



## **USE OF A CHATBOT IN AUTOMATED INFORMATION SYSTEM FOR PROCESS MANAGEMENT IN EDUCATION**

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**ABSTRACT:** *This scientific paper presents a role-based aspect of chatbots in the educational field, covering certain of their advantages and disadvantages. Future trends in their development are presented. The use and implementation of chatbots in an automated information system for process management in the educational field is discussed.*

**KEY WORDS:** *Chatbot, Automated Information System, Education, Python, Django.*

### **1. Introduction**

With the development of technology, automation has widely penetrated into various fields of human activity. Process automation in education increases the efficiency of educational institutions in terms of retaining the interest of learners, contributes to reducing the administrative burden on educators and facilitates the management of administrative processes. With the development of cognitive machines or so-called "Artificial Intelligence" (AI) and automation, chatbots are finding widespread application in an increasing number of different fields, including education. A chatbot is a software system that allows people to interact with technology using various input methods, such as voice, text, gestures and touch, 24 hours a day, 7 days a week, 365 days a year [3]. The use of chatbots in the educational process leads to improved communication between all participants, helps to automate administrative processes and tasks, provides support to the entire educational process using interactive approaches. Chatbots can play an important role in the field of education as they represent a mechanism with a high degree of interactivity compared to traditional e-learning systems. These are considered as safe and accessible tools that can lead to positive learning outcomes [4].

## **2. Types of chatbots in education.**

Chatbots in education use "artificial intelligence" and natural language processing to engage with learners, teachers or administrative staff. Their main purpose is to improve teaching approaches, streamline tasks, and provide personalized support. These intelligent assistants are able to answer queries, provide immediate feedback, suggest learning resources and guide the learner through the educational content. Such solutions lead to effective learning and administrative control [8]. There are different types of chatbots. Widely used chatbots are:

- rule-based. These chatbots are designed to follow a specific set of rules and provide predefined answers to specific questions or commands;
- based on keyword recognition. They recognize specific keywords or combinations of keywords from content in a user's query and provide an appropriate response based on those keywords;
- for machine learning. They use machine learning (ML) techniques to understand user input and provide feedback on questions and queries. They can learn from past interactions and adapt their responses accordingly;
- hybrid model. This type of chatbot is a combination of automation and live agent, leveraging strengths to provide a more flexible solution for handling routine user service tasks;
- voice-activated. They are designed to interact with users through voice commands and Natural Language Processing (NLP), making them well suited for voice-activated virtual assistants [7].

For implementation in an automated information system for process management in the educational field, a hybrid model and a chatbot based on machine learning would be suitable. The hybrid chatbot model for more complex queries that require human intervention can direct the user to an administrator or tutor. This model combines the speed of automation and the precision of live communication. A chatbot using machine learning can be trained on a large dataset of questions and needs from learners, parents, and educators.

It should be noted that a chatbot with keyword recognition can also be used for simpler tasks, such as answering frequently asked questions. If the system also includes voice activation, then learners and parents would have easier access via voice commands, which would be particularly useful for people with typing difficulties or who have difficulty with new technologies.

## **3. Advantages and disadvantages of using chatbots in the educational field.**

Chatbots in the educational field can play different roles and be useful in the educational process. Their applications are presented in Fig. 1

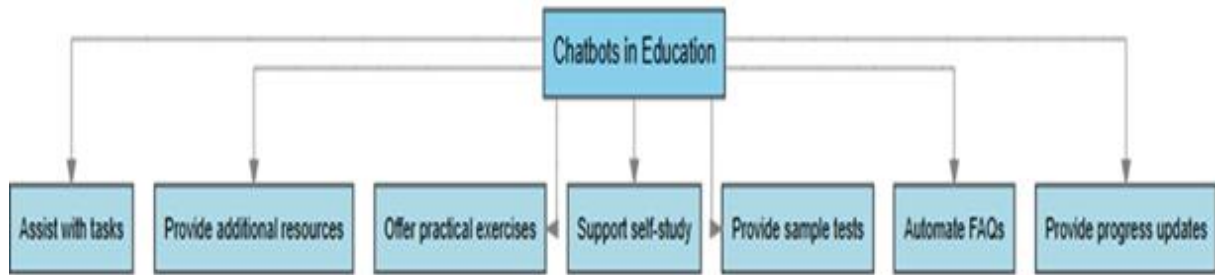


Fig. 1. Layout of chatbots in education.

### 3.1. Advantages of using chatbots in the educational field.

The use of chatbots in the educational field has a number of applications and advantages. These include:

- working 168 hours a week - Chatbots offer constant access to information, allowing learners and parents to get answers to their questions at any time. This makes education more accessible and facilitates communication between participants in the educational process [1];
- personalized learning - Chatbots can adapt to the needs of each learner, providing individual guidance and exercises. By analyzing data about the learner's progress, they can personalize the educational process, which increases the effectiveness of learning;
- increase motivation - The use of interactive elements such as chatbots stimulates learning in learners [2]. They offer instant feedback and can be programmed to motivate learners through various praises and expressions of support;
- save time and resources - By automating routine tasks such as answering frequently asked questions and managing enrolments, chatbots reduce the administrative workload of staff and streamline processes in educational institutions.

### 3.2. Disadvantages of using chatbots in the educational field.

Chatbots in the educational field offer a number of advantages, but there are also some disadvantages that should be considered when implementing them:

- lack of "emotional intelligence" - Chatbots, no matter how sophisticated they are, have difficulty recognizing and responding to the emotional needs of learners. They cannot offer emotional support in cases of stress, anxiety or psychological problems that often arise in trainees [4];
- difficulty answering more complex and unstructured questions - When questions require abstract thinking or contextual understanding, chatbots

may provide incorrect or inadequate answers, which can create confusion for learners [6];

- increased risk associated with data privacy - With the increasing collection of personal data from learners, information security becomes an important issue. To ensure confidentiality and protection of personal information, educational institutions need to provide security measures, but this process is complex and requires significant resources [5];
- need for maintenance and updates - To work effectively, chatbots require regular maintenance and updates. This requires time and technical resources, which can be an issue for educational institutions with limited budgets;
- potential risk of creating dependency - The frequent use of chatbots could lead to learners becoming dependent on these technologies to obtain quick answers and solutions rather than developing independent thinking and analysis skills. This could reduce their ability to tackle problems independently and negatively impact their critical thinking development.

### 3.3. Future Trends in the Use of Chatbots in Education

With the advancement of "artificial intelligence" and natural language processing, chatbots are expected to become increasingly sophisticated. Fig. 2 presents the development trends of chatbots in the educational field:

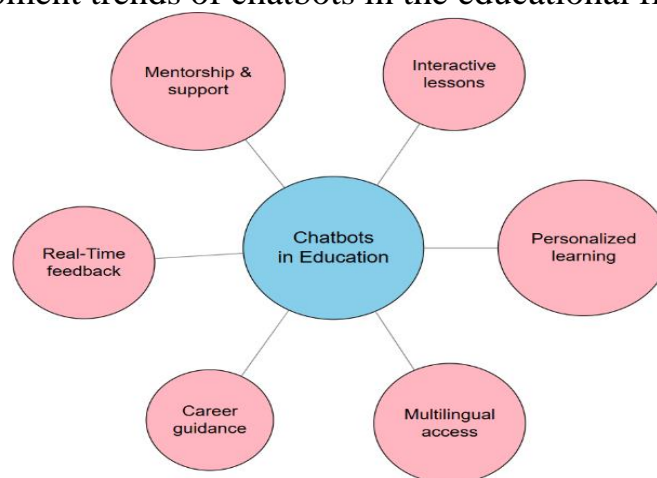


Fig. 2 Trends in the use of chatbots in education.

### 4. Appropriate technologies for building an automated information system for process management in the educational field with an integrated chatbot

The process of creating an automated information system for process management in the educational field is not the subject of the current research. The focus will be on the integration of a chatbot into such a system.

The considered model of an automated information system for process management in the educational field is implemented using the Python scripting

programming language and the Django working framework. The same is aptly used for the construction and implementation of a chatbot in the system. In the educational domain, for automation, personalization and security purposes, the Python language and the Django working framework provide a robust and flexible platform for chatbot solutions. These technologies offer multiple benefits:

- Python's easy syntax and readability - Python is characterized by its intuitive and easy-to-read syntax, which makes chatbot development easier and faster, even for less experienced developers. This helps reduce development and maintenance time, allowing developers to quickly adapt and maintain code over the long term;
- variety of AI and NLP libraries - Python has libraries such as NLTK and spaCy for text processing and conversation context understanding, TensorFlow and PyTorch for more complex algorithms and machine learning models [11];
- security and stability of the Django Web framework - Django is a popular working framework for Web applications, known for its stability and security. It comes with built-in protections against common vulnerabilities such as XSS and CSRF attacks [10], which is especially important for chatbots that may have access to sensitive information;
- Representational State Transfer API (RESTful API) support with Django REST Framework - Django REST Framework (DRF) makes it easy to create a RESTful API, which is necessary if a chatbot needs to be connected to other platforms and applications;
- easy maintenance and scalability - Django is a working framework suitable for projects that may evolve over time and require the use of more resources. It allows scalability for both small and large applications, which is especially important when creating a chatbot with the prospect of expanding and adding new features.

Using the Python language and the Django working framework to create chatbots also has several drawbacks that can affect its performance and functionality compared to other technologies specifically designed for chatbot solutions:

- lower speed and performance - Python is not as fast as some other programming languages such as C++ or Java, especially for tasks requiring intensive real-time data processing. Django is also not the most efficient for applications that require real-time processing;
- limited chatbot feature support - unlike dedicated chatbot platforms like Rasa or Botpress, Django does not have built-in features for natural language processing or for easily creating conversational AI models. Additional integration with NLP libraries is required to achieve response intelligence and personalization;

- limited mobility and scaling complexity - Django requires special settings and additional infrastructure to scale the application effectively, which can be labor-intensive to implement for a chatbot serving a large number of users. Some developers prefer microservices architectures, which are easier to manage in a cloud environment and offer better workload management.

After analyzing the above advantages and disadvantages, it can be said that Python and Django are a good choice for creating a chatbot when the focus is on ease of development and security, but for large-scale, interactive and responsive chatbot solutions, additional optimization or even the use of specialized chatbot tools may be required. However, for integrating a chatbot into an automated educational process management system developed using Python and Django, using the same technology for chatbot development is a good and appropriate solution. Using the same technology would improve the system as a whole as the same developers can be used who will have a broader view and better knowledge of the needs of the educational institution. Fig. 3 shows the structure of an automated information system for process management in education with an embedded chatbot:

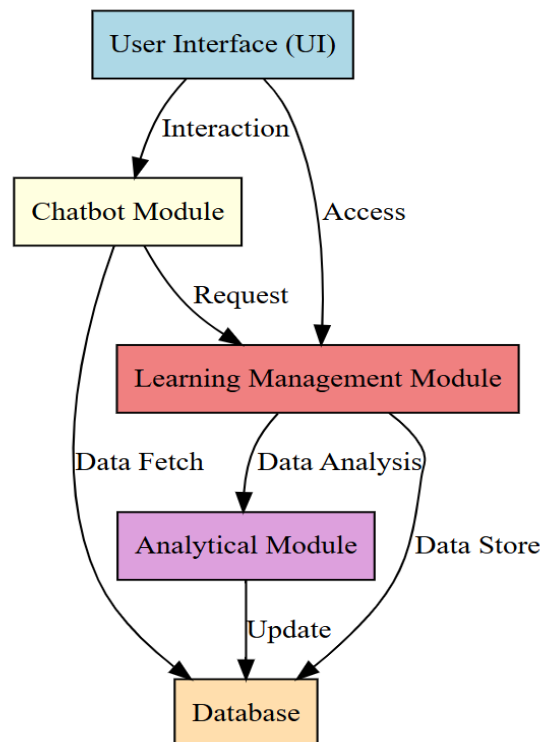


Fig. 3 Model of automated information system for process management in the educational field with built-in chatbot.

The figure above represents the interactions between the different components of the automated chatbot information system. It helps to understand the basic functions and information flows in the system, which is important for the design, development and maintenance of such systems.

The User Interface component is the interface through which learners, teachers and parents interact with the system. The Chatbot module component allows users to ask questions and receive information in real time. The LMS module is the main platform for managing educational materials, assessments and interaction between learners and teachers. The database stores all the information that is required for the functioning of the system. Analytical module analyzes the data to provide the required information to the users.

The relationships between the components of the automated information system with the chatbot and the management of the educational process can be described as follows:

- Interaction: The relationship between the UI and the Chatbot indicates that users interact with the chatbot through the interface. Users can ask questions and get information in real time;
- Access: Users can access the LMS through the UI, i.e., the main function of the interface is to provide access to learning materials and resources;
- Request: The Chatbot can send requests to the LMS to get information or resources;
- Data Fetch: The Chatbot also performs data fetching from the database to provide information to users; Data Store: the LMS saves information to the database;
- Data Analysis: The LMS and the analytics module interact to analyze the collected data;
- Update: The analytics module updates the database with the results of the analyses, which provides updated information about the system.

This structure is suitable for an automated information management system for educational processes with an added chatbot as it combines convenience, efficiency, information analysis and automation. This makes it a powerful tool for improving the educational process and simplifying administrative activities, which is key to the success of modern educational institutions.

## **5. Conclusion**

In conclusion, we can say that with the development of technology, the need for an automated information system for process management in the educational field is growing, and the integration of a chatbot to it would improve communication between the participants in the educational process and facilitate the work with the automated system by students, parents and teachers.

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