

**DEVELOPMENT OF TEACHERS' DIGITAL COMPETENCIES ON THE BASIS OF  
INNOPOLIS UNIVERSITY**

**DESENVOLVIMENTO DAS COMPETÊNCIAS DIGITAIS DOS PROFESSORES COM  
BASE NA UNIVERSIDADE INNOPOLIS**

**DESARROLLO DE LAS COMPETENCIAS DIGITALES DE LOS PROFESORES  
BASADO EN LA UNIVERSIDAD DE INNOPOLIS**

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**ABSTRACT:** The article explores approaches to the development of teachers' digital competencies within the professional development programs at "Innopolis University" and the possibilities of their application in the educational process at economic universities. The aim of the classes at the "Innopolis University" is to study modern digital technologies and the opportunities for their incorporation in the learning process within the disciplines taught. As a result of the training, the authors develop methodological materials employed in the educational process of improving the quality of training of specialists in the field of trade.

**KEYWORDS:** Digital technologies. Digital competencies. Innopolis University. Online learning. Trade.

**RESUMO:** O artigo explora abordagens para o desenvolvimento de competências digitais de professores dentro dos programas de desenvolvimento profissional na "Universidade Innopolis" e as possibilidades de sua aplicação no processo educacional em universidades econômicas. O objetivo das aulas na "Universidade Innopolis" é estudar as tecnologias digitais modernas e as oportunidades para sua incorporação no processo de aprendizagem dentro das disciplinas ministradas. Como resultado da formação, os autores desenvolvem materiais metodológicos empregados no processo educacional para melhorar a qualidade da formação de especialistas na área de comércio.

**PALAVRAS-CHAVE:** Tecnologias digitais. Competências digitais. Universidade Innopolis. Aprendizado online. Comércio.

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**RESUMEN:** El artículo explora enfoques para el desarrollo de competencias digitales docentes dentro de los programas de desarrollo profesional de la “Universidad Innopolis” y las posibilidades de su aplicación en el proceso educativo en las universidades económicas. El objetivo de las clases en la “Universidad Innopolis” es estudiar las tecnologías digitales modernas y las oportunidades para su incorporación en el proceso de aprendizaje dentro de las disciplinas impartidas. Como resultado de la capacitación, los autores desarrollan materiales metodológicos empleados en el proceso educativo para mejorar la calidad de la formación de especialistas en el campo del comercio.

**PALABRAS CLAVE:** Tecnologías digitales. Competencias digitales. Universidad Innopolis. Aprendizaje en línea. Comercio.

## Introduction

The COVID-19 pandemic has brought about significant changes in education, strengthening the role of online education and accelerating the ongoing digital transformation. This has led to the increasing role of digital information and communication technologies in education and the need to improve the skills of participants in the educational process.

“Innopolis University” is positioned as a supporting educational and unified methodological center within the Federal Project “Human Resources for the Digital Economy” of the Russian Federation. The goal of the project (professional development program) is to create, test, and scale the model for providing priority sectors of the Russian Federation with highly qualified personnel demanded in the digital economy.

One of the tasks is to improve the qualifications of the teaching staff and methodological staff of educational organizations in terms of mastering the competencies relevant in the priority sectors of the economy. The framework of the supporting educational center for teachers involves the implementation of the professional development program “Digital technologies in teaching core disciplines”, and the work of the unified methodological center for teachers involves the professional development program “Practice-oriented approaches in teaching core IT disciplines”.

The rapid development and popularization of “end-to-end” digital technologies, which include big data technologies, neurotechnologies and artificial intelligence, and distributed registry technologies, leads to the need for additional knowledge and development of relevant work skills among students and teachers. The tasks of digital transformation of economic processes are the formation and analysis of big data based on a deep study of customer experience, the creation of “digital twins” of complex technical products, organizations, and

consumers, and the formation of “digital ecosystems” uniting suppliers and consumers of goods and services.

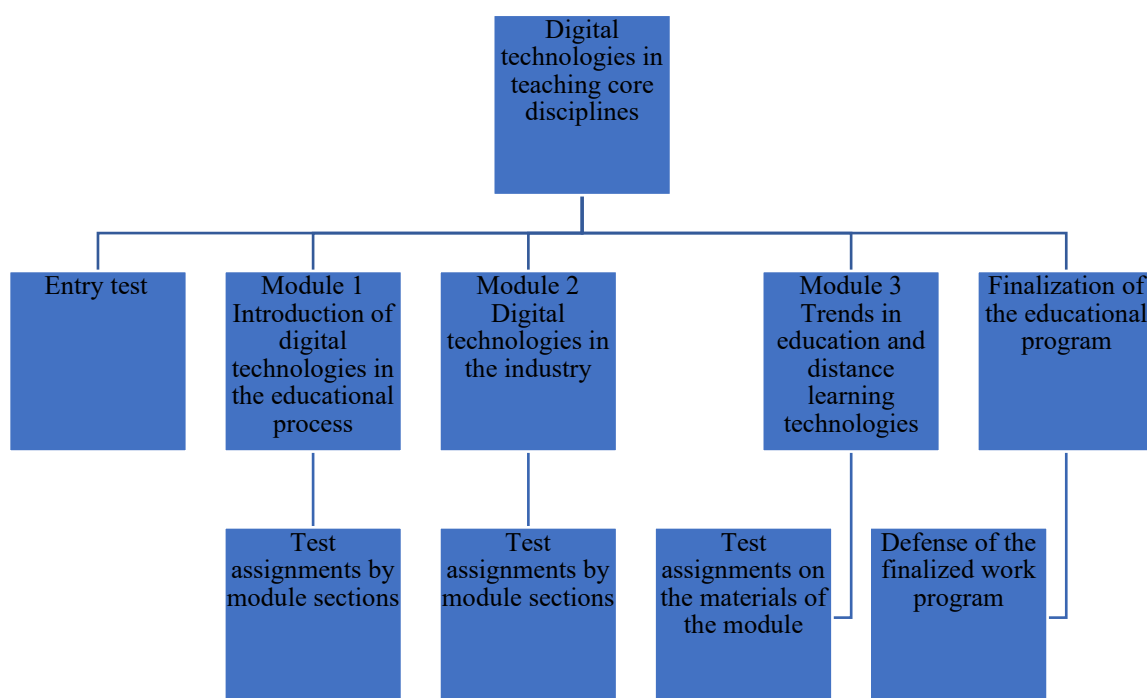
Professional development programs of Innopolis University are relevant since they focus on solving such problems as bridging the gap between the requirements of employers and the results of education and reducing the shortage of personnel in the labor market in the field of information technology.

## Methods

The structure of training in the professional development programs in "Innopolis University" for teachers comprises an entrance test to determine the level of training in information and communication technologies, the study of the sections of Module 1 titled “Introduction of digital technologies in the educational process,” the study of several sections within the specialized (industry) modules, independent work of students in selected areas with a discussion of the results of work on webinars with the moderators.

After studying the materials of each module, the students are tested. The structure of training within the framework of the professional development program is presented in Figure 1.

**Figure 1** – Structure of the professional development program for teachers  
Source: compiled by the authors



Source: Devised by the authors

Module 1 introduces the digital economy, introducing the goals, objectives, and intended outcomes of the National Program “Workforce for the Digital Economy”.

The first module examines the possibilities of digital technologies and digital services, as well as such issues as:

- describing the modern world as a VUCA world (volatility, uncertainty, complexity, ambiguity);
- a career navigator for IT professions;
- digital ethics;
- risks involved in work with data;
- information security for users;
- information hygiene for users of modern information services.

Module 2 involves studying such topics as:

- “Applied Artificial Intelligence” (introduction to applied artificial intelligence, natural language processing, computer vision, speech and sound processing, machine learning and its infrastructure), webinars reviewing examples of the use of artificial intelligence technologies in various industries;
- “Software Quality” (motivation and methodology for software quality management, quality perspectives and models, complete overview of methods: from inspection to demonstration, coverage in general, coverage through structured testing, functional testing, and boundary value analysis);
- “Managing Development Teams (Agile Methods)” (current development trends and processes, Agile manifesto and evolution, the dark side of Agile, functional and non-functional requirements, an overview of the Scrum framework, how to build a practical course, webinars). The topic involved a webinar on blockchain technology.

In Module 3, the teachers work individually in webinars with moderators to incorporate the materials they had learned about modern digital technologies into the working programs of the academic disciplines taught. After that, the teachers defend the updated working programs of academic disciplines during webinars.

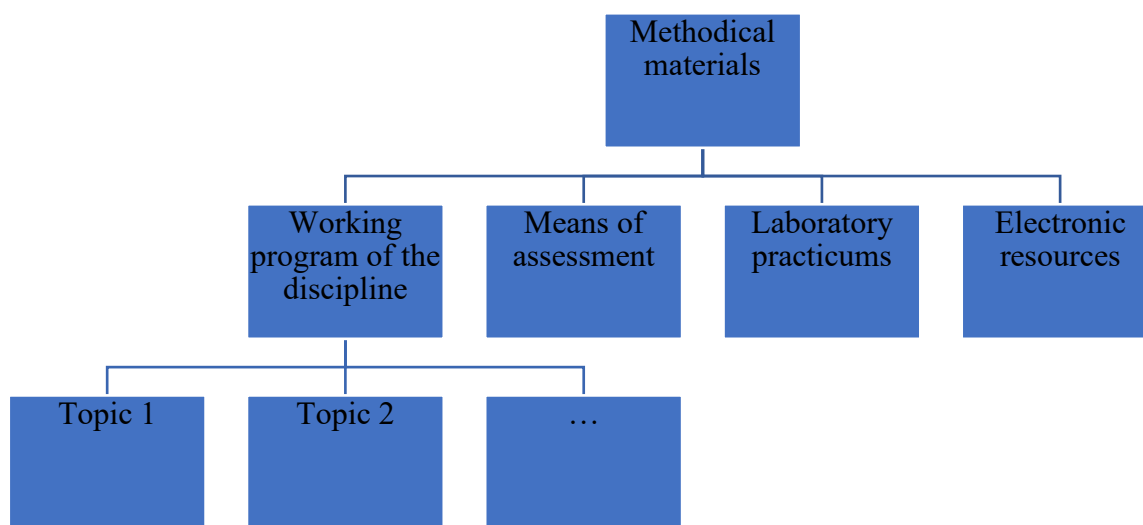
## **Results**

One of the results of the authors' work is a renewal of the methodological materials for the academic discipline “Information Technologies in Professional Activity” in the direction

of training “Trade Business” (“Commerce” and “Digital Technologies in Trade and Logistics” profiles). Methodological materials include the working program of the discipline, assessment tools, laboratory practicums, and methodological guidelines for laboratory and practical assignments.

The structure of methodical materials for the discipline is provided in Figure 2.

**Figure 2** – Structure of methodical materials for the discipline “Information Technology in Professional Activity”



Source: Compiled by the authors

The goal of the discipline “Information Technology in Professional Activity” lies in exploring the capabilities of modern information systems for the automation of trade enterprises that are designed to meet the challenges of management and accounting in such enterprises, as well as in developing practical skills of working with information systems designed to automate business processes of trade organizations.

The topics of the working program of the discipline “Information Technology in Professional Activity” are presented in Table 1.

**Table 1** – Discipline topics

Nº	Topic
1	Information technologies in commercial activities
2	Using the functionality of the application solution “IC: Trade Management 8” in trade enterprise management
3	Internet technologies in trade
4	Computer technologies for project management in commerce
5	Computer technologies for business visualization in commerce

Source: Devised by the authors

Table 2 contains the list of information systems, software products, and online services used in the Educational process as part of the discipline “Information Technology in Professional Activity” in the “Trade Business” direction of training.

**Table 2** – Computer technology in the educational process

№	Title	Purpose
1	“1C: Trade Management”	Automation of business processes of trade enterprises
2	“1C: Accounting”	Automatization of accounting
3	SPARK (spark-interfax.ru), Kontur Focus	Counterparty verification
4	Microsoft Visio, Figma, Canva	Process visualization, creating facility plans, organizational charts
5	Microsoft Project, ganttpro.com	Project management
6	WIX, InSales, 1C-Bitrix	Online store

Source: Devised by the authors

Table 3 presents the topics of the discipline and new educational material included in the work program of the discipline “Information Technology in Professional Activity” in the direction of training “Trade Business” after refinement and webinar discussions.

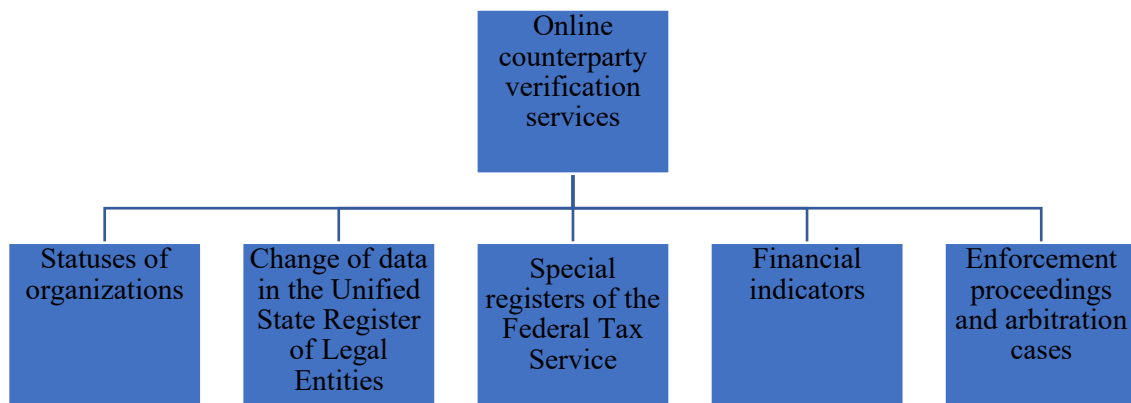
**Table 3** – Educational material for updating the thematic plan

№	Topic	Material to supplement the thematic plan
1	Information technologies in commercial activities	Capabilities of “end-to-end” digital technologies (distributed registry technologies, machine learning, “big data”, virtual reality) and their use in commerce
2	Using the functionality of the application solution “1C: Trade Management 8” in trade enterprise management	Analysis of the state of the trading enterprise using "big data". Using SPARK-Risky service in 1C software products for checking counterparties. SPARK indices (Due Diligence Index, Payment Discipline Index, Financial Risk Index, composite index).
3	Internet technologies in trade	Work with "big data" on the example of information-analytical systems SPARK and Kontur.Focus: analysis of the financial status of counterparties, express risk analysis, comparative analysis of companies, the construction and export of reports.
5	Computer technologies for business visualization in commerce	Virtual/Augmented/Mixed Reality technology capabilities and their use in trade

Source: Devised by the authors

One example of digital transformation in commerce is the increased use of online services for counterparty verification, such as SPARK by Interfax (spark-interfax.ru), Kontur.Focus (https://focus.kontur.ru), Integrum (www.integrum.ru), and others. Online services for counterparty verification are an example of the implementation of intelligent digital technologies and a tool for working with “big data” in the economy. An example of the use of “big data” in online counterparty verification services is shown in Figure 3.

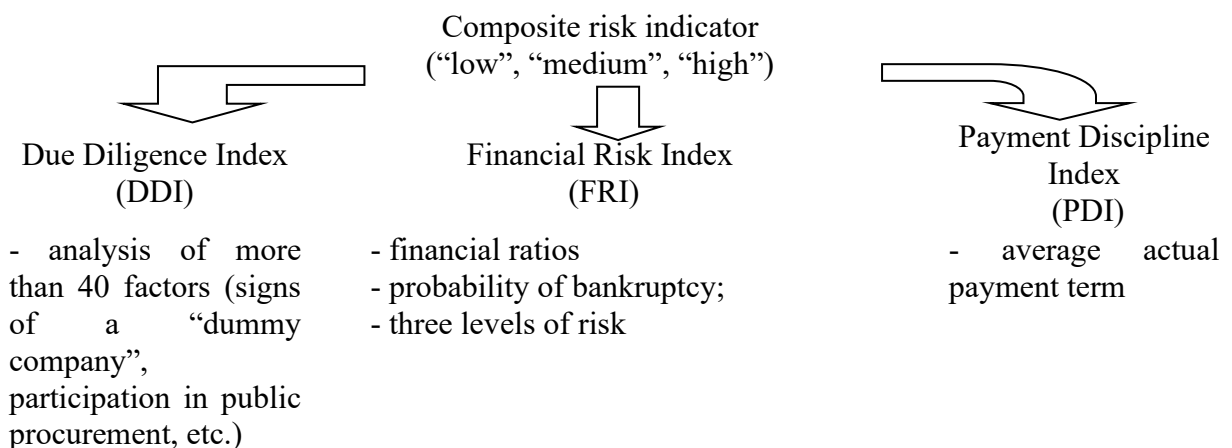
**Figure 3 – Capabilities of online counterparty verification services**



Source: compiled by the authors

A special feature of the SPARK information and analytical system is the use of specially developed indicators (indices) to verify and evaluate counterparties: the Due Diligence Index (DDI), the Payment Discipline Index (PDI), and the Financial Risk Index (FRI) (EIDLINA, 2016). The problems for which the indices are used are shown in Figure 4.

**Figure 4 – SPARK indices**



Source: Eidlina (2020)

The listed indices are composite indicators formed on the basis of “big data” analysis with the use of machine learning algorithms. They help to reduce the level of uncertainty in the process of working with counterparties.

As a result of the training program at “Innopolis University”, we supplemented the teaching materials for the discipline with practical exercises on working with information-analytical systems SPARK and Kontur.Focus. The use of teaching materials on working with SPARK and Kontur.Focus information-analytical systems in the learning process allows students to get acquainted with modern intelligent digital technologies and develop digital competencies.

Another example of digital transformation in commerce is the emergence of the concept of “smart store,” which uses modern digital technology (RFID tags, virtual and augmented reality technologies).

## Discussion

The professional development program "Digital technologies in teaching core disciplines" of Innopolis University is a flexible and structured approach to the study of modern digital technologies. Training within the first module allows students to systematize basic knowledge in the field of digital technology. The disadvantages of the lecture teaching materials of the first module are the insufficient number of references to information sources.

What can be indicated as a shortcoming of the professional development program as a whole is insufficient coverage of the sectors of the economy, in particular, the sphere of services and the sphere of trade. Modern trade is one of the sources of economic development and the processes of digital transformation in the sphere of trade have recently occupied an important place in scientific research. Many scientific publications are devoted to the issues of improving the activities of trade enterprises through digital transformation, some of them are listed below.

The impact of the COVID-19 pandemic on consumer behavior is studied using “big data” in (BRANDTNER *et al.*, 2021). Various aspects of the use of big data in merchants are analyzed in (DEKIMPE, 2019; EL-KASSAR; SINGH, 2019; VENKY, 2019), (TRABUCCHI; BUGANZA, 2019; WAMBA *et al.*, 2019; AVERSA *et al.*, 2021).

The use of online advertising based on consumer behavior data is explored in (LEE; CHO, 2019; AIOLFI *et al.*, 2021). The impact of “big data” on marketing research is



examined in (JOHNSON *et al.*, 2019; VERMEER *et al.*, 2019). An analysis of consumer behavior in social media is conducted in (PANTANO *et al.*, 2019).

The impact of digital platforms on retail process transformation is analyzed in (HÄNNINEN *et al.*, 2017; REINARTZ *et al.*, 2019; BÖTTCHER *et al.*, 2021a; SEMENOVA, 2020). The use of gamification in mobile applications to attract customers is considered in (DE CANIO *et al.*, 2021).

One of the notable trends in the development of digital technology in commerce is the increased use of virtual/augmented reality technology. The use of virtual and augmented reality technologies in retailing is considered in (BOLETISIS; KARAHASANOVIC, 2020). Castillo S.M.J. and Bigne, E. (2021) analyze the adaptation of self-service models using augmented reality technologies. A comparative analysis of customer behavior in physical retail outlets and in stores using virtual reality technologies is presented in (PIZZI, 2019). The features of digital models in commerce are analyzed in (BÖTTCHER *et al.*, 2021b).

Rapid changes in the field of commerce, largely as a result of changes in information technology, demand corresponding changes in education and training in this subject area. The processes of improving the methodological materials for the discipline “Information Technologies in Professional Activity” should reflect current trends in the development of trade and information technology, in particular, the digitalization of business processes of trading companies and the increased use of end-to-end digital technologies. This requires expanding the cooperation of universities with leading IT companies and getting the opportunity to use modern information systems and online resources in the educational process.

## Conclusion

The analysis of approaches to the development of digital competencies of teachers in the professional development programs at “Innopolis University” and the results of training allow us to draw the following conclusions:

The content of the professional development program “Digital technologies in teaching core disciplines” reflects current trends in education and is focused on teaching modern digital technologies to many teachers. At the same time, it is advisable to incorporate in Module 2 the study of digital technology considering the specifics of the industry and make the educational material of the sections of the second module more practice oriented. It is also possible to offer two levels of training for teachers: basic and advanced.

Regarding the field of commerce, the employers, trading companies, formulate requirements for specialists regarding the level of knowledge of specialized digital technology and the level of computer literacy in general. Therefore, the training of specialists in the field of commerce, which is one of the leaders among the industries in terms of implementing digital innovations, requires regular improvement of the content of educational and methodological materials. We believe that in the process of training specialists in the field of trade, it is necessary to pay considerable attention to IC software products and services, which hold a leading position in the Russian market of corporate automation systems, as well as to study the Internet services for trade offered by Google and Yandex, to expand the study of tools for analysis of “big data” sources in trade, and to study the examples of the use of “big data” by trade companies.

### Future Research

The popularization of mobile devices and Internet applications inspires the conclusion that methodological materials for the academic discipline should be adapted for mobile devices. In addition to standard tests, it is necessary to develop tasks to test students' knowledge using a game approach (gamification).

An important area for further improvement of methodological materials for training specialists in the field of trade is the use of virtual and augmented reality (VR/AR) technologies in the educational process.

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