

INTRODUCTION INTO ELECTRONIC COMMERCE ENTREPRENEURSHIP IN THE UNIVERSITY COURSE USING VIRTUAL ENTERPRISES

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Abstract: Entrepreneurship education helps to promote the employment of university graduates and it might be implemented in various fields of business including e-commerce. It may be appropriate for future entrepreneurs in e-commerce to experience the development and management of an enterprise in a virtual form as part of their education. This article aims to demonstrate how are virtual enterprises used for instructional reasons in the university entrepreneurial course. This particular course allows its participants to experience the first phase of the existence of their fictitious e-commerce enterprises. Students establish and manage virtual limited liability businesses operating online stores. Electronic banking software allows the settlement of payments related to their e-commerce business activities. Pre-course and post-course surveys were conducted to investigate changes in students' self-reported evaluation between these two moments. Results show significant improvements in all investigated entrepreneurial aspects of the course suggesting that the given approach of using virtual enterprises for entrepreneurship education positively impacts the entrepreneurial skills, knowledge, and experience of the course participants. This suggests that this design of using virtual enterprises can be a suitable way of implementation in the educational process of entrepreneurship in higher education institutions.

Keywords: e-commerce, entrepreneurship education, university course, virtual enterprise.

1 Introduction

The development of new enterprises has always aided in the continual growth of the productivity in the economy. Education in the area of entrepreneurship and developing students' entrepreneurial mindsets ought to be central to the curricula of academic institutions offering business management and economics degrees (Gerdin & Linton, 2016).

Experience with real-world entrepreneurship is frequently lacking in school (Harris, 1979). Conversely, university studies may be a great time for students to launch their own businesses since they can work with or be employed by their peers, collaborate with them, and obtain real-world experience. Even the failure of the business does not have only negative sides as many prosperous companies emerge from a string of unsuccessful ones (Thiel & Masters, 2014).

Furthermore, participating entrepreneurs get invaluable expertise from unsuccessful enterprises that they might apply to their future professions (as workers or as entrepreneurs). The business world has been impacted by information and communication technology (ICT) in many ways.

1.1 Information and communication technologies in e-commerce

Information and communication technology (ICT) usage currently affects a number of areas of economic life. Entrepreneurs may utilize it for promotion, banking and payment services, product delivery to clients, administration institution communication, business establishment, and more. The emergence of ICTs led to the creation of electronic commerce and enterprises.

The use of information and communication technology to facilitate the electronic exchange of goods and services is known as electronic commerce or e-commerce. E-commerce enables businesses to reach a larger pool of prospective clients by distributing goods and services. Other information and communication technologies (including online marketing, electronic data interchange, electronic money transfers, enterprise resource planning, data collecting systems, etc.) are frequently used in e-commerce.

At least a portion of transactions in electronic business take place online, while other information technologies could also be used. Online marketplaces for consumers or other businesses,

online shopping websites (e-shops) for customers at retail, online marketing and sales promotion, and business-to-business electronic data interchange are examples of e-commerce operations for enterprises (Bakos, 2001).

By definition, electronic payments and banking may be linked to electronic commerce. Electronic banking is characterized by constant, round-the-clock access to payment services. The ability to share information quickly and easily between merchants, banks, card providers, and customers outside of regular business hours. Additionally, virtual transactions may be completed at any time and from any location in the globe thanks to electronic payments. Retailers may save time and money by using this to provide cash flow without the requirement for physical store branches.

Electronic companies frequently need to get in touch with public administration organizations to complete legal requirements, such as filing tax returns and requesting permissions and licenses, among other things. We refer to electronic government (e-government) if this kind of connection and engagement with institutions of public administration is permitted by electronic means. Businesses engage with the government-to-businesses (G2B) level of e-government, also known as the commerce level, which is tailored to meet the unique requirements of companies (Yildiz, 2007).

1.2 Information and communication technologies in e-commerce entrepreneurship education

It is essential to incorporate all of these above-mentioned basic elements while preparing future e-commerce entrepreneurs so that students may gain as much firsthand experience as possible with the running of such enterprises. In addition to the effects on companies listed above, information and communication technologies regularly complement the educational process and aid in students' knowledge and skill development (Akimov et al., 2021).

It involves a lot of effort to include ICT properly in the teaching process at higher education institutions. The advent of e-learning, which is a popular kind of distance learning in the current educational environment, was made possible by information technology. E-learning may enhance other cutting-edge educational approaches or help university instructors become more proficient in ICT (Laurillard, 2005). The usage of e-learning might also help to overcome non-standard situations, similar as what occurred during the COVID-19 pandemic, when pandemic prevention measures made made classical face-to-face teaching impossible (e.g. Almarzooq, Lopes & Kochar, 2020; Bokolo & Selwyn, 2021; Shamir-Inbal & Blau, 2021 and others).

Future entrepreneurs may find that ICT may assist them in analyzing, reprocessing, and improving their business processes to optimize their companies' operations. ICT may also assist education in entrepreneurship (Von Graevenitz, Harhoff & Weber, 2010). Augmentation or virtualization of objects or processes is one of these ICTs which can support the educational process in various subjects of study, for example in biology (Vasiliadou, 2020), science (Alneyadi, 2019), digital media arts (Yingjun, 2021), biomedicine (Fabris et al., 2019), engineering (Ibáñez & Delgado-Kloos, 2018), mathematics (Costa et al., 2018), etc.

Various advanced information and communication technologies are also used in educational processes for a simulation of entrepreneurship (Vanevenhoven & Liguori, 2013), including the virtualization of enterprises. Virtual enterprise or virtual firm means that this company is only a fictitious company serving for educational purposes. Virtual in this case means that this company has no real legal status, but and serves as a pedagogic model.

Butterlin et al. (2014) used the model of virtual firm in biomedicine education for students to work in real conditions on the development of new medical devices and the modernization of medical products. The need for these innovative medical devices was identified by the students during their internship in hospitals and within the framework of the virtual enterprise students developed several products in reaction to this identified need. Keramitsoglou, Litseselidis, and Kardimaki (2023) described a virtual enterprise approach, which can be used to introduce circularity and sustainability in entrepreneurship to the students.

Zhi (2021) developed an education model for cooperative virtual enterprises based on e-commerce with the aim of solving selected teaching issues within the area of entrepreneurship. Blagosklonov et al. (2006) used a virtual enterprise as a role-playing tool which allowed students to gain relevant and practical on-the-job experience. The course participants played the roles of the employees and the applicants for vacant positions at the virtual firm. Their results showed that this concept may be used to improve students' performance and to support their post-graduate integration into the labor market.

Zhang and Zhang (2018) also proposed the use of virtual enterprises for entrepreneurial education in the conditions of China's higher education. They concluded that the virtual enterprise-based education pattern provides more practice capital for the employment of college students including their ability for self-employment. Similarly, Borgese (2011) described the virtual enterprise as a transformative learning methodology very helpful and effective in achieving entrepreneurship education goals.

Therefore, this paper will introduce the possibility of virtual enterprises usage in the educational process of the university course and its contributions to self-reported gains of students' knowledge, skills, and experience with entrepreneurship in the area of electronic commerce.

2 The Course

The capacity to comprehend and apply information and communication technologies (ICTs) is now one of the most important factors of success in e-commerce entrepreneurship. It is based on their ability to become acquainted with a wide variety of knowledge relevant to this sector. This promotes the use of ICTs in the electronic commerce training of potential future businessmen, who need to know how to operate and manage various economic information systems.

In our case, the course of Economic Information Systems (EIS) simulates the business activities of recently founded e-commerce enterprises in a university course. The enterprises have only the virtual (fictitious) character serving for entrepreneurship education purposes within the course. This non-mandatory course is offered to students in their second year of master's degree studies in the discipline of Business Informatics or alternatively in the third year of bachelor's study in the field of Finance, Banking, and Investment. Within the framework of the EIS course, problem-oriented learning, learning-by-doing, and e-learning methods are used. In particular, participants should improve their knowledge of website design, online shop administration and management, legal issues, taxation, and electronic accounting systems. They should also broaden their understanding of electronic communication e-Government methods with public administration authorities.

The EIS course enables the emulation of operating electronic commerce in the context of the Slovak economy through the use of virtual enterprises. The EIS course is built on e-learning technologies, allowing course completion without the need to attend lectures in person. Face-to-face components of the course are primarily consultative in nature and are not required of students. Through the creation and management of virtual businesses, the course gives students the opportunity to practice the fundamentals of entrepreneurship in the electronic commerce sector. One-person limited liability companies are a fairly frequent type of business in the context of local business reality.

Students have a limited opportunity to establish a virtual enterprise operating an online store within one of three categories of items (computer equipment, office equipment, or office furniture) as part of their entrepreneurial activity. The central faculty business, run by lecturers, acts as a wholesale outlet where enterprises owned by students may purchase their virtual items to resell.

Students set up their own enterprises in accordance with Slovak Republic legislation. To simulate public administration institutions (specifically: business register, trade register, tax office, social insurance office, and health insurance institution) lecturers run a virtual online registration authority. Course participants are obliged to electronically communicate with these institutions using a digital signature during the process of establishing their companies. The Sectigo certification authority issues certificates to students for digitally signing relevant documents. It is required of students to draft a business plan for their enterprise's initial periods. Making the webpage of the enterprise and uploading it to the web server hosted by the university is a further essential phase.

The e-shop, which houses the company's whole product line, is a crucial component of the website. Lecturers supply students with a preinstalled open-source e-shop solution, which students must further customize it to meet their requirements. Students are required to maintain their e-shops until the conclusion of the semester and fill them with their items. The central online wholesale e-shop (administered by lecturers) is the source of the goods within the environment of the EIS course. Other students are also imitating their customers by purchasing items that aren't listed in their online stores. Here, they take on the role of private individuals to create some demand for the commodities. Teachers who make purchases from students' e-shops also contribute to the demand. Faculty's virtual bank, which also offers all businesses startup financing, is used to process payments for sales made in e-shops.

Students are obliged to record all of their activities in accounting before the EIS course is over. This part of the EIS course uses an educational version of local accounting software. Developing the company's strategic plan for the coming years is the last assignment within the course. It also includes suggestions for modifications to their company's procedures and outlooks for their virtual enterprises. Students provide instructors comments on the course after the course.

Learning Management System (LMS) Moodle is used by students primarily to access educational content during the course. Our educational organization uses standardly LMS Moodle for e-learning reasons. Additionally, it facilitates simple communication with the course participants. LMS contains the course schedule as well as all assignments. Similarly, instructors supply all of the study resources here. Through LMS Moodle, students may verify if they are meeting the deadlines for the course and also get their assignments graded. Several of the assignments are submitted straight into the LMS by students and assessed by lecturers subsequently.

Students are obliged to digitally communicate with virtual public administration authorities while setting up their virtual enterprises. The virtual registry represents these authorities and students must use electronic communication to interact with them. All procedures and legal documents are updated under the current Slovak legal order. Students must register their enterprises in the Business Register and their upcoming business activities with the Trade Licensing Register. Subsequently, the course participants must register their businesses with the Social Security, Tax, and Health Insurance institutions. All required paperwork is available online, and once completed, they can be sent to the virtual office using the virtual registry.

These documents require a digital signature for authorization. A significant portion of the course is devoted to the topic of digital signatures in electronic communication. Additionally, a brief description of potential usage for digital signatures in various e-government domains is given to the course participants.

Furthermore, topics of encryption, digital communication, and Public Key Infrastructure are shortly introduced to students.

For issuing private certificates for digital signing, the Sectigo certification authority services are used. Adobe Acrobat Reader is subsequently used to sign documents in PDF format. The EIS course's practical application of digital signatures entails signing all required electronic papers and submitting them to the appropriate virtual authorities.

The establishment and administration of an electronic shop, where all the products of virtual enterprises are merchandised, is the primary focus of the EIS course's e-commerce module. All products originate from the primary wholesale e-shop, which is run by lecturers. The products are entirely virtual and are created with no production expenses within the central wholesale store's inventory. Student-run enterprises purchase products for their online shops based on the item categories (computers, office supplies, office furniture, etc.). The item category is chosen by students in early registration of their virtual enterprise. Students should purchase products from the e-shops of other students from two different categories of commodities supplied to mimic demand for their goods and to outfit their company's virtual workspace with furnishings or equipment. Additionally, lecturers increase demand by making sporadic purchases from each student's e-shop.

Students are required to promote their enterprise online as well. The primary marketing tool for their enterprise, a website should be intended to attract visitors to purchase things from the firm's online shop. Customers who are interested in purchasing products from a particular company should visit the website's e-shop section and register there. Following enrollment and login, a traditional online purchasing procedure is employed. After choosing items from multiple groups in the virtual shopping cart, the customer checks out and continues with online payment. In this section of the course, its participants use virtual enterprises to experience both - the selling and purchasing processes on both (customer's and administrator's) sides of the e-shop.

The online payment system of our virtual bank is used to process electronic payments that facilitate the buying and selling procedure in e-shops. This bank is based on the antiquated version of banking software donated to our institution for free. This bank provides virtual loans to students to facilitate the purchasing and selling procedure. When an online payment is made in the e-shop, the buyer is redirected to the bank's internet banking where the payment's parameters (for the purchase) have already been filled in. Digital signatures are supported as an authorization element in the online payment system of virtual banks as well.

Digital signatures are supported as an authorization element in the online payment system of virtual banks as well. A digital signature is also used to enable bank user identification. The main concern in the e-purchasing procedure is the security of the entire payment process. Course participants become familiar with this essential phase of e-commerce through the actual usage of online payments. Technology is advancing to provide safe online payment methods. The subject of users' safe behavior also pertains to the safety and security of their usage. Customers should, at the very least, abide by safety guidelines while making payments online.

The primary concern in the EIS course with online payments was connecting e-shops to essentially separate virtual bank systems so that payment data could be automatically sent from e-shops to banking systems. The course participants are to configure an account number in the e-shop management menu.

3 Materials and Methods

As part of gathering feedback for the Electronic Information Systems course, a survey concerning students' experiences with e-commerce entrepreneurship, electronic communication, and electronic payments was undertaken in the most recent course instance. Both before and after the course ended, a survey was

conducted. Investigated were the students' understanding of and experience with starting and running small trade enterprises, electronic payments, electronic commerce, and digital interaction with public administration. The survey's findings provide pertinent recommendations for enhancing the EIS course's educational process. The survey was conducted online using a web questionnaire and respondents were contacted using a link in the course in the LMS Moodle. Fulfillment of the questionnaire was mandatory for the course participants in order to acquire credit. Therefore, a complete sample (84 students) of participants answered the questionnaire that was recovered in both surveys (pre-course and post-course). All respondents were students of the face-to-face form of study participating in the EIS course in the academic year 2023.

Gathered data were subsequently tested for normality of distribution (Kolmogorov-Smirnov test) and further nonparametric test (Wilcoxon signed-rank test) was used for testing if the difference between pre-test and post-test data was statistically significant. Wilcoxon signed-rank test is a standard statistical test used in the case of testing the differences when data are normally distributed (Weiss, 2012).

The age composition of the respondents' sample was similar to the age composition of all students in a given year of study at our educational institution. However, the majority of respondents were students in age between 18 and 20 years old. The gender composition of the group of respondents shows that over 53 percent of our survey respondents were women. This reflects also the composition of students in our faculty. In Slovakia, the accessibility of broadband internet services is frequently influenced by one's residential region; larger cities tend to have higher coverage. More than one-third of responders are from smaller communities with less than 40,000 residents, where access to broadband internet may be more limited. All relevant demographic data gathered is available and shown in the following table.

Tab. 1: Demographic data on surveys respondents

	Count	Percentage
Age		
18 - 20	69	82.1
21 - 23	13	15.5
23 and over	2	2.4
Total	84	100
Gender		
Male	39	46.4
Female	45	53.6
Total	84	100
Residence		
Large-sized city (over 100,000 citizens)	65	77.4
Medium-sized city (40,000 to 100,000 citizens)	6	7.1
Small town (5,000 to 40,000 citizens)	8	9.5
Village (under 5,000 citizens)	5	6.0
Total	84	100

Source: authors

Respondents in the survey had to express their agreement with the provided statements regarding the process of setting up and managing their small enterprises. The same set of statements was used in both pre-course and post-course surveys to reveal any shifts in their self-reported knowledge, skills, and experience in these entrepreneurship areas. The level of their agreement with the given statement was expressible for respondents on a 5-degree Likert scale with standard levels (i.e. minimum at 1, maximum at 5 with meaning: 1 - strongly disagree, 2 - disagree, 3 - neutral, 4 - agree, 5 - strongly agree).

4 Results

The following table provides a comparison of students' pre-course and post-course levels of agreement with several statements regarding the processes of functioning of a small e-commerce enterprise.

Tab. 2: Pre-course and Post-course self-reported evaluation of experience with selected aspects of entrepreneurship

Survey Statement	Pre - Course		Post - Course		Wilcoxon signed-rank test - 2-tail. sig.
	Mean	Std. dev.	Mean	Std. dev.	
I can establish a small enterprise according to legal requirements	2.31	1.22	3.57	0.97	0.035
I can prepare a business plan for a small enterprise	2.84	1.50	3.98	1.48	0.030
I can use eGovernment services for enterprises	1.99	1.97	3.28	1.65	0.041
I can prepare web presentation for a small enterprise	2.02	0.99	3.53	1.1	0.023
I can manage and administer an e-shop for the e-commerce needs of a small enterprise	2.38	1.29	3.45	0.89	0.037
I can manage the accounting records of a small company	2.57	1.15	3.32	1.03	0.012
I can prepare a strategic plan for a small enterprise	2.19	1.48	3.78	1.22	0.008
I am considering starting my enterprise in the near future	1.95	1.65	3.09	1.44	0.048

Source: authors, Note: N=84, $\alpha=0.05$

There can be considered five ranges for the interpretation of means within the 5-degree Likert scale by dividing the full range from 1.00 to 5.00 by 5 degrees of agreement. This division creates 5 ranges with 0.8 widths, namely: strongly disagree with the statement is the meaning for means within the range from 1.00 to 1.80. Respectively, disagree for means within the range from 1.81 to 2.60, neither disagree nor agree for means within the range from 2.61 to 3.40, agree for means within the range from 3.41 to 4.20, and finally strongly agree for means within the range from 4.21 to 5.00. It is suitable to use mean to demonstrate the difference between two groups of respondents when trying to compare their central inclination on the Likert scale (Liddell & Kruschke, 2018).

The normality of the distribution of gathered data was tested using the Kolmogorov – Smirnov test to choose the proper test for testing the significance of the difference between pre-test and post-test data. The Kolmogorov-Smirnov test's results (test statistic 0.091, $p=0.033$) showed that the data are not normally distributed, therefore nonparametric test was used further (Ghasemi & Zahediasl, 2012).

Wilcoxon signed-rank test is a nonparametric method used to test whether the mean values of two dependent groups differ significantly from each other (Weiss, 2012). In this case, the Wilcoxon signed-rank test was used to detect the differences between pre-course and post-course self-reported levels of agreement with the given statement. The results in Table 2 with significance levels below 0.05 are statistically significant at the level of $\alpha=0.05$, meaning there is a statistically significant change between pre-course and post-course rate of agreement with the particular statement (Weiss, 2012). Hence, our gathered data can be interpreted as follows.

Respondents at the start of the EIS course did not believe to a large extent (mean=2.31, disagree range) that they could set up a small enterprise strictly according to local legislative conditions. After the course completion, their self-reported agreement in this area rose to the level of 3.57 (agree range). According to the Wilcoxon signed rank test, this is a significant (at a level of 0.035 which is below $\alpha=0.05$) increase in their confidence in establishing a small enterprise.

Before the beginning of the EIS course students stated a neutral stance (mean=2.84) when referring to their ability to prepare a business plan for their company. At the end of the course, they reported significantly higher confidence (mean=3.98, agree range) in their ability to prepare such a business plan. The Wilcoxon signed rank test indicated this growth as significant (at a level of 0.03 being less than $\alpha=0.05$).

At the beginning of the EIS course, the participants did not suppose (mean=1.99, disagree range) intensively that they could use eGovernment services for enterprises. Their self-reported agreement in this area increased to 3.28 (neutral range) after the course ended. The Wilcoxon signed rank test shows that their confidence in using eGovernment services for enterprises has increased significantly (at a level of 0.041).

Respondents at the beginning of the EIS course did not assume on average (mean=2.02, disagree range) that they can prepare web presentation for a small enterprise. After the course completion, their self-reported agreement with this statement increased to the level of 3.53 (which is in the agree range). According to the Wilcoxon signed rank test, this was a significant increase (at a level of 0.023).

Before the start of the EIS course, participants did not feel (mean=2.38, disagree range) that they could manage and administer an e-shop for the e-commerce needs of a small enterprise. Their self-reported agreement in this area increased to 3.45 (agree range) after the training in the course ended. The Wilcoxon signed rank test indicates this growth as a significant (at the significance level of 0.037) increase in their confidence in managing a small enterprise's e-shop.

Respondents before the EIS course were not confident in (mean=2.57, disagree range) that manage the accounting records of a small company. At the end of the course, they self-reported agreement on an average of 3.32 (neutral range) being significant (Wilcoxon signed rank at level of 0.012) increase in their confidence in managing the accounting records of a small enterprise.

At the beginning of the EIS course, the participants did not suppose to a large extent (mean=2.19, disagree range) that they could prepare a strategic plan for a small enterprise. Their self-reported agreement in this area improved to 3.78 (agree range) after the course ended. According to the Wilcoxon signed rank test, this is a significant (at a level of 0.008) increase in their self-assurance in preparing a strategic plan for a small enterprise.

Before the start of the EIS course participants did not consider starting their own real-life enterprise in the near future (mean=1.95, disagree range). After the course completion, their self-reported willingness to start their own business increased to the level of 3.09 (neutral range), confirmed by the Wilcoxon signed rank test as being a significant (at a level of 0.048) increase.

Our results show that in all investigated aspects of the functioning of a small enterprise, the course participants increased their self-confidence. This fact suggests that their knowledge, skills, and experience in entrepreneurship have increased during the course attendance. Though in three statements (i.e. I can use eGovernment services for enterprises, I can manage the accounting records of a small company, I am considering starting my enterprise in the near future) students' rate of agreement still did not reach the agree level at least.

At the end of the course, the survey had an additional statement asking respondents if they would recommend the EIS course to other students. The average rate of agreement of course participants with this statement was at 4.02 being in the agree range. This suggests that students appraised the EIS course positively and they would recommend to the other students to choose this non-mandatory course from the educational institution's curricula.

5 Discussion

Educators use virtual enterprises commonly for their educational purposes in the field of entrepreneurship. The design and implementation of the virtual enterprises must be adjusted for the needs of the particular course of educational area. The role of virtual enterprises must be adapted in accord with what knowledge, skills, and practical experience should virtual enterprises develop in each individual course. The success of the educational intervention using virtual enterprise might be investigated in several different ways. In this case, the students' self-reported evaluation in multiple entrepreneurial activities was used.

The obtained results suggest that our approach of virtual enterprise usage for entrepreneurship education purposes positively influences self-reported evaluation in all investigated aspects of the EIS course. This indicates that the use of virtual enterprises can have a positive impact on entrepreneurship education. These outcomes are consistent with the results of multiple other authors (e.g. Butterlin et al., 2014; Blagosklonov et al., 2006; Zhang & Zhang, 2018 and others).

Self-reported attitudes are standardly used to determine the fruitfulness of the educational intervention. However, it cannot describe its effects perfectly. Especially if the student's results are not compared to a control group without educational intervention.

However, the control group could not be formed due to the design of the course and the university curricula. Therefore, it is not possible to express that these increases were caused strictly by educational intervention within the EIS course.

Efforts to isolate the effects of educational intervention from other influences on the increase of self-reported evaluation of students in investigated areas of entrepreneurial activities might be the topics for further enhancement of the research.

Furthermore, our course is dedicated to the electronic commerce area of entrepreneurship with all its specifics. Possibilities of similar design of virtual enterprises implementation into educational processes within other areas of entrepreneurial education can be further investigated.

6 Conclusion

The inclusion of virtual enterprises in entrepreneurial education especially in the e-commerce domain is an innovative way of using modern information and communication technologies in education. The study introduced our approach to the implementation of virtual enterprises into the entrepreneurial university course in the field of e-commerce.

Pre-course and post-course self-reported confidence of the course participants in several e-commerce entrepreneurial aspects were investigated. This examination has indicated its influence, which has positively improved the students' self-reported evaluation of their confidence in all investigated entrepreneurial activities related to e-commerce. This may also contribute to their propensity for entrepreneurship and increase their capacity for self-employability. Students valued our course positively and they expressed their willingness to recommend this course to the other students.

Based on the conducted investigation, which aimed at exploring the contribution of our approach to the use of virtual enterprises in entrepreneurship education, it can be concluded, that this educational approach supports the development of entrepreneurial skills, knowledge, and experience of students in the field of e-commerce. However, the specifics of electronic commerce do not allow easy adaptation of our educational approach to an arbitrary entrepreneurial area.

Literature:

1. Akimov, O., Akimov, O., Karpa, M., Parkhomenko-Kutsevii, O., Kupriichuk, V., Omarov, A.: *Entrepreneurship education of the formation of the e-commerce managers professional qualities*. International Journal of Entrepreneurship, vol. 25, no.7, 2021. p.1-8.
2. Almarzooq, Z. I., Lopes, M., Kochar, A.: *Virtual learning during the COVID-19 pandemic: a disruptive technology in graduate medical education*. Journal of the American College of Cardiology, vol. 75, no.20, 2020. p.2635-2638.
3. Alneyadi, S. S.: *Virtual lab implementation in science literacy: Emirati science teachers' perspectives*. Eurasia Journal of Mathematics, Science and Technology Education, vol. 15, no.12, 2019. em1786.
4. Bakos, Y.: *The Emerging Landscape for Retail E-Commerce*. Journal of Economic Perspectives, vol. 15, no. 1, 2001. p.69-80.
5. Blagosklonov, O., Soto-Romero, G., Guyon, F., Courjal, N., Euphrasie, S., Yahiaoui, R., Butterlin, N.: *Virtual Firm as a Role-Playing Tool for Biomedical Education*. 2006 International Conference of the IEEE Engineering in Medicine and Biology Society, New York, NY, USA, 2006. p. 5451-5452, <https://doi.org/10.1109/IEMBS.2006.259721>.
6. Bokolo, A. Jr, Selwyn, N.: *Examining the adoption of emergency remote teaching and virtual learning during and after COVID-19 pandemic*. International Journal of Educational Management, Vol. 35 No. 6, 2021. pp. 1136-1150. <https://doi.org/10.1108/IJEM-08-2020-0370>.
7. Borgese A.: *Virtual Enterprise: Transforming Entrepreneurship Education*. Journal of Instructional Pedagogies Sep; Vol.,6. 2011. <https://eric.ed.gov/?id=EJ1097037>
8. Butterlin, N., Flores, S., Guyon, F., Blagosklonov, O.: *Virtual firm in biomedical education: A very successful experience*. 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Chicago, IL, USA, 2014. p. 5168-5171, <https://doi.org/10.1109/EMBC.2014.6944789>.
9. Costa, M., Patrício, J., Carranca, J. A., Farropo, B.: *Augmented reality technologies to promote STEM learning*. 2018. <https://doi.org/10.23919/cisti.2018.8399267>.
10. Fabris, C.P., Rathner, J.A., Fong, A.Y., Sevigny, C.P.: *Virtual reality in higher education*. International Journal of Innovation in Science and Mathematics Education, 27(8), 2019. <https://doi.org/10.30722/ijisme.27.08.006>.
11. Gerdin, J., Linton, G.: *Contingency fit(s) in entrepreneurship research: uses and usability*. Örebro University School of Business, 2016. [online]. Available from: <https://www.diva-portal.org/smash/record.jsf?pid=diva2:899746>
12. Ghasemi, A., Zahediasl, S.: *Normality Tests for Statistical Analysis: A Guide for Non-Statisticians*. International Journal of Endocrinology and Metabolism [online]. Dec 1;10(2): 2012. p. 486-9. Available from: <https://doi.org/10.5812/ijem.3505>.
13. Harris, K.: *Education and knowledge: the structured misrepresentation of reality*. Boston: Routledge and Kegan Paul. 1979.
14. Ibáñez, M. B., Delgado-Kloos, C.: *Augmented reality for STEM learning: A systematic review*. Computers & Education, vol. 123, 2018. p. 109-123. <https://doi.org/10.1016/j.compedu.2018.05.002>.
15. Keramitsoglou, K.M., Litseselidis, T, Kardimaki, A.: *Raising effective awareness for circular economy and sustainability concepts through students' involvement in a virtual enterprise*. Frontiers in Sustainability. Vol. 4, February 2023. <https://doi.org/10.3389/frsus.2023.1060860>
16. Laurillard, D.: *E-learning in higher education*. Changing higher education. Routledge, 2005. p. 87-100.
17. Liddell, T., Kruschke, J.: *Analyzing ordinal data with metric models: What could possibly go wrong?* Journal of Experimental Social Psychology, vol.79, 2018. p. 328-348, <https://dx.doi.org/10.1016/j.jesp.2018.08.009>.
18. Shamir-Inbal, T., Blau, I.: *Facilitating emergency remote K-12 teaching in computing-enhanced virtual learning environments during COVID-19 pandemic-blessing or curse?* Journal of Educational Computing Research, vol. 59, no.7, 2021. p.1243-1271.

19. Thiel, P., Masters, B.: *Zero to one: Notes on startups, or how to build the future*. Currency. London, United Kingdom: Ebury Publishing. 2014.
20. Vanevenhoven J., Liguori E.W.: The Impact of Entrepreneurship Education: Introducing the Entrepreneurship Education Project. *Journal of Small Business Management*. Vol. 51, no. 3, 2013. p.315–28. <https://doi.org/10.1111/jsbm.12026>
21. Vasiliadou, R.: *Virtual laboratories during coronavirus (COVID-19) pandemic*. *Biochemistry and Molecular Biology Education*. Vol. 48, no. 5, 2020. p. 482–483. <https://dx.doi.org/10.1002/bmb.21407>.
22. Von Graevenitz G., Harhoff D., Weber R.: *The effects of entrepreneurship education*. *Journal of Economic Behavior and Organization* [online];76(1), 2010. p.90–112. Available from: <https://doi.org/10.1016/j.jebo.2010.02.015>.
23. Weiss, N.A.: *Introductory Statistics*. 9th Edition, Addison-Wesley Pearson Inc., Boston, 2012.
24. Yildiz, M.: *E-government research: Reviewing the literature, limitations, and ways forward*. *Government Information Quarterly* 24, 2007. p. 646–665.
25. Yingjun, G.: *Application of virtual reality teaching method and artificial intelligence technology in digital media art creation*. *Ecological Informatics*. Vol. 63, 2021, p. 101304. <https://doi.org/10.1016/j.ecoinf.2021.101304>.
26. Zhang, P., Zhang, Y.: *Analysis of Virtual Enterprise-based Education Pattern for University Students' Innovative Undertaking*. *Proceedings of the 2018 International Seminar on Education Research and Social Science (ISERSS 2018)* [online]. 2018. Available from: <https://doi.org/10.2991/iserss-18.2018.2>
27. Zhi, K.: *Research on Innovation and Practice of School-enterprise Cooperative Education Model Based on E-commerce*. 2021 International Conference on Education, Information Management and Service Science (EIMSS), Xi'an, China, 2021. pp. 490-494, <https://doi.org/10.1109/EIMSS53851.2021.00111>.

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