Применение чат-ботов при обучении иностранному языку как важное условие повышения качества иноязычной подготовки будущих специалистов в области информатизации образования

Проблема и цель. Подготовка специалистов по информатизации образования предполагает формирование не только компетенций по разработке программных средств и автоматизированных систем, но и развитие иноязычной коммуникативной компетенции. Формирование соответствующих качеств в условиях высшего образования осложняется рядом проблем различного характера. Авторы предлагают для совершенствования иноязычной подготовки будущих специалистов организовать проектную деятельность по созданию диалоговых программ (учебных ботов).

Методы исследования. Конструирование чат-бота происходит в рамках командной работы и иноязычной коммуникации. Проводится авторское тестирование, включающее проверку знаний по синтаксису, лексике и грамматике, умениям профессионально-ориентированного общения и digital-навыков. Экспериментальное исследование выполнено в Вятском государственном университете при изучении курсов «Иностранный язык», «Разработка и применение компьютерных игр в обучении». К иноязычной коммуникации при поддержке автоматизированных систем привлечены 43 студента первого-второго курсов по направлению 44.03.01 Педагогическое образование (уровень подготовки – магистратура). Средний возраст респондентов составил 25 лет (90% девушек и 10% юношей). При конструировании чат-ботов используется ресурс BorisBot. Для установления статистически достоверных различий применяется критерий Фишера.

Результаты. Студенты изучают сервисы для создания чат-ботов, дидактический потенциал и функциональные возможности полученных диалоговых программ. Обучающиеся экспериментальной группы применяют их для решения проблем профессионально-ориентированной, иноязычной, коммуникации. Выявлены статистически достоверные различия в произошедших изменениях ($\phi_{эмп} = 2,514; p < 0,05$).

Заключение. Описаны особенности представленного варианта применения чат ботов в обучении иностранному языку: работа в команде, использование шаблонов и сценариев, выбор тем проектов. Сформулированы проблемные вопросы, ответы на которые позволяют определить направления работы по конструированию чат ботов: обсуждение цели разработки и дидактической цели, применение блоков и действий, моделирование сценариев иноязычного взаимодействия и т.п.

Ключевые слова: иноязычная коммуникативная компетентность, профессионально-ориентированное общение, digital-навыки, диалоговая программа, конструирование, BorisBot

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The problem and the aim of the study. Training of specialists in informatization of education involves formation of competences in development of software tools and automated systems and development of the foreign language communicative competence. Formation of appropriate qualities in the conditions of higher education is complicated by a number of problems. The authors propose to organize project activities to create dialogue programs (training bots) to improve foreign language training of future specialists.

Research methods. The construction of a chat bot takes place during teamwork and foreign language communication. The authors’ testing is carried out, which includes checking knowledge of syntax, vocabulary and grammar, skills of professionally oriented communication and digital skills. The experimental study was carried out at Vyatka State University during the study of the discipline "Foreign Language", "Development and Use of Computer Games in Education". 43 first- and second-year students of the training program 44.03.01 Pedagogical education (Master’s degree programme) were involved in foreign language communication with the support of automated systems. The average age of the respondents was 25 (90% female and 10% male). When constructing chat bots, the BorisBot resource is used. Fisher’s test was used to find out statistically significant differences.

Results. The students studied services for creating chat bots, the didactic potential and functionality of the dialogue programs. The students of the experimental group used them to do professionally oriented and foreign language communication tasks. Statistically significant differences were revealed in the changes $\varphi_{\text{Crit}}=1.64<\varphi_{\text{Em}}=2.514$.

Conclusion. The features of the presented version of using chat bots when teaching a foreign language are described: teamwork, using templates and scripts, choosing project topics. The problematic questions are formulated, the answers to which make it possible to determine the directions of work on designing chat bots: discussing the development goal and didactic goal, modeling scenarios of foreign language interaction, etc.

Keywords: foreign language communicative competence, professionally oriented communication, digital skills, dialogue program, design, BorisBot

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The UNESCO Recommendations on the ethical aspects of artificial intelligence are a set of principles for developing and using appropriate systems aimed at maximizing benefits they provide to society and reducing the risks associated with such technologies [1]. These principles largely coincide with the provisions of the National Strategy for the Development of Artificial Intelligence for the Period until 2030, adopted in Russia in 2019 [2].

Such systems, according to the indicated international recommendations, include chat bots. On the basis of experimental data S. Sands et al. prove that the result of automating the process of working with clients is that the latter more actively turn to companies services through a chat bot or robotic support on the site [3]. Y. Saadna, A. Boudhir, M. Ben Ahmed conduct an alternative study to analyze the frequency of students' using social media messengers for educational purposes [4]. According to the conclusions of both scientific groups, representatives of the modern generation prefer these methods of contact for obtaining advice, choosing a service, and organizing professionally oriented communication.

In general, interaction between a person and a chat bot should be aimed at implementing the goals that the UN identified as priorities for sustainable development [5]: development of linguistic diversity, support for a healthy lifestyle, quality education, gender equality, access to modern sources of energy, rational models of consumption and production, etc. Achieving all these goals requires interaction of participants to have skills of foreign language communication, intercultural communication, and digital skills. R. Barac et al. argue that work on formation of appropriate skills must begin at preschool age and continue at all stages of education [6], including at university. N. Yemez, K. Dikilitaş conclude that the learning model in the modern multicultural world should involve formation of a creative personality that will be capable of independent creative searching for solving professional problems, using cyber-physical systems at various stages of professional communication [7].

The level of scientific and technological achievements of recent years allows teachers to use not only social networks, video resources, interactive capabilities of Web 2.0 services, http://learningapps.org, but also new online technologies in teaching foreign languages [8]. Moreover, it is proposed to develop own mobile applications, video blogs [9]. A. S. Budnikova, O. S. Babenkova note that chat bots can radically change the nature of human interaction with the digital world: from reading and writing to listening and speaking. The authors point out that chat bots can be considered as "ideal partners" for learning languages, allowing learning several languages anywhere, anytime and at own pace [10].

At the same time, there are certain methodological difficulties: which chat bot to use when teaching a foreign language, how to organize effective educational and cognitive interaction in the automated environment, how to keep the interest of students. B. S. Goryachkin and ed. note that the danger of the novelty effect and the rapid loss of interest in learning a language is one of the main didactic problems of digitalization of education [11]. In the case of chat bots, for example, a celebrity-voiced conversational agent can be used as an aid.

So, there is an objective need for additional study of development and use of chat bots to enhance information interaction between participants in the didactic process in the modern educational environment. The relevance of the proposed idea
of improving foreign language training of future informatization specialists is also due to the fact that the orientation of higher education transformation processes involves formation of a new management model. This model should take into account globalization processes, both in the foreign economic activity and in the technological aspect of digitalization of society.

The research hypothesis is that the use of chat bots in the classroom will provide additional conditions for development of the foreign language communicative competence of students and in-demand digital skills (working with data, the ability to work with information and make decisions, programming, digital interaction, the use of modern means of communication, etc.).

The article presents the study aimed at identifying the features of using chat bots in educational activities and foreign language communication of future specialists in the field of informatization of education as an important condition for improving the quality of their training.

Materials and methods

The following methods were used in the work: theoretical analysis and generalization of the literature when reviewing scientific theories on formation of the foreign language communicative competence; specifying the conditions and modern digital tools to improve the quality of foreign language training of students; revealing the didactic potential of chat bots for teaching a foreign language.

In the process of using automated interactive programs for learning a foreign language all participants in the didactic process are involved in various activities (cognitive, regulatory, innovative, collective, etc.). In the presented study the interaction with a chat bot makes it possible to provide the most effective conditions for formation of the foreign language communicative competence of future specialists in the field of informatization of education, development of demanded soft skills, and experience of collaboration. At the same time, including chat bots in teaching a foreign language is simultaneously considered as a technology for acquiring new knowledge and competences, as it is a technology for professional communication.

In the study at various stages of organizing educational and practical activities on using chat bots in foreign language communication the didactic resources of Robochat, BotVK, Eliza, Parry, A.L.I.C.E., Jabberwacky, SmarterChild, Watson, Siri, Alexa and Cortana, Alice were considered. Criteria for comparing educational chat bots were: tariffs (paid/free), availability of help/support for self-learning, functionality for constructing a dialogue in various languages, didactic potential.

To design and develop own dialogue program the Borisbot service was used; it is a constructor of educational chat bots. Its advantages are: the possibility to create 30 block options (“Clear text”, “Buttons” (with one choice / with multiple answers), “Timeout”, “Rating”, “Predictive Question”, etc.). In addition, the designer’s YouTube channel has an official video with a detailed overview of the services’ functionality. The bot allows selecting tasks of different levels of complexity on various topics and in various formats.

But, of course, the most important criterion when choosing this particular constructor is the range of didactic functions: the possibility of independently obtaining new knowledge, of using extracurricular activities, support for gamification, and personalization of learning.
The experimental study was conducted on the basis of Vyatka State University when studying the disciplines "Foreign Language", "Development and Use of Computer Games in Education". 43 first- and second-year students of the training program 44.03.01 Pedagogical education (Master's degree programme) were involved in educational activities and foreign language communication with the support of chat bots. The average age of the respondents was 25 years (90% female and 10% male).

The empirical methods (observation, analysis of the results of professionally oriented and automated communication in the chat bot constructor) were used to obtain up-to-date information about real qualitative changes in foreign language training; to assess the degree of trust in each other, managing emotions when making mistakes, interacting in a team and with a designer; mutual support; reflection in the team and individually, in the use of feedback mechanisms; protection of educational results (chat-bot).

To diagnose formation of the foreign language communicative competence and competences in the field of informatization of education 30 tasks were formulated (to check the level of formation of language skills, communication skills, knowledge of basic algorithmic structures and information technologies).

The student could get from 0 to 100 points for these tasks. According to the results of measurements the marks were determined as follows: from 0 (inclusive) to 55 points – “failed” and “passed” in all other cases. To assess effectiveness of specially organized activities for using chat bots in foreign language communication in terms of improving the quality of education the Fisher criterion was used.

Literature review

The state program for introducing digital transformation technologies is the program “Digital Economy of the Russian Federation” [12]. It provides support for development of the following key technologies: big data; neurotechnologies and artificial intelligence; distributed ledger systems; quantum technologies; new production technologies; industrial internet; robotics and sensor components; wireless communication technologies; virtual and augmented reality technologies.

A. Følstad et al. understand artificial intelligence as information systems which have the following characteristics [12]:

- support the possibility to process data by methods that are as close as possible to intelligent behavior in terms of algorithms;
- include aspects such as reasoning, learning, recognition, forecasting, planning and control.

Such systems, according to the international recommendations of UNESCO on ethical aspects of artificial intelligence, include chat bots. According to the conclusions of S. Wollny et al., a chat bot is a program that imitates communication with a person using text and audio messages. Most often, chat bots are used in messengers (a program for instant messaging) [13].

S. Sands et al. consider the experience of Chatim.io, where the company implements chat bots for websites both using script templates and based on individual software solutions [3]. E. V. Shirinkina, B. Sh. Sobirov describe a chat bot that supports the operation of service stations in Russia and Kazakhstan, which sends daily reports on key indicators, informs about critical situations during interaction (missed call, bad rating, unprocessed application, access violation) [15].
E. Vázquez-Cano, S. Mengual-Andrés, E. López-Meneses determine that in formation of a single digital and multilingual educational space, an important factor is automation of information exchange processes (including in a foreign language) [16].

In the work of N. M. Chapaev problems associated with development of artificial intelligence in educational and upbringing spheres are noted [17]. The author considers issues related to the place and role of artificial intelligence and its potential in the educational and upbringing spheres, advantages and disadvantages of the distance learning process, artificial intelligence technologies (for example, the Internet of things, avatars and chat bots for consulting, testing and designing individual educational routes, machine learning, big data, blockchain and cloud computing, etc.) in education. Also in the work of P. Anki, A. Bustamam, R. A. Buyung the functions of artificial intelligence technology in education are highlighted [18].

E. M. Mateos-Sanchez and ed. indicate that chat bots combine two important components: they are multitasking, as they allow to automate a number of processes (consulting, conducting control activities and exams, checking test results, conducting surveys of students to identify weaknesses in educational programs), and convenient for interaction with the user due to a comfortable communication format that simulates a conversation with an interlocutor [19]. These qualities of chat bot applications make them an indispensable tool for conducting educational programs and bring the quality of education, including a foreign language, to a new level.

Due to cross-platform chat bot applications are available on various operating systems, and sometimes do not require installation on a computer at all, since most of the functions can be performed on remote servers [20].

In addition, chat bots help to involve students in foreign language communication, to interest students in mastering the material through constant communication with the user [10]. With this option of organizing educational and cognitive activities in a foreign language class, a chat bot is an important means of obtaining feedback and, as a result, improves the quality of foreign language training.

C. Tan, I. Huet substantiate that there is an objective need to train highly qualified specialists who are able to control and manage the processes of data exchange between users in a virtual interaction environment [21]. Therefore, automation of processing and recognition of messages is a logical and necessary step in further digitalization of the work of an educational institution. The work of Y. Saadna, A. Boudhir, M. Ben Ahmed describes a variant of organizing students' project activities to develop an intelligent chat bot to automate the exchange of information in the service sector [4]. S. Wollny et al. present a detailed analysis of online resources to automate the exchange of information between participants in network interaction, the creation of dialogue programs [13].

According to E. Vázquez-Cano, S. Mengual-Andrés, E. López-Meneses, chat bots are one of the promising areas for development of information technology [16]. These interactive programs are capable of processing natural language and offering answers to users' questions. The latter, however, do not always come in the form of text. Sometimes they are specific actions: showing a photo/video at the request of the user, making a purchase, making an appointment, etc.

S. Wollny et al. explore the technology for developing chat bots [13]. They conclude that many international companies (such as Facebook) are launching APIs that allow brands to adapt and use bots in their messengers to communicate with customers. According to the conclusions of M.N. Chapaev, there is another area in which chat bots can have a huge
potential – this is education [16]. A. S. Budnikova, O. S. Babenkova consider the problems of including artificial intelligence systems in the upbringing and educational spheres [10]. D. Jackson and A. Latham study issues related to clarifying the place and role of artificial intelligence, its didactic potential [20].

E. Vázquez-Cano, S. Mengual-Andrés, E. López-Meneses point out advantages and disadvantages of using various types of artificial intelligence in e-learning (for example, the Internet of things, avatars, chat bots, individual route constructors, etc.) [16]. N. M. Chapaev proposes to implement such models as part of the design, research activities of students [17].

Foreign language teaching, supported by modern digital services and online resources, as defined by O. Kalugina, N. Tarasevich, is focused on revealing the personality of the student, maintaining interest in educational and foreign language communication activities, developing intellectual, creative abilities in the process of solving any problem [22].

A. S. Budnikova, O. S. Babenkova describe the advantages of using chat bots in the process of learning a foreign language in detail [10]. The paper considers the experience of foreign and domestic researchers dealing with the use of chat bots as language partners. The authors provide a list of modern programs of this type, reveal their features.

So, the use of chat bots in teaching foreign languages allows to increase the level of digital skills, knowledge of information technology and artificial intelligence, maintain students’ interest in the process of mastering vocabulary and grammar, and contributes to development of logical and associative thinking [23].

At the same time, both Russian and foreign researchers note that the use of chat bots as an assistant in learning a foreign language is most often an element of game learning, in which case its didactic potential is significantly reduced and lost.

The analysis of the scientific works allows to identify the problem associated with the need for additional study of the use of chat bots in teaching a foreign language in the digital space of a modern university, especially in the preparation of future specialists in the informatization of education.

Research program

The main aim of the experiment was to test effectiveness of using chat bots in foreign language classes to improve the quality of training of future specialists in informatization of education. The study was conducted on the basis of Vyatka State University when studying the disciplines “Development and Use of computer Games in Education” and “Foreign Language”. 43 first- and second-year students of the training program 44.03.01 Pedagogical education (Master’s degree programme). The average age of the respondents was 25 years (90% female and 10% male).

At the preparatory stage of the experiment the modern achievements of linguodidactics regarding the potential of digital services, interactive tools for teaching a foreign language were analyzed. Then the authors stated the main methodological idea, which is “one should teach not only knowledge, but also skills that help to apply this knowledge and explore the world, create new things, solve problems, work in a team, understand oneself and others, and manage oneself” [10].

When choosing a software tool for creating chat bots, the international experience of using neural networks in education and health care was analyzed.
Various digital services (Robochat, BotVK, Eliza, etc.) and programming environments (Python, PHP, C#; Java; C++; JavaScript, etc.) for creating chat bots were considered. The projects and innovative experience of Telegram, Facebook, WhatsApp, VK were also studied.

To achieve the set goal the need for a special organization of the process of learning a foreign language was revealed. Its essence can be seen in the combination of creative pedagogical influence and complex of optimal pedagogical conditions, which should be based on the integration and interpenetration of modern achievements in pedagogy and psychology.

It was found out that in order to improve the quality of training of future specialists in informatization of education it is necessary to create and maintain additional conditions for:

- developing the foreign language communicative competence of students;
- providing experience in collaboration and project activities
- forming demanded digital skills (working with data, the ability to work with information and make decisions, programming, digital interaction, the use of modern means of communication, etc.).

It was decided to use constructors to create chat bots in order to provide the most effective conditions for achieving the set goal in the digital educational environment of the university, in particular, BorisBot (https://borisbot.com).

To assess the input conditions, a control work of 30 tasks was carried out.

The first 10 tasks were used to check the level of formation of language skills (speech, language competence). The following are examples of tasks.

Task 1. For example, find two synonyms for the highlighted words and fill in the gaps. Or: Paraphrase these sentences using indirect speech.

Task 2. A creative exercise to consolidate the present perfect continuous tense. Read the following story and make up a similar one according to the example. Use only the present perfect continuous tense. The text is given in the exercise.

Second 10 tasks are for diagnosing communicative abilities (sociocultural, compensatory and educational and cognitive competencies): the ability of students to interact with individuals, teams when solving professional problems. In particular, tasks were to develop a dialogue or choose the best answer. Or, problematic situations were described in the context of future production activities of students and the possibilities of international communication (buying a ticket and finding out the route to the conference, conducting an online lesson).

Some topics for foreign language communication: “Rules of conducting at the conference (before, after, during). The tasks included choosing a form of self-representation, defining/translating professional terms, compiling a conference schedule and a list of participants.

The last 10 control tasks were aimed at testing knowledge of basic algorithmic structures and information technologies, the ability to construct a dialogue with artificial intelligence systems, and project activity skills.

1. There are two lists: a list of communication situations (with an employer, with a manager, with a colleague, with parents, with friends, with network interlocutors, etc.) and phrases (“Would it make be difficult for you to tell me ...” , “I'm sorry to bother you, but will you tell me...” , “Listen, do you know where...” , “Ladies and gentlemen, a moment of attention...” , “Dear ladies and gentlemen!” , "Welcome aboard!") etc.). The student needs to correlate the situation and phrases of communication.

2. To implement the project "Choice of the profession of the future" by means of information technology (for example, MS Excel). The program must perform an analysis
of professions according to the proposed parameters and determine the most optimal option for the user. Or: write the parameters of the criteria by which you want to compare in a separate text file.

Some criteria columns are: demand (in percent), wages (in rubles), tuition fees (in roubles), and number of working days. Some professions are: teacher, process engineer, IT specialist, economist, and builder.

For example, an interactive program should select a profession suitable for the user according to the following parameters: salary of at least 100 thousand rubles, training budget should not exceed 150 thousand rubles.

Thus, it was possible to collect data on 43 students, from which the experimental (22 students) and control (21 students) groups were formed.

The second stage of the experiment was devoted to determining the structure of the course in accordance with the purpose of the study. The teacher of the discipline "Development and use of computer games in education" organized activities in the experimental group in the following stages: study of theoretical material; dividing the group of students into teams, choosing the topic of the project to create a chat bot; student activities in designing a chat bot; defending of projects and operability of dialog programs in teams.

Then, in the foreign language classes the topics “Culture and Art”, “Self-Improvement”, “Travel”, “Access to Knowledge”, “Relationships, Family, Friends and Helping Other People”, etc. were studied.

The third stage of the study. Further, when organizing practical work, research and creative activities, future specialists in the field of informatization of education were asked to revise the studied concepts, new words and set expressions when interacting with the previously constructed chat bot (https://borisbot.com).

Statistical processing of the results was performed using the Fisher criterion.

Research results

In the course of the analysis and generalization of the scientific literature the author's positions were determined regarding the key concepts of the study: chat bot, specialist in informatization of education, foreign language communicative competence.

A chat bot is a program that simulates a real conversation with a person.

In the presented study the information technology specialist in education is a specialist who is:

- able to create information products that support a single digital educational space;
- ready to carry out informatization of education in various directions: development of software tools for didactic purposes, management of projects and real objects (educational bots); experimenting with computer models; search for information, its collection, storage, processing and transmission; support intellectual leisure of students.

Foreign language communicative competence is a set of its constituent speech, language, sociocultural, compensatory and educational and cognitive competences.

So, the modern environment for teaching a foreign language should: be focused on new realities of didactics; provide opportunities for adaptation to specific conditions; support the interconnected communicative and socio-cultural development of students; encourage the participant of the didactic process to be creative; use information technologies (multimedia, electronic resources, software) at all stages of education.
Thus, it should be noted that any learning activity with the support of chat bots includes not only the image of the desired result (the model of the dialogue program), but also directly organized interaction for its design/modeling (from an idea to its implementation).

The review of digital services and programming environments made it possible to determine the range of common functions that chat bots can perform: statistics on working with users, a dialogue constructor, templates for responses and scripts, etc. Such functions can be provided through the use of online constructors for simulating interactive dialogue programs. The main advantage of which is that they:

- do not require special programming skills. The creation of the bot takes place in the constructor window - the user selects the desired steps of the bot and connects them like Lego;
- contain ready-made templates: questionnaires, a menu with buttons, a test with scores, design customization, subscription to mailing lists;
- determine the automatic reaction of the bot to keywords, requests and certain events: subscription and unsubscription from the community, the first message, sending files, and timer;
- support the possibility to send media: photos, videos, music, documents;
- load dynamic data from the user profile: name, city, social network ID, gender;
- perform automatic collection of interaction statistics, audience segmentation through tags.

Based on the results of the analysis of the supported didactic functions and the range of tasks performed, the BorisBot service (https://borisbot.com) was chosen.

According to the logic of the research program in the classes of "Development and use of computer games in education", students studied services and constructors for modeling chat bots.

Part I. The study of theoretical material (trends in development of artificial intelligence technology, chat bots based on artificial intelligence, educational bot as a variant of informatization of education (examples, didactic properties and functions), principles for developing interactive programs, ethical standards of application, etc.).

Part II. Dividing the students into teams, choosing the topic of the project to create a chat bot.

A feature of the proposed option for organizing educational and project activities is that the Wheel of Fortune service (https://ru.piliapp.com/random/wheel/) is used to divide the students into teams. This is an interactive program that allows automating the random selection of a participant.

Another feature is that the students of the experimental group could determine the topic for the project themselves, or use the order of a potential employer, or the teacher's options. For example, students developed the educational project of the chat bot "Healthy Lifestyle". The program interactively motivated the participants to bake cakes and sent the recipe; asked to do morning exercises and record its video; reminded of the need to organize a meeting on ZOOM and write about the results; recommended to watch movies or books.

A potential employer asked to develop a chat bot for remote interaction of company employees. The main areas of activity that were automated by the chat bot were: personnel management, sales of goods and related accessories, technical support, consultation, etc. For the initial testing of the chat bot it was necessary to create a scenario for automating the interview for the position "HR specialist". First, the applicant is asked to fill out a questionnaire (name, city, contacts), choose a position. Then the chat bot offers to pass
two tests: assessment of qualifications and personal characteristics. In the first case, the bot asks ten questions about professional competences (depending on the position). Time for answers is limited – ten minutes. In the second case the bot helps to find out the characteristics of the applicant such as inclinations and interests.

The project which the teacher offered: implement a chat bot to support the study of the string data type. The logic of the program:

1) asks for a username;
2) suggests studying the string data type. If the user answers “yes”, then the chat bot displays information about the string data type, otherwise it displays a final message. According to the information studied the program offers to answer one question and, in accordance with the answer, displays information about its correctness;
3) offers to continue studying and learning about the syntax of the string data type. If the user answers "yes", then the program displays information about the syntax of the string data type, otherwise it displays a final message.
4) offers to study what operations can be performed on the string data type, etc.

Part III. Student activities for designing a chat bot:
• designing dialogs and their modeling in a graphical user interface;
• customization of the initial design or selection of an existing template;
• using blocks "Timeout" (time delay for a response), "Channel selection" (transferring a dialogue to a messenger or mail), "Buttons", "Rating", "Geolocation", "Carousel", "Notification", "Repost links" etc.;
• setting up transitions to the block when choosing a different answer option, the ability to ask again;
• performing actions (create a survey, go to the site, etc.);
• testing, debugging and refinement of dialogue scenarios.

Development of the chat bot was accompanied by the following types of tasks: analysis of the professional field of activity of the future specialist, setting the task (objects and subjects of control, problems of data exchange, areas of interaction, evaluation criteria / efficiency of the programmable system); selecting blocks for the technical implementation of the chat bot; experimental verification of the computer model performance; testing and updating the information model; using the constructor to solve real problems.

Part VII. Defending of projects and operability of dialog programs in teams.

The third stage of the study is the training of students (in the experimental group) based on the materials of the "Foreign Language" discipline, during which they used chat bots for various purposes.

Examples of tasks with the use of chat bots for development of the foreign language communicative competence.

Task 1 (cognitive component of foreign language communicative competence). Read the text and make a family tree of the Coppola family. What other famous families do you know? Tell the bot about one of them.

Task 2 (sociocultural component of the foreign language communicative competence). Tell the bot about your ideal home. Indicate where it would be located, how many rooms it would have, what features would make this house unique.

Task 3 (speech and language components of the foreign language communicative competence). In the chat bot environment tell about the symbols of English transcription.

Task 4 (compensatory component of the foreign language communicative competence). Make a memo "Rules of safe behavior in an unfamiliar city."
Task 5 (speech and language components of the foreign language communicative competence). Tell the bot the basic rules of English rules: grammar, and speech, and syntax. Examples of rules are:

Rule number 1. The particle to is not used after modal verbs.
Rule number 2. You cannot use a definite/indefinite before a pronoun.
Rule number 3. Adverbs in the English language are formed by adding "ly" to an adjective.

Students of the control group studied software tools for creating chat bots as part of the discipline "Development and use of computer games in education." However, there were no specially organized activities to include chat bots for development of speech, language, sociocultural, compensatory and educational and cognitive competences in foreign language classes. The students studied the material using exercises and assignments proposed in the course of study. Examples of tasks are:

Task 1. Translate: "Our leader is a very honest person", “Illiterate people are nowhere and nobody needs them”, etc.

Task 2. Imagine that a friend is visiting you for a week. Tell us in detail what sights of Kazan you plan to show him.

Task 3. Translate the song/poem.

At the control stage of the experiment the verification work on the course materials was also carried out.

In other words effectiveness of using chat bots for formation of the foreign language communicative competence was also tested during the training of specialists whose future professional activity involves solving problems in the field of informatization of education. The student answered questions of 3 blocks at the control test (described in the research program). The validity of the experimental results was verified using the Fisher criterion. The control measurement data before and after the experiment are presented in Table 1.

|                         | Before the experiment | After the experiment |
|-------------------------|-----------------------|----------------------|
|                         | Control group         | Experimental group   |
|                         | Control group         | Control group        | Experimental group |
| Proportion of students  | 52,4% (11)            | 54,5% (12)           | 47,6% (10)         | 13,6% (3) |
| with the mark «failed»  |                       |                      |                     |           |
| Proportion of students  | 47,6% (10)            | 45,5% (11)           | 52,4% (11)         | 86,4% (19)|
| with the mark «passed»  |                       |                      |                     |           |

Calculations were made using the online calculator (https://www.psychol-ok.ru/statistics/fisher/). The critical value of the Fisher criterion for a significance level of 0.05 ($\phi_{\text{CRIT}}$) is 1.64. The following hypotheses were accepted: $H_0$ – the level of educational results in the experimental group is statistically equal to the level of the control group; $H_1$ – the level of learning outcomes of students in the experimental group is higher than the level of the control group. The empirical value of the Fisher criterion before the start of the experiment is 0.279 ($\phi_{\text{EMP}}=0.279<\phi_{\text{CRIT}}=1.64$). Therefore, before the start of the experiment, the hypothesis $H_0$ is accepted. The value of the Fisher criterion after the experiment is 2.514 ($\phi_{\text{CRIT}}=1.64<\phi_{\text{EMP}}=2.514$), so the hypothesis $H_0$ is rejected and $H_1$ is accepted.

So, the shift towards increasing of the level of foreign language training of specialists in informatization of education in the experimental group can be considered non-random.
Discussion of the results

Educational results in the experimental group after studying the discipline "Foreign language" in accordance with the proposed structure of the organization of educational activities of students on the use of chat bots during foreign language communication increased: the proportion of students who have the result "passed" increased by 40.0%. In the control group the increase was only 6.9%. When discussing the didactic potential of chat bots, it was found that formation of competences in the field of informatization of education occurs due to the fact that:

- in the process of developing a training bot (and its subsequent use in the classroom), uncommunicative and shy team members become more free in interaction;
- the process of decision-making and choice is supported ("predictable question", "timeout", time delay for the answer);
- the distribution of resources is optimized within the existing restrictions (for example, for asynchronous communication - the possibility of interaction by e-mail; entering text or choosing from available answers);
- there is an acceptance of the need to comply with "virtual" rules, follow patterns and scenarios;
- the fear of making a mistake in the answer is minimized (for example, by choosing the most convenient channel for communication);
- a joint effort to model a dialogue with a chat bot contributes to formation of professionally oriented and foreign language communication skills.

In general, the pedagogical experiment allows to conclude that the simulated educational and cognitive activity and foreign language communication contribute to formation of such demanded competences as computer and technical literacy, teamwork, communication with people and artificial intelligence, readiness to manage several tasks/project.

The following didactic capabilities of chat bots were identified in relation to learning in the context of development of the modern digital educational environment: active participation in the process of learning a foreign language; didactic games with the inclusion of digital services; development of creative thinking, speech, intelligence; systematization and generalization of the material; new forms of control; opportunity to learn independently.

Also in the discussion the following areas for improving the activity of constructing a chat bot and subsequent foreign language communication in an automated environment were identified:

- when modeling foreign language communication the possibilities of a chat bot were not always clear (especially if it was developed by another group of students);
- in ready-made chat bots (studied during the analysis at the first stage of the study), non-compliance with the basic principles of communication was found;
- ambiguous questions. This error is related to the previous one and even contradicts it a little in terms of developing dialog scripts. When modeling a dialogue, efforts must be made to avoid misunderstanding on the part of the interlocutor.

For example, to the question: "Could you please enter your email address?" the user can answer: "yes, of course, user@gmail.com", "of course ... here ... user@gmail.com", "yes, my mail is user@gmail.com".
These are just 3 options for responding to a seemingly simple email request. If the question is not clearly formulated, then received answers can lead to bot failures, and, accordingly, to a decrease in customer loyalty.

As a result of the discussion of these two methodological difficulties, a decision was made: to ask the simplest possible question and to assume a specific answer. This helped to reduce the number of chat bot responses in the spirit of: “Sorry, I don’t understand you.”

The research materials confirm and develop the conclusions of A. S. Budnikova, O. S. Babenkova [10] and E. Vázquez-Cano, S. Mengual-Andrés, E. López-Meneses [16] about the didactic capabilities of chat bots for teaching a foreign language. In addition, the present work offers a variant of solving the problems of using chat bots in education, which are formulated by S. Wollny et al. [13].

Conclusion

At present the artificial intelligence technology is actively used to improve the performance of employees, to manage innovation, to motivate personal development; to support operational interaction with customers; in the field of education. Artificial intelligence provides tools to support decision making, choice, and operational feedback.

A chat bot is one example of implementation of the artificial intelligence technology in the field of communication, information collection and analysis, and decision making. At the same time, experiments are being conducted in world didactics that prove that chat bots contribute to intensification of research activities, increase cognitive activity, and support professional self-determination.

The inclusion of activities of creating chat bots in the didactic process stimulates development of students’ cross-professional competences that are most in demand by the market and attractive to employers.

Designing a chat bot as a dialogue script contributes to development of professionally oriented and foreign language communication skills (listen to alternative opinions of other team members, accept standards and values of others, follow rules and regulations).

When creating educational chat bots, reference points – directions for project work – were formulated.

1. To consider well-known chat bots for educational purposes (including those used for teaching a foreign language):
   What is the purpose of creating such a bot?
   • do tasks solved by the bot and the didactic tasks coincide?
   • are there ready-made templates and scripts for dialogues in a foreign language, or is it necessary to develop own projects right away?
   • are programming skills required to write scripts?

2. To consider the impact of the chat bot topic chosen for implementation on the training of a specialist to perform work functions and foreign language communication: monitoring readiness of teachers to use digital technologies, choosing a teaching method, organizing students’ intellectual leisure, etc.

3. Before creating a chat bot for foreign language interaction, carry out preparatory work: write a text messages, a list of questions and possible answers, select illustrations and videos.
4. An obligatory stage of the described educational and project activities and subsequent foreign language communication is the analysis of the result (chat bot) and the didactic purpose of its creation.

As a direction for improving the proposed way of organization of students’ activities when designing educational bots, it was proposed: more active involvement of potential employers in formulating topics of projects; inclusion of programming elements to develop unique scripts and increase originality of the product; creation of chat bots to assist in preparation of documents in a foreign language and resource planning in the field of intercultural interaction.

The results of the study allow stating the advantages of project activities on development of chat bots to motivate students to work in teams, to create and to take part in professionally oriented communication.

The use of educational chat bots in the foreign language communication provides additional opportunities for training specialists to work in a team, the ability to interact and resolve conflicts in a team, the ability to empathize and motivate, and to adapt to the challenges of society.

The latter advantage is of particular importance in the context of training highly qualified specialists of the future. The research materials are consistent with the principles of the UN and UNESCO regarding the need to develop linguistic diversity, to promote the dissemination of creative ideas, and to include digital resources in education.

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