



MODERN APPROACHES TO TEACHING MAXILLOFACIAL SURGERY IN MEDICAL EDUCATION

A.A.Turabov

(Master's Student, 2nd Year, Specialty "Maxillofacial Surgery",
Tashkent State Medical University, Republic of Uzbekistan, Tashkent)

E-mail: aliturabov25@gmail.com

F.F.Sayfieva

(Master's Student, 2nd Year, Specialty "Prosthetic Dentistry",
Tashkent State Medical University, Republic of Uzbekistan, Tashkent)

E-mail: farangiz.sazfieva@mail.ru

O.M.Sokhibov

(Assistant of the Department of Public Health, Healthcare Management
and Physical Education,

PhD, Candidate of Medical Sciences)

<https://doi.org/10.5281/zenodo.17896496>

ARTICLE INFO

Received: 09th December 2025

Accepted: 10th December 2025

Online: 11th December 2025

KEYWORDS

medical education, maxillofacial surgery, innovative teaching methods, simulation learning, digital technologies, student performance

ABSTRACT

The teaching of maxillofacial surgery is one of the most challenging components of medical education due to the complexity of anatomical structures, high responsibility of clinical decision-making, and the need for well-developed manual skills. Traditional teaching methods often fail to ensure sufficient student engagement and long-term knowledge retention. The aim of this study was to analyze the factors that hinder students' learning of maxillofacial surgery and to assess the effectiveness of innovative teaching methods in improving academic performance. A comparative analysis of examination results and a survey of students were conducted. The introduction of digital tools, simulation technologies, and interactive learning platforms demonstrated a significant improvement in students' motivation, knowledge retention, and practical skills. The findings confirm that modern educational technologies are essential for optimizing the training of future maxillofacial surgeons..

Introduction

Modern medical education is undergoing profound changes driven by rapid technological development, the growing complexity of clinical disciplines, and increasing demands on the competence of future specialists. Maxillofacial surgery is one of the most technically demanding areas of medicine, requiring deep theoretical knowledge, precise anatomical orientation, and highly developed manual skills. Students often perceive this subject as difficult and psychologically stressful, which negatively affects their learning outcomes.

Traditional educational approaches in surgical disciplines are mainly based on lectures, practical classes at the patient's bedside, and limited access to surgical procedures. However,

these methods do not always ensure sufficient visualization of anatomical structures, repetitive skill training, or active student participation. As a result, students experience fear of making mistakes, lack confidence, and demonstrate poor exam performance.

In recent years, innovative teaching technologies such as digital flashcards, three-dimensional simulations, gamification, and virtual training platforms have gained widespread attention. These tools allow students to study complex topics in an interactive and individualized manner, repeat practical tasks multiple times without risk to patients, and increase motivation through game-based learning.

Therefore, the integration of innovative educational methods into the teaching of maxillofacial surgery is a promising direction for improving the quality of training, reducing academic anxiety, and increasing students' academic success.

Aim of the Study

The aim of this study was to analyze the factors that complicate the learning process for students studying the discipline of maxillofacial surgery and to evaluate the effectiveness of innovative teaching methods in improving academic performance, motivation, and practical skill acquisition.

Materials and Methods

To objectively assess the effectiveness of traditional teaching methods, official examination data from the dean's office were analyzed for the academic years 2022–2023. These data reflected students' performance in final examinations in maxillofacial surgery.

At the initial stage of the study, a total of 95 students participated in an anonymous survey aimed at identifying key difficulties in mastering the subject. The questionnaire included questions related to the volume of educational material, emotional attitude to the discipline, availability of practical training, and the level of psychological comfort during learning.

The results showed that only 47% of students passed the final examination on the first attempt. The main factors complicating the educational process were identified as:

- a large volume of complex theoretical information;
- fear of the subject due to its surgical nature;
- limited opportunities for hands-on training of manual skills;
- insufficient visualization of anatomical structures.

To test innovative teaching approaches, two experimental groups of students were formed. The educational process in these groups included the use of the following methods:

- digital spaced-repetition flashcards (Anki);
- three-dimensional anatomical and surgical simulations;
- interactive quizzes and game-based platforms (Kahoot);
- increased number of practical classes under the supervision of assistants.

The learning outcomes of the experimental groups were then compared with those of students who studied using traditional teaching methods.

Results

The introduction of innovative educational technologies led to a marked improvement in students' academic performance and learning motivation. Students noted that the use of

Anki flashcards significantly facilitated long-term memorization of complex anatomical and clinical information due to the principles of spaced repetition.

Three-dimensional simulations provided a clear visualization of anatomical structures and surgical procedures, allowing students to better understand spatial relationships and stages of operations. This significantly reduced fear associated with real surgical manipulation and increased students' confidence.

Interactive platforms such as Kahoot transformed the learning process into a competitive and engaging activity. Students demonstrated higher levels of participation during classes, improved concentration, and active involvement in self-assessment.

The expansion of practical training under the guidance of assistants allowed students to repeatedly practice basic surgical manipulations in a safe educational environment. This contributed to the formation of stable manual skills and increased readiness for clinical practice.

Objective examination data confirmed the positive effect of these innovations. The pass rate in the experimental groups increased significantly compared to the traditional training groups. In addition, most students reported reduced anxiety before exams, greater interest in the subject, and higher satisfaction with the learning process.

Discussion

The results of the present study confirm the effectiveness of integrating innovative teaching technologies into the educational process of maxillofacial surgery. Modern digital tools allow the transition from passive learning to active student-centered education. They create conditions for independent work, continuous feedback, and personalized learning trajectories.

One of the key advantages of simulation-based learning is the possibility of unlimited repetition of procedures without risk to patients. This is especially important in surgical disciplines, where the cost of error is extremely high. Simulation training helps bridge the gap between theoretical knowledge and real clinical practice.

Gamification elements enhance intrinsic motivation, promote competitive spirit, and reduce psychological barriers associated with complex surgical subjects. At the same time, digital flashcard systems effectively address the problem of information overload by optimizing memory retention.

Despite the obvious advantages, it should be noted that the successful implementation of innovative methods requires adequate technical infrastructure, trained teaching staff, and systematic integration into the curriculum. Innovative technologies should complement, rather than replace, traditional clinical training.

Conclusion

The findings of this study demonstrate that innovative educational technologies significantly improve the effectiveness of teaching maxillofacial surgery. Their implementation leads to:

- increased academic performance;
- reduction of fear and psychological stress;
- improved motivation and interest in the subject;
- enhanced development of practical surgical skills.

The integration of digital tools, simulation technologies, and interactive learning platforms should be considered a necessary component of modern medical education. These methods contribute to the training of competent, confident, and highly qualified future maxillofacial surgeons.

References:

1. Cook D.A., Hatala R., Brydges R. et al. Technology-enhanced simulation for health professions education: A systematic review and meta-analysis. *JAMA*, 2011.
2. Issenberg S.B., Scalese R.J. Simulation in health care education. *Perspectives in Biology and Medicine*, 2008.
3. McGaghie W.C., Issenberg S.B., Petrusa E.R. A critical review of simulation-based medical education research. *Medical Education*, 2010.
4. Harden R.M., Laidlaw J.M. *Essential Skills for a Medical Teacher*. Elsevier, 2017.
5. Ruiz J.G., Mintzer M.J., Leipzig R.M. The impact of e-learning in medical education. *Academic Medicine*, 2006.
6. Cant R.P., Cooper S.J. Simulation-based learning in nurse education. *Nurse Education Today*, 2010.
7. Larsen D.P., Butler A.C., Roediger H.L. Repeated testing improves long-term retention. *Medical Education*, 2008.
8. Van der Vleuten C.P.M., Driessen E.W. What would happen to education if we take educational evidence seriously? *Perspectives on Medical Education*, 2014.
9. Kneebone R. Simulation in surgical training: Educational issues and practical implications. *Medical Education*, 2003.
10. Norman G. Research in medical education: Three decades of progress. *BMJ*, 2002.