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Features of preparation of foreign students for taking objective structured practical (clinical) examinations in a combined learning format

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ABSTRACT

Introduction and objectives: As a result of the COVID-19 pandemic and the beginning of a full-scale military invasion, the opportunities for conducting offline training at the medical university have significantly decreased. This made it necessary to find mechanisms to ensure the continuity of medical education of students for all disciplines in general and "Hygiene and Ecology" in particular. Another new challenge was introducing a new form of final exams for university graduates, which also required students and teachers to focus on preparing for this format of knowledge control. This defined the objectives of this study to analyze and summarize the peculiarities of preparing international students for taking an objective structured practical (clinical) examination (OSP(C)E-2) in the "Hygiene and Ecology, Healthcare Organization" station, in the context of combined (distance and in-person) learning.

Materials and methods: Informational data on training organization systems, filling of training platforms, video hosting, and messengers, the results of intermediate controls of students' knowledge during the exam (3rd year) and final module control (6th year), and final graduation control (OSP(C)E-2) are used as research material.

The method of pedagogical analysis and observation, situational analysis, comparative method, content analysis, and methods of variable statistics, including the non-parametric coefficient of Spearman's rank correlation, Wilcoxon's T-test (dependent samples), Kendall's correlation coefficient, were used in the study.

Results: The content of suggested informational resources was analyzed, and the structure of preparational steps for the final exam and organization of learning in the combined form of education were evaluated.

The effectiveness of the proposed measures was proven by the results of the "Hygiene and Ecology, Healthcare Organization" station of the OSP(C)E-2 examination taken by international students. An analysis of the results of the mixed (online and in-person) administration of the OSP(C)E-2 examination by international students showed a 100% pass rate.

Conclusion: The developed steps have helped to make students resilient and to ease the stressful aspects of the transition to distance learning for English-speaking students during the periods of strict containment measures of the coronavirus disease pandemic and safety measures in wartime conditions.

According to all calculated indices using a sufficient set of variable statistics methods, no significant difference in the results between students of online and offline forms of attestation was found. According to Wilcoxon's W-test (unrelated samples), the difference was not statistically significant; according to Kendall's correlation coefficient, no correlation was found, as well as according to Spearman's rank correlation coefficient.

These achievements stand as proven evidence of the effectiveness of the aforementioned teaching methods and approaches in the combined learning format during these challenging times.

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Características de la preparación de estudiantes extranjeros para la realización de exámenes prácticos (clínicos) estructurados objetivos en un formato de aprendizaje combinado

Palabras clave:
higiene
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R E S U M E N

Introducción y objetivos: Como resultado de la pandemia de COVID-19 y el comienzo de una invasión militar a gran escala, las oportunidades para realizar formación fuera de línea en la universidad de medicina han disminuido significativamente. Esto hizo necesario encontrar mecanismos para asegurar la continuidad de la educación médica de los estudiantes en todas las disciplinas en general y en "Higiene y Ecología" en particular. Otro nuevo desafío fue la introducción de una nueva forma de exámenes finales para graduados universitarios, que también requirió que estudiantes y profesores se concentraran en prepararse para este formato de control de conocimientos. Esto definió los objetivos de este estudio para analizar y resumir las peculiaridades de la preparación de estudiantes internacionales para tomar un examen práctico (clínico) estructurado objetivo (OSP(C)E-2) en la estación «Higiene y Ecología, Organización de la Salud», en el contexto de aprendizaje combinado (a distancia y presencial).

Materiales y métodos: Datos informativos sobre los sistemas de organización de la formación, llenado de plataformas de formación, alojamiento de vídeos y mensajería, los resultados de los controles intermedios de conocimientos de los estudiantes durante el examen (3° año) y el control final del módulo (6° año), y el control final de graduación (OSP(C)E-2) se utilizan como material de investigación.

En el estudio se utilizaron los métodos de análisis y observación pedagógicos, análisis situacional, método comparativo, análisis de contenido y métodos de estadística de variables, incluido el coeficiente no paramétrico de correlación de rangos de Spearman, la prueba T de Wilcoxon (muestras dependientes) y el coeficiente de correlación de Kendall

Resultados: Se analizó el contenido de los recursos informativos sugeridos y se evaluó la estructura de los pasos de preparación para el examen final y la organización del aprendizaje en la forma combinada de educación.

La eficacia de las medidas propuestas quedó demostrada por los resultados del examen OSP(C)E-2 realizado por estudiantes internacionales en la sección «Higiene y ecología, organización sanitaria». Un análisis de los resultados de la administración mixta (en línea y presencial) del examen OSP(C)E-2 por parte de estudiantes internacionales arrojó una tasa de aprobación del 100%.

Conclusión: Las medidas desarrolladas han ayudado a que los estudiantes sean resilientes y a aliviar los aspectos estresantes de la transición al aprendizaje a distancia para los estudiantes de habla inglesa durante los períodos de estrictas medidas de contención de la pandemia de la enfermedad del coronavirus y medidas de seguridad en condiciones de guerra.

Según todos los índices calculados utilizando un conjunto suficiente de métodos estadísticos variables, no se encontraron diferencias significativas en los resultados entre los estudiantes de las formas de certificación en línea y fuera de línea. Según la prueba W de Wilcoxon (muestras no relacionadas), la diferencia no fue estadísticamente significativa; según el coeficiente de correlación de Kendall no se encontró correlación, así como según el coeficiente de correlación de rangos de Spearman.

Estos logros constituyen una evidencia comprobada de la eficacia de los métodos y enfoques de enseñanza antes mencionados en el formato de aprendizaje combinado durante estos tiempos difíciles.

Introduction

Due to the imposition of martial law in Ukraine starting on February 24, 2022, following strict limitations of the SARS-COVID-19 pandemic, in-person education became temporarily impossible, especially for foreign students during the initial stages of the full-scale invasion. As a result, distance online learning emerged as the only available form of education within the educational system.[1] The proposed form of educational process in the current realities addresses many challenges that the education system in Ukraine has faced.[2,3] However, distance learning requires joint efforts from students, educators, and university administrations and government support to achieve the desired results.[3]

The provisions of the Laws of Ukraine "On Education" and "On General Secondary Education" provide the opportunity to acquire education through distance learning. It is derived from implementing the right to education as stipulated in Article 53 of the Constitution of Ukraine.[4,5] The choice of learning format is based on the student's free will, as confirmed by a statement and/or a contract for educational services.[6] However, the efficacy of such educational models was very doubtful considering the fact that the traditional form of teaching in medical universities and colleges is offline and face-to-face for most of the subjects including the "Hygiene and Ecology" discipline.

Another challenge the educational process has faced was the introduction of the new form of graduates' certification at Bogomolets National Medical University proposed for implementation in the 2019/2020 academic year (just before the pandemy of COVID-19 had started) and delayed due to the anti-epidemic restrictions. This certification system is closer to EU and USA forms of student knowledge control than the former soviet era kinds of examinations. Teachers were tasked with creating an effective complex system of monitoring students' knowledge according to the new requirements.[8] Students, in turn, had to learn new methods of demonstrating the acquired skills and abilities.

Therefore, the components of the innovation of such an exam were the time frame for completing the received task at the station, raising the level of skills and abilities demonstrated by students to automaticity and perfection under the new form of scoring—a checklist, the simultaneous completion of various components within 1 day in the directions that also included a preventive part of medicine in the form of a "Hygiene and Ecology. Healthcare Organization" station.

At the same time, the combined form of education, taking into account the realities of wartime, gave students of the faculty of training

foreign citizens (English-language form of education) opportunities to use online or offline mode to demonstrate their knowledge and practical skills during certification. The specified conditions created heterogeneity in the assessment procedure organization to evaluate the graduates' skills and abilities evenly by examiners.

The aim of this study is to analyze and summarize the peculiarities of preparing international students for taking an objective structured practical (clinical) examination (OSP(C)E-2) in the "Hygiene and Ecology, Healthcare Organization" station, in the context of combined (distance and in-person) learning. To achieve such an aim, the following tasks were set: (1) to assess the viability of the measures implemented to organize the teaching of the discipline " Hygiene and Ecology " to students of the English-language form of study of the speciality 222 "Medicine" at the Bogomolets National Medical University (BNMU)[7]; (2) to analyze the results of the preventive part of the objective structured practical (clinical) exam passed by foreign students of the 6th year of study, taking into account the online and offline forms of attestation.

Materials and methods

Informational data on training organization systems, filling of training platforms, video hosting, and messengers, the results of intermediate controls of students' knowledge during the exam (3rd year) and final module control (6th year), and final graduation control (OSP (C)E-2) are used as research material.

The method of pedagogical analysis and observation, situational analysis, comparative method, content analysis, and methods of variable statistics, including the non-parametric coefficient of Spearman's rank correlation, Wilcoxon's T-test (dependent samples), Kendall's correlation coefficient, were used in the study.

Results and discussion

In-person physical attendance of practical classes by medical university students is an essential component of acquiring practical skills and abilities. Therefore, at Bogomolets National Medical University, a combined learning format was implemented, incorporating elements of synchronous online learning (video conferences on Zoom, Google Meet, etc.), asynchronous online learning (including the educational platform LIKAR_NMU using Moodle tools), as well as in-person offline learning (training centers, consultations, and practical sessions, when possible).[6]

Since the beginning of the COVID-19 pandemic in 2020, the administration of Bogomolets National Medical University and the Department of Hygiene and Ecology staff, in particular, have made maximum efforts to create the best conditions for distance learning. This included launching the NEURON educational platform, transitioning to LIKAR_NMU, creating a YouTube channel, recording video lectures, and providing technical support for conducting classes in Zoom and Google Meet platforms.[9]

The syllabus and curriculum of the "Hygiene and Ecology" discipline in the 3rd academic year, in addition to independent student work, included 35 practical classes and lectures. However, with the onset of the full-scale invasion, new challenges arose for higher medical education.[8] Due to constant air sirens, power outages, and internet disruptions, classes not only shifted to an online format but also became asynchronous, with a significant amount of material left for self-study by students.

Therefore, we have enhanced our teaching technologies. We provided audio and video instructions and tutorials for problem-solving, created and worked out in detail schemes with essential theoretical material, and recorded additional video consultations.

For the organization of online training, the BNMU administration implemented the online distance learning platform "LIKAR_NMU",[9] which allowed filling the subject section with content according to the appropriate scheme. The lecture material was presented as a PDF file of the corresponding presentation and links to the lectures posted on YouTube video hosting.[10] The content of practical training units included methodological guidelines for the practical classes, a section for uploading the student's work, and tests (in random order, the student took 10 tests within 10 min from a minimum set of 20 or more tests for each topic). The student's work for upload consisted of: (1) a protocol of preparation for the lesson, which was uploaded before the beginning of the lesson; (2) results of initial knowledge control [which was carried out using social messenger tools (Telegram, Viber, etc.)]; (3) results of practical work.

For lively and purposeful interaction with students and to facilitate the formation of imagination about the steps and order of practical works, video materials of such practical works were created for each class and uploaded to YouTube video hosting.[11,12]

It is worth mentioning that distance learning has several advantages for basic theoretical departments. Students, especially those in medical universities, save time commuting between different campus locations scattered throughout the city and can spend those hours studying. The need for long breaks diminishes, allowing students more time after classes, while teachers can devote more time during class to topic discussions rather than organizational issues.

We have discovered new possibilities for interactive learning. We can apply all the features of the Zoom platform: diagrams and drawings on the whiteboard for visualizing theoretical material, working in separate rooms for practical-oriented tasks, problem-solving, student presentations, and reports on extended topics related to practical classes. All sessions, lectures, and explanations can be recorded and reviewed by students before final assessments.

In addition, a pool of exemplary classes with students was recorded using Zoom video conferencing software capabilities, and the Telegram channel Hygiene Prevails, which publishes interesting facts on hygiene topics, was created for interested students.

To enhance qualifications, expand knowledge, and improve proficiency in using online learning tools (such as Zoom, Google, Microsoft, Kahoot, Quizlet, etc.), English-speaking staff of the department undergo training through various webinars and courses, including those conducted internationally, even during challenging times of war.

Another challenge of the current academic year was transitioning from state exams for graduating students to taking the Objective Structured Clinical Examination (OSCE) / OSP(C)E-2 in the 6th year of study. This certification examination included 13 stations of all studied fields in "Medicine" speciality. To prepare students for successfully passing the station in the "Hygiene and Ecology, Healthcare Organization" section, we developed a comprehensive system of activities, methodological materials, and video demonstrations on the algorithm of completing the OSP(C)E-2 station.

To begin with, a 2-h session was dedicated to the theoretical and practical preparation for the OSP(C)E-2 examination. The theoretical part involved the analysis of the fundamental hygienic requirements on the example of the microclimate of various hospital premises, its impact on the patient's body, and the monitoring device parameters. It also covered the importance of sanitizing healthcare facilities, the criteria for adequate air sanation, and the necessary equipment etc. During the practical part of the session, students, together with the instructor in a Zoom conference, worked on typical tasks of each type. They then independently solved several similar tasks and uploaded them to the corresponding section on the LIKAR_NMU platform for assessment by the instructor. If necessary, the instructor addressed typical errors and reviewed important or challenging aspects of the proposed tasks through voice messages in a messenger or via additional video conferences.

Furthermore, during each practical class (19 lessons, 2 h each) of the 7-day cycle in the 6th academic year, specific theoretical questions related to the topics of the examination station were discussed. Similar tasks to those encountered in the examination stations were included in the final module assessment after completing the hygiene cycle.

Approximately, 1 month before the start of the OSP(C)E-2 examinations, weekly consultations were organized for students. The initial consultations were conducted online with mandatory video recording and distribution among the 6th-year students.

In the last pre-examination weeks, additional in-person consultations were added for students who were present in Ukraine. However, online consultations continued for all interested students.

Video instructions on the algorithm of completing the "Hygiene and Ecology, Healthcare Organization" station of the OSP(C)E-2 examination, all illustrative materials (banners), and theoretical preparation materials were posted on the university and department websites from the beginning of the semester.

The effectiveness of the proposed measures was proven by the results of the "Hygiene and Ecology, Healthcare Organization" station of the OSP (C)E-2 examination taken by international students. An analysis of the results of the mixed (online and in-person) administration of the OSP (C)E-2 examination by international students showed a 100% pass rate.

The total number of foreign students who passed certifications in the "Hygiene and Ecology" part is 229. The maximum score in the discipline is 200 points. According to the "Regulations on the procedure for assessing students' knowledge during the current and final examination of the discipline in BNMU", their values were distributed by the following grading. 200–170 points were equal to Grade "A" by the European Credit Transfer and Accumulation System (ECTS) ("excellent" in the National scale), 169–155—"B" and 154–140—"C"("good"), 139–125—"D", and "124–111—"E" ("satisfactory"), 110 and below—FX/F ("unsatisfactory"), respectively.

The calculated average score for studying "Hygiene and Ecology" discipline for 3rd and 6th years is 133.5 ± 1.321 (132–136.5, 95%). The average score during the "Hygiene and Ecology" part (OSP(C)E-2) was 184 ± 1.806 (180–188, 95%), Wilcoxon's T-test was <0.001, Spearman's rank correlation coefficient Ro = 0.390, at the level of significance $p<.01$, Kendall correlation coefficient Tau = 0.288, at the level of significance $p<.01$.

The number of students who passed the offline certification was 57. The calculated average score of studying the discipline "Hygiene and Ecology" for 3rd and 6th years is 132 ± 2.297 (126.5–134.5, 95%), the average score of the "Hygiene and Ecology" (OSP(C)E-2)—184 ± 3.250 (180–200, 95%), Wilcoxon's T-test was <0.001, Spearman's rank correlation coefficient Ro = 0.233, at the level of significance $p>.05$, Kendall's correlation coefficient Tau = 0.187, at the level of significance $p<.04$.

The number of students who passed the online certification is 172. The calculated average score of studying the discipline "Hygiene and Ecology" for 3rd and 6th years is 134 ± 1.573 (132–138.5, 95%), the average score of the "Hygiene and Ecology" part (OSP(C)E-2)—184 ± 2.147 (180–188, 95%), the Wilcoxon T-test was <0.001, Spearman's rank correlation coefficient Ro = 0.448, at the level of significance $p<.01$, the Kendall Tau correlation coefficient = 0.329, at the level of significance $p<.01$.

Calculations of the comparison of the average from the result of OSP (C)E-2 between the offline and online form of certification: Wilcoxon W-test (unrelated samples) $p = .392$, Kendall correlation coefficient Tau = 0.017, $p>.05$, Spearman's rank correlation coefficient – Ro = 0.031, $p>.05$.

Conclusion

The above steps have helped to make students resilient and to ease the stressful aspects of the transition to distance learning for English-speaking students during the period of strict containment measures of the coronavirus disease pandemic.

With the onset of a full-scale invasion of the Russian Federation into Ukraine, these developments helped to support and not to disrupt the pedagogical process, to use the full power of digital resources for the proper course of the educational trajectory of studying the discipline of Hygiene and Ecology at BNMU, and to introduce the possibility of asynchronous learning in conditions of power outages, air attacks, and interruptions in access to Internet networks.

The staff of the department has implemented modern teaching methods and forms into the educational process during regular classes in the 3rd and 6th academic years and prepared international students for the OSP(C)E-2 examination (station "Hygiene and Ecology, Healthcare Organization"). These methods included online synchronous teaching (video conferences in Zoom, Google Meet, etc.), asynchronous teaching (including on the LIKAR_NMU educational platform), and in-person offline teaching (training centers, consultations, etc.) within the framework of the combined (online and in-person) learning format.

According to all calculated indices using a sufficient set of variable statistics methods, no significant difference in the results between students of online and offline forms of attestation was found. According to Wilcoxon's W-test (unrelated samples), the difference was not statistically significant; according to Kendall's correlation coefficient, no correlation was found, as well as according to Spearman's rank correlation coefficient.

The conducted pedagogical analysis of the results of the preventive part of the objective structured practical (clinical) exam (OSP(C)E-2) by foreign students of the 6th year of study made it possible to establish the absence of bias and differences in the approaches of teachers to evaluate the acquired knowledge and skills of graduates according to different forms of examination and to prove the viability and pedagogical justification of the possibility to organize the examination process in a combined online/offline format.

Therefore, the current academic year has compelled both university staff and students to exert even greater effort to ensure an adequate level of the educational process and the acquisition of proper knowledge by students. However, all the efforts made were rewarded by the successful completion of the hygiene station in the OSP(C)E-2 final examinations of more than 200 international students studying in the English-language program. These achievements stand as proven evidence of the effectiveness of the aforementioned teaching methods and approaches in the combined learning format during these challenging times.

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Authorship

Blagaia Anna: (1) the conception and design of the study, (2) revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Antonenko Anna: (1) the conception and design of the study, (2) drafting the article

Vavrinevych Olena: (1) acquisition of data (2) drafting the article

Borysenko Andriy: (1) acquisition of data, (2) drafting the article

Kondratiuk Mykola: (1) acquisition of data, analysis and interpretation of data (2) drafting the article

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Tkachenko Inna: (1) acquisition of data

Declaration of competing interest

There are no interests to declare.

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