Methodological Approaches to the Use of Artificial Intelligence Technologies in Teaching

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Abstract: The ongoing research is dedicated to the problem of online education improvement. For this reason, the article touches upon the specific methods of teaching based on the student's cognitive perception type. Those types of perception (visual, auditory and kinesthetic) are described in the article in details and certain principles are enumerated to justify the didactic approach accordingly. It is stated that AI technologies are able to recognize the type of student's perception and adjust the didactic material in accordance with student's cognitive needs.

1 INTRODUCTION

The contemporary era of digital technologies being in its constant development, opens more and more horizons for scientific growth in various scholarly spheres including educational one. To refer to this aspect no one can deny the relevance of the teaching profession and special professional training required in terms of digital metamorphoses and globalization. In other words, the modern trend of an online learning environment development, ensuring accessibility of education with virtually no loss of quality, predetermines the competencies of a modern teacher, taking into account the focus on computer technology, on the one hand, and the appeal to basic didactic principles, on the other. At the same time, this circumstance does not mean at all that all future philological teachers must have computer knowledge to the level of creating neural network architecture. However, modern teachers should basicallly understand exactly how to formulate technical specifications to specialists in the field of IT technologies in order to obtain one or another online environment designed directly to meet the requirements for the educational process they are creating. In this context, the most daring and unusual didactic experiments are possible, including reference groups in research, pilot projects, etc. subject to basic methodological approaches and their skillful combination (Zhdanov, 2015). This idea has many times been emphasized by scholars all over the globe as well as the relevance of the online education throughout different educational levels (Kuprieva, 2020; Kuprieva, 2020 (1); Deeney, 2021).

2 MATERIALS AND METHODS

The ongoing research is mostly theoretical and does not require any specific empirical instruments. And at the same time, it is aimed at the search of the proper fundamental methods and ways to study the object of the research from different sides. Moreover, this study due to its complex nature bears a multidisciplinary character and allows to stick to linguistic and extralinguistic (computer) methodology. In other words, the authors take into account the anthropocentric scientific paradigm,

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interdisciplinarity of research, linguistics, psycholinguistics, anthropology, psychology, ethnopsychology, anthropology, axiology, cultural linguistics, in addition, the methodology of teaching English as a foreign language.

3 RESULTS AND DISCUSSION

As it has been mentioned before, the study bears the methodological character and is based on the combination of knowledge, skills and abilities inherent in the teacher/teacher and aimed at a comprehensive study of the object. It is methodological approaches that predetermine didactic behavior in the chronotope, that is, at a certain stage of learning. However, it cannot be said that methodological approaches are equivalent to educational methods. One of their specific features is situational or relevance and the ability to be in tune with the didactic situation, in which traditional educational methods require adaptation and modernization to solve a number of practical problems. Another specific feature of methodological approaches is their unlimited adaptability to specific didactic tasks and the ability to act as alternative solutions. In addition, methodological approaches allow a combination of a theoretical basis and several practical didactic methods and techniques.

In the complex of the specific features positively described above, methodological approaches are aimed at selecting and adapting methods and techniques for competently solving a particular methodological problem within the framework of the corresponding task and are capable of performing the corresponding fundamental functions:

- studying the genesis of educational tools to find tools for solving a specific problem;
- forecast of the metamorphoses of the educational process, taking into account the available information obtained through a systematic analysis of the knowledge available in pedagogical science;
- carrying out scientific activities alongside with the educational process, taking into account the projection of this activity in order to optimize the process;
- fixation of the educational approach as a holistic process in a complex of all components;
- practice-oriented process and its direction in an applied direction;
- the process of relying on specialized technologies, technical and educational, or a complex of them.

It is the latter function that is essentially associated with the implementation of this project, which involves a combination of digitalization and a traditional approach to the educational process.

Among the methodological approaches, as follows from the analysis of the relevant literature, we can highlight some of the most fundamental ones that are directly related to this project. In other words, the methodological approaches that served as the didactic basis for this project, first of all. Let's start with a brief description of them.

Firstly, we are talking about an anthropological approach, which puts the human factor of educational activity at the forefront, which, in other words, means that the teacher takes an individual approach to each student and cultivates knowledge in each student, taking into account his individual talents and needs. In this project, as well as in any other based on Internet technologies and neural networks, this approach, despite being mediated by computer technology, is fully implemented. We are talking about the so-called individualization of learning by adapting the neural network to a specific student. In this case, the principle of adjusting the neural network to the needs of a specific student is implemented.

Another approach associated with this study is a cultural one, taking into account the cultural and creative ontogenesis of the student, allowing for the individual specificity of each student in the process of solving creative problems and creating in the process of educational activity. It was precisely this formulation of the question that predetermined the tasks set for specialists in the field of computer technology, which, first of all, boil down to adapting and personalizing the neural network to the creative abilities of each student.

An important role in the process of implementing this project is also played by the formative approach, which, in parallel with the process of transferring knowledge, skills and abilities, gives the teacher the right to influence the student in terms of education, the formation in each student of positive motivation for educational activities in general and for a specific subject. In our project, thanks to the implementation of this approach, we provide a special approach to each student according to his abilities and present the material from simple to complex. This approach makes learning understandable and, accordingly, interesting for the student.

The hermeneutic approach, being built into this project as a methodological basis, appeals to the feelings and emotions of the speaker, who independently or with the help of a teacher evaluates his educational activities in terms of needs, success, etc., reflects and carries out further goal setting. In this project, control over the assimilation of material is carried out automatically, that is, directly by the neural network itself, and manually, that is, under the action of the teacher. With all the positive qualities of neural networks, we must not forget about the positive role of the human factor in learning. The teacher, despite the almost complete automation of the process, plays a leading role both in the formation of the content of the discipline and in the individual assessment of the student. And if the neural network adapts the content taking into account the selection of the optimal option from the existing database (tasks), then the teacher can independently show creativity and control the student's educational activities.

The next fundamental and specific methodological approach implemented in this project is biogenetic. It is he who immanently takes into account the learner's mode of perception. This approach itself makes it possible to search for a correlation between the psycho type according to the type of perception of a student and his educational potential. In this project, as stated earlier, we rely on the understanding that there is a certain relationship between the leading type of perception (visual/auditory/kinesthetic) and the mastery of material for learning a foreign language. This idea in psychological research belongs to a whole galaxy of scientists who consider the psychological prerequisites for teaching children with different types of perception (Borisjonok, 2022; Navalihina, 2013; Puchkova, 2016; Rogozhnikova, 2011; Chibisova, 2010).

So, as has been repeatedly noted at different stages of the study, this project is built on proving the hypothesis (it is confirmed by experimental data) that students/learners with different types of information perception (visual, auditory, kinesthetic) learn information differently, respectively, the success of learning depends to a large extent on the nature of the material presented for study according to the leading channel of perception. The attraction of new computer capabilities is due to the need to quickly determine both the level of language proficiency and the specific mode of perception of each person. Computer technologies and forms significantly saved time for conducting experiments and testing, and also ensured objectivity of the process. Moreover, through such digital work, an appropriate database was created for subsequent training of the neural network. This possibility is based on the ability of neural networks to learn from samples of options, adapt to conditions and continue to improve based on the existing learning algorithm (Gavrilova, 2016).

So, understanding the fact that, taking into account the technologization of the process, one can count on the speed of task implementation, further work on solving the project's problems was built taking into account the setting of didactic tasks and methodological approaches, based on traditionally defined stages, including setting the goals of the topic being studied, explaining the material, training material for consolidation, generalization of material to bring it into the system, final control of assimilation and feedback, justification of the prospects for further training (Antamoshkin, 2012). And again, all stages were accompanied by training with the participation of a neural network, which automatically determined the mode of presentation of the material (emphasis on the perception channel) and adjusted to the specific needs of the student.

Experience in the project and the results obtained allow us to speak about the unconditional didactic and methodological potential of the neural network. However, as is obvious, such a positive result is possible taking into account high-quality planning, when all didactic stages are correctly followed, which are accompanied by the use of various methods of IT training, taking into account the potential for participation and activity of each student. Here, first of all, we are talking about the process of planning training and selecting material, verifying and preparing test tasks, and building a neural network architecture. It was precisely at this stage that the participation of the student was not expected, especially in the case of the present experiment, which was entirely aimed at proving the hypothesis about the dependence of the quality of learning on the priority channel of perception of the listener. It was at this stage that tasks were selected for the experimental group in order to obtain initial empirical data for constructing a neural network. These data subsequently predetermined the nature of the training system, the sequence, quality and quantity of tasks and test material offered to the student.

Let us dwell directly on the description of this task, which was solved in the project in order to achieve the general goal.

Initially, tasks were selected for the experimental group in order to obtain initial empirical data for constructing a neural network. In this case, we relied on a systematic analysis of literature in various branches of science and came to the conclusion that different people perceive information differently. This assumption is not new; it acquired a scientific form around the 6th century. BC. And if at the beginning the formation of this approach was based on the correlation of a person with society, that from about the 18th century, the personal benefit of a person and the assessment of all phenomena based on their usefulness and acceptance by an individual became paramount (Bentham, Smith). Further, during the development of social psychology in the 19th–20th centuries. psychology moved from a priori conclusions to laboratory experiments, and it was at this time that attempts to study the differences in people's perceptions began to appear as a priority. At this very time, tests appeared that predetermined different types of perception of people, which became a prerequisite for the emergence of socionics.

Modern teaching methods, including didactics of foreign languages, are based on the latest developments of scientists in related fields of science and are thereby being improved. Thus, one of the important areas of didactic dogma of today is the understanding of the existence and dominance of different types of perception (Borisjonok, 2022; Puchkova, 2016; Chibisova, 2010). In forming the hypothesis and constructing the subsequent research algorithm, we relied on scientifically proven facts that people with different types of perception perceive oral text, its graphic presentation, working with a book, computer, oral and written communication differently. Moreover, such people not only master tasks that are "suitable/unsuitable" for their temperament at different speeds, but also achieve results with varying degrees of success and strive to adapt to their own type of perception (Borisjonok, 2022; Rogozhnikova, 2011).

Determining the type of perception is a fairly simple process, and if a psychological test is carried out to clarify the type of perception, we can talk about a conditional independent subjective assessment by students of themselves. Such an assessment is possible mainly in the first stages. Further, it is possible to use already proven tests, one of which is, for example, a psychological test using the method of "Diagnostics of the dominant perceptual type" by S. Efremtsev. However, this is not the only or even the most ideal and absolute test available for establishing a person's type of perception. Such tests are endowed with a special error, which in the case of learning foreign languages has the most disastrous results.

Educators and psychologists, based on a variety of experimental data, note that, for example, the visual learner has difficulty perceiving by ear without illustrative graphic support, while the auditory learner is for the most part capable of perceiving oral information and correspondingly fixing it in memory. Taking these features into account, a teacher can build an individual learning trajectory, but at school/university there is often not enough time to identify the type of perception, which follows from generally accepted practice. It would be good if the teacher had the opportunity to conduct specific testing for the type of perception of the student or establish this circumstance during individual lessons (several lessons for the teacher are quite enough), but in view of the training program rushing forward, the teacher does not have enough strength or time to clarify corresponding sources (Rogozhnikova, 2011).

A systematic analysis of the scientific literature shows that it is traditionally possible to establish four basic types of perception. Here, of course, it should be noted that all of them are not the Absolute and undergo changes and are supplemented in the process of life. However, despite all the existing metamorphoses, students retain their innate type of perception.

Typical ways to determine the leading type of perception in modern science are testing, including the above-mentioned methodology, observation (vivid images and pictures are used by the visual; sensations are characteristic of kinesthetic; sounds and intonations are characteristic of auditory; logical connections and thoughts determine digital); associations (a person is given associations for a specific type of perception and his sensations are clarified); observation of speech (emphasis on words used). In the latter case, we are talking about verbs of visual perception for the visual, auditory for the auditory, emotional states for the kinesthetic and logical inferences for the digital. However, the latter observation is mostly complementary rather than fundamental (Puchkova, 2016; Chibisova, 2010).

So, based on the position that each type has its own characteristics that affect its perception of surrounding information, any educational processes, interaction with other people, to build a training sample and the architecture of the corresponding neural network, let us recall the initial parameters in the corresponding tables. Note that the initial diagnostic tracking of the student's activity will also add information to determine the type of perception. Approximate parameters for organizing the operation of the platform are reflected in the table below (see Table 1).

Table 1: Student activity in correlation with the type of perception.

Type of Perception	Communication	Preferable Internet Content	Internet Searches
Visual	Speech lacks prepositions and adverbs, consists of simple phrases	Prefers computer games with good graphical design	Formulates the internet searches thoroughly
Auditory	Speech is characterized by complicated and grammatically correct phrases	Prefers audio books, loves imagination games, has no difficulties in studying, reads the manuals before starting to work with something	Formulates the internet searches easily
Kinesthetic	Speech is characterized by short and grammatically incorrect sentences	Prefers physical contact to any other form of perception, would better memorize if touches the object	Formulates the internet searches with great difficulty

Let us recall that 850 students were involved in the experiment, who anonymously completed the task and passed on the information received to the developers so that they sorted the received data and passed it on to specialists for subsequent modeling of the neural network. The obtained data on the set of characteristics were checked for compliance of the completed task with the conditions of this task, ranked into groups and in the same form were transferred to specialists in the field of IT technologies for the purpose of subsequent modeling of the neural network. Based on the information received from specialists in the field of computer technology, the questions were adjusted and the theory was tested to determine the direction of the perception.

In the absence of contradictions in our theory (this conclusion is based on a preliminary report from specialists in the field of computer technology that the hypothesis was fully confirmed during the construction of the neural network), the directions for forming the content of the developed didactic resource were determined and the following facts in e-learning were taken into account:

- to fill resources addressed to the visual, special attention is paid to the graphic parameter (color, size, shape); texts are purely descriptive; tasks are described in as much detail as possible, examples are given; due to the nature of work with visuals, there is a frequent change of types of activities;

- to fill the kinesthetic resource, the concept of “game” and a large number of repetitions are at the forefront; at the initial level, exercises on comparing resource information and data coming from the environment are especially relevant; the focus is on the student’s sensations and additional work involving motor activity;

- the auditory resource is saturated with musical and sound accompaniment of visual support (for beginners to learn a foreign language it is impossible to rely solely on auditory perception, visual supports are required); At the same time, the soundtrack is ranked from easy to difficult levels.

4 CONCLUSION

The listed principles formed the basis for the formation of the platform’s content. At the same time, taking into account the mode, the selection of the content of educational activities is based on a combination of the most common approaches. The first of them involves direct material education, when the amount of information relevant to the student’s perception is put at the forefront. Within the framework of this approach, work is carried out with a large volume of data and special requirements are imposed on the assimilation of encyclopedic knowledge, which is verified through testing and control measurements as a result of mastering a particular stage or section.

The second approach is the theory of formal education. As a result of this approach, the emphasis is placed directly on the formation in the student of a holistic understanding of the subject, a system of knowledge and skills in search scientific activity, the ability to operate with a large volume of data, to be based on methods of deduction and induction, analysis and synthesis of information. This approach is the most relevant in today's time, it has proven itself on the positive side and allows you to get quite impressive results from students. At the same time, we note that there is no absolute in this matter. This means that in both approaches we will encounter elements of each other. Moreover, working with computer teaching methods allows you to combine as much as possible all the positive aspects of both approaches and obtain the most impressive results.

What has been said and listed above, of course, is not an absolute, but it allows us to determine the directions for further improvement and filling of the resource, in principle, as well as work prospects. Moreover, due to the fact that the entire resource is correlated with neural network data, the entire process is automatically adjusted and improved in the process of individualization.

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