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## TRAINING IN DIGITAL ENTREPRENEURSHIP AS A BASIS FOR FORMING THE INTELLECTUAL CAPITAL OF NATION

**Abstract.** Nowadays, digital technologies have a significant impact on how business perceptions change and how new businesses are created. The new technological paradigm harnesses the potential of collaboration and intellectual capital to develop and implement more robust and sustainable entrepreneurial initiatives. However, while a research in digital entrepreneurship is relevant and timely, there is a limited amount of studies on the real impact of digital technology and intellectual capital on entrepreneurship education, although inquiries into digital entrepreneurship theory and practice have drawn more attention in the recent years. Moreover, at the current level of globalization, society, as practice shows (the situation with COVID-19), is not protected from global shocks in the form of chain crises and pandemics. Therefore, digital entrepreneurship is also able to help solve the economic problems caused by the above phenomena. The purpose of the article is to analyse and clarify various aspects of training students of economic specialties in digital entrepreneurship; formulate the tasks that arise while using digital technologies in the economy, and determine the ways to solve them in the education system. Among many forms of digital entrepreneurship training, online courses are one of the strongest trends and they do affect the content and flow of teaching and learning. This article also focuses on better understanding the skills, opportunities, and risks involved in using the online courses as a new way of training entrepreneurship in higher education system. The authors empirically study the problems and drivers for developing such courses as a new pedagogical concept. The results show that such a course is flexible in time and space and can therefore contribute to the accessibility of entrepreneurship education.

**Keywords:** digital economy; intellectual capital; online courses; education innovations; online education and training; aggregator; digitization; entrepreneurship.

## 1. INTRODUCTION

**Problem statement.** In the recent years, the development of technologies such as cloud computing, social media, the Internet of things, the Big Data analysis and robotics have led to the emergence of new methods of cooperation, resource management, product design, and the development of new standards and solutions. This rapid development has profoundly changed the competitive environment, as well as, traditional business strategies, models and processes [1]. Digital technologies have created novel entrepreneurship and digital start-ups that incorporate new technologies as an essential component of their business models and operations. In this sense, digital technologies are the activators of entrepreneurship [2] and come in many forms, such as digital products or services, or digital platforms, etc. [3]. Traditional economy yields to innovative one, and intellectual capital becomes the main source of surplus value. Examples of this transformation are online businesses that can engage with customers and stakeholders through new channels (Netflix), provide multidimensional and personalized services (Uber, Airbnb), use social networks to outsource and promote products (Upwork and Kickstarter) or test the potential of a business idea (Quirky). Moreover, new digital technologies support the creation of new services when a set of agents with diverse goals and motives dynamically interacts to execute business processes (LinkedIn). In an era of global economic competition, the digital-based industry has changed the model, strategy, and value creation of a new business.

Higher education plays an important role in stimulating the growth of innovation and training professionals for digital economy enterprises, that is creating intellectual capital essentially. Distance education technologies and the use of digital educational content contribute to broadening access to education and improving its quality, both for higher and secondary education. However, the higher education system also faces challenges in the direct implementation of digital entrepreneurship education. It is necessary to develop and implement training programs for entrepreneurship education with a greater approximation to the content of digital technologies and digital transformation of the economy: students should be taught comprehensive logic (computational thinking), including both modelling tools and methods of data analysis and information gathering. In addition, the skills associated with the analysis of complex systems will help conduct business in the future immediate entrepreneurial practice.

**Analysis of recent research and publications.** In recent decades, digital technologies across the global community have found widespread use and acceptance at all levels. These digital technologies offer entrepreneurs exciting innovative opportunities [1]. At the same time, digital technology and related entrepreneurship have caused not only economic growth but also competitive turbulence and institutional changes in the higher education system [3]. According to Education International [4], the global education market is \$ 4.5-5.0 trillion, and in the coming years it promises to increase to \$ 6-7 trillion. The share of online education in it is about 3%, or \$ 165 billion. Due to the steady growth dynamics, the digital part of the industry promises to overcome the \$ 240 billion mark by 2023, adding more than 5% per year.

[5] provides a structured literature review of digital entrepreneurship to generate insights into recent developments in the field, critique the research to date, and identify opportunities for future research. Analysis of 133 scholarly articles by discipline, time, methodology, geography and theoretical focus informs that digital entrepreneurship research has been fragmented, divergent and slow to respond to practice. However, the field is now rapidly acquiring legitimacy and an identity, growing rapidly and is becoming more interdisciplinary.

Famous Indonesian scientists [6] argued, that digital transformation in entrepreneurship education is a new approach and an important challenge in education to prepare students in the face of technological change. Currently, building a technology-based entrepreneurship education curriculum is critical, whereby the digitalization process can expand student partnerships and networks with their peers across countries, entrepreneurial educators, and the business communities. In particular, students will use digital tools to learn entrepreneurial skills such as business feasibility and market research as well as designing their own business plans.

The pedagogical methodology, proposed in [7] is based on a design-way of thinking, digital competences and entrepreneurial spirit, together with an experimental culture of creating, and collaborating in order to improve students' innovative, co-creative and collaborative way of thinking and making. The main finding is that the proposed pedagogy enhanced innovative, collaborative and co-creative student competences. Moreover, digital and entrepreneurial skills gave the ability to the students to create new valuable products and services. [8] argues, that the process of digital transformation of education primarily involves the transformation of the learning process and methods, a new level of cooperation with all participants in the educational process to make quick and effective management decisions based on Big Data technologies and expanded opportunities to meet students' educational needs. All these processes require an understanding of the ways of using digital technologies and services, taking into account modern techno-trends and trends in digital technologies.

The digital economy, including digital entrepreneurship, is becoming a priority for Ukraine for socio-economic development in the following 20 years. In today's business environment one of the key issues for any company (whether a traditional industrial company that digitally transforms its own production and management system; or a software development company; or a start-up that is just starting its own business path) is staffing. This issue is especially relevant in the context of the digital economy, when professionals are being challenged by completely new requirements that were previously applied solely to information technology professionals.

**The purpose of the article** is to analyse and clarify various aspects of training students of economic specialties in digital entrepreneurship; formulate the tasks that arise while using digital technologies in the economy, and determine the ways to solve them in the education system in order to improve essential intellectual capital creation.

## 2. METHODS

The conducted research is based on the use of general scientific and theoretical methods: analysis and synthesis of scientific, technical and pedagogical literature on the introduction of digital technologies in the educational sector, development of digital economy and entrepreneurship; systemic, inductive, deductive approaches; interpretation of research results; as well as a hands-on approach.

## 3. FINDINGS

Intellectual capital becomes today the basis for the national wealth formation, a key resource for economic growth and determines the competitiveness of economic systems [9], [14]. According to the World Bank and the United Nations Development Program, today physical capital (accumulated material wealth) makes up no more than 20% of the world welfare, about the same part is formed by natural resources, the rest is human capital, while in most developed countries of the world the latter varies between 70-80% [10], [11]. The global

market of high-tech products and technologies, according to recent estimates, is almost \$ 4 trillion. Today, Ukraine ranks 82nd with an overall share of only 0.2% in this market; at the same time being 17th in the world in knowledge production, 1st in the number of developed utility models and 17th in patents by origin. Unfortunately, there is a tendency to deteriorate our country's position in this ranking: thus, in 2013, the domestic economy was the first in knowledge production, and in 2015, it was already the 14th [12].

According to the Global Competitiveness Index of the World Economic Forum, the top ten are respectively: Singapore (84.8), United States of America (83.7), Hong Kong (83.1), Netherlands (82.4), Switzerland (82.3), Japan (82.3), Germany (81.8), Sweden (81.2), United Kingdom (81.2), Denmark (81.2). Ukraine unfortunately ranks 85th among 141 countries that are listed in the Index [13]. Moreover, according to the Report, one of the indicators of the greatest weight among the aggregate used to calculate the rating is “innovation and development factors”, thus, an analysis of the performance indicators of these economies in this area makes it possible to draw a conclusion on the results of the impact of economic intellectualization on its competitiveness [1]. So, according to the Global Innovation Index, the top ten overall rankings are: Switzerland (Index - 67.24), Sweden (63.65), United States of America (61.73), Netherlands (61.44), United Kingdom (61, 30), Finland (59.83), Denmark (58.44), Singapore (58.37), Germany (58.19), Israel (57.43). Ukraine ranked 47th place out of 128th with a result of 37.40 [12]. Hence, there is an obvious correlation, with some exceptions, of leaders' positions in both ratings, which suggests that the competitiveness of the country's economy is determined by the scientific and technological development and the volume of investments in an intellectual capital [1].

One of the important manifestations of the intellectual capital of an individual entrepreneur is the ability to adapt quickly to the new demands of society in an increasingly proliferating digital economy. The modern world offers a wide range of opportunities for realizing the entrepreneurial potential of a person, moreover, this process is two-sided: on the one hand, the person realizes their intellectual capital, creating an additional value by doing business in the digital environment, on the other – in the process of acquiring knowledge and skills for a new format for doing business – generates and multiplies initial intellectual capital. Digital entrepreneurship is a phenomenon that has emerged from technological assets such as the Internet and ICT [14]. “a sub-category of entrepreneurship that digitizes part or all of what would be physical in a traditional organization” [15]. Moreover, at the current level of globalization, society, as practice shows (the situation with COVID-19), is not protected from global shocks in the form of chain crises and pandemics. According to ILO, almost 25 million jobs could be lost worldwide as a result of COVID-19 [16].

Therefore, digital entrepreneurship is also able to help solve the economic problems caused by the above phenomena. In particular, to help maintain business activity, create new jobs, generate fiscal and financial processes, and more. Sometimes, the transfer of economic activity to the digital plane could become the needed leverage that contributes to at least the minimum preservation of sustainable development.

Let us consider the concepts of a business model and a digital entrepreneurship product. Herewith, we understand a product as an entity (a commodity or a service) that has a value (for example, food, a car, or a medical service), and a business model as a set of processes aimed at creating values and delivering them to consumers.

Historically, there are plenty of common goods and services in the world, all united by the fact that certain resources are needed to produce each copy of such a product. But new kind of products are being created: ones, the cost of manufacturing each copy of which is equal to zero (recorded music, photos, software, and so on). With the development of technology (the emergence of computer networks, cloud technologies, artificial intelligence,

data analysis, etc.), there is a unique opportunity to copy products continuously and for free. This is *a digital product*.

*A digital asset* is something that allows you to produce a product (duplicate a product or provide services) production cost of each subsequent copy of which is zero (for example, your online store through which you sell a nuclear reactor monitoring database that will allow you to build forecasts and make experiments).

*Digital transformation* is the transition from the production of tangible products to the production of digital products, as well as (or) the transition to business models that use digital assets.

*Information industry* is a wider term that defines a broader phenomenon that includes components other than information technology, such as management, logistics, labour organization, and the like.

In the framework of this article, we can define *digital entrepreneurship* as the activity aimed at the production, processing, storage and distribution of digital goods and knowledge.

Accordingly, *digital infrastructure* is a set of digital tools and systems that offer connectivity, collaboration, and computing technology:

- using digital infrastructure is a socio-technical process. A number of key considerations can be drawn from the above definitions to characterize the digital entrepreneurship ecosystem:
- view entrepreneurship as a dynamic process aimed at transforming opportunities into innovative solutions and endeavours;
- take into consideration the expansion of the role of digital technologies, both object and domain, where value proposition is created through product development and organizational transformation;
- assess the impact of digitization on connecting business entities and supporting a new environment for business processes, as well as for the emergence of the digital business community.

In a digital entrepreneurship ecosystem, it may be relevant to distinguish between digital output ecosystems and digital environment. In digital ecosystems, business motivation prevails, and people and groups generally seek to participate in innovative business processes, trying to develop and sell new digital solutions. On the other hand, digital ecosystems can contain a wider range of scenarios and motivations. In fact, digital ecosystems can focus on the development of intellectual capital (such as creating new cancer therapies or developing algorithms to assess the impact of climate change), for which it is easier to anticipate more "intangible" motivations such as the impact of social networks, popularity in the Internet, emotional goals and glory.

Illustrative examples are as follows: the idea management system and virtual collaboration suite, crowdfunding and crowdsourcing platforms, social media tools that gather thoughts and commentary for analysis to get strategic and operational information.

Entrepreneurial agents interact with other entities to increase the potential for success of the business process by maximizing market acceptance, social relevance, technological opportunity and economic sustainability. Such interaction can be described by a series of actions or "flows" performed within digital entrepreneurship (see Table 1).

We offer a course consisting of four disciplines, two modules in each discipline. The course requires no special prerequisites and aims to prepare students for the implementation of their own business ideas. Therefore, the course provides basic knowledge and methods, as well as the means of their implementation, in order to acquire competencies for the creation of your own digital enterprise by the end of the course. In addition, the elements and methods of the course are taught in consequent stages, with a focus on the customer's values, which are

the reason for consuming or buying the products or services and building the global value chains.

Table 1

**The digital entrepreneurship ecosystem and its impact on professional competencies**

<b>Key components of the digital entrepreneurship ecosystem</b>	<b>Components description</b>	<b>Business processes</b>	<b>Digital technologies used</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Conceptualization	Stakeholders form an idea of a digital product, service or solution	Testing business ideas Pitching business ideas	Online discussion boards, fiverr platforms, blogs, forums, social media
Product creation	Development of digital resources or transformable ones	Collaborative design and development, user involvement, expertise, innovation	Virtual prototyping, online contests, digital packages for 3D printers
Decision-making systems	Choosing a solution among various possible alternatives	Valuation of investments, formation of teams, partners involvement	Appropriate machine learning algorithms, decision-making simulators
Networking	Stakeholders strengthen their relationships for business purposes	Partnership development, early client base, networking	Professional social networks and expert communities
Digital Marketing	Promoting a specific solution, alternative, or resource developed by others	Business Marketing, promoting ideas	Recommendations, communication in professional social networks, SEO-optimization
Requests	Access to information or resources owned or generated by others	Fundraising, Asset Development, Strategic Design	Web crawlers and shared software development (PaaS) platforms
Exchange	Stakeholders use publicly available resources	Coordination mechanisms, IT cooperation strategy	Digital Markets and Virtual Communities
Offer	Stakeholders provide advice and expertise	Strategic consulting, expertise, knowledge dissemination	Recommendation systems and online compliance tools support collective intelligence
Transfer of goods and services	Transfer of information or money	E-commerce, product / service distribution, digital trade	Online platforms, cross-border transactions

An important step in the learning process is to create their own business model. To do this, students learn what a digital economy business model is, how they are classified, and how to create one. Table 2 provides an overview of the core modules of the Digital Entrepreneurship online course. The first stage begins with a review of the terminology of digital content and essentials in processing latter, the basics of digital business models and digital economy. The second step explains why USP (Unique Point of Sale) is important, how customer value is determined, how value chains are created in the new economy, and what

useful methods and tools could be used to develop your own business model. As a result, in the third stage a business model is developed, using Uber, Tesla, Netflix etc. as an example. If desired, the task could be switched as to create business models for the domestic start-ups and links to possible solutions are provided.

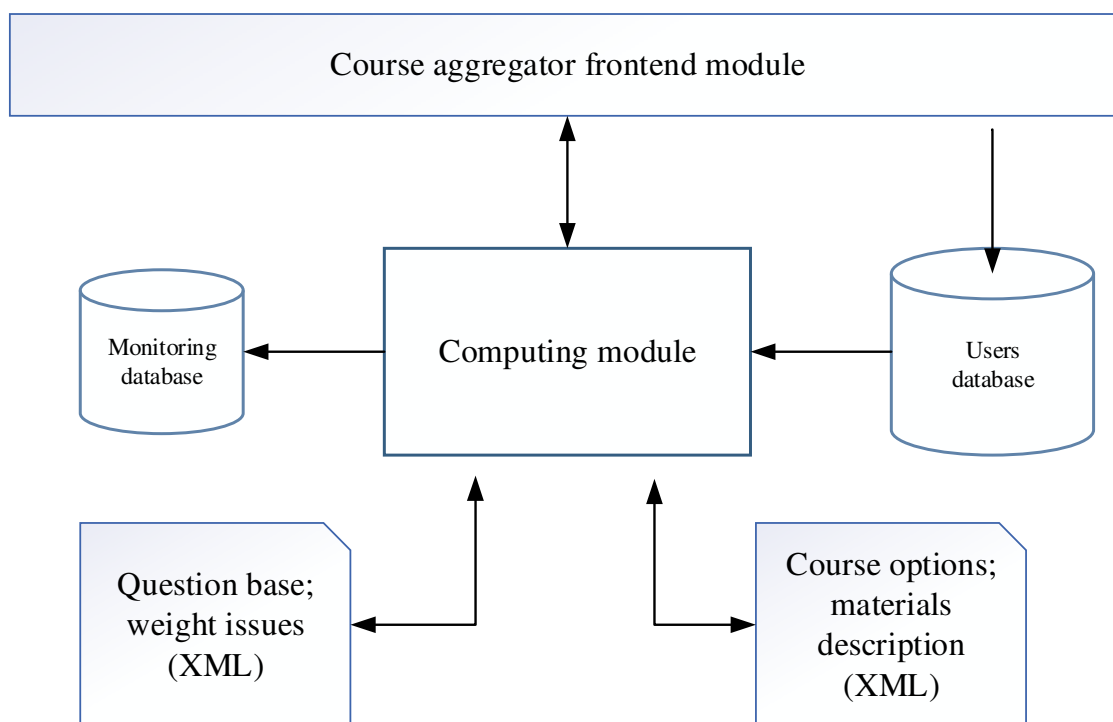
To emphasize the practicality of this concept, the real experience of start-up founders is explored upon completion. In the fourth stage, students create their own projects and report on the experience gained from the project work and analyse the shortcomings of the developed business model and suggest ways to successfully advance it. As a result of the Digital Entrepreneurship course, participants gain knowledge of useful methods for digital entrepreneurship projects and can develop a business model for their own start-up idea.

*Table 2.*

**Digital Entrepreneurship course core modules**

<b>Modules</b>	<b>Topics</b>	<b>Skills</b>
<b>1</b>	<b>2</b>	<b>3</b>
1. Digital entrepreneurship business processes, templates and diagrams	1. Digital business model development methods	<ul style="list-style-type: none"> <li>– professional online profiles creation;</li> <li>– browsing, searching and filtering data, information and digital content;</li> <li>– copyright;</li> <li>– programming;</li> <li>– entrepreneurship patterns</li> </ul>
	2. Learning the basic patterns of digital entrepreneurship	
2. Consumer value	1. Defining customer value	<ul style="list-style-type: none"> <li>– digital marketing;</li> <li>– digital data exchange;</li> <li>– digital collaboration;</li> <li>– Internet of Things;</li> <li>– global value chains</li> </ul>
	2. Introducing digital entrepreneurship	
3. Business model generation	1. Developing a business model for a given start-up	<ul style="list-style-type: none"> <li>– solving the technical problems;</li> <li>– determination of needs and technological recall;</li> <li>– creative use of digital technologies</li> </ul>
	2. Comparative analysis of business models	
4. Create your own project	1. Defining the purpose and limitations of the project	- starting your own business
	2. Pitch	
	3. Online survey	

Upon completion of the course, students automatically take the online survey and receive a certificate in case of scoring at least 75% of true answers. To facilitate the online course, it is necessary to create a specialized site – an aggregator. An aggregator is a web application or a website that integrates data from multiple sources into one with a mere user-friendly interface. The aggregator architecture includes an interface and a computing module combined with various xml files, including both assessment information and course content. The architecture is represented in Fig. 1.



*Figure 1. Digital Entrepreneurship Course Aggregator Architecture*

The frontend module is used both for student evaluation and for displaying the assessment results. It also provides links to the University Cloud-Oriented Platform [17] where this course is hosted. XML files allow teachers to dynamically modify the assessment tools, the weights of standard survey questions according to the suggestions that students can provide. Finally, the aggregator includes a monitoring service that collects course usage statistics and feedback services, so that students can present pitches of their own projects and submit possible suggestions.

The aggregator can be used not only in Digital Entrepreneurship training but also in ancillary training courses, for example: Cybersecurity and Digital Design.

To determine the parameters of the course on digital entrepreneurship, an empirical study was conducted by interviewing number of students (sample is random, 678 respondents of Kyiv National Economic University).

The questionnaire used for this purpose included the following questions:

- How important are e-learning resources for you when studying the disciplines? (43.3% - very important, 36.8% - apparently important, 15.4% - difficult to answer, 3.2% - apparently not important, 1.3% - not important at all);
- Are student learning materials usually available and of open access? (32% - completely agree, 37.4% - apparently agree, 16.4% - difficult to answer, 10.8% - apparently disagree, 3.4% - strongly disagree);
- How do you estimate the amount of educational material that must be mastered within the course of digital entrepreneurship (31.6% - quite large, 43.4% - apparently large, 23.4% - medium, 1.5% - apparently small, 0.1% - quite small).

It is worth noting, that 19 out of 30 students majoring in Systems Analysis fully agreed to regularly use the online course on digital entrepreneurship. Respondents also agreed that it is possible to adapt the online course to the individual pace of learning. The main problems of this course are the lack of self-discipline compared to lectures with mandatory university



attendance, and the problem of teaching (the need for special equipment and infrastructure for video recording and course support), focusing on a small area of content.

#### 4. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

Digital technologies change the way we do business or start a new one. Universities are launching new initiatives to implement novel forms of academic entrepreneurship. Digital technologies are ubiquitous and offer open and flexible opportunities for convergence and creativity. These technologies are announcing new forms of organization and new business models. Digital technologies mean that academic enterprises can use standardized tools to support academic business processes within the company, and as a result more and more data and processes move outward. Researchers and academics can now reach out to a wide audience to open up new opportunities and enhance their ideas.

Online courses are changing the way people use and share digital knowledge, creating new opportunities for learning and developing skills in market-relevant areas, such as innovation management and entrepreneurship. They are predefined for a large audience, and can be considered as an appropriate tool for teaching entrepreneurship courses, as they can enhance personal entrepreneurial attitudes, improve skills in working within the digital world.

Thanks to their simplicity, scalability, flexibility and economic benefits, online courses can provide a large heterogeneous audience with convenient business education tools. Nevertheless, unlike the study of traditional subjects, entrepreneurial training is best spread through the practical process, although the available pedagogy in this aspect is scarce. Therefore, further research is needed to develop methods for improving the cognitive skills, maintaining regularity of classes, and reducing the number of failures during training. Given the large number of economics students whose demand needs to be met, it is important to develop meaningful and cost-effective processes for evaluating such courses, introduce new meta-training to effectively master the course, and bring training to practice as close as possible.

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*The material was received by the editorial board on 20.04.2020*

## НАВЧАННЯ ЦИФРОВОГО ПІДПРИЄМНИЦТВА ЯК ОСНОВА ФОРМУВАННЯ ІНТЕЛЕКТУАЛЬНОГО КАПІТАЛУ НАЦІЇ

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**Анотація.** У наш час цифрові технології суттєво впливають на зміну уявлень про підприємницьку діяльність та створення нових підприємств. Нова технологічна парадигма використовує потенціал співпраці та інтелектуального капіталу для розробки та впровадження більш надійних і стійких підприємницьких ініціатив. Однак, хоча дослідження аспектів цифрового підприємництва є актуальним та своєчасним, існує обмежена кількість наукових досліджень про реальний вплив цифрових технологій та інтелектуального капіталу на процес підприємницької освіти, хоча дослідження теорії та практики цифрового підприємництва привертає все більшу увагу вчених в останні роки. До того ж, за сучасного рівня глобалізації, суспільство, як показує практика (ситуація з COVID-19), не захищене від світових потрясінь у вигляді ланцюгових криз та пандемій. Тому цифрове підприємництво здатне допомогти у вирішенні економічних проблем, спричинених вищезгаданими явищами. Метою статті є аналіз та уточнення різних аспектів навчання студентів економічних спеціальностей цифровому підприємництву, формулювання задач (проблем), які виникають під час використання цифрових технологій в економіці, та окреслення шляхів їх вирішення в системі освіти. Серед багатьох форм навчання цифровому підприємництву саме онлайн курси є однією з найсильніших тенденцій, які впливають на зміст навчання. Дану статтю також присвячено кращому розумінню необхідних навичок, можливостей та ризиків, що виникають унаслідок використання онлайн курсів як нового способу навчання підприємництву у вищих навчальних закладах. Автори емпірично досліджують проблеми та налаштовують драйвери для розробки таких курсів як нової педагогічної концепції. Результати показують, що подібний курс є гнучким у часі та просторі і тому може сприяти доступності підприємницької освіти.

**Ключові слова:** цифрова економіка; інтелектуальний капітал; онлайн курси; інновації в освіті; онлайн освіта; агрегатор; цифровізація; підприємництво.

## ОБУЧЕНИЕ ЦИФРОВОМУ ПРЕДПРИНИМАТЕЛЬСТВУ КАК ОСНОВА ФОРМИРОВАНИЯ ИНТЕЛЛЕКТУАЛЬНОГО КАПИТАЛА НАЦИИ

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**Аннотация.** В наше время цифровые технологии существенно влияют на то, как меняется представление о предпринимательской деятельности и как создаются новые предприятия. Новая технологическая парадигма использует потенциал сотрудничества и интеллектуального капитала для разработки и внедрения более надежных и устойчивых предпринимательских инициатив. Однако, хотя исследования аспектов цифрового предпринимательства являются актуальными и своевременными, существует не так много научных исследований относительно реального влияния цифровых технологий и интеллектуального капитала на процесс предпринимательского образования, хотя исследования теории и практики цифрового предпринимательства привлекли большое внимание ученых в последние годы. К тому же, при современном уровне глобализации, общество, как показывает практика (ситуация с COVID-19), не защищено от мировых потрясений в виде цепных кризисов и пандемий. Поэтому цифровое предпринимательство также способно помочь в решении экономических проблем, вызванных вышеуказанными явлениями. Целью статьи является анализ и уточнение различных аспектов обучения студентов экономических специальностей цифровому предпринимательству, формулировке задач (проблем), которые возникают при использовании цифровых технологий в экономике, и определение путей их решения в системе образования. Среди многих форм обучения цифровому предпринимательству именно онлайн-курсы являются одной из самых сильных тенденций и влияют на содержание обучения. Данная статья также посвящена улучшению понимания необходимых навыков, возможностей и рисков, возникающих вследствие использования онлайн-курсов как нового способа обучения предпринимательству в высших учебных заведениях. Авторы эмпирически изучают проблемы и драйверы для разработки таких курсов как новой педагогической концепции. Результаты показывают, что подобный курс является гибким во времени и пространстве и поэтому способствует доступности предпринимательского образования.

**Ключевые слова:** цифровая экономика; интеллектуальный капитал; онлайн-курсы; инновации в образовании; онлайн-образование; агрегатор; цифровизация; предпринимательство.

