7. Federal State Educational Standard of Primary General Education dated [*Federal'nyj gosudarstvennyj obrazovatel'nyj standart nachal'nogo obshchego obrazovaniya*] May 31, 2021 - URL: https://sh-sazonovskaya-r19.gosweb .gosuslugi.ru/netcat_files/30/50/FGOS_NOO_ot_18.07.2022.pdf (accessed 04/21/2024).

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ИСПОЛЬЗОВАНИЕ НЕЙРОННЫХ СЕТЕЙ В СОВРЕМЕННОМ ОБРАЗОВАНИИ: ЭФФЕКТИВНОЕ СРЕДСТВО ДЛЯ УЛУЧШЕНИЯ МЕЖКУЛЬТУРНОЙ КОММУНИКАЦИИ СТУДЕНТОВ

И.А. Турьев, С.Е. Горбачев

Аннотация. *В статье описывается влияние нейронных сетей на обучение и межкультурную коммуникацию. Последняя определяется как обмен информацией, ценностями и дискурсами между представителями различных культур с целью понимания, взаимодействия и сотрудничества. В условиях растущей глобализации и миграции контакты межкультурного обмена становятся более частыми. Основная цель образования в цифровой среде заключается в намеренном и целенаправленном развитии творческих навыков и определенного мировоззрения в профессиональной области. С развитием технологий обновления профессиональные образовательные программы должны быть пересмотрены в сторону применения нейронных сетей и искусственного интеллекта. Нейронные сети играют важную роль в обучении межкультурной коммуникации, способствуя более эффективному взаимопониманию между культурами и различиями. Они могут анализировать и интерпретировать данные, прогнозировать поведение людей, переводить тексты и аудио-видео контент, а также помогать развитию коммуникативных навыков. Несмотря на многочисленные преимущества использования нейронных сетей в обучении межкультурной коммуникации, имеются и недостатки. Это может привести к снижению навыков общения и критического мышления, а также зависимости от технологий и уменьшению мотивации студентов. В заключении отмечается необходимость тщательного обдумывания преимуществ и недостатков использования нейронных сетей в обучении для обеспечения эффективного и качественного образования. Нейронные сети, хотя и обладают большим потенциалом, требуют баланса между применением технологий и традиционных методов обучения для достижения целей межкультурного общения и образования.*

Ключевые слова: *межкультурная коммуникация, нейронные сети, образование, взаимодействие, искусственный интеллект, преимущества и недостатки*

USE OF NEURAL NETWORKS IN MODERN EDUCATION: AN EFFECTIVE TOOL FOR IMPROVING INTERCULTURAL COMMUNICATION OF STUDENTS

I. Turyev, S. Gorbachev

Abstract*. The article describes the effect of neural networks on learning and intercultural interaction. It defines intercultural communication as exchange of information, values and discourses between representatives of cultures for understanding, interaction and cooperation. The paper remarks that intercultural contacts are becoming more frequent due to growing globalization and migration. It is stated that main goal of education in a digital environment is development of creative skills to be applied in the professional sphere, and that development of advanced technologies promotes a tendency for revising educational programs in terms of using neural networks and artificial intelligence. The work describes neural networks that play an important role in learning intercultural communication, and classifies them and gives examples of how they can develop communication skills, analyze and interpret data, predict behavior, translate texts and arrange audio-video content. The articles further summarizes advantages of neural networks, but warns that despite advantages, there are also drawbacks, since over-reliance upon neural networks can decrease critical thinking, communication skills and motivation. In conclusion the paper recommends carefully considering pros and cons of neural networks in learning in order to ensure high-quality education. Neural networks require a wise balance between technological and traditional teaching methods to achieve intercultural communication outcomes.*

Keywords*: intercultural communication, neural networks, education, interaction, artificial intelligence, advantages and disadvantages*

There are many different definitions of intercultural communication. We believe that it is best described by the following explanations: it is a process of exchanging information, discourses and values between representatives of different cultures for the purpose of ensuring mutual understanding, interaction and cooperation. In other words, it is a set of principles and tools used by people of various cultural backgrounds to communicate and cooperate successfully. At present, intercultural contacts are enhancing due to increased globalization and migration. Since the society has become multicultural, it is imperative to promote smooth interaction among people with different values, norms and views in business, educational and social spheres. Well-developed skills of intercultural communication not only promote mutual understanding, they can efficiently reduce distrust, prejudice and conflicts, thus creating a harmonious community. We can say that successful intercultural communication requires application of various strategies to overcome cultural barriers [7]. Among such strategies a new digital method can be suggested in this article.

Modern society has acquired digital features, so the goal of education in such setting is to deliberately and systematically develop creative skills and specific worldview in the professional area [3]. There is a new rise in advances technologies in the world - neural networks and artificial intelligence, so, to address this challenge, professional learning programs must be changed towards application of those technologies to ensure advanced learning concept. It will, undoubtedly, make education more effective. That is why we should identify how learning can be improved through neural networks [11]. Evidently, a mixture

of traditional learning methods with intelligent technologies will foster a brand new tool - neural network training systems [9]. They can ensure individualized, personally-focused learning, which will maximally improve the learning process and quality of education [6].

Nowadays we are amidst revolutionary changes, when theoretical knowledge and abstract ideas about prospect of neural networks and artificial intelligence can be practically implemented and we can take advantage of their results. One of such practical area of their application is cross-cultural interaction in the digital age. Neural networks can make a wide range of effects on communication between peoples and communities, when properly applied. Among such effects we can highlight the following: Better understanding, because neural networks can analyzed and interpret information with more precision, thus improving rapport between cultures and prompting effective cultural communication strategies, training to recognize non-verbal cues, gestures, body language, other culturally sensitive signals. Forecasting patterns of behavior: possessing a large amount of data, neural networks can extract characteristics and explanations of behavior of people from different cultural backgrounds, which can help to avoid conflicts and misunderstandings [2]. Instant translation: neural networks can translate written and oral texts in different languages with a high degree of correctness, which helps to communicate more effectively. For example, virtual assistants, such as Alice, can help communicate in a native language and provide information about cultural peculiarities. Besides, gesture and facial recognition can help interpret non-verbal communication, which is an essential element of cross-cultural communication. For instance, lack of eye contact in some cultures does not mean evasiveness, but rather respect. An instant prompt about it can help to establish trust quicker. So, artificial intelligence can be used to develop tools that simplify cross-cultural interaction.

Goal of the article is to study influence of neural networks on learning process and intercultural interaction. Among objectives of the article we can formulate the following: give a definition to intercultural communication and consider its role in the modern world; analyze how the digital setting influences the learning process, suggest methods of using neural networks for improved learning quality; see in details the role of neural networks in developing cross-cultural skills and identify advantages and disadvantages of their use.

There are many studies that give definition to neural networks. Most common explanation of this advanced technology sounds as a mathematical model imitating operations of human brain, capable of self-learning based on the stored data, consisting of computational elements (artificial neurons). Neural network has a distinguished characteristic: it can independently improve and refine itself based on machine learning [4]. Using artificial intelligence in education can promote hybrid learning, i.e. a mixture of traditional in-person classroom instructions with online learning activities, and ensure a broader geographic coverage of the audience. As already said above, neural networks can translate learning material into different languages and make educational programs more accessible. They can quickly respond to ongoing changes in the learning setting thanks to the fact that their design is based on self-learning, which means a good opportunity to implement the concept of lifelong learning for people [4]. A 2023 study made in by Sber University and the GeekBrains platform showed that AI can improve involvement in learning and save time of educators in terms of creating educational materials, and that of students in terms of doing routine part of tasks; it can also provide support for students on learning issues [10].

It is impossible and even destructive to limit usage of neural networks, including in the learning process. Self-learning design means that widespread, large-scale use of net-

works continuously improves them; i.e. the more it is used, the smarter it gets. That is why access to some neural networks is almost unlimited (for example, ChatGPT - a chatbot with artificial intelligence, Stable Diffusion - image generation based on a text description, MyHeritage - a photo animation service, Ostagram - combining two images into a single whole, Looka - generates logo options for businesses) [12]. Flexibility and no need in re-programming in case of changes due to the self-learning feature of neural networks make them an indispensable tool, especially in terms of increasing amount of educational and learning material. Since neural networks are trained of a large number of texts and sources, including educational curricular, they will become an inevitable educational instrument of digital era. However, their information should be applied critically. It is obvious, mass education time has come to an end, and there is a tendency towards transition to a personalized learning through application of technologies, including neural networks that can take into account characteristics features of cognitive development of students (like level of knowledge acquisition, dynamics of learning, etc.)

Neural networks can analyze students by their individual learning characteristics, like mode of perception of information, cognitive styles, level of competence or independence; besides they will instantly classify learning materials by complexity, necessary scope of information. Such differentiation can help in building individual learning trajectories. When it comes to cross-cultural communication, neural networks can assess communication skills of interlocutants by analyzing speech in terms of complexity, coherency and reasonability, after which recommending ways how to adjust existing skills to the required learning outcomes and show the learning progress by assessing results in different periods. So educators and students can timely deal with any communication problems and solve them by selecting a suitable training scenario [8]. When building personal learning paths for students who learn intercultural communication, neural networks can analyze several factors:

1. Assess learning goals to be achieved in cross-cultural communication. For example, the goal can be to learn speech etiquette for business or academic purposes, and neural network can suggest different resources to improve relevant vocabulary.

2. Assess language Proficiency based on students' answers and offer appropriate learning materials.

3. Identify learning preferences and a training format that works best for a student, be it online tasks, group sessions, face-to-face classes.

4. Determine cultural differences that a student needs to consider in learning. For example, if a user wants to learn business etiquette in China, neural network can highlight cultural specifics, such non-verbal communication, personal space, respect to the elders, no disagreements, etc [1].

In general, neural networks have a wide range of applications, since they focus on continuous education and ensure ease of learning. Besides, neural networks can solve problems quite effectively even with incomplete information, which is a great advantage in education. It is necessary to remark that artificial intelligence cannot replace a teacher or cooperative learning in class with peers. Therefore, neural networks can become only an additional tool, but cannot fully replace traditional learning methods [8].

Currently, there are several types of neural networks that can be applied to development of cross-cultural communication skills:

– networks creating a text fragment based on a query: ChatGPT, InterKit, Smodin, Autopoet from Yandex, Balabob. Text-based AI can generate educational conversations, stories, or dialogues reflecting cross-cultural challenges and scenarios;

– networks generating an image based on a text description: DALL-E, Midjourney. Such networks can create visual representations of cross-cultural communication or scenarios based on written descriptions, helping to visualize cultural nuances;

– networks processing photos: Lensa, Colorize, Let's Enhance. They can be used enhance photos depicting various cultural contexts, landmarks, or symbols for immersive learning experiences;

– networks drawing illustrations based on a sketch: GauGAN, AutoDraw. Such networks can generate illustrations that convey cross-cultural concepts or differences effectively;

– networks generating speech. For example, virtual personal assistants can support intercultural dialogues, provide instant and accurate translation;

– networks ensuring translations. For example, a neural network DeepL Translate allows building complex language structures that ordinary translation programs are not able to understand.

We can suggest various formats to use neural networks for learning cross-cultural communication in English:

- Automatic analysis of cultural contexts, which allows selecting most effective learning materials for students.
- Voice assistants and speech recognition to train accents, which are an integral part of cross-cultural understanding, for example, through dictation or pronunciation exercises.
- Automatic translators of texts, audio and video content, especially set expressions, in order to explain cultural nuances and traditions.
- Adaptive learning. Neural networks can provide personalized tasks and exercises that correspond to the level of knowledge of the student.

There are several benefits of using neural networks in learning intercultural communication:

1. Individualized learning - training can be tailored to meet unique requirements of each learner by suggesting activities matching needs and learning styles, incentives and strategies of each students. Through instant analysis of personal strengths and weaknesses neural networks can adjust any topic to a concrete person.

2. Immediate feedback – relying on vast recourses imbedded in them, neural networks can respond in real time, giving recommendations, correcting errors, suggesting learning material to cover. Since feedback plays a vital role in learning, this advantage can be of great help in drilling typical situations of cross-cultural communication.

3. Use of every-day colloquial language - neural networks do not only provide sterile texts of educational textbooks, but can also facilitate exposure to real-life situations in everyday scenarios though interactive simulations.

4. Better accessibility: intercultural communication can be available to everyone in any setting, even if a native speaker cannot be reached.

5. Gamification strategies: through neural networks it is possible to set gaming environments to crease engagement and enjoyment in learning, especially given that it will motivate learners and enhance their performance.

6. Natural language processing: some neural networks can ensure precise speech recognition and comprehension of natural language. Learners will be able to grasp the nuances of a language, such as idiomatic expressions, colloquialisms, cultural references, implicit meanings, and socio-cultural context.

7. Flexibility: being digital technology, neural networks provide adaptable learning choices, flexible schedules, so that students can progress at their own pace.

8. Engaging materials: it is possible to attract multimedia tools to enrich the learning journey though use of multimodal texts.

9. Progress checking: it is possible to track progress and assess performance, finding areas of further improvement [5].

Despite obvious advantages, neural networks have several drawbacks:

1. Overreliance upon technologies can deteriorate critical thinking and practical communication skills; for example learners will not be able to communicate with real people and express their own thoughts.

2. Lack of face-to-face communication: using only digital tools will inevitably limit engagement with native speakers, however, mastering a language cannot do without real life communication. Despite their rich databases of accents and pronunciation, neural networks can prevent learners from understanding natural speech, and miss feedback to improve pronunciation and clarity.

3. Mistakes and inaccuracies inherent in AI language tools due to programming flaws or translation errors can lead to confusions, misunderstanding, learners might find themselves in awkward situations during conversations with native speakers.

2. Reduced motivation can stem from lack of understanding of online learning tools. Not knowing how network-based learning tools function, or thinking them dull or uninspiring, students will be less involved in learning.

3. Despite an instant feedback that neural networks may produce, it can be poorer than a human instructor can provide, especially in situations when a communication scenario is influenced by the learner's own speech patterns.

4. Lack of cultural immersion – neural networks cannot always explain cultural nuances essential for language proficiency, especially in non-standard situations, or in implicit context. AI learning tools cannot incorporate cultural references as effectively as native speakers can.

5. Different access to technologies can make a barrier to effective learning. For example, learners can have difference internet infrastructure, low-income or rural residents may face challenges in accessing technological tools [13].

Thus, we can see that neural networks can easily deal with standard situations, when it is necessary to drill some typical cross-cultural patterns, but they cannot substitute a human instructor when it comes to more complicated situations.

In conclusion, we can say that in terms of intercultural communication in the modern digital society, in order to achieve successful interaction we need to apply new technological tools, even in the process of learning intercultural skills. In the modern context, educational process has become to a large extent influenced by advanced technologies, including neural networks and artificial intelligence. They substantiate a transition to individualized learning, promoting accessible education and contributing to selection of suitable learning paths; above all, they provide effective teaching methods and new learning possibilities. In terms of intercultural communication, networks can analyze and interpret cultural infor-

mation, predict possible patterns of behavior, translate texts, arrange multimodal content, and, in general, help to master intercultural skills by setting real life cultural scenarios and encouraging learning cultural differences. However, despite obvious advantages, application neural networks can present some drawbacks, for example, too much of technologies decrease interpersonal communication with native speakers, deteriorate critical thinking skills, present social-cultural setting one-sidedly. Also, technologies cannot avoid errors or glitches, so it is quite possible that a neural network will provide wrong information or analysis, which may lead to misunderstanding. So, it is recommended to consider all pros and cons to balance technological and traditional learning methods in learning cross-cultural communication to ensure high-quality of education. We can conclude that neural networks have a great potential, ensure progress and make learning more efficient. However, we must keep in mind, that technology is not a universal educational solution, since only human face-to-face learning communication with instructors and peers can provide effective education in the modern digital world.

Список литературы:

1. Букин А.С. Использование нейросетей для обучения английскому языку на примере chat gpt: возможности и вызовы для современного образования // Вестник Государственного гуманитарно-технологического университета. 2023. № 2. С. 14-20

2. Генварева Ю.А., Марченкова Н.Г. Использование нейросетей в преподавании высшей математики в техническом вузе. В книге: Современные образовательные технологии: психология и педагогика. 2023. С. 99-107

3. Добровольская Н.Ю. Компьютерные нейросетевые технологии, как средство индивидуализированного обучения студентов физико-математических специальностей. Автореферат диссертации ... кандидата педагогических наук. Краснодар, 2009.

4. Егорычев Д.Н., Егорычев А.Д. Направления влияния нейросетей на экономику, бизнес и образование // Экономические и социально-гуманитарные исследования. 2023. № 2 (38). С. 25-33

5. Ильиных Т.В. Анализ использования нейронных сетей для изучения иностранного языка: преимущества и недостатки // В сборнике: Современные стратегии и цифровые трансформации устойчивого развития общества, образования и науки. Сборник материалов X Международной научно-практической конференции. Москва, 2023. С. 69-74

6. Козлова Н.Ш. Цифровые технологии в образовании. Вестник Майкопского государственного технологического университета. 2019; № 1 (40): 85-93

7. Кравченко О. Н. Формирование межкультурной коммуникативной компетенции в современных условиях: нейродидактический подход, нейросети, социальные сети // Виртуальная коммуникация и социальные сети. 2023. №2. [Электронный ресурс] URL: https://cyberleninka.ru/article/n/formirovanie-mezhkulturnoy-kommunikativnoy-kompetentsii-v-sovremennyh-usloviyah-neyrodidakticheskiy-podhod-neyroseti-sotsialnye (дата обращения: 01.06.2024).

8. Курбанова З.С., Исмаилова Н.П. Нейросети в контексте цифровизации образования и науки Мир науки, культуры, образования. 2023. № 3 (100). С. 309-311.

9. Торкунова Ю.В., Коростилева Д.М. Формирование цифровых навыков в электронной информационно-образовательной среде с использованием нейросетевых технологий. Современное педагогическое образование. 2020; № 5: 107-110.

10. Управление изменениями в образовании: генеративный ИИ [Электронный ресурс]: отчет об исследовании // СберУниверситет: [образовательная платформа]. 31.03.2023. URL: https://sberuniversity.ru//upload/re-search/Generativyj_II_issledovanie_SUji_GB.pdf (дата обращения: 02.06.2024).]

11. Филатова О.Н., Булаева М.Н., Гущин А.В. Применение нейросетей в профессиональном образовании // Проблемы современного педагогического образования. 2022. № 77-3. С. 243-245

12. Чемарина А.В. Роль нейросетей в системе современного образования. В сборнике: Точки научного роста: на старте десятилетия науки и технологии. Материалы ежегодной научно-практической конференции преподавателей по итогам НИР за 2022 г. Краснодар, 2023. С. 591-593

13. Ilinykh T.V. Critical review of the negative impact of neural networks on foreign language learning // В сборнике: Теоретические и прикладные вопросы экономики, управления и образования. Сборник статей IV Международной научно-практической конференции. Под научной редакцией Б.Н. Герасимова. Пенза, 2023. С. 150-154

References:

1. Bukin A.S. (2023) Using neural networks for teaching english by the example of chat gpt: opportunities and challenges for modern education // Bulletin of the State University of Humanities and Technology. [*Ispol'zovanie nejrosetej dlya obucheniya anglijskomu yazyku na primere chat gpt: vozmozhnosti i vyzovy dlya sovremennogo obrazovaniya // Vestnik Gosudarstvennogo gumanitarno-tekhnologicheskogo universiteta*] No. 2. P. 14-20

2. Genvareva Yu.A., Marchenkova N.G. (2023)The use of neural networks in teaching higher mathematics at a technical university. In the book: Modern educational technologies: psychology and pedagogy. [*Ispol'zovanie nejrosetej v prepodavanii vysshej matematiki v tekhnicheskom vuze. V knige: Sovremennye obrazovatel'nye tekhnologii: psihologiya i pedagogika]* pp. 99-107

3. Dobrovolskaya N.Yu. (2009) Computer neural network technologies as a means of individualized training for students of physics and mathematics. Abstract of the dissertation... candidate of pedagogical sciences. [*Komp'yuternye nejrosetevye tekhnologii, kak sredstvo individualizirovannogo obucheniya studentov fiziko-matematicheskih special'nostej. Avtoreferat dissertacii ... kandidata pedagogicheskih nauk*] Krasnodar,

4. Egorychev D.N., Egorychev A.D. (2023) Directions of the influence of neural networks on the economy, business and education // Economic and social-humanitarian research. [*Napravleniya vliyaniya nejrosetej na ekonomiku, biznes i obrazovanie // Ekonomicheskie i social'no-gumanitarnye issledovaniya*] No. 2 (38). pp. 25-33

5. Ilinykh T.V. (2023) Analysis of the use of neural networks for studying a foreign language: advantages and disadvantages // In the collection: Modern strategies and digital transformations of sustainable development of society, education and science. Collection of materials of the X International Scientific and Practical Conference. Moscow [Analiz ispol'zovaniya nejronnyh setej dlya izucheniya inostrannogo yazyka: preimushchestva i nedostatki // V sbornike: Sovremennye strategii i cifrovye transformacii ustojchivogo razvitiya obshchestva, obrazovaniya i nauki. Sbornik materialov X Mezhdunarodnoj nauchno-prakticheskoj konferencii. Moskva] pp. 69-74

6. Kozlova N.Sh. (2019) Digital technologies in education. Bulletin of Maikop State Technological University. [Cifrovye tekhnologii v obrazovanii. Vestnik majkopskogo gosudarstvennogo tekhnologicheskogo universiteta] No. 1 (40): 85-93

7. Kravchenko O. N. (2023) Formation of intercultural communicative competence in modern conditions: neurodidactic approach, neural networks, social networks // Virtual communication and social networks. [Formirovanie mezhkul'turnoj kommunikativnoj kompetencii v sovremennyh usloviyah: nejrodidakticheskij podhod, nejroseti, social'nye seti // Virtual'naya kommunikaciya i social'nye seti] No. 2. [Electronic resource] URL: https://cyberleninka.ru/article/n/formirovanie-mezhkulturnoy-kommunikativnoy-kompetentsii-v-sovremennyh-usloviyah-neyrodidakticheskiy-podhod-neyroseti-sotsialnye (date of access: 01.06.2024).

8. Kurbanova Z.S., Ismailova N.P. (2023) Neural networks in the context of digitalization of education and science The world of science, culture, education. [Nejroseti v kontekste cifrovizacii obrazovaniya i nauki Mir nauki, kul'tury, obrazovaniya] No. 3 (100). pp. 309-311.

9. Torkunova Yu.V., Kostyleva D.M. (2020) Formation of digital skills in an electronic information and educational environment using neural network technologies. Modern teacher education [Formirovanie cifrovyh navykov v elektronnoj informacionno-obrazovatel'noj srede s ispol'zovaniem nejrosetevyh tekhnologij. Sovremennoe pedagogicheskoe obrazovanie] No. 5: 107-110.

10. Managing changes in education: generative AI (2023) [Electronic resource]: research report // SberUniversity: [educational platform]. [*Upravlenie izmeneniyami v obrazovanii: generativnyj II [Elektronnyj resurs]: otchet ob issledovanii // SberUniversitet: [obrazovatel'naya platform]*] 31.03.2023. URL: https://sberuniversity.ru//upload/research/Generativyj_II_issledovanie_SUji_GB.pdf (access date: 02.06.2024).]

11. Filatova O.N., Bulaeva M.N., Gushchin A.V. (2022) Application of neural networks in professional education // Problems of modern pedagogical education. [*Primenenie nejrosetej v professional'nom obrazovanii // Problemy sovremennogo pedagogicheskogo obrazovaniya*] No. 77-3. pp. 243-245

12. Chemarina A.V. (2023) The role of neural networks in the modern education system. In the collection: Points of scientific growth: at the start of a decade of science and technology. Materials of the annual scientific and practical conference of teachers based on the results of research for 2022. [*Rol' nejrosetej v sisteme sovremennogo obrazovaniya. V sbornike: Tochki nauchnogo rosta: na starte desyatiletiya nauki i tekhnologii. Materialy ezhegodnoj nauchno-prakticheskoj konferencii prepodavatelej po itogam NIR za 2022*] Krasnodar,. P. 591-593

13. Ilinykh T.V. Critical review of the negative impact of neural networks on foreign language learning // In the collection: Theoretical and applied issues of economics, management and education. Collection of articles of the IV International Scientific and Practical Conference. [*V sbornike: Teoreticheskie i prikladnye voprosy ekonomiki, upravleniya i obrazovaniya. Sbornik statej IV Mezhdunarodnoj nauchno-prakticheskoj konferencii. Pod nauchnoj redakciej B.N. Gerasimova*] Ex. Ed. B.N. Gerasimova. Penza, 2023. pp. 150-154