



MODERN TRENDS IN PSYCHOLOGY: INTEGRATION OF COGNITIVE PROCESSES AND INFORMATION TECHNOLOGIES IN MEDICAL EDUCATION

Sahiyeva Matluba Toshpo'lat qizi

Termez Branch, Tashkent State Medical University Department of Social and Humanitarian
Sciences, Associate Professor

E-mail: matlubasahiyevattatf@gmail.com

Qurbonova Mohinur Baxtiyorovna

“Lecturer at the Faculty of Law, Termiz State University”

mohinurqurbonova@gmail.com

TURDIMURATOV BAXTIYOR KURBONOVICH

Tashkent State Medical University, Termez Branch
Assistant at the Department of Social and Humanitarian Sciences

Email: baxtiyorturdimuratov6691@gmail.com

Mavlonova Mohinur Husanovna

2nd-year medical student Tashkent State Medical
University, Termez Branch

E-mail: mmavlonova698@gmail.com

Abdumalikova Zilola Abdukarim qizi

2nd-year medical student Tashkent
State Medical University, Termez Branch

E-mail: abdumalikovazilola2775@gmail.com

Abstract: This article analyzes modern trends in psychology, particularly the role of cognitive psychology and cyberpsychology in the medical education process. The psychological impact of using information and communication technologies in students' mastery of complex subjects (including the morphology and physiology of internal organs) was studied. The research covers issues of optimizing the educational process and stabilizing the psycho-emotional state of future doctors.

Keywords: modern psychology, cognitive processes, medical pedagogy, information technologies, bioethics, statistical analysis.

INTRODUCTION

In the 21st century, the science of psychology is moving beyond its traditional boundaries, deeply penetrating all aspects of human activity, particularly the fields of education and medicine. Today, among the leading modern trends in psychology, cyberpsychology, which studies human behavior in a digital environment, and cognitive psychology, focused on the mechanisms of receiving, processing, and storing information, stand out. The rapid pace of digitalization globally directly affects the characteristics of a person's information assimilation. This situation, in turn, requires a psychological and methodological revision of the educational process in the higher education system, especially in medical pedagogy.

Medical education is distinguished by its extreme complexity and social responsibility. In a short period, students are required to master an exceptionally large volume of fundamental scientific information, such as the complex functional systems of the human body, the microscopic structure of tissues, and the morphology of internal organs. Modern psychological research shows that such a continuous and high cognitive load can cause information perception



barriers, fatigue, and psychological strain in students. It is precisely at this point that the issue of optimizing cognitive processes through the introduction of information and communication technologies (ICT), digital modeling, and virtual laboratories into medical education becomes highly relevant. The use of information technologies in medicine is not merely providing technical support for education; it is a complex psychological phenomenon that affects the formation of a student's attention, visual memory, and clinical thinking. Therefore, there is a vital need to create special modern educational literature and specialized textbooks integrating information technologies into medicine for the republic's medical education system.

At the same time, it should be noted that the technological and digital trends of psychology must not be limited to a purely technocratic approach. In the training of future doctors, combining the traditions of the philosophy of medicine, bioethics, and Eastern humanities with technological innovations is a demand of the time. Empathy towards the patient, medical responsibility, high moral and ethical values, and Eastern principles of humanism determine the primary psychological portrait and professional ethics of a specialist even in the age of virtual technologies.

Based on the above, the main purpose of this study is an in-depth analysis of students' psychological adaptation, the flow of cognitive processes (perception, memory, thinking), and mastery indicators in the context of using digital and information technologies in modern medical education. Furthermore, within the framework of the research, an assessment of innovative pedagogical processes based on the principles of bioethics and Eastern humanities is envisaged, which serves to reveal new psychological and methodological aspects of increasing educational efficiency in medical higher education institutions.

METHODS

This study was conducted with the participation of students from the Termez Branch of the Tashkent State Medical University. The research was organized on the basis of a comparative-experimental design, and a total of 120 students involved in the educational process were divided into two groups by random sampling: the experimental group (n=60) and the control group (n=60). The research was carried out under conditions of integrating the achievements of information and communication technologies (ICT) and cognitive psychology into medical pedagogy.

Research Procedure and Tools In the control group, classes were conducted using standard, traditional teaching methods and printed literature. In the experimental group, visualized digital technologies, electronic databases, and virtual educational programs were widely introduced into the educational process. In particular, practical classes on studying complex physiological systems of humans and the morphology of internal organs (including special test classes held within the 10th practical session of the approved academic cycle) were conducted using 3D models and computer technologies. In this process, interactive approaches were used to reduce students' cognitive load, facilitate concentration, and ensure a deep perception of the material.

Psychological and Pedagogical Assessment Methodologies To study the psychological, cognitive, and emotional state of students in the educational process, the following complex methodologies were used:

- **Assessment of cognitive processes:** The Münsterberg test to determine the scope and selectivity of attention, as well as psychological tests to measure visual memory capacity.
- **Determination of psychological strain:** Ch. Spielberger and Yu. Khanin's State-Trait Anxiety Inventory (STAI) to assess educational stress under conditions of information overload.



- **Analysis of bioethical and value-based approach:** A special socio-psychological questionnaire conducted to determine students' medical responsibility, empathy skills, and level of humanism based on the criteria of the philosophy of medicine and Eastern bioethics.

- **Mastery efficiency:** The level of students' mastery of medical and biological sciences was analyzed based on laboratory test results in practical classes and pedagogical evaluation criteria.

Statistical Analysis All the empirical data obtained, psychological test results, and pedagogical evaluation indicators were directly subjected to an in-depth statistical analysis using Microsoft Excel software. The reliability of differences ($p \leq 0.05$) between the experimental and control groups was calculated using the arithmetic means (M), standard deviation (SD), and Student's t-test through the software's built-in statistical functions. To visualize the research conclusions and explicitly demonstrate the dynamics of cognitive changes and pedagogical results in a scientific article, comparative histograms and line charts were created by processing the data in Microsoft Excel.

RESULTS

All empirical data and test results obtained within the framework of the study were processed in Microsoft Excel, and the effectiveness of introducing cognitive psychology and information and communication technologies (ICT) into the educational process was comparatively analyzed. The analysis of indicators between the experimental and control groups revealed the following important patterns:

Dynamics of Cognitive Processes and Perception The use of computer technologies in medical education significantly expanded the scope of students' concentration and visual memory. In particular, in the experimental group, which studied the complex structure of the morphology of internal organs and physiological systems through 3D models and digital visualization, the cognitive mastery level increased by an average of 34% compared to the beginning of the academic year. In the control group (traditional method), this indicator was only 12%. According to the results of the Münsterberg test, the speed of rapid search and analysis of information was statistically significantly higher in the experimental group ($p < 0.05$).

The Importance of Analyzing Laboratory Test Results Through the Use of Computer Technologies One of the most important results of the study was manifested in the analysis of laboratory test results in medical education. Instead of dryly memorizing clinical measurements and histological data, the use of a dynamic analysis method utilizing computer programs developed students' clinical and analytical thinking. 82% of the students in the experimental group were able to correctly interpret the practical significance of laboratory test results not only theoretically but also algorithmically.

Psychological State and Emotional Stability The results of the STAI (State-Trait Anxiety Inventory) methodology showed that the proper organization of the digital environment in education reduces students' cognitive strain. While the level of situational anxiety (educational stress) showed a high indicator ($M = 45.2 \pm 3.1$ points) in the control group, which mastered a huge volume of medical-biological information traditionally, this indicator dropped to a moderate level ($M = 32.4 \pm 2.8$ points) in the experimental group, which used visual and interactive digital tools. This confirms that information technologies ease the brain's cognitive load by systematizing information.

Formation of Bioethics and Humanitarian Values Another noteworthy aspect of the obtained results is the correlation between psychological relief and bioethical values. According to the results of the socio-psychological questionnaire, the students of the experimental group, who were free from cognitive strain and received educational information in a convenient digital



format, recorded a 28% increase in their level of understanding empathy and the principles of Eastern humanities (compassion towards the patient, medical responsibility, medical ethics). In other words, while information technologies simplified the learning process, they allowed students to focus their attention on the philosophical and humanistic aspects of medicine rather than on memorizing dry facts.

All obtained results were correlated and analyzed in Microsoft Excel, fully confirming their reliability for practical application.

DISCUSSION

The research results confirm that the cognitive and digital trends of psychology are becoming an integral part of modern medical education, and that forming a digital environment in educational institutions is not just a technical need but a deep psychological necessity. The data obtained show that traditional pedagogical mastery alone is not enough for medical students to master a huge amount of information; systematically taking their psycho-cognitive state into account is of crucial importance.

Reduction of Cognitive Load and Clinical Thinking It is well known that in medical higher educational institutions, studying highly complex topics that require precision, such as the functional activity of the human body and evaluating the morphological state of internal organs, can lead to cognitive strains. The study at the center of the discussion clearly showed that applying to practice and analyzing the results of laboratory tests obtained using computer technologies shifts the student's focus from remembering dry facts to systematic clinical analysis. This serves to optimize memory functions and retain information in long-term memory. As a result, the speed and accuracy of medical decision-making in future specialists are ensured to increase.

Integration of the Philosophy of Medicine and Eastern Humanities The introduction of cyberpsychology and cognitive processes into medical pedagogy does not mean a purely rational (technocratic) approach. An important pattern identified in the study—the reduction of educational stress due to technological convenience—allowed students to focus their attention on humanistic values. From the perspective of the philosophy of medicine and bioethics, the level of empathy in future doctors increases precisely in an environment free from psychological strain. According to the traditions of Eastern humanities, a healer must not only know the structure of body organs but also fully understand the patient's psyche and be their spiritual support. Information technologies save the student from the hardship of mechanical memorization, giving them the time and mental resources to work on the ethical relationship between doctor and patient.

Practical Significance and Future Tasks The results obtained dictate a unique innovative approach for the medical education system of the Republic of Uzbekistan. Creating a specialized database of literature linking computer technologies with medicine in the education system is one of the most urgent tasks. From this point of view, creating special study guides and textbooks on the application of information technologies in medicine is the only systematic solution to integrating the achievements of cognitive psychology into practice in the republic's medical education. Such specialized literature serves not only to transmit knowledge but also as a means to protect a student's mental health and prevent professional deformation.

CONCLUSION

The results of the conducted research show that modern trends in psychology, in particular cognitive and cyberpsychological approaches, serve as an important scientific and methodological foundation in the process of digitalizing medical education. The systematic use of information and communication technologies in medical higher educational institutions was



practically confirmed to significantly increase (by 34%) the efficiency of future doctors' mastery of complex medical-biological information and eliminate cognitive strain. The reduction of educational stress in the learning environment creates an opportunity for students to more deeply understand and absorb bioethics and the principles of Eastern medical philosophy (empathy for the patient, high responsibility, and humanism).

The conclusions drawn from this study put forward the following specific recommendations for implementation in medical education practice:

- **Creation of Specialized Educational Literature:** Developing special textbooks and study guides, such as "Information Technologies in Medicine," which are considered specific and unique for the republic's medical education system and integrate medical information systems and digital technologies, is a strategic necessity. Such textbooks serve to lighten the students' cognitive load and help them systematically perceive the material.

- **Scientific Research Prospects:** In the future, applying pedagogical approaches based on information technologies directly to highly specialized medical research, in particular, highly complex fields such as the histological study and analysis of the morphological state of internal organs in descendants, will ensure expected high efficiency.

- **Stabilizing the Analytical-Statistical Approach:** Continuously and deeply analyzing all laboratory tests and pedagogical indicators obtained during the medical education process using precise statistical software (especially Microsoft Excel) guarantees objectivity in monitoring the quality of education.

In general, the mutual harmony of technological innovations and the laws of modern psychology is the strongest driver of today's medical pedagogy. This integration serves as the main pillar in training modern doctors who not only have high intellectual qualifications but are also spiritually and morally mature, and capable of feeling the patient's pain.

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