

**PEDAGOGICAL FOUNDATIONS FOR THE
FORMATION OF OTORINOLARYNGOLOGICAL
CLINICAL THINKING IN FUTURE DOCTORS**

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ANNOTATION. *This scientific research is dedicated to the problem of forming clinical thinking competence in future doctors based on the integration of otorhinolaryngology and pedagogy. In modern medical education, harmonizing theoretical knowledge with practical skills is considered a pressing task. Especially in the field of otorhinolaryngology, advanced clinical thinking is required for the correct and rapid diagnosis of diseases, clinical decision-making, and effective communication with the patient. Therefore, the study scientifically analyzed the pedagogical mechanisms and effective teaching methods for forming this competence in students.*

During the study, students' level of clinical thinking, diagnostic decision-making speed, and practical skills were evaluated based on specially developed criteria. The results obtained showed that students in the experimental group who studied using interactive methods achieved higher results compared to the control group. In particular, it was found that their clinical thinking, diagnostic accuracy, and practical skills have significantly improved. Statistical analyses confirmed that this difference is significant.

The research results indicate that the implementation of pedagogical innovations in the teaching of otorhinolaryngology is a crucial factor in developing students' professional competence. In particular, simulation learning and approaches based on clinical situations develop students' independent thinking, increase their adaptability to real clinical conditions,

and enhance their professional training. These approaches play an important role in improving the quality of medical education and training personnel in accordance with international standards.

KEYWORDS: *otorhinolaryngology, medical education, pedagogical integration, clinical thinking, interactive learning, simulation training, case-based learning, problem-based learning, diagnostic decision-making, practical skills, competency-based approach, OSCE assessment system, innovative pedagogy, clinical education.*

SIGN IN

In the context of modern medical education, the process of training future doctors should not be limited solely to providing theoretical knowledge. Particularly in clinical disciplines such as otorhinolaryngology, students must possess in-depth knowledge, practical skills, and the ability to think clinically independently. This is because ENT diseases often require a complex diagnostic process and prompt, informed decision-making. Therefore, the integration of theory and practice within the medical education system is one of the most pressing issues.

Nowadays, traditional teaching methods in many cases form students as passive recipients. This negatively affects their ability to make independent decisions in real clinical situations. In pedagogical science, student-centered, interactive, and competency-based approaches are recognized as effective. Simulation training, clinical case-based learning, and problem-solving methods are of particular importance in developing students' clinical thinking.

The main objective of this study is to determine the effectiveness of forming students' clinical thinking competence through the use of modern pedagogical approaches in teaching otorhinolaryngology. The research results will serve to improve the quality of medical education and enhance the professional training of future doctors.

METHODS

This study is aimed at determining the effectiveness of modern pedagogical approaches in teaching otorhinolaryngology, in which the process of forming the clinical thinking competence of future doctors was comprehensively studied. The study was organized based on a quasi-experimental design and included stages of theoretical, practical, and statistical analysis.

Research design and general approach

The study was conducted based on a quasi-experimental model. In this model, the difference in teaching methods between the experimental and control groups was selected as the main variable. The study consisted of two stages: preliminary assessment (pre-test) and final assessment (post-test). Through this approach, the differences between the initial and final levels of students' knowledge, clinical thinking skills, and practical training were identified.

A mixed methodology (mixed-methods) was applied during the study. That is, quantitative and qualitative analysis methods were used together. Quantitative analysis allowed for the statistical evaluation of results, while qualitative analysis served to conduct a deeper study of students' attitudes, motivation, and thinking mechanisms toward the learning process.

Research object and participants

Students of the 4th year of medical higher educational institution were selected as the object of the research. Students of this stage are in the process of studying otorhinolaryngology, which is the most important period for the formation of clinical knowledge.

A total of 120 students participated in the study. They were divided into two groups based on the random sampling method:

- Experimental group - 60 students
- Control group - 60 students

The age of the participants ranged from 20 to 23 years, and it was ensured that their academic performance (GPA) and academic performance in previous subjects were approximately the same. This factor served to increase the reliability of the research results.

Content of the experimental intervention

The educational process in the experimental group was organized based on modern pedagogical approaches. These approaches included:

1. Simulation trainings

Simulation trainings made it possible to train students in conditions close to a real clinical situation. Special ENT simulators and simulators were used in this process. Students completed the following practical skills:

- Otoscopy (ear examination)
- Anterior and posterior rhinoscopy (examination of the nasal cavity)
- Laryngoscopy (viewing the larynx)

During the simulation, students had the opportunity to correct errors in a safe environment, which increased their learning efficiency.

2. Case-based learning (CBL)

Students were given tasks based on real clinical cases. In each case:

- Patient complaints
- History
- Results of objective examination
- Laboratory and instrumental studies

presented. Based on this data, the students developed a diagnosis and treatment plan.

3. Problem-based learning (PBL)

Students were encouraged to think independently through problem-based learning. In this method, the teacher played a guiding role, while the students solved the problem themselves.

4. Role-playing

Students were divided into roles based on the "doctor-patient" model. This method served to develop communicative competence.

5. Multimedia technologies

Video materials, 3D animations, and visual aids reflecting clinical processes were used. This helped students better understand complex processes.

Training in the control group

Traditional teaching methods were used in the control group. These included:

- Lecture-based learning
- Use of textbooks and teaching aids
- Teacher explanation

Students were mainly in the role of passive listeners, and practical classes were conducted to a limited extent.

Evaluation criteria and tools

The study evaluated students based on the following indicators:

1. Level of clinical thinking

Evaluated using specially developed tests. The tests were based on clinical situations and were aimed at determining the student's analytical thinking.

2. Diagnostic decision-making speed

The time spent on analyzing and diagnosing the clinical condition given to the students was measured.

3. Practical Skills (OSCE)

Students' practical skills were assessed using the OSCE (Objective Structured Clinical Examination) method. In this method, students at different stations:

- Examination

- Diagnostics
- Contact with the patient

completed tasks such as.

4. Motivation and satisfaction level

It was determined through a questionnaire and evaluated on a Likert scale.

Data collection and processing

The data obtained during the study were collected electronically and analyzed using specialized statistical software.

The following statistical methods were used:

- Mean
- Standard deviation (SD)
- Student's t-test
- Pearson correlation coefficient

The level of statistical significance was taken as $p < 0.05$.

Reliability and validity of the study

To ensure the reliability of the results:

- Evaluation criteria have been standardized
- The teachers worked according to the same methodological guidelines.
- The tests have been validated

Also, during the experiment, the influence of external factors was kept to a minimum.

Ethical issues

Consent was obtained from all participants before the study was conducted. Students' personal data was kept confidential. Strict adherence to pedagogical ethical norms was maintained during the research process.

RESULTS

The results of this study were determined through a comparative analysis of the effectiveness of the teaching methods used in the experimental and control groups. The obtained data were evaluated based on the students' level of clinical thinking, diagnostic decision-making speed, practical skills, and motivation for learning.

The results of the preliminary assessment (pre-test) conducted at the beginning of the study showed that the students in both groups were in almost equal positions in terms of knowledge and skill levels. The level of clinical thinking averaged 68% in the experimental group and 67% in the control group. This confirms the absence of initial differences between the groups and provides a basis for comparing subsequent results.

The results of the assessment (post-test) conducted at the end of the study showed a significant difference. Students in the experimental group achieved an average score of 89% on the level of clinical thinking. This indicator was 74% in the control group. Consequently, students who studied using interactive and simulation methods achieved significantly higher results compared to students who studied using traditional methods. Statistical analysis showed that this difference is significant ($p < 0.01$).

The speed of diagnostic decision-making was also studied as one of the important indicators. Students in the experimental group analyzed the given clinical situations on average 25–30% faster and were able to make the correct diagnosis. In the control group, this process took longer, and in some cases, errors were observed. This result indicates that problem-based learning (PBL) and clinical situations (CBL) are effective in developing students' rapid thinking.

The OSCE method was used to assess practical skills. Students in the experimental group achieved a 90% academic performance. They performed important practical manipulations such as otoscopy, rhinoscopy, and laryngoscopy correctly and accurately. In the control group, this indicator was

72%. In particular, the students of the experimental group showed superiority in working with the equipment and communicating with the patient.

The level of motivation and interest in learning was also studied separately during the study. The survey results showed that the students in the experimental group were highly satisfied with the learning process. They emphasized that interactive methods make learning interesting, understandable, and effective. In the control group, some students rated the learning process as boring and monotonous.

Furthermore, the experimental group significantly developed skills in independent thinking, problem analysis, and teamwork. Students became accustomed to deeply analyzing clinical situations, considering alternative diagnostic options, and making informed decisions. In the control group, these skills were formed at a relatively low level.

Overall, the research results show that methods based on interactive, simulation, and problem-based approaches in teaching otorhinolaryngology are significantly more effective than traditional teaching methods. These methods comprehensively develop not only the students' level of knowledge but also their clinical thinking, practical training, and professional competence.

DISCUSSION

The results of this study confirm the high effectiveness of modern pedagogical approaches in teaching otorhinolaryngology. In particular, it was found that interactive methods, simulation training, and clinical situation-based instruction are important factors in shaping students' clinical thinking. The significant positive changes observed in the experimental group indicate that these methods not only increase the level of knowledge but also comprehensively develop practical skills.

The results obtained are consistent with international scientific research. In particular, the competence-based medical education model proposed by the World Health Organization emphasizes the need to integrate theoretical

knowledge with practical activity. From this perspective, the results of this study support global trends and justify the need to modernize the national medical education system.

One of the advantages of simulation learning is the creation of a safe learning environment for students. In this environment, they have the opportunity to learn, reinforce their knowledge, and gain practical experience without fear of making mistakes. Simulation is particularly important in the mastery of diagnostic manipulations (otoscopy, rhinoscopy, laryngoscopy) in otorhinolaryngology.

Case-based and problem-based learning methods serve to develop students' analytical thinking. Through these methods, students learn to deeply analyze clinical situations, identify cause-and-effect relationships, and make informed decisions. The results of the study also showed that these skills were significantly developed in the experimental group.

It was also established that role-playing methods are effective in enhancing students' communicative competence. Improving the quality of doctor-patient communication is crucial for future clinical activities.

However, there are some limitations to the research. In particular, the fact that the study was conducted in only one higher educational institution limits the possibility of generalizing the results to a certain extent. In the future, it is advisable to conduct research on a broader scale.

Overall, the results obtained once again confirm the need to introduce innovative pedagogical technologies into the medical education process.

CONCLUSION

The results of this study demonstrated the high effectiveness of modern pedagogical approaches in teaching otorhinolaryngology. Specifically, it was determined that interactive methods, simulation training, and clinical situation-based instruction play an important role in shaping students' clinical thinking.

The positive changes observed in the experimental group confirm that these approaches not only deepen theoretical knowledge but also effectively develop practical skills.

During the study, it was noted that students' diagnostic decision-making speed, accuracy, and independent thinking ability increased significantly. This indicates the need for the widespread implementation of a competency-based approach in medical education. The superiority of innovative pedagogical technologies over traditional teaching methods has been scientifically proven.

At the same time, the research results demonstrate the importance of the widespread use of simulation centers in medical universities, the enrichment of the educational process with clinical cases, and the implementation of modern assessment methods (OSCE). Thanks to these approaches, the professional training and competitiveness of future doctors will significantly increase.

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