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PROSPECTS FOR THE USE OF CHATBOTS IN THE FORMATION OF ECONOMIC COMPETENCE OF FUTURE TECHNOLOGY TEACHERS

Abstract

The article addresses the methodology of using chatbots in the formation of the economic competence of future technology teachers while studying the discipline 'Fundamentals of Production (Economics and Organisation of Production)'.

It is proven that chatbots are a powerful tool that facilitates the integration of the latest technologies into the educational process, creating conditions for a

personalised approach, supporting students' independent work and providing immediate feedback. The use of chatbots in studying production economics allows students not only to become familiar with theoretical concepts such as production capacity, production costs and the organisation of production processes, but also to apply the acquired knowledge in practice.

Chatbots can be used to organise learning modules, conduct testing, simulate economic situations and carry out final assessment tasks. This enables students to interact actively with the material, promotes the development of analytical and critical skills and also provides opportunities for a deeper understanding of economic terms and principles.

The article also emphasises the importance of using chatbots as tools for independent learning, where students are provided with additional resources, self-assessment tasks and personalised recommendations.

Particular attention is paid to the use of chatbots for simulating economic processes, which gives students the opportunity to make managerial decisions, assess the efficiency of production processes and optimise costs. Such simulations allow students not only to become acquainted with the economic aspects of production in theory, but also to apply their knowledge in real-life conditions. Chatbots also monitor students' progress, giving teachers the opportunity to adjust the educational process in a timely manner and provide students with individual recommendations.

In addition, the article demonstrates the potential of chatbots as an effective tool for developing the economic competence of future technology teachers and provides specific methodological recommendations for their use in creating flexible and adaptive learning environments.

Keywords: chatbots, economic competence, future technology teachers, interactive learning.

Problem Statement. In the context of contemporary educational challenges, particularly during the period of global digitalisation, the educational process is undergoing significant changes. One of the most promising areas is the integration of the latest information technologies, particularly chatbots, which are capable of substantially transforming traditional approaches to teaching and creating new opportunities for achieving high educational outcomes. Modern education requires not only academic knowledge but also the ability to adapt to rapid changes in the technological environment, which requires educators to develop certain competencies. One such important competency is economic competency, which plays a key role in the training of future teachers of technology and is an important component of the professional preparation of future educators, as it enables them to manage resources effectively, understand economic processes in the field of technology and optimise educational processes [4].

In this regard, the use of chatbots for developing students' economic competency is extremely promising. Due to their interactivity and accessibility, chatbots can significantly improve the educational process by providing students with immediate access to resources, tests, assignments and consultations at any time, regardless of their location. They make it possible to create personalised learning pathways by adapting content to the individual needs of each student. This is especially important in the context of training future teachers of technology, as their ability to independently acquire economic knowledge is a necessary condition for the development of critical thinking and preparation for the real challenges of professional activity [1].

The use of chatbots makes it possible to explain complex economic concepts in an interactive format, monitor students' progress and provide feedback. In particular, chatbots can be used to organise thematic online lectures, create economic games, conduct interactive tests and simulate real economic situations, all of which contribute to a deeper understanding of the material. In

addition, chatbots can effectively serve as a support tool for students' independent work by enabling them to quickly find the necessary materials, request additional information and receive guidance.

Of particular interest is the possibility of using chatbots in distance learning, which is especially relevant in the context of global pandemics and other force majeure situations. Chatbots can become a powerful tool for ensuring continuity of learning by supporting students and teachers at all stages of the educational process. They provide integration of various learning materials, which makes education more accessible and flexible [7].

Taking all this into account, the prospects for using chatbots in the training of future teachers of technology are extremely promising. These technologies not only improve the quality of education but also foster the development of new teaching methods that meet the demands of the modern world, where the pace of change and innovation has become an integral part of the educational process.

The issue of integrating modern information technologies into the educational process is highly relevant in the context of the rapid development of digital technologies, particularly artificial intelligence (AI). With each passing year, technologies are becoming increasingly accessible and powerful, opening up new opportunities for education and allowing traditional approaches to teaching to be transformed. This issue is being actively studied by many scholars, particularly in Ukraine, where researchers are working intensively on the implementation of the latest technologies in the field of education [6].

In particular, Hrytsyshyn and Habruseva (2020), in their work 'Artificial Intelligence Today and Tomorrow', focus on the fundamental and applied problems of modern technologies, particularly artificial intelligence, which plays a significant role in the development of educational processes. They emphasise that AI makes it possible to automate many teaching functions, improve the personalised approach to students and create more flexible forms of learning

oriented towards learners' individual needs. This helps increase the effectiveness of education, particularly in distance learning [3].

Vlasenko's research (2023) also addresses the importance of using pedagogical technologies in continuing education, with particular emphasis on the role of technology in improving the quality of learning. Vlasenko notes that technologies such as chatbots can significantly facilitate interaction between teachers and students by providing quick access to learning materials, as well as enabling the automation of assessment and feedback processes [2].

Another important topic is the use of chatbots in education, which is being actively explored by scholars and practitioners. According to Peven, Khmil and Makohonchuk (2023), chatbots integrated with CRM systems can transform traditional models of learning by providing not only automated process management but also support for the personalised learning of each student. This makes it possible to create a more effective, convenient and flexible model of learning in which students can receive help and support in real time.

Another significant aspect is the influence of artificial intelligence on the transformation of traditional teaching methods. In his article, Sharov (2023) notes that the development of AI makes it possible to create new teaching methods, particularly through intelligent systems that adapt to students' level of knowledge. Such systems not only ensure the individualisation of the educational process but can also help identify students' weak points and provide them with additional learning resources [9].

The study 'Chatbot & CRM System: What Can They Do Together?' (CRMium, 2023) also emphasises that chatbots integrated with CRM systems have considerable potential for use in educational institutions by automating routine tasks and improving communication between learners and teachers. This contributes to increasing the efficiency of the educational process and makes it possible to use new technologies to create personalised learning pathways [8].

In addition, considerable attention is being paid to the changes that chatbots bring to education, particularly in the context of 'Education for Zoomers' (Osvita FP, 2025). This study examines how chatbots are transforming traditional approaches to teaching and making learning more adaptive and interactive, which is especially important for the new generation of students who prefer using digital tools [5].

Thus, scholarly research demonstrates the enormous potential of using artificial intelligence, chatbots and CRM systems in education. They can significantly improve the effectiveness of learning, make it more personalised and accessible, and adapt the educational process to the requirements of the modern information environment. This makes it possible to create more effective learning models that meet students' needs and improve the quality of education as a whole.

The aim of the article is to examine the possibility of integrating chatbots into the formation of the economic competence of future teachers of technology while studying the discipline 'Fundamentals of Production (Economics and Organisation of Production)'.

Modern chatbots are increasingly viewed as a tool not only for automating communication but also for providing adaptive, personalised learning. They are capable of ensuring immediate access to learning materials, automatically assessing students' responses, collecting analytical data on progress, and proposing individual learning pathways. In the context of developing the economic competence of future teachers of technology, which includes the ability to analyse economic processes, make well-grounded decisions and apply economic knowledge in practical activity, the choice of a platform for creating chatbots has not only a technical but also a pedagogical dimension.

No-code solutions enable teachers to create educational chatbots quickly. One such platform is Chatfuel, which, through its block-based interface, makes it possible to design dialogues for test-based surveys and thematic micro-courses. At

the same time, the limited interaction logic makes it less suitable for creating complex adaptive scenarios. Similar in its operating principle is ManyChat, which supports multichannel communication, automated messages and integration with various web resources, but it also has limitations when it comes to building deep logical structures.

To implement intelligent chatbots that use Natural Language Processing (NLP), it is advisable to use platforms with more advanced capabilities. Dialogflow (Google) provides powerful NLP mechanisms that make it possible to analyse users' responses and create adaptive educational pathways. Such mechanisms can be used to model economic dialogues, build simulations of economic situations, and so on. Similar capabilities are offered by IBM Watson Assistant, which has an advanced set of tools for analysing message context, integrating with business systems and constructing complex dialogue logic. Watson Assistant, in particular, makes it possible to carry out semantic analysis of students' responses and adapt further tasks according to previous results. This makes the platform valuable for building adaptive learning environments with a high level of personalisation.

Other professional-level solutions include Microsoft Bot Framework and Rasa. Microsoft Bot Framework integrates with corporate educational environments, particularly Microsoft Teams, which makes it possible to organise chatbots as part of the educational process in university LMSs. Rasa is an open framework with flexible configuration capabilities: it allows complex dialogues to be created on the basis of machine learning and integrated with external data. However, the use of these solutions requires a high level of technical competence and development skills.

Among the platforms oriented towards the universal business and educational segment, Tidio and Landbot should also be highlighted. Tidio makes it possible to create chatbots quickly for websites and social media, and it can be

used to implement basic educational scenarios by providing students with answers to frequently asked questions, access to economic reference materials or explanations. Landbot offers a more visual bot builder, which allows more complex scenarios to be developed through a drag-and-drop interface, including conditional transitions and logical blocks. This makes Landbot more suitable for creating interactive educational dialogues, particularly for organising case study classes in economics, simulating business decisions and similar activities.

Another tool worth mentioning is Botsify, which supports integration with various educational services and provides an opportunity to create bots for the automatic administration of tests, surveys and the collection of statistical data on students' responses. In this context, Botsify can be used to organise differentiated assessment of knowledge in economic topics, which contributes to the development of students' competence in the independent analysis and generalisation of economic information.

A separate category is represented by specialised educational platforms such as Moodle Bot, a chatbot for the Moodle LMS, which extends the standard functionality of the learning platform through interactive assistants. It can automatically inform students about learning tasks, deadlines and test results, as well as generate thematic questions from economics modules. The integration of such a chatbot directly into the learning platform helps increase the convenience of access to educational content and strengthen students' motivation to study economic disciplines.

When evaluating the above-mentioned platforms from the perspective of pedagogical requirements, it should be noted that the choice of a particular tool should be determined not only by its technical characteristics but also by its ability to ensure interactivity, adaptability and analytical support within the educational process. The level of implementation complexity, the possibility of LMS integration, language processing mechanisms, and the availability of functions for

analysing students' academic performance are key evaluation criteria. Thus, simple no-code solutions may be effective for organising basic educational services, whereas platforms with NLP and the possibility of deep personalisation open up prospects for developing a high level of economic competence through adaptive learning and the analysis of individual educational pathways.

The development of the economic competence of future teachers of technology is an important stage of their training, as it allows them to develop the ability to analyse economic processes, manage costs and make well-grounded decisions regarding resources and the organisation of production. Chatbots can significantly improve this process by ensuring an interactive and personalised approach to learning, automating routine tasks and giving students an opportunity to receive feedback quickly. In this context, they become an effective tool for developing economic knowledge and skills.

The use of chatbots makes it possible to create a clear structure for the educational process. Students can gain access to theoretical materials, additional sources and test tasks through a chatbot, which ensures their interactive engagement in the learning process.

After each lecture or class, the chatbot can offer a brief summary of the main concepts, for example 'production capacity', 'business economics' and 'production planning', followed by knowledge testing. Students are able to check themselves through questions based on the lecture material, while the chatbot provides feedback on the correctness of their answers, explaining each answer option.

The chatbot can also direct students to additional materials or exercises aimed at deeper mastery of the topic. This may be useful for students' independent work, as they will be able to turn to the chatbot for assistance at any time.

Cost analysis is one of the important components of the discipline 'Fundamentals of Production'. Chatbots can be used to create realistic simulations

in which students must calculate the production cost of goods under changing parameters, such as changes in the cost of raw materials or changes in labour.

After students have familiarised themselves with the theoretical material, the chatbot offers them a simulation. For example, students are given a task concerning a change in the cost of raw materials at an enterprise and must calculate how this will affect the production cost of goods. The chatbot automatically checks the calculations and explains why this affects the final costs in one way or another.

This not only allows students to apply the theoretical knowledge they have acquired in real conditions, but also contributes to the development of analytical abilities, since they are required to think like managers and make economically well-grounded decisions.

Another important part of learning is the evaluation of the efficiency of production processes. Chatbots can be used to simulate real production situations in which a student chooses the optimal strategy for organising production or reducing costs. For example, the chatbot may offer the student a choice between several options: purchasing new equipment or optimising existing production processes.

After the student chooses one of the options, the chatbot provides feedback, explaining which option is the most economically justified and why. This task allows students to see the consequences of their decisions and gain experience in resource management.

Chatbots can also be used to support students' independent work. After each class, they may be offered additional tasks or questions for self-assessment. The chatbot provides recommendations, for example, on how to improve cost calculations or which tools to use to evaluate the efficiency of production processes. This allows students to deepen their knowledge independently by working with additional materials provided by the bot.

An important part of such independent work is the opportunity to receive immediate feedback from the chatbot, which allows the student to correct mistakes and improve their knowledge in real time, without having to wait for assessment from the teacher.

The chatbot can be used to conduct final assessments that make it possible to evaluate the level of knowledge acquired by students at the final stages of learning. The tests may include theoretical questions, cost calculation tasks and practical assignments related to the optimisation of production processes.

After completing the test, the chatbot provides students with feedback, offering a detailed explanation of each correct and incorrect answer. This helps them understand their mistakes and correct them while receiving recommendations for further improvement of their knowledge.

Thanks to the possibility of automatic monitoring of results, the chatbot can regularly provide students with feedback on their progress. For example, if a student has difficulties with a particular topic, the chatbot can recommend additional materials or exercises to improve knowledge in that area.

In addition, the bot can monitor students' performance in real time and offer individual recommendations for improving results

Conclusions. The use of chatbots in the educational process makes it possible to significantly increase the effectiveness of developing the economic competence of future teachers of technology. Chatbots provide an interactive approach to learning, support students in the independent study of material, automate testing and provide feedback, all of which contribute to a deeper understanding of economic principles and practical skills. They also make it possible to adapt learning to the needs of each student, which makes the educational process more flexible and personalised.

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