Revista de la Universidad del Zulia

Fundada en 1947
por el Dr. Jesús Enrique Lossada

Ciencias

Exactas,

Naturales

y de la Salud

Año 15 N° 43

Mayo - Agosto 2024
Tercera Época
Maracaibo-Venezuela

77
ANIVERSARIO

The Use of Cloud Technologies in the Professional Training of Future Doctors

Oksana Yefremova*
Mariia Humeniuk**
Tetiana Salyzhyn***
Vasyl Humeniuk****
Oleksandr Korniichuk*****

ABSTRACT

The aim of the research was to determine the effectiveness of the use of cloud technologies during the professional training of medical students. Methods. The research employed the methods of comparative analysis, survey, expert evaluation, observation, and statistical analysis. Results. The conducted research determined that the students of the experimental group had a higher level of cognitive, motivational and volitional, organizational and activity components of professional competence. It can be stated that the ability to use digital technologies for professional and personal needs is important in the era of digitalization. Students of the experimental group showed significant results after using cloud technologies such as: Pbwiki, Google Docs, Sway, Microsoft Planner, Microsoft Azure. The teachers changed their attitude towards the use of cloud technologies during classes, although most of the teachers had doubts about the proposed tools at the beginning of the study. The novelty and implementation. The academic novelty of the study was the fact that few studies have been conducted on the use of cloud technologies during the educational training of future doctors. The implementation of virtual reality in the practical classes of future doctors can be a promising direction of research.

KEYWORDS: Technologies, future doctors, professional competence, digital competence, professional training.

*Associate Professor of the Department of Pediatric Dentistry, Faculty of Dentistry, Danylo Halytsky Lviv National Medical University, Lviv, Ukraine. ORCID: https://orcid.org/0000-0002-5149-2151. Email: ox1975ye@gmail.com

** Assistant at the Department of Internal Medicine #1, Clinical Immunology and Allergology, Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine. ORCID: https://orcid.org/0000-0001-9545-3181. E-mail: mmarih@gmail.com

*** Assistant of the Department of Internal Medicine #1, Clinical Immunology and Allergology, Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine. ORCID: https://orcid.org/0000-0003-4206-622X. E-mail: taniia23.saliizh@gmail.com

****Associate Professor of the Department of Disaster Medicine and Military Medicine, Medical Faculty No. 2, Danylo Halytsky Lviv National Medical University, Lviv, Ukraine. ORCID: https://orcid.org/0000-0003-2736-3875. E-mail: bassvv.humeniuk@gmail.com

*****Assistant of the Department of Dentistry, Faculty of Postgraduate Education, State Institution "Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine", Dnipro, Ukraine. ORCID: https://orcid.org/0000-0002-9020-8109. E-mail: med.23dent@gmail.com

El uso de tecnologías en la nube en la formación profesional de los futuros médicos

RESUMEN

El objetivo de la investigación fue la introducción de tecnologías en la nube en el proceso educativo, para determinar el impacto en los componentes individuales de la competencia profesional de los futuros médicos. Métodos. La investigación empleó los métodos de análisis comparativo, encuesta, evaluación de expertos, observación y análisis estadístico. Resultados. La investigación realizada determinó que los estudiantes del grupo experimental tenían un mayor nivel de componentes cognitivos, motivacionales y volitivos, organizativos y de actividad de la competencia profesional. Se puede afirmar que la capacidad de utilizar tecnologías digitales para necesidades profesionales y personales es importante en la era de la digitalización. Los estudiantes del grupo experimental mostraron resultados significativos después de utilizar tecnologías en la nube como: Pbwiki, Google Docs, Sway, Microsoft Planner, Microsoft Azure. Los docentes cambiaron su actitud hacia el uso de tecnologías en la nube durante las clases, aunque la mayoría de los docentes tenían dudas sobre las herramientas propuestas al inicio del estudio. La novedad y la implementación. La novedad académica del estudio fue el hecho de que se han realizado pocos estudios sobre el uso de tecnologías en la nube durante la formación educativa de los futuros médicos. La implementación de la realidad virtual en las clases prácticas de los futuros médicos puede ser una dirección de investigación prometedora.

PALABRAS CLAVE: Tecnologías, futuros medicos, competencia professional, competencia digital, entrenamiento profesional.

Introduction

Long-term medical education requires constant improvement and updating of the content of the curriculum, the use of digital technologies and methods, taking into account the personal and professional needs of future doctors. The modern world dictates new requirements for a new type of specialist. This is why professional competence is an important component of the quality training of future doctors for the ability to correctly use the acquired knowledge in any unforeseen situations and to develop professionally throughout life to achieve high results in the medical field. However, the practical activity of a doctor involves not only the application of the necessary theoretical knowledge and practical skills, but also the establishment of professional relations between colleagues,

communication with patients and their relatives. All these professional and personal traits determine the professional competence of a specialist.

The future doctor must have not only the usual knowledge and skills in the medical field, but also have a professional mindset and the ability to work in difficult conditions (Zhao et al., 2023; McGushin et al., 2023). The development of personal qualities of the future doctor begins even before entering the higher education institution (HEI) and continues throughout life. Therefore, this process is quite complex and requires strong motivation on the student's part (Li et al., 2021; Jones et al., 2023). During training, these qualities are transformed and encourage the development of a subjective vision of opportunities for success in the future profession. So, changes in the educational programme are intended for preparing a specialist who is able to solve professional problems under any circumstances, is motivated and has special professional competencies (Reifferscheid et al., 2021; Foster-Collins et al., 2023). However, the modern traditional educational system does not meet the current requirements. More modern, digital technologies shall be implemented into the study of special subjects to increase the level of future doctors' professional competence. Digital and interactive technologies improve the learning process by changing the information transfer system. Therefore, the aim of this study was to determine the effectiveness of using cloud technologies during the professional training of medical students.

The aim involved the fulfilment of the following research objectives:

1. Carrying out a comparative analysis of available cloud technologies;

2. Conducting a survey of teachers regarding the use of cloud technologies during traditional education;

3. Determining the initial level of the components of the medical students' professional competence;

4. Implementation of an experimental programme using cloud technologies;

5. Determining the level of medical students' professional competence after the experiment;

6. Determination of the personal attitude of teachers and students to the proposed cloud technologies.

The hypothesis of our research is based on the assumption that the use of cloud technologies in the professional training will contribute to the building future doctors' professional competencies.

1. Literature review

Information processing technologies have undergone significant changes in the era of globalization. The use of cloud technologies in education is one of the factors in the development of students' digital competence. Cloud services are one of the modern and effective tools for solving the problems of digitalization of the educational process. Their main advantage is the lack of costs for the appropriate software. The number of studies on the introduction of cloud technologies into the educational process of HEIs is growing rapidly (Konotop et al., 2023).

In her work, Tayirova (2023) states that cloud technologies are an important tool for improving the educational process. They make it possible to increase the level of students' knowledge, create an interactive environment, choose learning methods, and also contribute to the development of students' important competencies.

The educational model which involves cloud technologies is an effective tool in improving the students' ability of critical thinking and information literacy (Hongphanut, 2023). The use of cloud technologies provides users with access to the necessary information from any device with Internet access, which enables educators to freely view educational materials, build teamwork skills during joint work on projects and tasks online (Dobrovitska & Luchko, 2023). Fernanda et al. (2023) believe that the use of cloud technologies attracts their users, as they are convenient for students to receive lecture materials anywhere if they are connected to the Internet.

Modern researchers pay a lot of attention to the modernization of medical education: conducting trainings (Thommes et al., 2023), using network technologies (Halkina, 2022), 3D holography (Haleem et al., 2022). Therefore, quality training for professional activities of future doctors is always relevant in scientific communities.

The academic literature emphasizes the importance of clinical confidence during medical practice (Puhalenthi et al., 2023; Sakamoto et al., 2023). It is noted that specialists who are confident in their actions are more competent and perform their duties better (Lakhlifi et al., 2023; Dave et al., 2023).

The researchers determined that technological learning paradigms give educators the opportunity to support the development of highly professional human resources. Therefore, advanced technologies are becoming increasingly useful for future doctors (Banerjee et al., 2021). Hack-Polay et al. (2023) analyse the effect of technologies such as artificial intelligence, digital technologies and health-related engineering equipment for the abilities and professional development of future nurses. Krielen et al. (2023) determined that the use of simulation during the training of doctors can improve communication between members of related professions and teamwork in general, which has a positive effect on professional development throughout life.

It was decided to analyse the effectiveness of the implementation of cloud technologies to improve the methodology of training future doctors considering that modern medical education should prepare future doctors both theoretically and practically (Hemmati & Harris, 2023), teach new preventive methods for disease prevention as well as early diagnosis of diseases. Therefore, the introduction of cloud computing into pedagogical practice creates a professional need to study the technological capabilities of cloud educational services to choose the best educational solutions among the available options.

2. Methodology

2.1. Research design

The research continued throughout 2022/2023 and consisted of organizational, formative and final stages (Figure 1).

The organizational stage provided for a comparison of well-known cloud technologies. The criterion for inclusion in the study was: free of charge and the possibility of introduction into the educational environment. The inclusion criterion was a low rating and a demo version (Table 1). The obtained results were the basis for the analysis of the traditional tools and methods that have already been introduced into the educational process. For this purpose, a survey of teachers was conducted regarding the use of traditional methods and tools that were implemented during lectures. The experimental programme was developed based on the obtained results using cloud technologies during the professional training of medical students.

At the formative stage, the main components on which the professional competence of future doctors is based were formed according to the proposed model of Lymar & Omelchuk (2018), (Table 2).
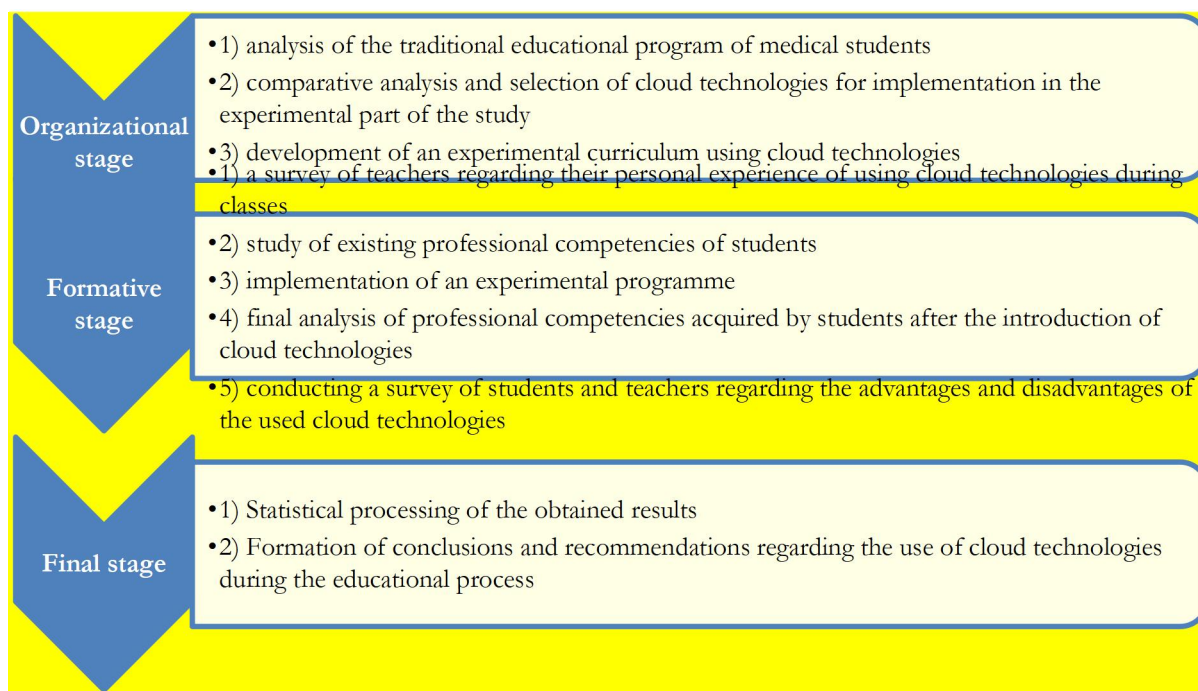

Organizational stage
- 1) analysis of the traditional educational program of medical students
- 2) comparative analysis and selection of cloud technologies for implementation in the experimental part of the study
- 3) development of an experimental curriculum using cloud technologies

Formative stage
- 1) a survey of teachers regarding their personal experience of using cloud technologies during classes
- 2) study of existing professional competencies of students
- 3) implementation of an experimental programme
- 4) final analysis of professional competencies acquired by students after the introduction of cloud technologies
- 5) conducting a survey of students and teachers regarding the advantages and disadvantages of the used cloud technologies

Final stage
- 1) Statistical processing of the obtained results
- 2) Formation of conclusions and recommendations regarding the use of cloud technologies during the educational process
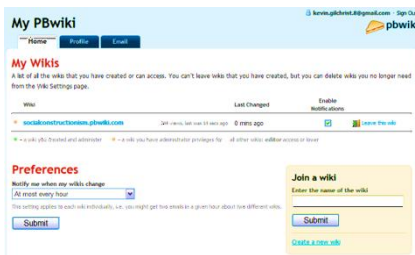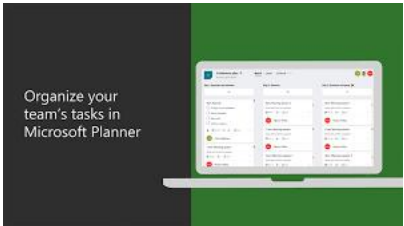
Figure 1. The procedure for conducting the experimental part of the study
Source: developed by the author

2.2. Sample

The experimental part of the study was conducted at 3 HEIs: State Institution "Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine", Danylo Halytsky Lviv National Medical University, Ivano-Frankivsk National Medical University. This number of institutions makes it possible to comprehensively consider the issue under research and provide more substantiated conclusions. The experiment involved 320 students of 3rd-4th years of study. The criterion for the inclusion of students was the absence of missed classes. The exclusion criterion is the failure to pass the credit. The sample was evenly divided into control and experimental groups. The control group (CG) consisted of 110 students and continued classes according to the traditional programme. The experimental group (EG) also included 110 students. The experimental programme using cloud technologies was introduced into their classes. Two training courses on special

subjects of major 221: Dentistry were selected to confirm the advanced hypothesis. These courses were: Therapeutic Dentistry and Medical Law of Ukraine, and a training course in English for a professional direction. As the selected courses are objectively different in terms of the methods of educational activity, the final results obtained after the experiment were determined to confirm or refute the hypothesis. The study also involved 5 teachers with a total of 21.5 years of experience. They made up the expert group.

Table 1. Description of cloud technologies that were used during the research in the experimental group (EG)

Cloud technologies	Description	Logo
PBwiki	The purpose of implementing this technology was building communicative competences during joint creative projects. EG students were divided into groups to complete the task. While using Pbwiki, students could simultaneously use the resource to add new information, make changes using the tools available at the website.	
Google Docs	This resource was used to perform homework (calculate in the programme, conduct a survey).	
Sway	Sway provided an opportunity to make creative presentations, as well as to collect text, images, videos and other content in an interactive online format, while applying design layouts, colour schemes or choosing existing options for design elements.	
Microsoft Planner	Using this web application, students could communicate while completing assignments, teaming up, and planning future meetings.	

Microsoft Azure	The Microsoft Azure platform was offered to teachers for testing EG students. It is an example of a hybrid cloud that allows testing up to 5,000 students at the same time, as well as automated verification of answers.

Table 2. Characteristics of the main components of the professional competence of medical workers

Components	Peculiarities
Cognitive	General medical knowledge; basic deontological, ethical, legal and psychological knowledge.
Motivational and volitional	The doctor's motivation for professional activity, which is rooted in the motivation of choosing a profession and the doctor's value system, and is also represented by a set of volitional characteristics of a specialist (self-monitoring and self-regulation, which is especially relevant for a doctor who interacts with a large number of patients which results in the emotional stress)
Organizational and activity	Skills and organization of work with patients and other participants in the treatment process, behavioural strategies, etc. In other words, a doctor may know how to organize work and interaction, choose a certain algorithm of treatment, but in practice, choose wrong strategies because of certain unknown reasons. This component also covers strategies for interacting with patients, including verbal and non-verbal communication.

Source: created by the author

2.3. Data collection

-Comparative analysis. It was used when comparing cloud technologies. This analysis helped to select 5 technologies that meet the given requirements.

- Diagnostics of developed professional competencies. The method was applied to compare the results before and after the implementation of cloud technologies. This helped to determine the effectiveness of cloud technologies on the quality of assimilation of the completed educational programme.

- Author's survey. It was implemented to understand students' and teachers' personal opinion regarding the use of selected cloud technologies during the experiment.

- The method of expert evaluations was used to analyse the results of the educational activities of students and teachers. A group of experts studied the level of professional competence of EG and CG students.

2.4. Data analysis

The survey was conducted using Google Forms. They included 30 items for each component of professional competence. A 100-point rating scale was used to process the obtained results, where:

0-25 – not developed

25-50 - weakly developed

50-75 – developed but need improvement

75 -100 - well developed.

Validity and reliability of the questionnaire were tested using Cronbach's alpha reliability coefficient and Pearson' correlation coefficient.

IBM SPSS Statistics 25.0.0.1 was used to analyse quantitative data. Pearson's test and Cohen's coefficient were calculated for statistical processing of the obtained results.

2.5. Ethical Criteria

The conducted experimental research met all the requirements of ethics and integrity in relation to the respondents. Before the start of the research, the students signed a document on confidential processing of the obtained results and non-disclosure of personal information.

3. Results

The experience of teachers regarding the use of cloud technologies during classes was studied before starting the implementation of the experimental programme in the educational environment (Figure 2). This made it possible to determine the relevance of the selected technologies, as well as the advantages and disadvantages of technologies that have already been introduced into the educational programme.

Figure 2 demonstrates that the majority of teachers had no experience of using cloud technologies at all. During the conversation, the teachers noted that the main reason for refusing to use cloud technologies was: difficulty in use (30%); worries about the safety of personal data and educational materials (5%); a large selection of cloud technologies (2%).

Before and after the experimental part, a diagnostic of the professional competences of CG and EG students was carried out to understand the impact of the use of cloud

technologies on such components of professional competence as cognitive, motivational and volitional, organizational and activity (Tables 3-5).

Considering the obtained results, it can be stated that the use of cloud technologies affected such components of professional competence as the ability to diagnose diseases and conduct tests (CG R=13 compared to EG R=21); knowledge of ethical and professional standards (CG R=12 compared to EG R=24); knowledge of regulatory and legal standards in the field of health care (CG R=36 compared to EG R=21). This range can be caused by the fact that the experimental programme was built for the subject Medical Law of Ukraine, which affected the positive results of EG students compared to CG.
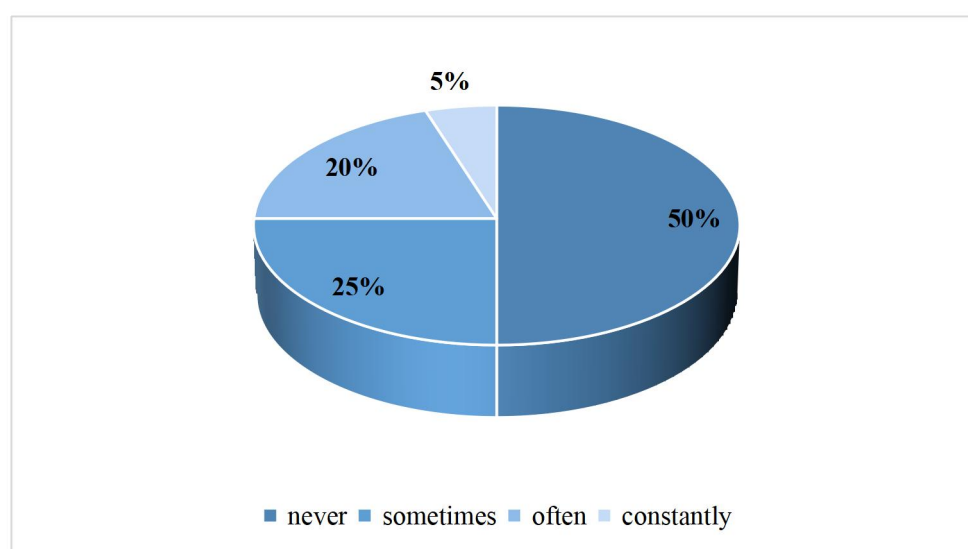

Figure 2. Distribution of teachers' answers regarding the personal use of cloud technologies during the educational process.
Source: developed by the author

The obtained results indicate the improvements in the EG students in the field of understanding of professional ethical norms, stress resistance, the ability to make quick decisions, as well as motivation for continuous professional development and lifelong learning. The better results in the selected areas can be caused by the fact that the teachers gave creative tasks for joint work in groups. Students independently agreed on the meeting, shared responsibilities, and independently resolved disputed issues between each other.

A significant difference between the EG and CG indicators was found in the assessment of the organizational and activity component. Students who studied using

cloud technologies learned to better manage time for providing medical care, understand professional standards and norms, and have better developed communication skills than students who studied under a traditional programme.

Table 3. Distribution of the assessment of the cognitive component of the professional competence of CG and EG students before and after the introduction of cloud technologies

Cognitive component	CG			EG		
	Before (X)	After (X)	R	Before (X)	After (X)	R
Knowledge of medical terminology	39	72	33	37	71	34
Understanding pathophysiological processes and disease mechanisms	29	69	40	28	73	45
Study of medicines, their effects, side effects, and interactions	45	72	27	43	69	26
Training in methods of disease diagnosis, including laboratory tests, imaging and other methods, as well as development of treatment plans and treatment methods	37	50	13	39	60	21
Understanding the ethical aspects of medicine and professional standards in the field	39	51	12	41	65	24
Development of critical thinking skills, research work and continuous learning	43	58	15	44	64	20
Understanding the structure and functioning of health care systems, legislation and regulatory authorities	43	64	21	40	76	36

Note: where **x** – mean value
Source: developed by the author

The diagnostics of the developed professional competencies was followed by a survey on the personal opinion of the use of the proposed cloud technologies. Both students and teachers took part in the survey. Table 6 presents the results of the survey.

The results of the survey show that students positively evaluated the use of cloud technologies during education. However, there is still concern among both students and teachers about the safety of personal data. Teachers also noted that the use of cloud technologies is an effective tool for ensuring students' access to educational materials. A total of 93% of teachers will continue to use cloud technologies during lessons.

Table 4. Distribution of assessment of the motivational and volitional component of the professional competence of CG and EG students before and after the introduction of cloud technologies

Motivational and volitional component	CG			EG		
	Before (X)	Afte r (X)	R	Before (X)	Afte r (X)	R
Professional motivation	70	69	-1	71	73	2
Development of empathy and communication skills with patients	45	65	20	43	69	26
Understanding and acceptance of professional ethical norms and values	55	62	7	52	68	16
Stress resistance	39	51	12	41	70	29
Development of self-discipline and volitional control	39	58	19	44	75	31
Ability to make decisions, even in difficult situations	39	56	17	40	80	40
A desire for continuous improvement and professional development, as well as a willingness to spend time and effort to improve medical practice	65	66	1	65	75	10

Note: where **x** – mean value
Source: developed by the author

After the research, the obtained results were subjected to statistical processing. The Pearson test was used to identify a tendency to increase the results obtained by the EG students in comparison with students who continued their studies using traditional tools. Because of this, it can be concluded that the use of cloud technologies in the curriculum has an impact on the development of professional competencies of medical students. This fact confirms our advanced hypothesis. The calculation of Cohen's coefficient confirmed the effectiveness of the use of cloud technologies, which ranged from 0.8 to 1.17 in the obtained results of the experimental group. The value obtained for the group of students who studied according to the traditional programme was 0.5. This result reflects the medium effect.

4. Discussion

The conducted research confirmed the previous hypothesis that the use of cloud technologies contributes to the development of professional competencies of future doctors.

Table 5. Distribution of assessment of the organizational and activity component of professional competence of CG and EG students before and after the introduction of cloud technologies

Organizational and activity component	CG			EG		
	Before (X)	After (X)	R	Before (X)	After (X)	R
Clinical skills	45	68	23	46	70	24
Development and implementation of a treatment plan, including prescribing medications, physical therapy, surgery, and other medical procedures	55	65	10	53	70	17
Development of effective communication skills with patients, including the ability to explain medical information in a clear and empathetic manner	54	65	11	53	80	27
Making medical records	29	45	16	28	76	48
Understanding the structure of medical institutions, working with medical equipment and materials, scheduling patient appointments and organizing working hours	20	55	35	21	69	48
Understanding of regulatory and legal aspects of medical activity, ethical principles and professional standards	19	45	26	19	75	56
Ability to effectively manage time and resources to provide quality medical care	43	50	7	44	75	31

Note: where x – mean value

Source: developed by the author

Among the students of the experimental group, the following components of professional competence were better formed: cognitive, motivational-volitional and organizational-active. The obtained results are confirmed by the group of researchers Puchkov et al. (2020). The researchers established that cloud technologies provide additional opportunities for the organization of the educational process, contribute to the improvement of student success and also realize educational opportunities.

Table 6. Results of the survey of teachers and EG students regarding the use of cloud technologies after the experiment

Students	Yes (%)	No (%)
Was it convenient to use cloud technology to access educational content from any device?	95	5
Has cloud technology made it easier to collaborate and share information with other students and teachers?	93	7
Do you think your personal data stored in cloud storages that were used in training are safe?	75	20
Teachers		
Do you think it is effective to use cloud technologies to provide access to educational content for students?	98	2
Will you continue to use cloud technologies for collaboration and communication with other teachers or students? Will you continue to use cloud technologies for collaboration and communication with other teachers or students?	93	7
Do you think that the use of cloud technologies facilitates the process of conducting lessons and evaluating students' educational performance?	89	11
Do you think it is safe to use cloud technologies to save personal data and educational material?	88	12

Source: developed by the author

The use of cloud technologies during training, such as: Pbwiki, Google Docs, Sway, Microsoft Planner, Microsoft Azure, turned out to be a positive tool in improving the professional development of future doctors. The experience of using the above forms and methods of work showed that building professional competence is possible through consistent work in the system and development of all its tools. Similar results were obtained in a study by Mosenkis et al. (2020). The researchers determined that the use of cloud technologies is an effective means of improving the development of all components of teacher competence. The use of selected tools during distance learning completely solved the problem of interaction with the teaching staff and the learning environment.

The conducted research also influenced the personal attitude of teachers regarding the use of cloud technologies during classes and for independent use. At the beginning of the experiment, most teachers believed that the use of cloud technologies is not a convenient tool, not safe or not effective at all. After using cloud technologies, teachers were able to change their minds about the proposed cloud technologies. The obtained results are

confirmed by Korucu (2016). The study found that teachers do not use cloud systems because they do not need them or they mostly do not know them. This may be explained by the fact that many teachers still have a low level of digital competence and try not to use the latest technologies during educational activities (Basilotta-Gómez-Pablos et al., 2022; Hinojo-Lucena et al., 2019).

However, the introduction of new courses using cloud technologies can contribute to the construction of a holistic concept of building professional and digital competence of future doctors. The use of the latest technologies in medical practice can increase the efficiency and accuracy of diagnostics, the quality of medical services, as well as the effective management of a medical facility (Srinidhi et al., 2021; Prusaczyk et al., 2022).

Conclusions

The conducted research gave grounds to state that the ability to use digital technologies for professional and personal purposes is important in the era of digitalization. The EG students showed significant results after using cloud technologies such as: Pbwiki, Google Docs, Sway, Microsoft Planner, Microsoft Azure. The teachers changed their attitude towards the use of cloud technologies during the lessons, although most of the teachers had doubts about the proposed tools at the beginning of the study. Therefore, one of the ways of updating the content of education and integration into the global educational space is the orientation of educational programmes of HEIs on building professional competencies by students and the creation of effective mechanisms for their introduction. The advantages of using cloud technologies in HEIs include: no need for powerful computers; lack of significant investments in the purchase of licenses and expensive equipment; no piracy; online testing, openness of the educational environment; increased interaction between teachers and students; preliminary preparation for further work in the classroom; increasing active learning in the classroom; involving media content instead of explaining basic concepts, access to materials at any time and in any way, saving resources, etc. The more diverse the tools of the theoretical and practical parts of classes will be, the more effective will be the acquisition of new knowledge by higher school students. So, we concluded that the use of cloud technologies is most appropriate for building professional competencies of medical students. The academic novelty of the study was the fact that few

studies have been conducted on the use of cloud technologies in the studies of future doctors. The implementation of virtual reality in the practical classes of future doctors can be a promising direction of research.

References

Banerjee, M., Chiew, D., Patel, K.T., Johns, I., Chappell, D., Linton, N., ... & Zaman, S. (2021). The impact of artificial intelligence on clinical education: perceptions of postgraduate trainee doctors in London (UK) and recommendations for trainers. *BMC Medical Education, 21*, 429. https://doi.org/10.1186/s12909-021-02870-x

Basilotta-Gómez-Pablos, V., Matarranz, M., Casado-Aranda, L.A., & Otto, A. (2022). Teachers' digital competencies in higher education: A systematic literature review. *International Journal of Educational Technology in Higher Education, 19*, 8. https://doi.org/10.1186/s41239-021-00312-8

Dave, T., Athaluri, S.A., & Singh, S. (2023). ChatGPT in medicine: an overview of its applications, advantages, limitations, future prospects, and ethical considerations. *Frontiers in Artificial Intelligence, 6*. https://doi.org/10.3389/frai.2023.1169595

Dobrovitska, O., & Luchko, Y. (2023). The application of cloud technologies in the educational process of higher education institutions. *Education and Pedagogical Sciences, 2*(183), 62–70. https://doi.org/10.12958/2227-2747-2023-2(183)-62-70

Fernanda, A., Huda, M., & Fadri Geovanni, A.R. (2023). Application of learning cloud computing technology (cloud computing) to students in higher education. *International Journal of Cyber and IT Service Management, 3*(1), 32–39. https://doi.org/10.34306/ijcitsm.v3i1.121

Foster-Collins, H., Mattick, K., & Baumfield, V. (2023). Workplace support for newly qualified doctors and secondary school teachers: A comparative analysis. *British Educational Research Journal, 49*(5), 1005-1043. https://doi.org/10.1002/berj.3879

Hack-Polay, D., Mahmoud, A.B., Ikafa, I., Rahman, M., Kordowicz, M., & Verde, J.M. (2023). Steering resilience in nursing practice: Examining the impact of digital innovations and enhanced emotional training on nurse competencies. *Technovation, 120*, paper 102549. https://doi.org/10.1016/j.technovation.2022.102549

Haleem, A., Javaid, M., & Khan, I. (2020). Holography applications toward medical field: An overview. *Indian Journal of Radiology and Imaging, 30*(3), 354–361. https://doi.org/10.4103/ijri.IJRI_39_20

Halkina, T. (2022). Use of network technologies in the practice of educational training and re-training of military doctors. *New Collegium, 3*(108), 33–36. https://doi.org/10.30837/nc.2022.3.33

Hemmati, Z., & Harris, S. (2023). Integrating leadership into the undergraduate medical curriculum in the UK: A systematic review. *BMJ Leader. Published Online First.* https://doi.org/10.1136/leader-2022-000714

Hinojo-Lucena, F.J., Aznar-Diaz, I., Caceres-Reche, M.P., Trujillo-Torres, J.M., & Romero-Rodriguez, J.M. (2019). Factors influencing the development of digital competence in teachers: Analysis of the teaching staff of permanent education centres. *IEEE Access*, 7, 178744–178752. https://doi.org/10.1109/ACCESS.2019.2957438

Hongphanut, R. (2023). A development of history instructional model on cloud technology to enhance critical thinking abilities and information literacy of undergraduate students. *Kasetsart Journal of Social Sciences*, *44*(3), 911–920. https://doi.org/10.34044/j.kjss.2023.44.3.29

Jones, G., Macaninch, E., Mellor, D.D., Spiro, A., Martyn, K., Butler, T., & ... Moore, J.B. (2023). Putting nutrition education on the table: development of a curriculum to meet future doctors' needs. *British Journal of Nutrition*, *129*(6), 1000–1008. https://doi.org/10.1017/S0007114522001635

Konotop, O., Bykonia, O., Bondar, O., Shevchenko, Y., & Korobeinikova, T. (2023). Effectiveness of generative learning strategies in independent study of English using mobile technologies. *Revista Eduweb*, *17*(3), 160-181. https://doi.org/10.46502/issn.1856-7576/2023.17.03.14

Korucu, A.T. (2016). The views of teacher candidates on using cloud technologies in education. *International Journal of Higher Education*, *6*(1), 84-100. https://doi.org/10.5430/ijhe.v6n1p84

Krielen, P., Meeuwsen, M., Tan, E.C.T.H., Schieving, J.H., Ruijs, A.J.E.M., & Scherpbier, N.D. (2023). Interprofessional simulation of acute care for nursing and medical students: interprofessional competencies and transfer to the workplace. *BMC Medical Education*, *23*(1), art. 105. https://doi.org/10.1186/s12909-023-04053-2

Lakhlifi, C., Lejeune, F.X., Rouault, M., Khamassi, M., & Rohaut, B. (2023). Illusion of knowledge in statistics among clinicians: Evaluating the alignment between objective accuracy and subjective confidence, an online survey. *Cognitive Research: Principles and Implications*, *8*(1), art. 23. https://doi.org/10.1186/s41235-023-00474-1

Li Ho, A.V., Ju, X., Dreyer, C., & Jamieson, L. (2021). Motivations of postgraduate dental students in Australia and New Zealand to pursue a dental specialty training program and their concerns. *Heliyon*, *7*(1), art. E06060. https://doi.org/10.1016/j.heliyon.2021.e06060

Lymar, L., & Omelchuk, S. (2018). Factors of the medical career choice within the context of Ukrainian healthcare reforms. *Wiadomosci Lekarskie*, *71*(1 pt 2), 211–216. https://www.researchgate.net/publication/325684358_Factors_of_the_medical_career_choice_within_the_context_of_ukrainian_healthcare_reforms

McGushin, A., de Barros, E.F., Floss, M., Mohammad, Y., Ndikum, A.E., Ngendahayo, & ... Abelsohn, A. (2023). The World Organization of Family Doctors Air Health Train the Trainer Program: Lessons learned and implications for planetary health education. *The Lancet Planetary Health*, *7*(1), E55-E63. https://doi.org/10.1016/S2542-5196(22)00218-2

Mosenkis, I.L., Lukianyk, L.V., Strokal, O.M., Ponomarova, V.A., & Mykhailiuk, H.V. (2020). Application of cloud educational technologies for teacher competence development. *International Journal of Learning, Teaching and Educational Research, 19*(5), 289–303. https://doi.org/10.26803/ijlter.19.5.18

Prusaczyk, A., Bogdan, M., Galazka-Sobotka, M., & Kowalska-Bobko, I. (2022). Competency deficits of medical and peri-medical staff in medical facilities, including new tasks associated with the COVID-19 epidemic. *International Journal of Integrated Care, 22*(S3), 315. https://doi.org/10.5334/ijic.icic22157

Puchkov, I., Yeshchenko, M., Dolgaleva, O., & Grytsuk, Y. (2020). Using cloud technologies as a means of forming professional competence of students in higher education institutions. *Technologies of Intellect Development, 4*(3), 1-29. https://doi.org/10.31108/3.2020.4.3.2

Puhalenthi, K., Prasad, S., Chandrababu, C., & Roshini, S. (2023). Assessment of confidence in communication skills and its practice with patients among medical professionals in Trichy, India. *Cureus, 15*(3), paper e35818. https://doi.org/10.7759/cureus.35818

Reifferscheid, F., Harding, U., & Wirtz, S. (2021). Emergency physician training—survey of course participants regarding training conditions and motivation. *Medizinische Klinik - Intensivmedizin Und Notfallmedizin, 116*(1), 36–40. https://doi.org/10.1007/s00063-019-00624-8

Sakamoto, A., Inokuchi, R., Iwagami, M., Hanari, K., & Tamiya, N. (2023). Association between physicians' characteristics and their knowledge, attitudes, and practices regarding advance care planning: a cross-sectional study. *BMC Palliative Care, 22*(1). https://doi.org/10.1186/s12904-023-01253-x

Srinidhi, V., Karachiwala, B., Iyer, A., Reddy, B., Mathrani, V., Madhiwalla, ... & Sen, G. (2021). Asha Kirana: When digital technology empowered front-line health workers. *BMJ Global Health, 6.* https://doi.org/10.1136/bmjgh-2021-005039

Tayirova, M.A. (2023). Possibilities of using cloud technologies in the higher education system. *Frontline Social Sciences and History Journal, 03*(04), 19–26. https://doi.org/10.37547/social-fsshj-03-04-04

Thommes, M.S., Schmidt, M., Lambert, S.I., Schauwinhold, M.T., Klasen, M., & Sopka, S. (2023). Reflective practice improves Basic Life Support training outcomes: A randomized controlled study. *PLoS ONE, 18*(6 June). https://doi.org/10.1371/journal.pone.0287908

Zhao, Y., Mbuthia, D., Blacklock, C., Gathara, D., Nicodemo, C., Molyneux, S., & English, M. (2023). How do foundation year and internship experience shape doctors' career intentions and decisions? A meta-ethnography. *Medical Teacher, 45*(1), 97–110. https://doi.org/10.1080/0142159X.2022.2106839