Howard Stephensen. This definition highlights entrepreneurship as the process of identifying, pursuing, and exploiting business opportunities by individuals and organizations, regardless of the directly controlled resources at hand. It signifies that successful entrepreneurs possess the ability to identify the potential for new ventures, recognize avenues for growth, and effectively leverage resources for success (Sørensen, 2020).

Audretsch (2014, 2017), Etzkowitz (2017), Guerrero and Urbano (2012, 2019), in their research, emphasize innovation and development as key criteria of entrepreneurship. Drucker (2014), on the other hand, focuses on the entrepreneurial nature of managerial activities and their orientation towards the constant pursuit of new and effective ways of organizing operations. The author emphasizes that the innovative aspects of managerial activities involve searching for, activating, developing, and effectively utilizing the resources required for organizational purposes, while also leveraging drivers of scientific and technological progress. The concept of "entrepreneurial university" remains an unofficial term, which all universities rather use to emphasize their exceptional characteristics in the field of commercialization and contracts with partner companies. In particular, Etzkowitz understands an "entrepreneurial university" as an institution that has income sources such as proceeds from the sale of patents, where research is funded through contracts and partnerships with private businesses (OECD, 2018). In this connection, the relevance of the development of entrepreneurial universities in Asia, including Kazakhstan, is explained. That is, international experience in the

development of entrepreneurial universities is very important for young transforming universities (Alghamdi, 2020; Budyldina, 2018).

Chinese researchers have conducted a scientific study on students' perceptions of MOOCs, exploring the possibilities of integrating modern digital technologies with MOOCs. They found that the success of this integration depends on meeting the fundamental psychological needs of students. However, the duration of online MOOC viewing may negatively impact the number of views, highlighting the importance of effective time management when utilizing MOOCs (Wu, 2021).

The viewpoint expressed by economist Williams regarding the need for developing their own higher education system in countries with emerging economies, particularly in Asia, underscores that mere knowledge accumulation is not a determinant of success in the twenty-first century due to intense market competition (Tayauova & Bektas, 2018). In modern education, two popular types of MOOCs are widely utilized: cMOOCs, based on collaborative online courses, and xMOOCs, which offer instructional materials from universities and other educational institutions (Duan, 2022).

French researchers shared intriguing findings in their study examining the influence of social factors and self-regulation on students' academic performance in MOOCs (Pozón-López et al., 2021). Particularly, they noted that the utilization of modern digital technologies and MOOCs requires consideration of students' needs, autonomy, self-regulation, and the opportunity to make choices in learning. The research results demonstrated that the success of MOOC learning depends on fulfilling basic psychological needs such as autonomy, flexibility, meaningfulness, and competence development. Additionally, active participation in discussion forums, publishing online textual reviews, high online ratings, and a positive mood in online reviews and forums contribute to progress in MOOC learning. However, the duration of MOOC viewing negatively impacts the number of material views (Chaker & Impedovo, 2021).

A team of researchers from Morocco also shared positive outcomes from their study utilizing MOOCs (El Kabtane et al., 2020). They explored the impact of virtual and augmented reality on enhancing interactivity in MOOCs. It is known that distance online and web-based learning have their limitations, such as a lack of interactivity among participants on the platform and noticeable disengagement of some students.

Entrepreneurial education holds a significant position in the higher education system of Kazakhstan. The country fosters active collaboration among universities, the business community, and governmental bodies to develop entrepreneurial potential. One key organization facilitating entrepreneurial education in Kazakhstan is the Association of Entrepreneurship Education of Kazakhstan. This association brings together higher education institutions, researchers, educators, and business representatives to promote entrepreneurial learning and foster entrepreneurship in the country. The Association of Entrepreneurship Education of Kazakhstan hosts a range of events, such as seminars, conferences, and training programs, to enhance the entrepreneurial competency of both students and educators (Nurtaeva et al., 2021).

Toraighyrov University, under investigation, has expanded its development by integrating innovation and entrepreneurship across diverse specializations. With a primary emphasis on nurturing entrepreneurship among students, Toraighyrov University has implemented various initiatives aimed at achieving this goal. These initiatives encompass the establishment of business incubators, the launch of a startup academy, the modernization of educational programs, the revision of educational trajectories, and the integration of entrepreneurial modules. Having carried out research work, the university management is paying attention to the search for optimal financial and effective ways to optimize the educational process of future businesspeople.

1.2 Setting goals

The article describes the model of an entrepreneurial university that meets the needs of the twenty-first century. Entrepreneurship plays a high role in Kazakhstan and around the world. To be competitive internationally, in recent decades Kazakhstan has introduced an entrepreneurial model of university for higher education, using the experience of North America and Europe. Materials and programs to improve entrepreneurial education in different countries were analyzed, and some gaps were revealed in the study of the educational process in Kazakhstan in the context of training future entrepreneurs. At the same time, there is a large context of gaps in the use of new means of the educational digital process: MOOCs, courses, and training.

The purpose of the study is to investigate the level of motivation, as well as the potential to improve the entrepreneurial abilities of students using open online business courses. The study aims to address the following objectives:

- analyze the current state of entrepreneurial abilities of respondents and their motivation to learn,
- implement a program to enhance students' business management skills through the incorporation of MOOCs available on the Coursera platform for the experimental group,
- compare the level of motivation and entrepreneurial skills between the control and experimental groups of respondents after the implementation of the MOOCs module.

2 Method and material

2.1 Research design

The study consists of four stages, which were carried out based on analyzing the behaviour of the sample groups (Fig. 1).

The study uses a quantitative approach and an experimental research design. Two groups of participants are identified, homogeneous demographically, and the intervention is applied to the experimental group. Pre- and post-intervention measures

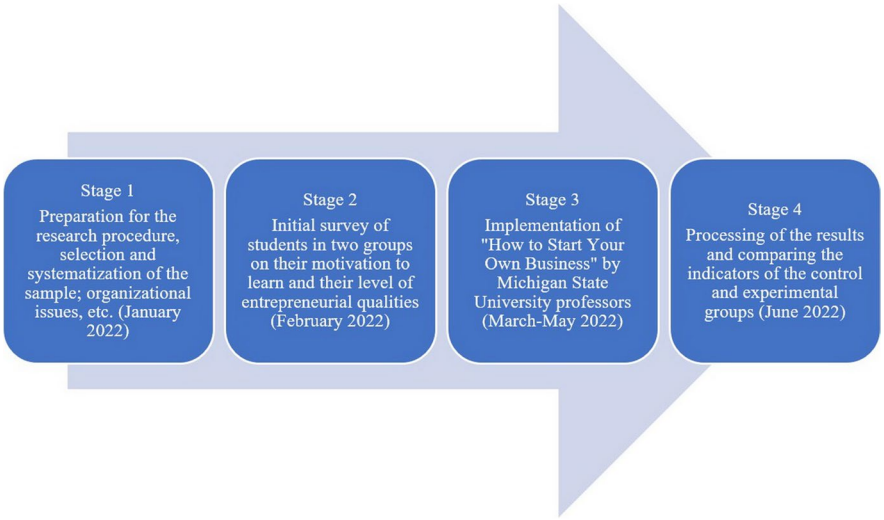

Fig. 1 Stages of the study

of motivation and the variable of interest, entrepreneurial opportunity. The results obtained are compared and the presence of a correlation between the results of the experimental group is established to ensure that it was the intervention that most likely led to the recorded changes. The statistical significance of differences in motivation and entrepreneurial ability outcomes between groups that received and did not receive the intervention is established.

Initially, the selected respondents were divided into two groups—a control group and an experimental group, before commencing the cluster learning program. The motivation level and entrepreneurial abilities of each group were assessed. Subsequently, students in the experimental group were provided with a list of courses available on the Coursera platform from which they could choose (Coursera, 2023). According to the results of voting in Google Forms, the majority of students expressed interest in the course "How to Start Your Own Business" offered by Michigan State University (Coursera, 2022). This course offered opportunities and strategies for establishing one's own business and consisted of six distinct modules: entrepreneurial mindset development, idea generation, planning, structuring, launch strategy, and laying the foundations for business growth.

Each course must be taken by students within 2 weeks. Students took the course on their own at home in their own time. In addition, university professors allocated 2 h 2 times a week for students to devote time to the course. While completing the course, students in the experimental group continued their regular course of study at the university and could conduct free collaboration on topics that were interesting or difficult for them or hold discussions with colleagues. At the end of each course, each student took a mini-test on their learning. After the entire program, a student receives an electronic certificate, which may mean their further participation in a follow-up survey.

The course includes audio and video materials, real-life stories of famous businesspeople in the world, analysis of entrepreneurial cases, and prototypes of building one's own business. Students had the opportunity to communicate with the course founders in personal chats. The course is free after registration from a student's email. Next, both groups were retested using similar questionnaires as the initial questionnaire and the results were compared.

2.2 Sample

The target group of the survey were 3rd- and 4th-year graduate students and master's degree students of Toraighyrov University, who have completed a full course of the entrepreneurial module provided by the university, respectively, clearly representing the content of the module to assess the quality of entrepreneurial ability. All students of the university in the specified faculties were sent personal e-invitations. Among them, 248 people responded positively to the test. Then they were randomly generated into 2 groups: experimental and control (Table 1).

Table 1 Description of the research sample by the respondent group

Faculties	Separation of study participants		Total	Total (% of the general population)
	Control	Experimental		
Faculty of Natural Sciences	16	15	31	12%
Faculty of Engineering	23	31	54	22%
Faculty of Agricultural Sciences	19	20	39	16%
Faculty of Economics and Law	28	22	50	20%
Faculty of Energy and Computer Science	10	12	22	9%
Faculty of Humanities and Social Sciences	28	24	52	11%
Total	124	124	248	100%

Table 2 Age and gender of respondents

Age	Number of respondents	Percentage	Gender	Number of respondents	Percentage
19–20	92	37%	Male	120	48%
21–23	112	45%			
23–25	20	8%			
26–30	15	6%	Female	128	52%
Over 31	9	4%			
Total	248	100%			

Most respondents were in the 21–23 and 19–20 age groups: 45% and 37%, respectively. In the age category from 23 years old, there were 18% of respondents. By gender, the proportion of male respondents was 48%, and 52% of female respondents (Table 2).

The acceptable sampling error did not exceed p = 4.81. Therefore, the current number and structure of respondents are sufficiently representative for the study.

2.3 Research procedure

Two methods were used in the context of primary and secondary analysis. The standardized questionnaire by K. Zamfir, modified by A. Rean (Motivation of Professional Activity), was used to assess the level of students' motivation for business studies, which allows one to diagnose the motivation for learning activities of future entrepreneurs (Rean, 2013). The technique consists of 7 consecutive questions with response options on a Likert scale (from 1 (very little) to 5 (very much)). After completing the questionnaire, motivation indicators were calculated, specifically overall motivation (M), external positive motivation (EPM), and external negative motivation (ENM), using the following formulas:

$$M = (6 + 7)/2,$$
$$EPM = (1 + 2 + 5)/3,$$
$$ENM = (3 + 4)/2.$$

Each motivation indicator is expressed as a number ranging from 1 to 5, including possible decimal values.

Indicators of M, EPM, and ENM were evaluated in points. The resulting scale values were divided by 2, and then a participant's profile was calculated, which could take the form:

M > EPM > ENM, M = EPM > ENM, or ENM > EPM > M.

Optimal and motivational complexes (high level): M > EPM > ENM and M = EPM > ENM. Poor motivational complex (low level): ENM > EPM > M. Other combinations are intermediate in terms of their effectiveness (medium level). Next, the entrepreneurial qualities of the interviewed respondents were assessed according to the scale by Altukhov et al. (2008). Total time of the test was 40–60 min. The total number of questions was 122. The test included 4 blocks of scales:

Potential: Entrepreneurial Potential.

3 Knowledge and skills block:

- Business savvy (entrepreneurial decision-making skills);
- Economic knowledge (necessary knowledge of economics, marketing, etc.);
- Legal knowledge (necessary knowledge of the legal aspects of entrepreneurship).

4 Risk Preparedness Unit:

- Ability to take risks (the ability to adapt to risk conditions, to make the right decisions that lead to a win in a situation of risk);
- Flexibility (the ability to quickly change behavioral strategies in negative risk situations);
- Caution (the ability to exercise caution in a changing risk environment).

5 Block of personal qualities:

- Resilience (ability to remain calm; emotional stability; readiness for stress);
- Ambition (focus on achievement, status, activity and flexibility);
- Readiness (a person's readiness for the conditions of entrepreneurial activity).

According to the results of the test, a conclusion is made about the integral potential of entrepreneurship on the subject, based on the results of the 3 blocks. Each scale of the test has five diagnostic zones, which correspond to five levels of interpretation of the results, differing in the degree of expression of the factor. For ease of interpretation, test scores are presented in normalized standard scores (on a one-dimensional ranking scale from 1 to 10). That is, low test values are 0–4.4, average values are 4.5–6.5, and high values are 6.6–10.

5.1 Data analysis

A multistage quota sampling method was employed for conducting the survey. The sampling error was calculated using the formula:

Sampling error formula $= Z \times \sigma / \sqrt{n}$,

Where Z is the value corresponding to the desired confidence interval (95%); n is the sample size, and σ is the population standard deviation (Survey Monkey, 2021).

Thus, the sampling error amounts to 0.652 or approximately 1%. This indicates the reliability of the obtained data as there are no unaccounted errors, and the accounted errors do not exceed the specified level. To assess the reliability of the questionnaire, Cronbach's alpha coefficient was utilized (Gliem & Gliem, 2003). The cumulative Cronbach's alpha value for the questionnaire was determined to be 0.925.

Conclusion: the questionnaire is reliable and can be used for interviewing. The effectiveness of the developed complex of knowledge sharing and distance communication of students was also tested and implemented on a sample of the experimental group. For this purpose, the authenticity test of the obtained effectiveness was applied according to the Kolmogorov–Smirnov methodology.

Input data:

$\{\times_1, \ldots \times_2, \ldots \times_i, \ldots \times_{N1}\}$ – vector of data obtained by students of the control group;

$\{y_1, \ldots y_2, \ldots y_i, \ldots y_{N1}\}$ – vector of data obtained by students in the experimental group.

Then $T_1\, T_2\, T_3$ values are calculated, and then the benchmark for comparison:

$$Tb = Q\sqrt{\frac{N1 + N2}{N1 * N2}}.$$

Comparing the results obtained, the hypothesis of the effectiveness of the developed course is rejected or accepted with a probability of 0.95.

5.2 Statistical processing

Statistical data processing was performed using elements of computational and descriptive statistics. The statistical data processing program was used (IBM SPSS Statistics 26).

5.3 Ethical issues

The study adhered to ethical norms and rules for conducting sociological surveys. At the beginning of the study, respondents were warned about the confidentiality of the survey, the anonymity of the answers, and the application of the research results in a generalized form and for scientific purposes. Personal data is not recorded in questionnaires, is not transferred to third parties, and is not published. The questionnaires are processed by one specialist who has access to download answers from the site. The university's ethics committee granted permission to conduct research and process student data. Participation in the study is voluntary for all respondents. The research results are presented in a generalized form.

5.4 Research limitations

The results are reliable. No inappropriate results were obtained. However, the study was conducted at 1 university. The sample was small, and this did not allow the results to be extrapolated. Only one entrepreneurial course was applied, limiting the study results.

6 Results

Verification of the studied course was determined using the Kolmogorov–Smirnov criterion (Table 3).

Based on the data of the primary survey, the vast majority of students in both groups marked mediocre levels of motivation to learn: the control group (56%,

Table 3 Validation of the effectiveness of the developed program according to the Kolmogorov–Smirnov criterion

T_1	T_2	T_3
0.24	0.24	0.06
$T_1 > T_b$	$T_2 > T_b$	$T_3 > T_b$
The hypothesis is rejected; the level of well-being of students who took a digital course to improve knowledge sharing and communication is different from students in traditional distance learning	The hypothesis is rejected; the well-being of students who took a digital course to improve knowledge sharing and communication does not obey the same distributional values	The hypothesis is accepted; the welfare scores of the experimental group are not lower than those of the control group respondents

p = 0.4784), and experimental group (61%, p = 0.6439). At the same time, the majority of them marked a high level of positive motivation to study exactly in such an educational setting. On average, about 20% of students (p = 0.9465, p = 0.8538) indicated an unsatisfactory state of motivation process among the surveyed respondents with a higher proportion of intrinsic negative motivation, which is evidence of disorientation in the educational business environment (Table 4). It was observed that the calculated chi-square value was X2 (1, N = 248) = 1.1, p = 0.36494 (NonSig. p < 0.5), whereas the Yates-adjusted chi-square statistic was X2 (1, N = 248) = 0.8585, p = 0.32895 (NonSig. p < 0.5).

According to the results obtained, both groups of respondents demonstrated satisfactory results of competencies in entrepreneurship (Table 5). The highest correlation between competencies was observed among the blocks:

- The potential of entrepreneurship: p = 0.4675
- Economic knowledge: p = 0.5749
- Flexibility:p = -0.6048

At the same time, in all categories of testing, there is a high correlation of the obtained scores both between the categories and within the group. This finding suggests that students' entrepreneurial capacity undergoes equitable development within the framework of university educational programs while also possessing substantial potential for further expansion.

After taking a 12-week course to improve entrepreneurial ability among students, students were retested on two questionnaires. In particular, paying attention to the motivational component of the study, one should note significant shifts

Table 4 Chi-square analysis of students' motivation before course implementation (N = 248)

Criterion groups	Marginal row totals
Control group	3.4 (3.1) [0.327]
Experimental group	3.2 (2.9) [0.349]

Table 5 Correlation of results on the entrepreneurial qualities questionnaire in the program

	Competency	p	%
1	Entrepreneurial Potential	0.4675	0.11%
2	Business savvy	0.3576	0.09%
3	Economic Knowledge	0.5749	0.07%
4	Legal knowledge	0.1525	0.05%
5	Risk-taking skills	-0.1198	0.04%
6	Flexibility	-0.6048	0.07%
7	Caution	-0.6485	0.03%
8	Resilience	0.3478	0.03%
9	Ambition	-0.3658	0.02%
10	Willingness	0.2955	0.07%

in the internal and positive motivation of experimental group students after taking this course (Table 6). Thus, their percentage increased to 43% compared to 25% in the experimental group (p = 0.3585). While the improvement in the control sample group was only 2% towards the high level of motivation (p = 0.2648). It was observed that the calculated chi-square value was X2 (1, N = 248) = 0.8523, p = 0.424756 (NonSig. p < 0.5), whereas the Yates-adjusted chi-square statistic was X2 (1, N = 248) = 1.88, p = 0.845298 (NonSig. p < 0.5).

There were significant structural shifts in the diagnosis of entrepreneurial abilities of students, as they were improved on almost all items tested (Table 7). There is a percentage shift in all items of the characteristics of entrepreneurial ability in the group of respondents after the course, while the control group of respondents had almost no change in their results in the direction of improving business ability. This is evidence of the effectiveness of the developed program in the context of motivation and entrepreneurial competencies while taking online courses.

In this regard, it is necessary to create a favourable virtual environment in higher education institutions to "create" a new type of teacher with such qualities as initiative, creativity, entrepreneurial thinking, and having the necessary flexible knowledge, skills and abilities, focused on the development of entrepreneurial education. At the same time, the program has demonstrated a significant improvement in students' perception of the vectors of leadership and business abilities, starting their own business. It is also necessary to develop teachers' digital literacy and the possibilities of integrating the latest technologies into the educational process. The above points can be solved by systematic work in this direction. For example, business competencies can be formed by sharing experiences with universities focused on the development of entrepreneurship through digital learning with MOOCs.

Table 6 Chi-square analysis of students' motivation after course implementation (N = 248)

Criterion groups	Marginal row totals
Control group	3.5 (3.3) [0.468]
Experimental group	4.6 (4.9) [0.361]

Table 7 Correlation of results on the questionnaire of entrepreneurial qualities in the program

	Competency	p	%
1	Entrepreneurial Potential	0.7583	0.12%
2	Business savvy	0.5374	0.13%
3	Economic knowledge	0.3684	0.09%
4	Legal knowledge	0.2644	0.05%
5	Risk taking skills	0.4583	0.12%
6	Flexibility	0.6316	0.11%
7	Caution	0.6555	0.11%
8	Resilience	0.5438	0.12%
9	Ambition	0.4682	0.08%
10	Willingness	0.3148	0.04%

7 Discussion

Although the worldwide growth of entrepreneurial education, there is an ongoing debate about how this type of learning fits into entrepreneurial education and what conditions should be in place. Hahn et al. concluded that based on the concept of human capital, it can be assumed that there is a complex relationship between various entrepreneurship education initiatives and their impact on learning outcomes in this domain. Furthermore, the authors acknowledge the impact of students' entrepreneurial background, the pedagogical approaches used to implement entrepreneurship initiatives within the university, and the supportive entrepreneurial ecosystem that cultivates conducive conditions for entrepreneurial development in the country (Hahn et al., 2017). Compared to the initial stage of introducing entrepreneurial education in Toraighyrov University, 2023), today, there are specific results, such as a positive perception of the entrepreneurial direction among teachers and employees, the opening of new educational opportunities for students, researchers, teachers, and employees, the formation of a different view of the potential and capabilities of the university as a whole, the creation of infrastructure and conditions for the development of startups and businesses. The formation of a company's paradigm and values plays a significant role in preparing future professionals for creating a favourable business environment. However, a prevailing issue lies in the mismatch between the actual skills and abilities of graduates from educational institutions and the required skills and competencies for successful entrepreneurship (Anjum, 2020). Alshare and Seveilem (2018) draw attention to the substantial gap between the skills and competencies of student entrepreneurs and the demands of the labour market, as exemplified by an analysis of the situation in Qatar.

American researchers Janelli and Lipnevich (2021) analyzed the impact of MOOCs on learning outcomes. The study included four groups of students: the first group received no feedback from instructors, the second group received basic feedback providing correct or incorrect comments, the third group received detailed feedback, and the fourth group served as the control. The results indicated that feedback had no influence on students' academic achievements, and those who underwent the MOOC demonstrated positive learning outcomes (Janelli & Lipnevich, 2021).

The development of a model for fostering progressive entrepreneurial thinking among students is a common practice in higher education, particularly through the utilization of digital technologies. A recent study of Akrami (2022) involving 355 chemistry students at Farhangian University emphasizes that the STEM (Science, Technology, Engineering, and Mathematics) approach significantly influences overall entrepreneurial characteristics such as confidence, creativity, leadership, thinking, risk-taking, and forecasting. Researchers also highlight significant differences between male and female students in the context of entrepreneurship, as well as varying levels of entrepreneurial activity. The study emphasizes that educational institutions can create favourable conditions for nurturing students' talents and abilities by employing approaches that best align with their needs and potential.

The insightful findings by Hägg and Gabrielsson (2019) underscore the significance of self-regulation in the field of entrepreneurship. This pertains to an individual's ability to make decisions in conditions of uncertainty and necessitates reflective thinking. In their conducted study, students engaged in a practice known as "entrepreneurial journaling." The objective of this exercise was to cultivate abilities in self-organization and self-directed learning, while also establishing a bridge between the theoretical foundations of entrepreneurship and their practical implementation.

A unique example of student entrepreneurship support is the project launched by the Alliance for Young Universities for the Future of Europe (YUFE), which will foster a new generation of student entrepreneurs and innovators and is actively involved in which the University of Essex is taking part. The new project aims to remove barriers to student entrepreneurship and strengthen the role of universities as launching sites for entrepreneurial careers. Within its framework, 400 students and 80 teachers and specialists of universities will receive support (Allterra, 2023). The research conducted by de Moura et al. (2021) draws similar conclusions. According to their findings, MOOCs are widely employed as an alternative form of instruction to facilitate blended learning.

To eliminate barriers to student entrepreneurship in Kazakhstan, it is necessary to study and apply the experience of the Alliance of Young Universities of the Future of Europe to support student entrepreneurship (Morris et al., 2017). It should be noted that the Kazakhstani start-up market began to develop actively in 2018 since the adoption of the Law "On Venture Funding," the task of which included regulation of this market (Zakon.kz, 2020). Modern technology parks and innovative hubs were created to attract venture investors to start-up projects, such as the FinTech Hub of the Astana International Financial Center, Astana Hub, QazTechVentures, and Tech Garden (InBusiness, 2020). In line with these innovations, Toraighyrov University created its startup academy, which assists students in developing and implementing creative ideas, business plans, incubators, and start-up projects.

This publication is unique in its analysis of the formation and development of entrepreneurial competencies in higher educational institutions in Kazakhstan, particularly in Toraighyrov University. It explores effective practices from global entrepreneurial universities. The survey was conducted among third and fourth-year master's degree students of Toraighyrov University. A total of 248 respondents were surveyed and divided into two groups. The research procedure included taking the online course "How to Start Your Own Business" from Michigan State University professors for an experimental sample of respondents. After taking a 12-week course to improve entrepreneurial ability among students, in particular, paying attention to the motivational component of the study, one should note significant shifts in the internal and positive motivation of experimental group students after taking this course. Thus, their percentage component increased to 43% compared to 25% in the experimental group ($p=0.3585$). While the improvement in the control sample group was only 2% towards the high level of motivation ($p=0.2648$). Simultaneously, notable structural changes were observed in the assessment of students' entrepreneurial capability, with significant improvements observed in nearly all examined items.

The results of this study contribute to international experience in the development of entrepreneurship and entrepreneurial education and can be used by researchers both in countries where entrepreneurial education is developed and in countries where it is just beginning to develop. The practical value of the study lies in the fact that students' attitude to the entrepreneurial module is determined, the self-assessment of the students' acquired competencies, skills, and abilities is revealed, and the application of the knowledge gained in their other entrepreneurial activity. At that time, the results of this study may serve as an important stimulus for the development of a full-fledged course on the digitalization of entrepreneurial education in Kazakhstan with the help of MOOCs. Future researchers may be interested in developing an online course based on their university to attract other students and conduct international business training.

8 Conclusion

The digital environment and distance learning methods are persistently changing the landscape of university education. The study aims to examine how the level of motivation and entrepreneurial competencies of entrepreneurial students changes during the use of massive open online courses (MOOCs) as part of distance learning. The study involved 248 3rd and 4th year students and master's degree students, who were randomly divided equally into experimental and control groups. Participants in the experimental group were given the opportunity to choose one of the Courser courses by voting. They chose the course "How to Start Your Own Business" offered by Michigan State University and subsequently mastered this course for 12 weeks, 2 h, 2 days a week. The control group of students studied according to the regular program without the use of MOOC. Before and after the intervention, the level of motivation and entrepreneurial abilities of each group was assessed. Using correlation of results on the entrepreneurial qualities, a connection was established between the intervention and changes in the results of the experimental group. The presence of significant differences in the level of motivation of the groups before and after the experiment was established using chi-square. Positive significant changes were found in the internal positive motivation of students in the experimental group based on the results of completing the course (from 25 to 43%). The Entrepreneurship Assessment also showed improvements in the experimental group on almost all assessment items. Future research should focus on longitudinal studies of post-graduation success of students who have used MOOCs in their education and determine their role in such success. Practical application of the results obtained is possible during the implementation of individual MOOC courses in the academic training programs of universities in developing countries.

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Declarations

Code Availability Not applicable.

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