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The significance of digital technologies in fostering the development of communicative competence among the prospective doctors

La importancia de las tecnologías digitales para fomentar el desarrollo de la competencia comunicativa entre los futuros médicos

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Abstract

Future doctors are expected to possess a high level of professional skills, as reflected by their acquisition of proficient communication competence. The purpose of the article is to determine the role of digital technologies in the formation of communicative competence of prospective doctors. The objective was attained through the use of observation, analysis and weight coefficient, efficiency coefficient, Spearman's correlation coefficient. It was established that the development of communicative competence skills

primarily allows to ensure the relevant orientation to the communication conditions (1.6) as well as informativity (1.53). To cultivate the communication proficiencies of prospective medical professionals, the authors developed corresponding approaches that included the use of digital technologies. The study of theoretical material involved the use of the SlideDog application; conducting practical classes via Medvoice Platform. The formation of professional competence involved the role-playing of relevant situations, based on the materials of the Pediatric Dentistry Academy, CARE-NExT-PG. After determining the level of students' communication skills development in Group 1 (40.2) and Group 2 (40.1), it was established that they attained a high level. The development of communication skills contributed to the formation of students' communication and social skills, as well as skills of abstract thinking and statistical information processing. The practical significance of the study lies in the elaboration of effective approaches to the development of prospective doctors' communication skills drawing on the use of digital technologies. Research perspectives may be linked to the comparison of the level of communicative competence among medical students across various academic levels.

Keywords: communicative and competency skills, digital applications, professional terminology, role-playing the professional situation, transfer of content.

Resumen

Se espera que los futuros médicos posean un alto nivel de habilidades profesionales, como lo refleja la adquisición de una competencia comunicativa competente. El objetivo del artículo es determinar el papel de las tecnologías digitales en la formación de la competencia comunicativa de los futuros médicos. El objetivo se logró mediante el uso de observación, análisis y coeficiente de ponderación, coeficiente de eficiencia, coeficiente de correlación de Spearman. Se estableció que el desarrollo de las habilidades de competencia comunicativa permite principalmente asegurar la orientación adecuada a las condiciones de comunicación (1.6) así como a la informatividad (1.53). Para cultivar las habilidades comunicativas de los futuros profesionales médicos, los autores desarrollaron enfoques correspondientes que incluían el uso de tecnologías digitales. El estudio del material teórico implicó el uso de la aplicación SlideDog; Realización de clases prácticas a través de la Plataforma Medvoice. La formación de la competencia profesional implicó la dramatización de situaciones relevantes, con base en los materiales de la Academia de Odontología Pediátrica, CARE-NExT-PG. Luego de determinar el nivel de desarrollo de las habilidades comunicativas de los estudiantes del Grupo 1 (40.2) y Grupo 2 (40.1), se estableció que alcanzaron un nivel alto. El desarrollo de habilidades comunicativas contribuyó a la formación de habilidades sociales y comunicativas de los estudiantes, así como habilidades de pensamiento abstracto y procesamiento de información estadística. La importancia práctica del estudio radica en la elaboración de enfoques eficaces para el desarrollo de las habilidades comunicativas de los futuros médicos basándose en el uso de tecnologías digitales. Las perspectivas de investigación pueden estar vinculadas a la comparación del nivel de competencia comunicativa entre estudiantes de medicina en varios niveles académicos.

Palabras clave: aplicaciones digitales, habilidades comunicativas y competenciales, role-playing de la situación profesional, terminología profesional, transferencia de contenidos.

1. Introduction

The utilization of information technologies has a significant impact on the enhancement of the educational process, as evidenced by communication advances, knowledge acquisition, etc.. This is largely attributed to the wider availability of scientific resources and integration of diverse materials into academic curriculum. By implementing digital technologies in a well-structured learning environment, one can effectively foster communicative competence among future medical professionals (Zhao et al., 2019; Silkens et al., 2023). Such competency is instrumental in enabling doctors to accurately diagnose patients and perform

professional responsibilities proficiently. Therefore, probing deeper into this topic remains pertinent for further research endeavors.

The concept of communicative competence is aimed at establishing contacts with people, taling into considering the attained knowledge and expertise to ensure effective communication (Gummesson et al., 2023). The formation of communicative competence is indispensable in ensuring professional success as a result of professional interpersonal contacts. Communication facilitates the assistance provision on any subject matter, as well as enables efficient engagement with colleagues, availability of resources for effective interaction (Chaban et al., 2021; Babinets et al., 2022). High-profile communication can be ensured as a result of high-quality use of language tools, development of communication culture. Moreover, maintaining efficient interaction allows to ensure the formation of professional competence. To that end, one needs to have general communication skills, a developed outlook, as well as specialized expertise in a specific area. During communication, it is important to engage emotionally, thus contributing to people's commitment to establish appropriate contact. The cultivation of effective communication skills in aspiring medical professionals must be closely linked to the refinement of articulate speech, as well as the mastery of language tools (Muller & Konecny, 2023; Kawamura et al., 2023). Furthermore, it necessitates the capacity to reproduce the former communication subjects in order to construct a comprehensive understanding, furnish proficient suggestions, etc. However, professional communication should rely on the appropriate medical terminology that is scientifically substantiated.

The utilization of digital technologies, which serve as instruments for producing and storing data in a digitalized format, enables the attainment of an elevated degree of professional aptitude. Digital technologies are technical means that promote rationality in education and ensure the development of the competitiveness of the future qualified specialist (Lisetska, 2020). One of the digital technologies that can enhance the learning process is electronic coursebooks, study program complexes, tools for online control, etc. The effectiveness of digital technologies in education is related to the formation of independence, logical thinking, the development of new knowledge, interaction with other students (Marler & Ditton, 2021). The successful professional activity of the future doctor should be associated with the formation of ethical values that will contribute to ensuring a holistic practical implementation. Digital technologies promote teamwork, which is reflected in value orientation, formation of professional paradigms and so forth (Sodomora et al., 2021). Given the above, the development of communication skills of future doctors is indispensable for obtaining professional information, ensuring cooperation, forming scientific achievements, etc.

The exploration of the theoretical framework made it possible to identify the overarching significance of communication in fostering future doctors' professional growth, with particular emphasis on leveraging digital technologies. Research gaps pertain to devising tailored training mechanisms for prospective medical professionals using digital tools that allow for the development of their communication skills. The purpose of the current study is to ascertain how digital technologies contribute towards cultivating effective communicative competence among future doctors.

The authors established the following objectives to achieve their goal:

- to ascertain the necessity of cultivating communication proficiencies among prospective doctors by emphasizing the significance of predetermined criteria through the weighting factor;
- to devise the applicable approaches to enhancing the communicative proficiency of prospective dentists and military medical officers with a specialization in "Medical business" through the utilization of digital technologies;
- to determine the level of students' acquired communication skills as a result of using the efficiency factor;

- to determine the development level of additional skills in medical students as a result of orientation towards approaches to the formation of communicative competence of prospective medical professionals.

2. Literature review

Digital technologies have become widespread in the education of prospective medical professionals, which contributes to the development of their professional skills. The feasibility of the process is attributed to the use of appropriate tools that are seamlessly incorporated into the training program. Typical strategies pertaining to digital technologies include the advancement of computer systems for data processing and communication purposes. As noted by Esposito et al. (2023), digital technologies promote flexibility in learning that is not limited to specific frameworks. The application of artificial intelligence is important not only for practicing medical professionals., but also for future doctors. To work with artificial intelligence, relevant skills should be developed in the medical education system. The analysis of medical students' questionnaires completed at the University of Lübeck and the University Hospital of Tübingen made it possible to determine their positive attitude towards chatbots. Current research has it that the use of artificial intelligence not only enables the identification of potential risks, but also reflects the provision of structured learning (Moldt et al., 2023). In this light, the development of digital technologies contributes to the systematization of medical care, which allows for remote diagnostics. Ensuring high-quality communication makes it possible to enhance the accuracy of information collection, which will contribute to timely decision-making. This is evidenced by the development of individual and societal competencies stemming from the dynamic delivery of information and prompt decision-making. Therefore, digital competence should be developed in the learning process, which will ensure the formation of professional skills (Salem et al., 2022).

Information technologies contribute to the improvement of medical students' communication skills. Yet, it is expedient to ensure reframing and recalibration of perception, as well as to form experiential learning. In the realm of medical training, it is imperative to prioritize certain objectives that will guarantee the automation of healthcare services and ultimately enhance patient well-being. The incorporation of digital technologies must be closely connected to one's professional duties. This makes it possible to substantiate the relevance of such training, which is reflected in the motivation of students (Garling, 2022). The formation of medical students' communication skills contributes to the development of empathy and professional development, as it provides a more personal approach to each patient. The creation of discussion groups presents an opportunity for the enhancement and refinement of medical students' communication abilities, which provide for the discussion of the read text, a lecture, or a film on a professional topic. Such an approach to education made it possible to ensure the development of reflection among students at a professional level, the use of applicable communication strategies. When conducting research, it is crucial to consider the principle of prioritizing patient needs and preferences, which contributes to the development of mindfulness, self-reflection in students (Leijenaar et al., 2023). The development of communication skills in the framework of interaction between the future doctor and the patient in training is a limited issue. With that in mind, it is necessary to develop a science-based educational training program, which will be focused on the communicative interaction of future doctors. This can be achieved through blended learning – online and offline approaches that promote an effective hands-on interaction with patients (Houwen et al., 2022).

It is worthy of note that it is feasible to enhance the communication skills of prospective doctors through their involvement in general practice, namely during outpatient appointments. This is due to the possibility of providing face-to-face meetings between the doctor and the patient, which is related to obtaining and providing professional information. During the training, the level of medical subjects in the area of humanities should be raised and the number of practical classes should be expanded (Zhao et al., 2023). Evidently, the Chat Generative Pre-Trained Transformer (ChatGPT) can be used in medical education. This

pertains to the development of personalized methodologies in pedagogy, the design of practical classes, the solution of clinical problems, which contributes to more effective learning. However, the use of digital technologies should be moderate, excluding their mindless overuse. Nevertheless, digital technologies can have a positive impact on the development of clinical reasoning skills, independent learning, practical skills, and systemic logical thinking. ChatGPT allows ensuring the development of humanistic skills of students, to improve the accuracy of diagnosis due to the development of communication skills (Qu et al., 2023).

After the analysis of a substantial body of scholarly literature, a number of studies was identified highlighting the significance of cultivating effective communication skills in prospective medical practitioners. However, among the gaps in this field of inquiry, one can distinguish the lack of relevant methodologies for ascertaining communication skills through employment of specialized digital technologies.

3. Methods

3.1. Research Procedure

The research procedure involved three interrelated stages. At the first stage of the research, the benefits arising from the acquisition of communication skills were investigated. Also, among the highlighted advantages, the research identified the most significant ones that must be taken into account during training. At the second stage of the research, it was envisaged to develop additional approaches to learning that will contribute to the development of communicative competence. The elaborated approaches presented an additional element to the adopted research program, which included an emphasis on the development of communicative competence. Approaches to learning provided for the development of communicative competence for students who studied at the Department of Pediatric Dentistry. The same approach was applicable to the students of the department of emergency medicine and military medicine, specialization "Medical business". The duration of the training with the development of communication technologies comprised 5 months.

At the third stage of the research, the level of communication skills development in students of various specialties was established. Furthermore, this stage provided for the determination of additional skills of students, which were related to the formation of communicative competence of medical professionals.

3.2. Formation of the Sample

A total of 115 individuals, who were enrolled in a program to pursue a career as pediatric dentists and were assigned to Group 1, participated in the study. Additionally, there were 108 students specializing in "Medical business" from Lviv National Medical University named after Danylo Halytskyi and Kharkiv National Medical University, who took part in the research as Group 2 and pursued a career of military doctors. For the selection of respondents, the analysis method was utilized, which provided abstraction regarding the sample of respondents, taking into account the relevant and non-relevant criteria. Using the evaluation of individual characteristics, it was possible to determine the preferences of some respondents of the sample over others. The inclusion criteria involved a cohort of second-year students to establish uniformity among all participants. Moreover, as for the sample of research participants, it was envisaged that they would obtain a medical specialization to develop professional communicative competence. Limitations were related to specialization, which involved the selection of particular digital technologies that would contribute to that line of research. The exclusion criteria involved the restrictions on the sample of first-year students in view of the fact that their training program included many general subjects that do not affect the formation of professional competence. Respondents had a conscious choice to participate in the study and were informed about the provision of statistical observation of the learning process by independent researchers.

3.3. Methods

Determining the advantages of communicative competence of prospective doctors became possible due to the use of the general theoretical method of observation. The observation method consisted in determining the level of professional communication among first-year, fifth-year students, as well as internship students. As a result of observing students, it was intended to ascertain the factors that influence the establishment of effective communication as well as how is it related to the development of professional skills. It was also planned to determine which of the criteria were more significant in the formation of professional competence using a weighting factor. The authors determined the weighting factor with a particular emphasis on the specific research characteristics.

$$y_{\text{в}} = \frac{a_d \times p_c}{a_h}, \quad (1)$$

p_c – the weight of the selected preference in comparison with other criteria;
a_h – the highest weight of established advantages, which was determined by the authors of the article (equal to 10);
a_d – the complexity of achieving a separate indicator during the development of communication skills.

The elaboration of approaches aimed at the development of communicative competence of future doctors in the basic education system involved the analysis of various sources (Son et al., 2018; Hagiwara et al., 2019; Ortega et al., 2021; Sekar et al., 2021).

In the course of elaborating of the approaches, the criteria that are interrelated with the development of professional competence of future doctors were taken into account. Upon analysis, it was determined that the attainment of a higher level of communication skills is possible due to the use of digital technologies. The utilization of digital technologies was also aimed at motivating the future doctors. The choice of digital technologies primarily involved a focus on professional specialization. Among 74 different digital applications, SlideDog, Medvoice Platform, Pediatric Dentistry Academy, CARE-NExT-PG, Kahoot were selected. Their selection was aimed not only at professional information acquisition, but also at the development of communication skills.

Determining the overall level of communication skills involved the use of the efficiency coefficient formula as follows, which was prepared by the authors. The level of communication skills was determined among students of different groups. The level of communication skills was determined drawing upon the observation of students during the entire study period and during the control exam. At the control exam, the students were given the task of role-playing a specific situation that needed to be addressed by the doctors. Additional skills were also identified that were developed among students during the development of communication skills

$$r_{ef} = c_s + c_e + c_p, \quad (2)$$

c_s – future doctors are awarded points for the development of communication skills during the entire period of study;
c_e – future doctors were awarded points for the development of communication skills on the basis of a control exam;
c_p – the level of professional competence of future doctors.

3.4. Data Analysis

To verify the obtained numerical results, additional statistical calculations were performed in the study based on the Spearman rank correlation coefficient (Barabash et al., 2021). A statistical comparison of the obtained numerical results was carried out when determining the importance of the advantages of the communication skills development, ascertaining the level of their formation. A statistical comparison of the skills held by students was also carried out. If the calculated value is within the range of less than 0.3, then a low level of relationship between the presented values is present:

$$p = 1 - \frac{6\sum d^2}{n(n^2-1)}, \quad (3)$$

n – the quantity of research metrics available for comparison purposes;
$\sum d^2$ – the sum of squares between rank indicators.

3.5. Ethical Criteria

Adherence to ethical standards was a fundamental prerequisite for the research. In accordance with the ethical criteria of the Guidelines for Research Ethics in Science and Technology (Mikkelsen et. al, 2016), it was planned to ensure correct data collection, which does not contradict the requirements of international communications. The authors confirm the absence of data falsification that is not related to the conducted research.

4. Results and discussion

At the initial stage of the study, an evaluation was conducted to identify potential advantages that could result from enhanced communicative competence among prospective doctors. The said research phase entailed identifying the most notable benefits associated with improving communication skills, which require the greatest emphasis during training (Figure 1).

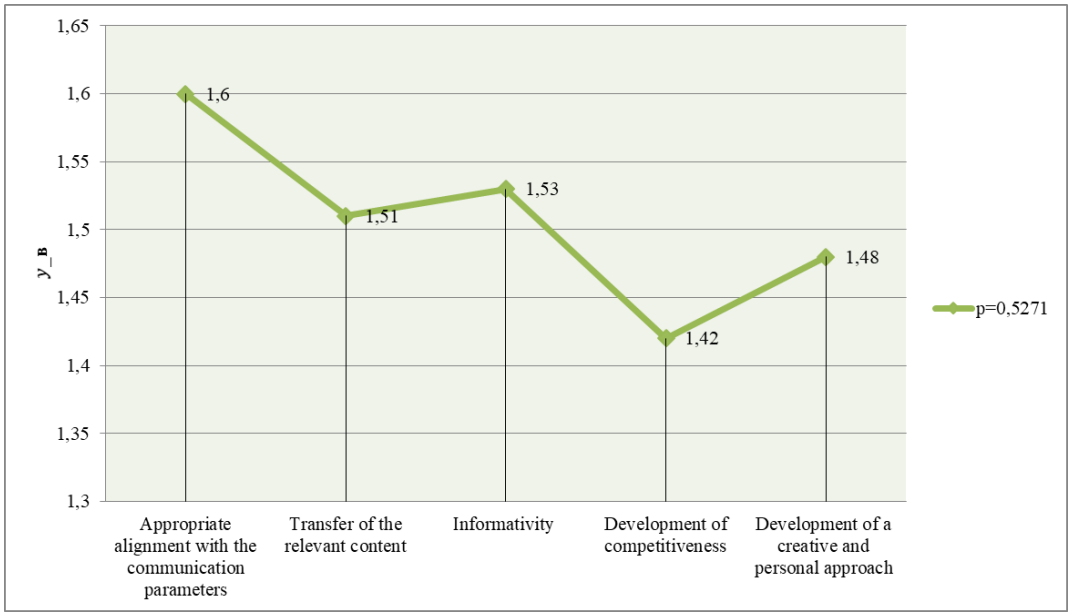

Figure 1. The significance of benefits derived from the development of future doctors' communicative professional skills.

The development of communicative competence of future doctors primarily affects the relevant orientation to the conditions of communication. This enables efficient navigation of pertinent subjects, facilitating the preparation of a competent professional conversation. The relevant orientation to the communication conditions also contributes to the determination of the accurate diagnosis, focusing on the patient's complaints, which allows prescribing high-quality treatment. *Informativity* is also important, which affects the quality of the speech process and allows one to master professional vocabulary. From this perspective, it can enable the doctor to regulate the psychological impact on the patient and professionally inform about the diagnosis, which ensures productivity and effectiveness of professional activity. Informativity is reflected in the formation of the doctors' professional culture. *The conveyance of accurate information* is linked to its informativeness and serves as a reflection of the doctor's actions. Such conveyance must be rooted in the physician's awareness and composure, which impact their ability to regulate any sensual aspects. This indicator enables the adjustment of knowledge and appropriate response to patient diagnoses. Additionally, it fosters a positive outlook towards the treatment regimen among patients.

The development of a creative and personal approach during communication allows to increase the efficiency of the doctor-patient interaction. Moreover, this approach is reflected in the improvement of the quality of activities in medical practice. A personal approach contributes to obtaining positive dynamics during the interaction with the patient. For a medical practitioner, *cultivating competitiveness* is crucial and this can be demonstrated through effective communication with patients. Utilizing appropriate language facilitates the acquisition of essential knowledge, which affects the professional motivation and improvement of the doctor's qualification level.

Focusing on the established advantages of the future doctors' communicative competence development, the authors identified specific approaches to ensure the students' relevant training. The elaborated learning approaches involved the use of digital technologies as follows (Figure 2).

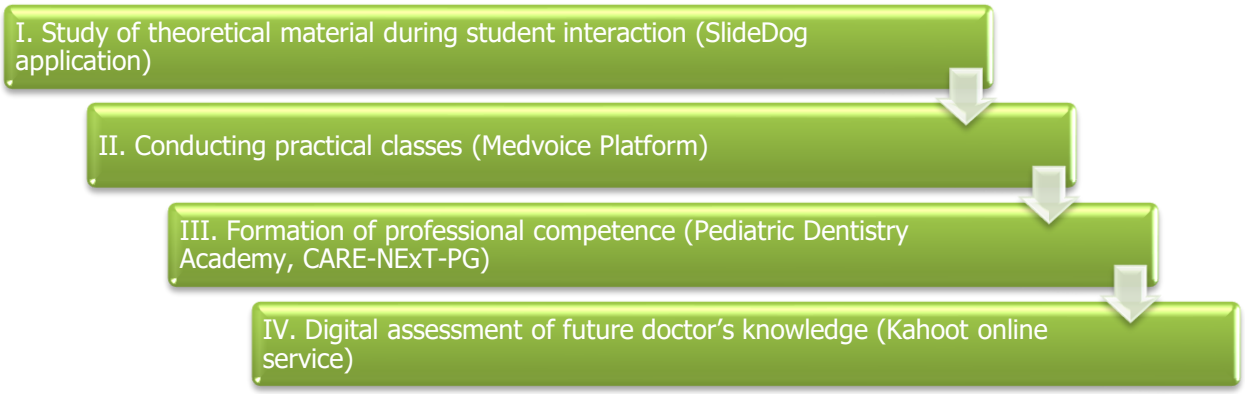

Figure 2. Approaches to the development of prospective doctors' communicative competence based on the use of digital technologies

I. The study of theoretical material became possible due to the use of the SlideDog application. The application is aimed at conducting classes in the form of presentations, which allows for visual perception of materials. In addition, information can be provided not only with the help of text, but also with charts, drawings, video materials. The study of theoretical concepts necessitated the incorporation of practical applications, including comprehensive comprehension of specialized jargon and medical apparatus. Theoretical classes for dentists involve studying the criteria of intraoral scanning, studying approaches to radiological methods, understanding approaches to digital design of teeth. Furthermore, during the perception of theoretical information, it is necessary to determine the approaches to the rehabilitation of simple and complex cases. For students of the specialization

"Medical business" there is a definition of approaches to the diagnostic function, patient care, preventive, rehabilitation function; ensuring the principles of high-quality emergency care during accidents. Understanding patient diagnostic approaches during training is aimed at predicting possible consequences, carrying out invasive interventions. In order to cultivate effective communication skills, it was envisaged that collaboration within the team would be prioritized. Learning information using the SlideDog application involved discussing it in groups of students. The students were presented with a separate situation that needed to be solved on the basis of the acquired knowledge. The approach allowed not only the development of general erudition, but also the solution of non-standard situations in groups, which contributes to the development of communication skills.

II. Practical classes during the training of future doctors involve an orientation to interactivity within the framework of laboratory classes. Practical classes were conducted in specialized laboratories with the availability of appropriate tools, which contributed to the consolidation of the acquired theoretical knowledge. The use of interactive Medvoice Platform technology provides a visual perception of determining the approaches to the stages of conducting laboratory classes. Dividing students into groups allows to enhance the communication between them, including focusing on the stages of conducting laboratory work using the Medvoice Platform. After performing the laboratory work, the group of students was expected to present its results, which was aimed at the development of professional speaking competence. Facilitating hands-on sessions entails the cultivation of conceptual reasoning and comprehension of professional activity.

III. The formation of professional competence involved conducting a role play among future doctors. This involved the role-playing of a relevant situation from professional medical activity with the distribution of students' roles. The training stage was aimed at mastering professional skills, as well as behavioral reactions and professional communication. The formation of professional competence involved conducting theoretical classes by students and the development of practical skills. During training, students could use the Pediatric Dentistry Academy and CARE-NExT-PG applications. The focus on applications contributed to a better perception of educational information, which made it possible to conduct theoretical classes while fluently possessing professional knowledge. During the staging of the corresponding situation, the applications facilitated orientation to professional materials for determining clinical diagnosis, approaches to treatment, etc. Additionally, at this stage students had to comply with relevant ethical and legal norms. Completing professional documentation was one of the elements of training.

IV. During training, it was also planned to provide digital assessment of the future doctors' knowledge. The training stage was implemented utilizing the Kahoot online service. The service offers the creation of quizzes, discussions in learning conditions that develop teamwork. It also provides for testing knowledge in a test format, which contributes to the facilitation of scientific, methodical, and organizational activities. The knowledge assessment is aimed at determining the level of knowledge regarding the understanding of individual diseases, features of the human body. Moreover, the assessment involves students' understanding of the specifics while determining the patient's condition, including and psychological, which is related to the development of communication skills.

Conducting the research involved determining the general level of development of students' communication skills as a result of orientation to the developed approaches to learning. The results were obtained among future dentists (Group 1) and military doctors (specialization "Medical business") (Group 2) (Figure 3).

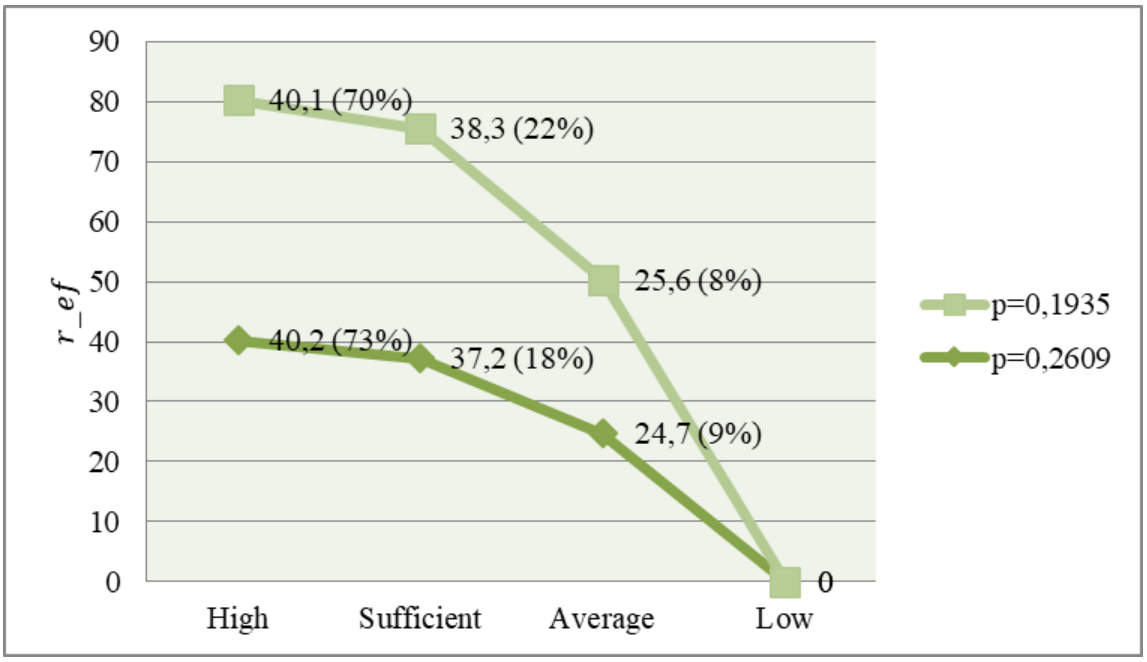

Figure 3. The level of communication skills development among prospective doctors in different groups

During the study, it was determined that a majority of the prospective doctors in both groups demonstrated exceptional communication abilities. This is due to the fact that the students were fluent in professional information, which allowed them to actively solve a particular role-played situation. It should be noted that such results indicated the achievement of a high level of proficiency, as it involves the relevant use of theoretical knowledge to solve practical problems. Students were able to reasonably use professional data, utilize applicable methodologies to delineate an accurate clinical scenario, and execute suitable diagnostic procedures.

A sufficient level of communication skills was also common among students of different groups. The students of Group 1 were able to provide the most qualitative treatment of dental problems, which is draws upon the implementation of specific algorithms. However, additional study was needed to combine the different results regarding the CT scan and the appropriate follow-up. Students of Group 2 mastered the skills of conducting primary diagnostics, which was reflected in high-quality communication. However, additional knowledge was needed to identify approaches to mitigate the onset of further ailments.

A low level of knowledge was not evident among future doctors, while a modest degree of proficiency was noted in a minority of students. Apparently, this is due to the lack of students' active participation in the discussion during the role-playing of individual situations and work in groups.

After the training, the skills that were acquired by the future doctors were also highlighted. The characterization of refined skills was linked to the cultivation of proficient and effective communication skills (Table 1).

Table 1.
The acquired skills of future doctors during the formation of communication

Variety of skills	Indicators of Group 1	Indicators of Group 1	p
Cognitive skills	26%	29%	0,8602
Social skills	28%	27%	0,9317
Statistical information processing skills	24%	23%	0,9510
Abstract reasoning skills	22%	21%	0,8024

The results of the study showed that cognitive skills were well-developed among future doctors, which facilitated the cultivation of critical and logical reasoning in the process of communication. Furthermore, cognitive skills made it possible to develop critical thinking, which was reflected in tackling quickly certain problems. Also, the development of cognitive skills was shown in the creative thinking of future doctors, which affected the ability to analyze a particular situation. This made it possible to identify the problem in the process of communication and solve it on the basis of professional knowledge. The development of social skills guaranteed the quality communication between different students, which made it possible to ensure teamwork. Social skills were aimed at identifying approaches to intercultural understanding. It is worthy of note that social skills are essential to creating a dynamic doctor-patient relationship. The skills of statistical processing of information contribute to the formation of responsibility for solving individual cases related to professional activity. Statistical processing of information allows to ensure high-quality performance of professional tasks, which affects the adequate understanding of the initial data from the patient for diagnosis and methods of treatment. Abstract thinking skills are of the utmost importance for the development of professional competence, as they will allow making accurate and well-grounded decisions. Abstract reasoning was manifested in formulating pertinent judgments for evaluating specific circumstances.

Effective communication between physicians and patients leads to improved treatment outcomes. Ensuring high-quality communication is possible due to the involvement of patients in training. Such an approach allows future doctors to form personal-oriented care for an individual patient (Eijkelboom et al., 2023). High-tech digital technologies contribute to the development of medical skills, including and communication skills. An intelligent environment allows for automation between a person and the medical system. Online visualization facilitates enhanced comprehension of educational information, fostering the acquisition of professional knowledge and promoting opportunities for communication development (Salem et al., 2019). The digital revolution in higher education has made the study of medical students more intricate. Chatbots can help build communication skills in everyday conversations by focusing on validated digital tools. This approach allows reducing the level of stress in communication due to the involvement of digital assistants. Consequently, this impacts the favorable reception of information among fellow students (Moldt et al., 2022). Our article also presents aspects of the digital transformation of medical education. Yet, the emphasis is placed on enabling digital technologies to develop professional communication skills.

To cultivate the communication skills of prospective doctors, it is feasible to administer a thoroughly organized methodical instruction. In this light, communication skills should be manifested in the production of diction, active listening and interview with the patient, empathy, acting technique. The development of future doctors' communication skills should be patient-centered. With that in mind, online stimulators can be used in the professional training of medical students, which can be combined with the Miller system. Miller's system involves the development of communicative competences based on a structured program that promotes science-based learning (Patra, 2022). Involving the gamification approach in the training of future doctors can impact the formation of communication skills even in the most unpredictable situations. Modeling the role of the patient by students allows for the development of individual communication skills. In the course of the training, the development of personal skills, joint training, and the implementation of educational standards were taken into account, which affects the enhancement of future doctors'

competence. The development of a professional identity influences a better interaction with the patient (Erici et al., 2023). In general medicine, numerous physicians encounter difficulties in effectively communicating with their patients during consultations. Therefore, during training the following communication elements should be taken into account, namely: psychosomatic research, development of empathy, adequate perception of the problem and ongoing discussion. In order to achieve this objective, physicians ought to possess a heightened level of cognitive awareness, be ready to evaluate the individual needs of patients and conduct daily practice (Houwen et al., 2021). Effective communication is an important element of medical practice based on professional skills, queries, improvement of listening skills as well as information processing. Communication skills are essential to ensure proper counseling. Their development is possible only as a result of conscious and meaningful training aimed at effective communication of prospective medical professionals (Salam et al., 2022). In our article, in contrast to the presented works, the development of communication skills was an integral part of training. The process involved the creation of student groups to activate thinking and develop communication skills.

The integration of information technologies in education has undeniably enhanced the quality of learning, yet it necessitates an increased level of communication skills. To optimize this approach, a distinct curriculum plan can be developed that can contribute to the optimization of training. The refinement of professional knowledge is indispensable to enhance communication skills; however, their elaboration should also be ensured to facilitate seamless adaptation during unconventional scenarios (Baumgartner et al., 2022).

Having analyzed the relevant scientific literature, it was established that digital technologies are increasingly used to cultivate the future physicians' professional skills. However, the utilization of said technologies for enhancing communication skills was explored superficially. The current study outlines methods for developing professional communication skills among future doctors through the implementation of digital tools. After providing such training, Following such training, significant changes were observed in the formation of communication skills among students pursuing specializations in "Pediatric dentistry" and "Medical business." Additionally, indispensable proficiencies acquired during their studies were identified.

5. Conclusions

The conducted research facilitated the achievement of the set goal. Initially, the authors identified potential benefits that could arise from improving future doctors' communicative competence. It was determined that effective communication primarily enables accurate identification of communication contexts (1.6), leading to correct diagnoses and quality treatment outcomes. Additionally, the formed communication skills are essential for conveying informative content (1.53) with precision (1.51), which testifies to a doctor's competence and commitment level. The development of innovative and personalized approaches as well as competitiveness are also pivotal components in enhancing communicative competence, contributing to professional growth among medical practitioners.

To enhance the cultivation of professional competence, the authors elaborated relevant methodologies. Those comprised a thorough examination of theoretical concepts via presentation materials and videos, as well as practical sessions that were conducted in groups of students. To consolidare professional expertise, individual role-played scenarios were addressed. The evaluation of medical students' aptitude was conducted using Kahoot online platform for digital assessment. Overall, training included the creation of separate student groups to foster communication capabilities and proficiency in digital technologies such as SlideDog, Medvoice Platform, Pediatric Dentistry Academy, CARE-NExT-PG, Kahoot.

The of the five-month training showed that a high level of professional communication skills (40.2) was achieved among the students of Group 1 (future dentists). Also, who were studying to be military doctors specializing in "Medical business" (40.1). Mostly, a high and sufficient level of communication skills was

formed as a result of substantiation of professional information, competent solution of the set practical tasks. Cognitive, social skills, statistical information processing skills, and abstract thinking were also developed among the future doctors, which is connected with the achievement of a high level of professionalism of the future doctors.

The end of the five-month training program revealed that Group 1, consisting of aspiring dentists, achieved a remarkable level of professional communication skills (40.2). Similarly, predominantly high results were achieved among the respondents of Group 2 who were pursuing medical studies with specialization in "Medical business" also scored high (40.1) on this metric. The achievement of such impressive results can be attributed to their adept handling of practical tasks and proficient utilization of professional data. This rigorous training has not only fostered cognitive and social skills but has also honed their statistical information processing abilities and abstract thinking capabilities, which are all crucial components for becoming successful physicians in the future.

The practical significance of the study lies in assessing the efficacy of digital technologies in fostering communicative competence future doctors, with a particular emphasis on qualitative approaches to the organization of training. Future research may explore the extent to which interactive and traditional training foster the development of professional communication skills.

6. Bibliographic references

Babinets, L. S., Borovyk, I. O., Migenko, B. O., Botsyu, N. Ye., Korylchuk, N. I., & Halabitska, I. M. (2022). Holistic approach in communication skills teaching of medical students. *Wiadomosci Lekarskie, 75*(4), 1019-1021. https://doi.org/10.36740/WLek20220420118

Barabash, O., Weigang, G., Dychko, A., Belokon, K., & Zhelnovach, G. (2021). Modeling a Set of Management Approaches for the Effective Operation of the Environmental Management System at the Business Entities. *Ecological Engineering & Environmental Technology, 22*(6), 1-10. https://doi.org/10.12912/27197050/141895

Baumgartner, M., Sauer, C., Blagec, K., & Dorffner, G. (2022). Digital health understanding and preparedness of medical students: a cross-sectional study. *Medical Education Online, 27*(1), 2114851. https://doi.org/10.1080/10872981.2022.2114851

Chaban, O., Khaustova, E., Omelyanovich, V., & Abdryakhimova, T. (2021). Experience of adaptation of the method communication skills attitude scale. *Psychiatry, Psychotherapy and Clinical Psychology, 10*(2), 252-266.

Eijkelboom, C., Brouwers, M., Frenkel, J., van Gurp, P., Jaarsma, D., de Jonge, R., ... & de la Croix, A. (2023). Twelve tips for patient involvement in health professions education. *Patient Education and Counseling*, 106, 92-97. https://doi.org/10.1016/j.pec.2022.09.016

Erici, S., Lindqvist, D., Lindström, M. B., & Gummesson, C. (2023). Three perspectives on learning in a simulated patient scenario: a qualitative interview study with student, simulated patient, and teacher. *Advances in Simulation, 8*(1), 10. https://doi.org/10.1186/s41077-023-00249-0

Esposito, S., Rosafio, C., Antodaro, F., Argentiero, A., Bassi, M., Becherucci, P., ... & Gaddi, A. V. (2023). Information and Training on the Use of Telemedicine in Pediatric Population: Consensus Document of the Italian Society of Telemedicine (SIT), of the Italian Society of Preventive and Social Pediatrics (SIPPS), of the Italian Society of Pediatric Primary Care (SICuPP), of the Italian Federation of Pediatric Doctors (FIMP), and of the Syndicate of Family Pediatrician Doctors (SIMPeF). *Journal of Personalized Medicine, 13*(2), 314. https://doi.org/10.3390/jpm13020314

Garling, K. A. (2022). Revitalization of a communication pharmacy course: The journey of reframing student perceptions. *Currents in Pharmacy Teaching and Learning, 14*(2), 138-144. https://doi.org/10.1016/j.cptl.2021.12.002

Gummesson, C., Alm, S., Cederborg, A., Ekstedt, M., Hellman, J., Hjelmqvist, H., … & Tejera, A. (2023). Entrustable professional activities (EPAs) for undergraduate medical education – development and

exploration of social validity. *BMC Medical Education, 23*(1), 635. https://doi.org/10.1186/s12909-023-04621-6

Hagiwara, N., Elston Lafata, J., Mezuk, B., Vrana, S. R., & Fetters, M. D. (2019). Detecting implicit racial bias in provider communication behaviors to reduce disparities in healthcare: Challenges, solutions, and future directions for provider communication training. *Patient Education and Counseling, 102*(9), 1738-1743. https://doi.org/10.1016/j.pec.2019.04.023

Houwen, J., de Bont, O. A., Lucassen, P. L., Rosmalen, J. G. M., Stappers, H. W., olde Hartman, T. C., & van Dulmen, S. (2022). Development of a blended communication training program for managing medically unexplained symptoms in primary care using the intervention mapping approach. *Patient Education and Counseling, 105*(5), 1305-1316. https://doi.org/10.1016/j.pec.2021.09.018

Houwen, J., Lucassen, P. L. B. J., Stappers, H. W., van Spaendonck, K., van Duijnhoven, A., Hartman, T. C. O., & Dulmen, S. V. (2021). How to learn skilled communication in primary care MUS consultations: a focus group study. *Scandinavian Journal of Primary Health Care, 39*(1), 101-110. https://doi.org/10.1080/02813432.2021.1882088

Kawamura, A. A., Brown, L., Orsino, A., Zubairi, M. S., & Mylopoulos, M. (2023). Navigating Challenging Conversations: The Interplay Between Inquiry and Knowledge Drives Preparation for Future Learning. *Perspectives on Medical Education, 12*(1), 304-314. https://doi.org/10.5334/pme.949

Leijenaar, E., Eijkelboom, C., & Milota, M. (2023). "An invitation to think differently": a narrative medicine intervention using books and films to stimulate medical students' reflection and patient-centeredness. *BMC Medical Education, 23*(1), 568. https://link.springer.com/article/10.1186/s12909-023-04492-x

Lisetska, I. S. (2020). Distance form of learning medical students as a challenge of today. *Modern Pediatrics. Ukraine, 7(111)*, 81-86. https://doi.org/10.15574/SP.2020.111.81

Marler, H., & Ditton, A. (2021). "I'm smiling back at you": Exploring the impact of mask wearing on communication in healthcare. *International Journal of Language and Communication Disorders, 56*(1), 205-214. https://doi.org/10.1111/1460-6984.12578

Mikkelsen, Ø., Hartvigsen, S. H., Hauge, K. H., Nordenson, S., Nordtveit, E., Nydal, R., ... & Ingierd, H. (2016). Guidelines for Research Ethics in Science and Technology. *Jahrbuch für Wissenschaft und Ethik journal*, *1*(02), 0021-2017.

Moldt, J.-A., Festl-Wietek, T., Madany Mamlouk, A., Nieseltc, K., Fuhl, W., & Herrmann-Werner, A. (2023). Chatbots for future docs: exploring medical students' attitudes and knowledge towards artificial intelligence and medical chatbots. *Medical Education Online, 28*(1), 2182659. https://doi.org/10.1080/10872981.2023.2182659

Moldt, J.-A., Festl-Wietek, T., Mamlouk, A. M., & Herrmann-Werner, A. (2022). Assessing medical students' perceived stress levels by comparing a chatbot-based approach to the Perceived Stress Questionnaire (PSQ20) in a mixed-methods study. *Digital Health, 2022*, 8. https://doi.org/10.1177/20552076221139092

Muller, R., & Konecny, L. T. (2023). Patient perceptions of the readability and helpfulness of bilingual clinical forms: a survey study. *BMC Medical Education, 23*(1), 607. https://doi.org/10.1186/s12909-023-04519-3

Nahornyi, V., Tiurina, A., Ruban, O., Khletytska, T., & Litvinov, V. (2022). Corporate social responsibility in modern transnational corporations. *Amazonia Investiga*, *11*(53), 111-121. https://doi.org/10.34069/AI/2022.53.05.11

Ortega, P., Moxon, N. R., Chokshi, A. K., Pérez-Cordón, C., & Park, Y. S. (2021). Validity Evidence Supporting the Comunicación y Habilidades Interpersonales (CAI) Scale for Medical Spanish Communication and Interpersonal Skills Assessment. *Academic Medicine, 96*(11), S93-S102. https://doi.org/10.1097/ACM.0000000000004266

Patra, S. (2022). Competency-based child and adolescent psychiatry curriculum for Indian medical graduates: Need of the hour. *Asian Journal of Psychiatry, 72*, 103150. https://doi.org/10.1016/j.ajp.2022.103150

Qu, X., Yang, J., Chen, T., & Zhang, W. (2023). Reflections on the Implications of the Developments in ChatGPT for Changes in Medical Education Models. Sichuan da xue xue bao. Yi xue ban = Journal of Sichuan University. *Medical Science Edition, 54*(5), 937-940.

Salam, A., Zakaria, H., Abdelhalim, A. T., Choon, L. C., Alsharkawy, A., Malaysia, P., … & Zainol, J. (2022). Communication Skills of Fresh Medical Graduates in a Malaysian Private University. *Bangladesh Journal of Medical Science, 21*(2), 404-412. https://doi.org/10.3329/bjms.v21i2.58074

Salem, M., Elkaseer, A., El-Maddah, I. A. M., Youssef, Kh. Y., Scholz, S. G., & Mohamed, H. K. (2022). Non-Invasive Data Acquisition and IoT Solution for Human Vital Signs Monitoring: Applications, Limitations and Future Prospects. *Sensors, 22*(17), 6625. https://doi.org/10.3390/s22176625

Salem, M., El-Maddah, I., Youssef, K., & Mohamed, H. (2019). Internet of things solution for non-invasive vital data acquisition: a step towards smart healthcare system. *Smart Innovation, Systems and Technologies, 155*, 387-397.

Sekar, D. R., Siropaides, C. H., Smith, L. N., & Nguyen, O. K. (2021). Adapting Existing Resources for Serious Illness Communication Skills Training for Internal Medicine Residents. *Southern Medical Journal, 114*(5), 283-287. https://doi.org/10.14423/SMJ.0000000000001247

Silkens, M. E. W. M., Alexander, K., Viney, R., O'Keeffe, C., Taylor, S., Noble, L.M., & Griffin, A. (2023). A national qualitative investigation of the impact of service change on doctors' training during Covid-19. *BMC Medical Education, 23*(1), 174. https://doi.org/10.1186/s12909-023-04143-1

Sodomora, P. A., Gutor, L. V., Tryndiuk, V. A., & Lobanova, S. I. (2021). Student storytelling for communication skill development online (In the time of covid-19 quarantine). *New Educational Review, 63*, 149-160. https://doi.org/10.15804/tner.21.63.1.12

Son, D., Shimizu, I., Ishikawa, H., Aomatsu, M., & Leppink, J. (2018). Communication skills training and the conceptual structure of empathy among medical students. *Perspectives on Medical Education, 7*(4), 264-271. https://doi.org/10.1007/s40037-018-0431-z

Zhao, T., Zhang, B., Ma, H., Han, H., Ma, L., Gao, X., Luo T., & Luo, H. (2023). Doctor-patient Communication Skills in Master Supervisors in General Practice during Outpatient Encounters: a Survey from Beijing. *Chinese General Practice, 26*(28), 3539-3543. https://doi.org/10.12114/j.issn.1007-9572.2022.0637

Zhao, T., Zou, X., Zhou, H., & Ma, H. (2019). General Practitioner-patient Communications in Outpatient Clinic Settings in Beijing. *Chinese General Practice, 22*(4), 413-416. https://doi.org/10.12114/j.issn.1007-9572.2019.04.009