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The Communicative Competence of Future Healthcare Professionals in the Era of Pharmaceutical Market Transformation and Modern Technologies

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Abstract

The transformation of the pharmaceutical market places increasing demands on the way educational processes are managed, especially in cultivating the professional competence of future healthcare professionals. This article examines how modern technologies play a role in the development of communicative competence in healthcare students amidst the evolving pharmaceutical market. The study reviews the application of digital tools and technologies throughout different stages of practical lessons. It clarifies the meaning of "communicative competence" and identifies its key elements: motivation, knowledge, and practical engagement. The research focused on 295 students enrolled in the Department of Pharmacy of the O.O. Bohomolets National Medical University, assessing their competencies before and after the intervention. Statistical analysis of the data collected pre- and post-experiment showed significant changes in the levels of competence (ranging from excellent to satisfactory) between the experimental and control groups. These findings confirm the positive impact of integrating modern technologies and web tools into the educational process, highlighting their role in effectively managing the development of communicative competence.

Keywords: Web tools, Pharmaceutical market transformation, Modern technologies, Communicative competence

Introduction

The World Health Organization underscores the principle that "there is no health without a workforce" [1], highlighting the essential need for equal access to a competent and adequately distributed health workforce as a foundation for achieving universal health coverage. Ensuring that patients receive pharmaceutical care depends on the deployment of a dynamic and responsive pharmaceutical workforce, capable of applying its knowledge and skillset effectively within interdisciplinary healthcare teams [2].

In response to the evolving demands of the pharmaceutical market, there is a growing emphasis on strengthening the education and competency development of future healthcare professionals. According to the World Health Organization and the International Pharmaceutical Federation, pharmacists of the future must demonstrate proficiency in a competency framework that includes: "1. Handling and managing medicinal products through their lifecycle; 2. Delivering efficient medication therapy management; 3. Pursuing continuous professional development; and 4. Enhancing healthcare system efficacy and contributing to public

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health initiatives" [3]. The overarching mission of contemporary pharmacy practice, as defined by these organizations, is "to contribute to improved health outcomes and support patients in the optimal use of medications." This mission includes several core responsibilities such as: ensuring accessible services, identifying and managing health concerns, promoting wellness, maximizing medication efficacy, minimizing risks, and responsibly utilizing scarce healthcare resources [3].

With these changes, the pharmacist's function has shifted dramatically—from a "product-focused" approach to that of a "caregiver" whose priority is person-centered pharmaceutical care and the safe, effective use of medications [4]. Additionally, pharmacists are now expected to fulfill broader roles such as educator, mentor, service innovator, manager, and researcher [4].

Educational transformation is now compelled to address pressing issues such as the alignment with humanistic values, the democratization of learning, and the enhancement of pedagogical strategies that support personalized learning, academic mobility, and remote education. These reforms aim to produce future professionals who are well-rounded and equipped for modern challenges. Personality development in students is more effectively fostered in a learning environment that promotes shared goals and collaboration, supports open dialogue, and reframes the teacher's role from disciplinarian to trusted advisor. Modern learning technologies are crucial in establishing such environments.

The onset of the COVID-19 pandemic profoundly altered the landscape of education, requiring the adoption of new approaches to preserve academic quality and student performance. This shift spurred the exploration and integration of innovative technologies for organizing practical lessons. Information and communication technologies (ICTs) have proven to be instrumental in developing communicative competence and enabling structured quality educational experiences. These tools support a range of functions including baseline assessments, instructional content delivery, skill-based exercises, interactive learning, as well as performance tracking and evaluation.

Achieving fluency in professional terminology is essential for future pharmacists and physicians, as it directly influences their ability to operate effectively in their fields. Within this context, terminological competence emerges as a foundational aspect of broader professional communicative competence. We interpret "communicative competence" as the professional's capacity to satisfy occupational demands through appropriate interpersonal behaviors, the precise use of field-specific language in both spoken and written formats and an ongoing dedication to refining personal and professional skills.

A diverse range of scholars has examined the application of information and communication technologies (ICT) in modern education. For instance, Sivo *et al.* [4] focused on how learners accept technological tools in online educational settings. Similarly, Weidlich and Bastiaens [5] addressed the significance of technological mediation in distance learning models. The effect of remote learning systems on student success was explored by Puspitasari and Oetoyo [6]. A broader examination of ICT's function in academic and research environments was provided by Tkachuk *et al.* [7]. The unique challenges encountered by universities in Ukraine during the COVID-19 crisis were investigated by Melnyk *et al.* [8].

Additionally, Brown [9] and Sergienko *et al.* [10] offered insight into how student assessment can be enhanced using digital tools. Other researchers have zeroed in on subject-specific uses of ICT: Blahun and Stuchynska [11] analyzed its utility in mastering pharmaceutical, botanical, and chemical lexicons; Stuchynska *et al.* [12] applied it in radiological diagnostics instruction; Demydovych and Holik [13] focused on English for professional purposes; and Lytvynenko and Misnyk [14] studied its effectiveness in general language instruction. The psychological aspects of educational quality in higher education, and how these can be monitored through ICT, were addressed by Bondarchuk *et al.* [15].

This study aims to evaluate how digital technologies contribute to shaping communicative competence among future healthcare providers amid the pharmaceutical sector's evolving demands. Given that Latin serves as the primary source of medical and pharmaceutical terminology, the investigation centers on how such technologies are applied during Latin language instruction in medical academic settings.

To fulfill this aim, the study sets forth two main objectives:

- To analyze and categorize digital tools and technologies employed during practical instructional sessions;

• To determine their effectiveness in enhancing communicative competence by comparing participants' competence levels before and after implementation.

In practical terms, innovations such as the Electronic Clinical Pharmacologist system are being piloted across various regions of the Russian Federation, including Moscow, the Stavropol Territory, and the Irkutsk and Rostov Regions.

The integration of the "Pharmaceutical Consultation" course, which employs dynamic and student-centered pedagogical approaches, has markedly elevated learners' readiness for real-world pharmacy practice, reinforcing the value of experiential and applied learning models within pharmaceutical education.

In summary, constructing a comprehensive framework for deploying web-based tools and modern technologies in the classroom is critical to nurturing communicative competence in emerging healthcare professionals, particularly in light of the pharmaceutical industry's ongoing transformation.

Unlike lectures, practical Latin classes follow a unique organizational format that must be reflected in instructional planning. These sessions are typically segmented into three distinct phases: the preparatory, the core, and the concluding stages. In structuring modern technology use within these classes, we align digital tools with the specific pedagogical objectives of each phase.

1. Digital Tools for the Preparatory Phase of Practical Instruction

This initial stage focuses on evaluating students' pre-existing competencies and introducing foundational materials, such as the lesson's objectives, required reading, and thematic content. To address these goals, a blend of mobile and e-learning approaches is employed. The LIKAR_NMU platform serves as the central digital hub where students can freely access topic-based theoretical resources, including concise multimedia presentations. These resources are downloadable in formats like .pptx or .doc, granting learners continuous availability for review.

Instant messaging platforms such as Viber, Telegram, and WhatsApp are leveraged for real-time communication, enabling educators to promptly provide feedback, guidance, and clarifications. Furthermore, the Kahoot! The mobile application supports this stage by offering an interactive, game-oriented assessment environment. It functions across devices, enabling instructors to conduct quick formative assessments through embedded quizzes and engage students through competitive learning formats (**Figure 1**). Educators can design tasks using Kahoot! Interface to efficiently gauge the students' baseline understanding at the onset of instruction.

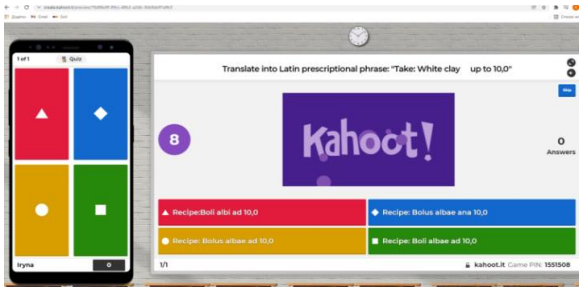

Figure 1. Interactive task created at Kahoot! Studying platform for checking the initial level of knowledge

2. Digital Tools for the Core Phase of Practical Instruction

During the central phase of practical classes, modern technologies are employed to facilitate content delivery, practical exercises, and student interaction. Tools like Zoom provide a range of functionalities, enhancing engagement and communication during web-based sessions, including:

• Displaying interactive whiteboards, screens, presentations, and annotations;

• Incorporating multimedia elements like video and audio;

• Allowing participants to view everyone at once or individually, with the ability to see who is speaking;

• Enabling the "raise your hand" feature, which helps identify students eager to answer, with a visible count of raised hands;

• Supporting the continuation of sessions after a disconnection;

• Providing access across devices such as computers, tablets, and phones;

• Facilitating real-time chat for queries and responses;

• Enabling the addition of emoticons for better interaction tracking;

• Recording sessions for later review, capturing everything from start to finish.

Microsoft Teams also fosters an interactive learning environment by allowing real-time collaboration and engagement during sessions, including:

• Demonstrating screens or presentations in real-time;

• Chatting through personalized messages;
• Offering a digital whiteboard for drawing or note-taking;
• Enabling the "raise your hand" function to manage speaking turns without disrupting others;
• Allowing the sharing and management of files;
• Supporting presentations, discussions, and training activities.

Additional web-conferencing platforms, such as Skype, Viber, and Google Meet, also serve as alternatives for delivering practical instruction. During this phase, various other educational tools are recommended, including EdPuzzle, Blendspace, VideoNotes, Teacher, eduCanon, Snowbie, Popplet, Prezi, Glogster, and Bookwidgets.

3. Digital Tools for the Conclusion Phase of Practical Instruction

The final stage focuses on wrapping up the lesson and evaluating, and assessing student progress.

The LIKAR_NMU platform offers a diverse set of question formats to assess student performance effectively, such as "True/False," "Essay," "Multiple Choice," "Matching," "Drag and Drop into Text," "Drag and Drop Markers," "Drag and Drop onto Image," "Calculated," "Numerical," and others.

For instance, the "True/False" question format presents statements where students must select "True" or "False." Example:

• A statement might read, "The Gen. sg. case is used in pharmaceutical terms with a non-agreed modifier," where the correct answer would be "True."
• An example with an image: "Is the Latin name of the plant 'Leonurus, i m'?" with an image of the plant provided; the answer would be "False" (**Figure 2**).

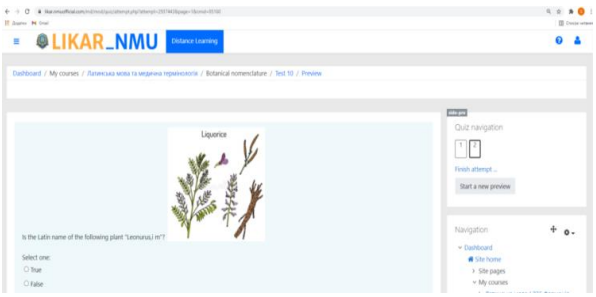

Figure 2. The example of the "true/false" question type at the LIKAR_NMU platform

"Essay"

This question type allows students to respond by either typing text directly or uploading a document. Since the answers require manual evaluation, students will only receive a grade after the teacher reviews their responses. For example:

• A typical question could be: "What role does Latin play in international medical terminology?" The expected response would include 10-15 sentences discussing the origins of terminology, the influence of Latin and Greek on modern European languages, and examples of medical terms derived from these languages.

"Multiple Choice"

This format includes both "Single-answer" and "Multiple-answer" questions, offering flexibility in how students' knowledge is assessed. For example:

• Students may be presented with a question that allows multiple correct answers, such as: "What does the Latin suffix –oma mean?" The possible answers could be: a. tumor, and d. increasing in volume. If students select only one correct answer, they will earn 50% of the total points for that question. If the settings are adjusted, a wrong answer could result in a score of 0.

"Matching"

This type involves a set of statements that need to be paired correctly with another set. Incorrect matches may result in partial credit, but not full marks for the question. For example:

• In this task, students match Latin prefixes on the left with their Greek equivalents on the right. The correct matches could be: "semi-" – "hemi-"; "contra-" – "anti-"; "con-" – "syn-"; "post-" – "meta" (**Figure 3**).

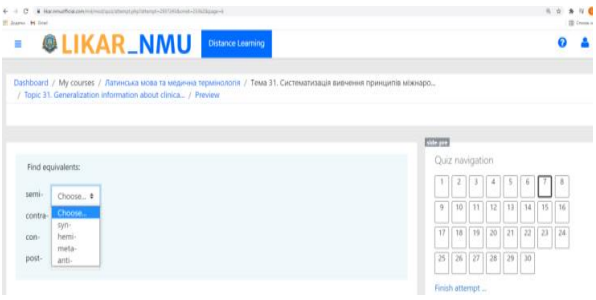

Figure 3. The example of the "Matching" question type at the LIKAR_NMU platform

Materials and Methods

Materials

In our investigation, both qualitative and quantitative research methods were integrated in equal proportions. The qualitative approach involved maintaining records, conducting observational analysis, and engaging in one-on-one discussions to evaluate the academic performance of the participants without bias. Conversely, the quantitative approach focused on gathering measurable data and applying statistical methods to ensure impartial analysis.

Participants

The study involved 295 students from the pharmaceutical faculty at O.O. Bohomolets National Medical University.

Procedure

Carried out from 2017 to 2020, this research aimed to evaluate the role of contemporary technologies in fostering the development of communicative competence among future healthcare professionals, particularly in light of the ongoing transformation of the pharmaceutical sector. The assessment was based on comparing the progress in various components of communicative competence among students before and after the intervention. At the beginning of the study (pre-intervention), the participants were assigned to either a control group (CG) with 111 students or an experimental group (EG) comprising 184 students. In the subsequent phase (post-intervention), the data collected was subjected to statistical analysis.

Three core elements of communicative competence were identified: motivational, cognitive, and activity-related components. To assess the motivational component (which relates to students' willingness to engage with the terminology used in professional communication), a survey was administered, and the results were categorized into four levels: satisfactory, good, very good, and excellent. The cognitive component (measuring students' understanding of the essential grammatical rules for constructing professional terms) was evaluated using oral and written vocabulary dictations, tests, and semantic modules, with the same four-tier grading system. Lastly, the activity component (referring to students' abilities to create, translate, and utilize terminology in professional interactions) was assessed through written exams and oral assessments, again classified as satisfactory, good, very good, or excellent.

Results and Discussion

Between 2017 and 2020, practical Latin classes were conducted at O.O. Bohomolets National Medical University, incorporating modern technologies to evaluate their effectiveness in enhancing communicative competence among future healthcare professionals amid the evolving pharmaceutical market. The components of communicative competence were measured before and after the intervention.

Table 1 illustrates the distribution of students across control and experimental groups based on their competency levels (excellent, very good, good, and satisfactory) in three key areas: motivational, cognitive, and activity-related components, before the commencement of the experiment.

Table 1. The distribution of the number of students in CG and EG according to the level of the competence components before the experiment

Component of competence	Level	Number of students in CG	Number of students in EG
Motivational	Excellent	26	43
	Very good	30	51
	Good	45	70
	Satisfactory	10	20
Cognitive	Excellent	5	6
	Very good	31	52
	Good	56	97
	Satisfactory	19	29
Activity	Excellent	8	13
	Very good	31	52
	Good	59	93
	Satisfactory	14	26

Before the experiment, the distribution of students' competency levels in the motivational, cognitive, and activity components was as follows: 7% of both the control group (CG) and experimental group (EG) demonstrated an "excellent" level in the activity component; 5% of CG and 3% of EG students exhibited an "excellent" level in the cognitive component, and 23% of students in both groups displayed an "excellent" level in the motivational component. For the "very good" level, 28% of students in both groups excelled in the

activity component, 28% in the cognitive component, 27% in CG, and 28% of EG students in the motivational component. The "good" level was achieved by 53% of CG and 51% of EG students in the activity component, 50% of CG and 53% of EG in the cognitive component, and 41% of CG and 38% of EG in the motivational component. The "satisfactory" level was recorded in 13% of CG and 14% of EG students in the activity component, 17% of CG and 16% of EG in the cognitive component, and 9% of CG and 11% of EG in the motivational component (**Figure 4**).

Figure 4. The distribution of the components of communicative competence in CG and EG before the experiment

Table 2 illustrates how the students in both the control and experimental groups are distributed across different competence levels (excellent, very good, good, and satisfactory) for each of the competence components (motivational, cognitive, and activity) following the experiment.

Table 2. The distribution of the number of students in CG and EG according to the level of the competence components after the experiment

Component of competence	Level	Number of students in CG	Number of students in EG
Motivational	Excellent	21	62
	Very good	47	59
	Good	30	53
	Satisfactory	13	10
Cognitive	Excellent	6	15
	Very good	20	58
	Good	72	107
	Satisfactory	4	1
Activity	Excellent	3	20
	Very good	18	59
	Good	79	103
	Satisfactory	1	2

Following the experiment, the distribution of students' proficiency levels in the motivational, cognitive, and activity components was as follows: 3% of CG students and 11% of EG students reached the "excellent" level in the activity component; 5% of CG and 8% of EG students demonstrated the same in the cognitive component, while 19% of CG and 30% of EG students achieved this in the motivational component. The "very good" level was represented by 25% of CG and 32% of EG students in the activity component, 18% of CG and 32% of EG students in the cognitive component, and 42% of CG and 35% of EG students in the motivational component. For the "good" level, 71% of CG and 56% of EG students exhibited it in the activity component, 65% of CG and 58% of EG students in the cognitive component, and 27% of CG and 29% of EG students in the motivational component. The "satisfactory" level was shown by 11% of students in both CG and EG for the activity component, 12% of CG and 2% of EG students for the cognitive component, and 12% of CG and 6% of EG students for the motivational component (**Figure 5**).

Figure 5. The distribution of the components of communicative competence in CG and EG after the experiment

The statistical analysis comparing the data collected before and after the experiment revealed significant differences in the levels (excellent, very good, good, and satisfactory) of motivational, cognitive, and activity components between the control and experimental groups. This highlights the importance of integrating

modern technologies and web tools into education, demonstrating their effectiveness in enhancing the communicative competence of future healthcare professionals during practical Latin classes.

With the evolving pharmaceutical market, the role of pharmacists is shifting from being solely "product-focused" to actively coordinating care alongside all healthcare professionals, primarily supporting care delivery through physicians. This transformation emphasizes the need for stable professional communication between doctors and pharmacists, which can only be achieved through the effective development of communicative competence. Consequently, educational programs should focus on equipping future healthcare specialists with the skills necessary for high-level professional communication, minimizing misunderstandings, and improving the efficiency of extemporaneous medicine production.

To meet the demands of this shift, educational programs for aspiring pharmacists should evolve from a purely academic orientation to a more clinical one. As pharmacists frequently collaborate with doctors in healthcare settings, their professional duties are closely tied to clinical practice. This collaboration involves sharing information on new treatment methods, prevention strategies, diagnostic tools, medications, and treatment plans, as well as ensuring proper drug usage and selecting appropriate drug forms, doses, and regimens. The integration of modern technologies into education is a powerful tool for fostering the communicative competence required for such professional collaboration.

This study offers valuable insights into the role of modern technologies in shaping the communicative competence of future healthcare specialists within the context of the changing pharmaceutical market. It also reveals positive outcomes related to students' academic performance.

As illustrated in **Table 1** and **Figure 4**, the initial levels of the motivational, cognitive, and activity components of communicative competence were below expectations. At the "satisfactory" level, students demonstrated low motivation and lacked the initiative to engage with Latin, which is essential for communicative competence. The cognitive component was characterized by limited knowledge of essential vocabulary and grammar, while the activity component reflected frequent errors in the formation and usage of terms.

The "good" level revealed a positive, albeit inconsistent, motivation to study Latin, with some students recognizing its importance for communicative competence. Students at this level showed partial use of terminology and had difficulty fully understanding terms' meanings in communication.

For the "very good" level, students displayed a strong motivation to learn Latin, recognizing its value in building communicative competence. They demonstrated fluency in terminology and nomenclature, with minor issues in using terms accurately.

At the "excellent" level, students exhibited a stable and strong motivation to master professional terminology, paired with a desire for independent learning and self-improvement. They demonstrated proficiency in both terminology and grammar and used professional terms confidently, without making errors.

Following the use of modern technologies and web tools, as displayed in **Table 2** and **Figure 5**, significant improvements were observed in the levels of the motivational, cognitive, and activity components of communicative competence.

The research objectives were successfully achieved, confirming that the application of modern technologies in education plays a crucial role in developing communicative competence among future healthcare professionals.

Web tools and technologies can be tailored to different stages of the practical class—whether preparatory, main, or final—based on the topic or students' needs. Future research should explore the digital skills of students and their motivation to incorporate modern technologies and web tools into various classes to enhance their professional abilities in the healthcare field.

Conclusion

The research conducted indicates that incorporating modern technologies into practical sessions at the National Medical University named after O. O. Bohomolets has proven to be highly beneficial for enhancing the communicative competence of future healthcare professionals. Students demonstrated strong performance in all key components: motivational, cognitive, and activity-related. The practical class structure, consisting of preparatory, main, and final stages, remained intact, supported by the integration of various modern technologies and web tools. However, some challenges arose during the implementation of

these technologies, including limited or slow internet access, issues with devices such as outdated computers or malfunctioning cameras, and the lack of necessary equipment like headphones and microphones. Additionally, students faced difficulties meeting deadlines, particularly for control tests that were closed after the allotted time. Despite these issues, modern technologies provide clear benefits, such as streamlining the evaluation process for instructors, offering materials that are accessible at any time through audio or visual formats, and ensuring that students can study remotely during the COVID-19 pandemic, maintaining social distancing by avoiding crowded classrooms.

Future research could further build on these findings, focusing on the development and management of digital skills for healthcare professionals.

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