

Analysis of modern systems for electronic control of knowledge of future specialists of pharmaceutical profile based on moodle: problems and prospects of improvement

Análise de sistemas modernos de controle eletrônico de conhecimentos de futuros especialistas de perfil farmacêutico baseados no moodle: problemas e perspectivas de melhoria

Análisis de los modernos sistemas de control electrónico de los conocimientos de los futuros especialistas de perfil farmacéutico basados en moodle: problemas y perspectivas de mejora

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ABSTRACT

Development of methodological and axiological settings that contribute to the effectiveness of modern systems of knowledge control of pharmaceutical students in the system Moodle. The synergetic philosophical-scientific method was applied to provide a versatile consideration of the problems of using distance learning format. Demonstrated the active use of the Moodle learning environment by pharmacy students of these institutions of higher education. Elements, by means of which knowledge control was carried out, confirmed its effectiveness, since the results of

knowledge assessment of students conducted in Moodle mostly coincided with the examinations and qualification examinations (in particular, KROK). Among the key guidelines, we note openness, implying the comprehensibility of tasks; dynamism, providing the possibility of changing or adjusting control tasks; the educational and pedagogical value of control forms, forming an effective system of assessment of knowledge and skills of students; compliance with moral and psychological standards when conducting control in the distance learning system Moodle. Prospects for further research we see the creation of an international unified system of control of the relevant branches of knowledge (in our case - pharmaceutical specialty) based on the initial environment Moodle.

Keywords: Distance learning. E-learning. Knowledge control. Moodle. Pharmaceutical education.

RESUMO

Desenvolvimento de ambientes metodológicos e axiológicos que contribuam para a eficácia dos modernos sistemas de controlo do conhecimento dos estudantes farmacêuticos no sistema Moodle. O método filosófico-científico sinérgico foi aplicado para proporcionar uma consideração versátil dos problemas de utilização do formato de ensino à distância. Demonstrou a utilização activa do ambiente de aprendizagem Moodle pelos estudantes de farmácia destas instituições de ensino superior. Elementos, através dos quais foi efectuado o controlo de conhecimentos, confirmaram a sua eficácia, uma vez que os resultados da avaliação de conhecimentos dos alunos realizada no Moodle coincidiram na sua maioria com os exames e exames de qualificação (em particular, KROK). Entre as principais directrizes, notamos a abertura, implicando a compreensibilidade das tarefas; o dinamismo, proporcionando a possibilidade de alterar ou ajustar as tarefas de controlo; o valor educativo e pedagógico das formas de controlo, formando um sistema eficaz de avaliação dos conhecimentos e competências dos alunos; o cumprimento das normas morais e psicológicas ao efectuar o controlo no sistema de ensino à distância Moodle. Perspectivas de investigação adicional vemos a criação de um sistema internacional unificado de controlo dos ramos de conhecimento relevantes (no nosso caso - especialidade farmacêutica) com base no ambiente inicial Moodle.

Palavras-chave: Controle do conhecimento. E-learning. Educação farmacêutica. Ensino à distância. Moodle.

RESUMEN

Desarrollo de los ajustes metodológicos y axiológicos que contribuyen a la eficacia de los sistemas modernos de control de conocimientos de los estudiantes de farmacia en el sistema Moodle. Se aplicó el método filosófico-científico sinérgico para proporcionar una consideración versátil de los problemas del uso del formato de aprendizaje a distancia. Se demostró el uso activo del entorno de aprendizaje Moodle por parte de los estudiantes de farmacia de estas instituciones de educación superior. Los elementos, mediante los cuales se realizó el control de conocimientos, confirmaron su eficacia, ya que los resultados de la evaluación de conocimientos de los estudiantes realizada en Moodle coincidieron en su mayoría con los exámenes y pruebas de calificación (en particular, KROK). Entre las directrices clave, señalamos la apertura, que implica la comprensibilidad de las tareas; el dinamismo, que proporciona la posibilidad de cambiar o ajustar las tareas de control; el valor educativo y pedagógico de las formas de control, que forman un sistema eficaz de evaluación de los conocimientos y habilidades de los estudiantes; el cumplimiento de las normas morales y psicológicas al realizar el control en el sistema de aprendizaje a distancia Moodle. Perspectivas para la investigación futura vemos la creación de un sistema internacional unificado de control de las ramas relevantes del conocimiento (en nuestro caso - especialidad farmacéutica) basado en el entorno inicial Moodle.

Palabras clave: Aprendizaje a distancia. Control del conocimiento. E-learning. Educación farmacéutica. Moodle.

INTRODUCTION

The term virtual learning environment is used for a distance learning system, which provides for the organization of the learning process in online mode. This form of work implies the cooperation of the tutor and the applicant not directly in the classroom but through the use of information and communication technologies. Computer, Internet, and smartphone are the main means by which the training work is carried out. Let us note that it is not very difficult to introduce the elements in the form of lectures, presentations, or other manifestations of presentation of materials. In this case, the training information simply changes the form of delivery from the source to the applicant.

Research problem

When considering the issue of assessing students' abilities and skills in a distance virtual format, there are obvious problems associated with the reproduction of material, perception of the answers, and assessment of specific tasks performed. The article raises the issue of objectivity of knowledge control in the Moodle system and ways to eliminate contradictions in the control tasks for students presented through electronic distance learning systems.

Research focus

Analyzing the most common distance learning management systems, we note the dominance of two formats: Content Management System (CMS) - traditional management of learning content and Learning Management System (LMS) - learning management system. CMS-format provides passivity in the organization of training, providing only the instructional component, providing the actual presentation of materials with its subsequent review without the possibility of feedback and active cooperation in the online mode (Srivastava & Srivastava, 2021)

The study focuses on the distance learning system Moodle, which belongs to the LMS format and promotes an active model of the learning process and provides such elements directly related to knowledge control:

- creating different types of tasks;
- the ability to check and grade in real-time;
- online broadcasts, chats, forums with the possibility of direct questioning and evaluation;
- control of deadlines and delivery of certain forms of control;
- progress rating with the ability to trace the dynamics of progress in mastering a particular topic or discipline as a whole.

Research aim and research questions

The article aims to develop methodologically axiological settings that will contribute to the effectiveness of modern systems of knowledge control of pharmacy students in the system Moodle. Having analyzed the functioning of the Moodle distance learning system, it can be argued that the electronic format of knowledge control is not a key category in the problem of knowledge assessment. The main question that needs to be answered is the integration of the content (rather than form) of electronic student assessment systems. The problem of functionality or brightness of the interface of the proposed knowledge control resources is a secondary factor. The main thing is the organization of synergistic interaction between all stages of the learning process, one of which is knowledge control.

METHODOLOGY

Give adequate information to allow the experiment to be reproduced. Already published methods should be mentioned with references. Significant modifications of published methods and new methods should be described in detail. This section will include sub-sections. Tables & figures should be placed inside the text. Tables and figures should be presented as per their appearance in the text. It is suggested that the discussion about the tables and figures should appear in the text before the appearance of the respective tables and figures. No tables or figures should be given without discussion or reference inside the text.

Since we are talking about the control of knowledge, the appropriate research methods are selected. The synergetic philosophical-scientific method was applied to provide a versatile consideration of the problems of using distance learning format. A thorough analysis and systematization of knowledge control models of students receiving a specialty of the pharmacist were carried out. Also, a comparative analysis of the structure and content of the means of control in the educational content of Ukrainian Moodle distance learning systems and foreign resources.

Design

The article uses general scientific methods of systematization and analysis, due to which the key aspects of Moodle distance learning system functioning in modern socio-cultural challenges are highlighted. Structural and typological methods provide the study of the form and content of the educational content offered to students - applicants for a pharmaceutical specialty. The axiological method allows you to analyze the forms of control offered to assess knowledge and skills. Through the synergetic philosophical method, an attempt is made to evaluate the processes of self-organization (both mentors forming tasks and applicants performing these tasks) and their use in the learning process.

Participants

The platform for the study was educational platforms Moodle: Kherson State University, Bukovinian State Medical University, the Pylyp Orlyk International Classic University, and Cherkasy Medical Academy.

Instruments

Analysis of the activity of students acquiring the specialty of pharmacist on distance learning platforms was carried out and statistics on the success of test assignments as a form of knowledge control were updated.

Data collection

According to the results of the research, we can conclude that the change in the training format did not affect the performance of students. The indicators of students' activity even increased in the cluster of training and control test tasks. Regarding achievement results, they remain unchanged compared to the results demonstrated by students in the classroom format of learning. Moodle-based electronic systems for monitoring students' knowledge have become an effective component of the educational process in the distance learning format.

Moodle (Modular Object-Oriented Dynamic Learning Environment) distance learning system was put into operation by educational institutions back at the beginning of the XXI century. However, in the last two years, due to the transition to a distance learning format, the strategy of using the platform has changed dramatically. This led to the release of new scientific research assessing the effectiveness of the Moodle platform for different educational and qualification levels

and professional specialties. Therefore, our scientific reconnaissance mainly used the works of the last two years - the period of quarantine restrictions and distance learning related to the spread of the COVID-19 pandemic.

General characteristics of the educational environment Moodle in the context of the processes of digitalization of education are found in the studies of scientists who highlighted key aspects of the platform: the possibility of the active form of work, feedback between mentor and candidate, the convenience of the interface in the task cluster.

Separately covered features of the functioning of the educational online platform Moodle in the training of specialists in the pharmaceutical profile, which specifies specific aspects of formatting test assignments, and differentiation of forms and means of controlling knowledge presented in an electronic system.

The research was conducted on the relationship of different stages of the learning process in the Moodle distance learning system and the integration of forms of control in electronic systems of the educational process.

Statistical analysis

The article presents statistical data on the activity of students of Bukovinian State Medical University in the educational platform Moodle. A comparative analysis of the activity of passing practice tests in the pandemic period and in the period of the introduction of distance learning is carried out.

Ethical criteria

The research exploration met all the requirements for ethical criteria typical for this type of research. Statistical data of the students who were selected as elements for the study did not contain personal or confidential information and concerned only their activity in the educational platform Moodle.

RESULTS

Presentation of case

Moodle distance learning system has been actively used for a long time. In the pre-pandemic world, educators considered the Moodle platform as a valuable asset in education to optimize the learning system. However, it was emphasized that it is only an auxiliary component in the traditional learning system (Athaya et.al., 2021).

Note that due to the force majeure caused by the COVID-19 pandemic, appeals to this educational environment have increased significantly, and sometimes have become dominant in the organization of learning. "Research has shown that the Moodle-based online lesson module for a research course is an effective and proven tool for improving pharmacy students' knowledge and understanding" (Gillani et.al., 2021).

It is noted that the platform is a good alternative to the traditional model of medical and pharmaceutical education with the ability to replace practical training with video and audio materials (Lobach et al., 2021).

There is an acute problem of awareness of the difference between using the Moodle distance learning system as one of the components of the educational process and working in this educational environment permanently without elements of face-to-face learning. Studies of previous years did not take into account this important feature, which was actualized with the beginning of the educational crisis associated with pandemic realities (Antoniou & Papadima-Sophocleous, 2022).

Today we need not instructions or recommendations for the use or implementation of the

system Moodle in the educational process, but clear information messages, indicating how to overcome the difficulties arising in the organization of training and knowledge control.

The advantage of the server distance learning Moodle - a simple interface and the ability to quickly master the basics of the system by the teacher. For the conduct of his discipline or course, the teacher needs only a general knowledge of computer literacy and clear compliance with the instructions on the use of resources. In general, the teacher has every opportunity to serve without limitation all the necessary educational and methodological materials. When we focus on the knowledge control cluster, the opportunities even expand here. This is because the format of distance learning time is not regulated by the limits of the classroom session. The student has the opportunity to take a test at a convenient time, subject to all the conditions of the server. At the same time, the problem of potential conflict between students disappears, because the answers are provided by students individually.

Educational and methodological value

In the distance format, the learning and teaching value of the content presented is important. The online format is common to courses and disciplines. This means that both professional courses and disciplines of the general scientific direction should have their features on the presentation of learning materials in the Moodle system. Online learning is considered to be a model that expands the opportunities for expanding knowledge (Pate et al., 2017).

The educational and methodological value of the materials offered to students must meet the relevant criteria for the quality of education.

For applicants to the pharmaceutical profession is important full-fledged educational and methodological support of disciplines. The proximity of pharmaceutical professionals to health problems imposes an additional responsibility on the educational cluster. If today's realities require the educational process to be carried out remotely, it is necessary to create such a learning environment that will ensure the full training of specialists.

Assessment of students' knowledge is one of the key components of the educational process. Since knowledge control is frequently used, its forms and methods are constantly being improved. The effectiveness of assessment depends on many factors. In our study, we actualize our attention on the format of educational content using tasks for current and final control. Let us note that the implementation of control tasks in the Moodle distance learning system is quite labor-intensive for the teacher (Cristina Miranda, 2021).

However, the result is worth the spent intellectual and organizational resources. When it comes to applicants for the pharmaceutical profession, knowledge control should take place in any training format. Current and final control involves assessing the level of assimilation of basic knowledge of pharmacy and a whole range of medical and anthropological disciplines and specific soft skills, which are the manifestation of almost worldview aspects of social and individual activity.

Examples of forms of control

Consider the variations of knowledge control forms for pharmaceutical students offered in the Moodle distance learning environment system. The most common task for checking the knowledge and skills of students is testing. Moodle platform allows you to upload test tasks in Word, PDF, or other editors. However, more popular are uploading test tasks directly as part of the learning capabilities of the platform. Prepared test tasks are integrated into the "Tests" cluster in the menu of tasks for the relevant topic or course. The key parameters that are set when organizing a test task in Moodle are highlighted in figure 1.

Figure 1. Parameters of the test task in the Moodle distance learning system.

The screenshot shows the Moodle quiz settings interface, organized into four sections:

- Timing:**
 - Open the quiz: 22 January 2022 00:45 [Disable]
 - Close the quiz: 22 January 2022 00:45 [Disable]
 - Time limit (minutes): 0 [Enable]
 - Time delay between first and second attempt: None
 - Time delay between later attempts: None
- Display:**
 - Questions per page: 10
 - Shuffle questions: Yes
 - Shuffle within questions: Yes
- Attempts:**
 - Attempts allowed: Unlimited
 - Each attempt builds on the last: No
 - Adaptive mode: No
- Grades:**
 - Grading method: Highest grade
 - Apply penalties: Yes
 - Decimal digits in grades: 2

The key components that are taken into account in the ordering of test tasks can be divided into several elements:

- Timing, which specifies the date and time of testing for an individual student or group; the time allotted to complete the task (total and direct to answer one question);
- Structure, which defines the number of questions, the conditions for selecting the correct answers;
- Training, during which the student can take a practice test to adapt to the interface and calculate the time for successful completion of the task;
- Conditions of the form of testing - number of attempts, order of completion, groups or students involved in testing;
- Assessment, providing methods of evaluation, differentiation of results, a system of penalties;
- Comments (feedback), where the instructor can explain mistakes made during the test, which the student is familiar with when reviewing the test results.

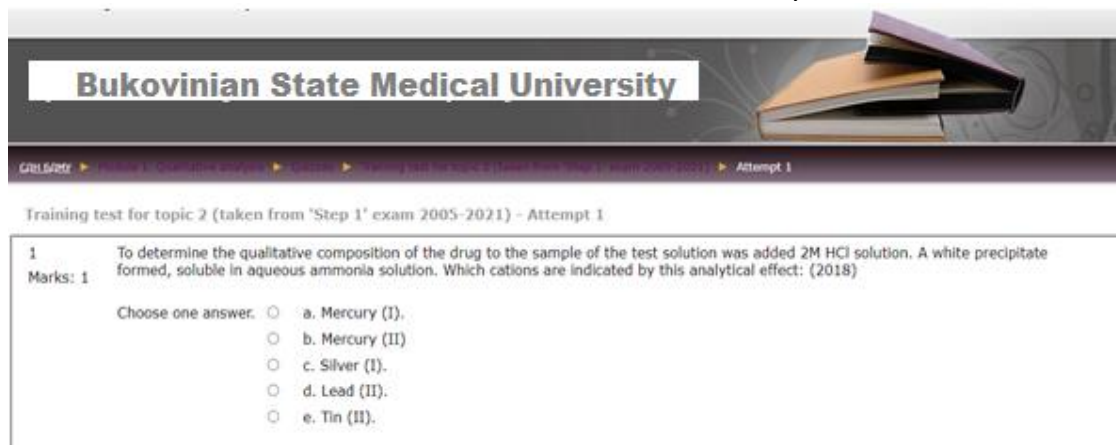
Consider an example of a test assignment on the distance learning server, which is offered to pharmacy students at the Cherkasy Medical Academy (see Table 1).

Table 1. An example of a test task for the final module control on the Moodle platform.

1	Journal of preferential and free leave
2	Prescription registry
3	Defects log
4	Prescription log (in the case of an extemporaneous drug), a log of preferential and free distribution
5	Packing log

The importance of control in the form of testing is also that it is a preparation for an objective external independent assessment of professional competence KROK. The distance learning system successfully implements the process of preparation for the exam on general scientific disciplines, which is compiled after studying the basic fundamental disciplines included in the test exam. The distance learning server has all the necessary conditions for organizing the booklets with the KROK test tasks (see Figure 2).

Figure 2. Test task of the KROK-1 exam preparation program on the distance learning server of the Bukovinian State Medical University.



Another form of knowledge control in the Moodle distance learning system is a survey, which provides knowledge control of students by assessing answers to different types of questions. Here is offered a format: question - answer. Among the questions are theoretical questions on the topic, questions for self-monitoring, general questions for the course.

One of the most popular models of learning through the Moodle system is quizzes, where each student is offered a question dropped at random from the general pool (Jánský et. al., 2021).

Different types of theoretical questions and practical tasks allow you to determine the level of the student's training and trace the dynamics of progress in mastering new knowledge. The tutor has the ability to differentiate tasks by providing both individual work and general control questions. At the same time, the student also has the opportunity to choose the level of difficulty of tasks according to his training, beginning with the simplest tasks, ending with complex ones. In general, the system of Moodle distance learning is quite effective for the dynamic process of assessing students' knowledge. It is not only a formal control of mastered knowledge on the relevant topics. The teacher and the student can trace the dynamics of learning. Consequently, the teacher can then use more effective forms of control, including individual controls. The student can choose the most appropriate form of control offered on the platform.

Dynamism is the setting for the successful implementation of the knowledge control segment in the educational environment of e-learning. The modern socio-cultural space is characterized by the dominance of information and communication technologies. Education, too, is permeated by information flows, which determine its content and form. Consequently, the electronic format of learning is gradually becoming the main one in the educational process. This model of learning opens up new prospects for the development of the sphere of education in general. The potential of distance learning systems lies in the ability to reorient teaching activities and student learning from a linear system to the format of interdisciplinary self-organization. For the training of pharmaceutical professionals, such guidance is important because this field combines medical, social, psychological, and individual aspects of the scientific and worldview paradigm. In this context, the specificity of the assessment of knowledge, abilities, and skills acquired by students in the process of training is relevant. Knowledge control in such conditions requires a comprehensive analysis of the competencies that a future pharmaceutical specialist should possess.

On the part of the teacher, pedagogical excellence in the educational environment of distance learning acts as an ability to navigate in the new information environment, gradually replacing the classroom environment. Dynamism and mobility of teaching in the system of distance learning are oriented in the modern educational realities. First of all, it is about understanding the role of information in modern society. Consequently, teaching and learning materials should be

clear and accessible in a new format.

Knowledge control cluster is one of the key elements of the training content offered in the distance learning system. As a matter of fact, test tasks or theoretical questions do not change in content regardless of the educational environment in which they are implemented. As for the form, it is necessary to understand the difference between the classroom and distance learning model.

Forms of control in the Moodle distance electronic environment are diverse. Online testing, answers to pre-proposed questions, quizzes, individual work - all this is possible in the format of e-learning.

Organizational system Moodle forms an educational environment close to the face-to-face learning format. Records of education applicants record their activity in the study of the discipline (Makruf et. al., 2022).

E-learning system forms statistical data on the student's work on a particular course in Moodle, namely:

- visiting the discipline page;
- downloading learning materials;
- viewing lecture and presentation content;
- results of tests and quizzes;
- feedback from the tutor and administration.

Note that statistical data is an important element in the analysis of assessing the knowledge of students who study remotely. Moodle system allows only to state the grade given for passing, for example, test tasks. The student needs to be able to review the analysis of their submitted answers. Thanks to the statistics of the work done, the number of correct answers is analyzed. Here we should note the importance of not only the quantitative aspects of grade analysis but also the qualitative ones. In this context, the problem is determined by the impossibility of characterizing the answers: incomplete, inaccurate, double-digit, etc. Such justification is only possible through direct communication between the instructor and the student, during which there is an opportunity to point out deficiencies in preparation that lead to erroneous statements.

Statistical analysis, integrated into the Moodle system, provides a proper assessment of student knowledge. In addition, the student receives advanced statistics on completed tasks. The same information is obtained by the teacher, allowing him to plan further teaching work through the differentiation of questions and tests.

We note an increase in research and learning activity on the part of the students. Studying electronically allows more support material to be used. This leads to increased student activity and self-organization. "Unlike the traditional 'passive' classroom, where the student often listens, in distance learning, it will be necessary to reason and think about every situation found" (Lorenzoni et al., 2019).

In addition, the student organizes his or her work and allocates time to prepare for the study of a topic or course.

Despite the fact that we are exploring the process of digitalization of education, the human factor has a decisive influence. The key role of "teachers' willingness and the degree of their skills and competencies necessary for this type of education" should be noted (Al Soub & Amarin, 2021).

The higher the level of their willingness, the more effective distance learning becomes. At the same time, it is necessary to speak about the necessity to motivate students to be actively involved in e-learning. Partly students use the potential of Moodle very limited. Work in the e-learning environment is limited to the formal registration of individual profiles and the performance of compulsory tasks. If we evaluate the effectiveness of the educational platform only in terms of educational content availability, Moodle is a good solution, especially when there is a need for distance education in a period of pandemic risks. However, there is a need to actualize the moral and psychological attitudes consisting in increasing the interest of all participants in the educational

process in the use of an online platform.

▪ In recent years a lot of surveys among students have been conducted to identify the negative points in the functioning of the distance learning system Moodle. To understand the general problems that take place in the organization of the distance learning environment, let's group the students' wishes to improve the work in the Moodle system, in particular, in the knowledge control cluster:

▪ the need for differentiation of common tasks for the group and individual forms of control; the need for multilevel tasks;

▪ accessibility of courses and interdisciplinary mobility.

A separate aspect requiring special attention was the moral and psychological component of the work in the Moodle distance learning system. Students in the questionnaire and survey noted that there is a certain problem of relatively low communication with the teacher (Hasan, 2021).

As a solution to this type of problem, it is proposed to synchronize cooperation in the Moodle system with the now popular among young people messengers. Consequently, the necessary synergy can be achieved, as the learning platform will focus on learning materials and tasks, and the communication on the process of knowledge control will take place in messengers, which establish communication in the aspect of dynamism and responsiveness.

The best form of feedback for students on the issue of knowledge control is the opportunity to discuss the results of the progress with the tutor, followed by an analysis of errors (Tait et al., 2018, p.41).

Auditorium learning allows coordinating personal consultations for the student. Virtual learning can provide success analysis even without direct communication between tutor and student. The tutor only needs to check the student's completed assignment, and then the statistics can be viewed online on the platform in the evaluation section. In addition, comments from the teacher about the check and help in planning the next tasks for the student(s) are also possible.

Note another guideline that is important for the effective use of the e-learning system is to ensure synergy in the activity in a distance learning environment. Relevant to the present is the concept of interdisciplinary. This aspect is important for pharmaceutical education. Therefore, when it comes to assessing students' knowledge, here we are talking not only about special knowledge of pharmacy but also about a complex of medical and humanitarian disciplines.

A characteristic feature of using a distance education server is its appropriateness. Moodle is not the only platform for learning, but over the years it has held a leading position ahead of competitors. The system has demonstrated its vitality because it is not a fashionable trend, but an effective tool in the training of specialists. The knowledge control segment of the e-learning server allows for full-fledged assessment of students. For future pharmaceutical professionals, it is important to have a detailed system of questions and tasks that allow you to determine the level of their training. Accessibility of tasks and comprehensibility of the algorithm for their solution is a relevant element for applicants for higher pharmaceutical education.

Considering the problem of knowledge control using the educational platform Moodle, in addition to forms of direct control of knowledge, we find quite a few functional solutions related to the control of student knowledge, academic virtue:

- integration of antiplagiarism systems (Kaya & Özel, 2014, p. 363–373);

- student self-assessment (Cedazo et al., 2015, p. 887–896);

- skills to work in a cloud environment (Wang et al., 2014);

- combination of technical and didactic components in the functionality of online platforms of different types (Cabero-Almenara et al., 2019, p. 25–33; Luo et al., 2017, p. 141-157; Badia et al., 2018, p. 483–499);

- interaction of the educational platform with social networks (Ariffin & Razali, 2019; Petrovic et al., 2014; Kazanidis et al., 2018; Manca & Ranieri, 2016; Al-Azawei, 2019);

- student acquisition of digital-skills (Garcia-Murillo, et al., 2020; Daniela & Rüdolfa, 2019; Cleveland & Block, 2017).

DISCUSSION

Knowledge control is a fundamental component of the educational process. The effectiveness of any format of learning depends on how successful the integration of forms of control in the educational environment offered. The educational platform Moodle has been working for a long time, but the realization of the potential in terms of knowledge control was fully realized only after the full transition to distance learning in the pandemic period.

The aim of the scientific exploration is a comparative analysis of the activity of students of pharmaceutical profile in passing various tasks (control, theoretical, test), which were offered in the Moodle system under the traditional model of learning (until spring 2020) and the transition to online learning.

The results we obtained confirm a quantitative increase in the activity of students and their activation of work in the Moodle system. Mandatory forms of control in Moodle were taken by the vast majority of students both in the pandemic period and during the pandemic. When it comes to the forms of self-monitoring offered in Moodle, this cluster has significantly increased the rate of student interest with the beginning of online learning.

Consequently, having investigated the problem of quantitative indicators, we are faced with the need to highlight the quality of the educational process and, consequently, the qualitative indicators of the forms of knowledge control available in the Moodle environment. The COVID-19 pandemic has not just led to the use of e-learning systems as an auxiliary or reinforcing factor. We are talking about the transition to the distance learning format as the main form of the educational process. The long period of using distance education allows "...to investigate the ratio of knowledge gained by students during online and offline classes, and consequently, the overall effectiveness of e-learning" (Humeniuk et. al., 2021; Elihami et. al., 2021). The administration and teaching staff of universities can conduct a comparative analysis of success at the horizontal and vertical level.

As noted by Skoropad (2021) distance learning has a number of advantages, such as:

- flexibility
- relevance
- convenience
- modularity
- cost-effectiveness
- interactivity.

Among the problems encountered in the study and issues requiring further scientific research:

- resources are closed and limited to their functioning exclusively in the corporate environment, which does not facilitate the exchange of information and advanced educational and methodological achievements among the educational and scientific pharmaceutical community;
- the lack of unified forms of electronic control systems within the Moodle distance learning server, which leads to the inability to integrate into the global system of pharmaceutical training specialists.

The prospects for further research we see the implementation of the analysis of the ratio of knowledge of pharmacy students in two groups:

- ratio of academic performance between students who studied both traditionally and remotely (the same group in different years of study);
- ratio of academic performance between students who studied traditionally and students who worked online (two different groups of the same year of study).

CONCLUSION

So, the use of Moodle distance learning system is dictated by the realities of today. Now the key task of the educational community is to develop theoretical-methodological and technological-practical mechanisms, through which the training of specialists will meet the requirements of quality education. The pharmaceutical industry needs specialists with good training and appropriate qualifications. Research shows that the use of Moodle platform provides appropriate educational services to applicants in a distance learning format. The following guidelines for improving the effectiveness of knowledge control of future specialists in the pharmaceutical industry are proposed: dynamism, educational and pedagogical value, diversity, compliance with moral and psychological norms.

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