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RESULTS OF THE EFFECTIVENESS OF USING MODERN TECHNOLOGIES IN TEACHING PEDIATRIC SURGERY

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Abstract. The thesis presents the results of a comparative study of the effectiveness of modern educational technologies in teaching pediatric surgery to 120 fifth-year medical students. The combined use of simulation training on laparoscopic box trainers, three-dimensional anatomical models, video recordings of operations, case-based learning on the Moodle platform and the flipped classroom model significantly increased the level of theoretical knowledge, practical skills and long-term retention of educational material compared with the traditional method. The results justify the wider integration of a blended technology-enhanced model into the pediatric surgery curriculum.

Keywords: pediatric surgery, medical education, simulation training, laparoscopic box trainer, 3D models, flipped classroom, OSCE.

Annotatsiya. Tezisda 120 nafar 5-kurs talabasi misolida bolalar xirurgiyasini o‘qitishda zamonaviy ta’lim texnologiyalari samaradorligining qiyosiy tahlili natijalari keltirilgan. Laparoskopik box-trenajyorlarda simulyatsion mashg‘ulotlar, uch o‘lchamli anatomik modellar, operatsiyalar videoyozuvlari, Moodle platformasida klinik holatlarga asoslangan ta’lim va «ag‘darilgan sinf» modelini kompleks qo‘llash an’anaviy usulga nisbatan nazariy bilim, amaliy ko‘nikma va o‘quv materialini uzoq muddat yodda saqlash darajasini ishonchli oshirgan. Olingan natijalar aralash texnologik modelni bolalar xirurgiyasi o‘quv dasturiga kengroq joriy etish zarurligini asoslaydi.

Kalit so‘zlar: bolalar xirurgiyasi, tibbiy ta’lim, simulyatsion o‘qitish,

laparoskopik trenajyor, 3D modellar, ag‘darilgan sinf, OSKE.

Aim of the study. To evaluate the effectiveness of a blended technology-enhanced model of teaching pediatric surgery in terms of students’ theoretical knowledge, practical skills, retention of educational material and learner satisfaction.

Materials and methods. The study was conducted at the Department of Pediatric Surgery and Neurosurgery during the 2026–2027 academic year and included 120 fifth-year students of the medical faculty, divided into two comparable groups. The control group (n=60) studied according to the traditional method (lectures, bedside clinical sessions, textbook-based preparation). In the main group (n=60), a blended model was applied: preliminary self-study of video lectures and recorded pediatric surgical operations on the Moodle platform (flipped classroom), interactive 3D models of congenital malformations of the gastrointestinal tract, practice of basic laparoscopic skills on box trainers, and analysis of virtual clinical cases (acute appendicitis, intussusception, pyloric stenosis, inguinal hernia). The results were assessed by an entry and final test of 50 multiple-choice questions, an objective structured clinical examination (OSCE), time for completing standard box-trainer exercises, a delayed test three months after the end of the module and an anonymous questionnaire on a five-point Likert scale. Statistical analysis was performed using Student’s t-test; differences were considered significant at $p<0.05$.

Results and discussion. Initial knowledge levels in the groups did not differ significantly (58.4±7.9 and 57.9±8.2 points; $p>0.05$). After completion of the module, the mean final test score in the main group was 84.6±6.1 points versus 72.3±7.4 points in the control group ($p<0.001$). The OSCE results were 86.2±5.8% and 70.9±8.1%, respectively ($p<0.001$); the largest difference was recorded at the stations “examination of a child with acute abdomen” and “interpretation of ultrasound and radiological findings”. In the main group, the time to complete the peg transfer exercise on the box trainer decreased from 312±48 to 146±31 seconds ($p<0.001$), and

the share of students performing the task without errors increased from 18.3% to 76.7%. The delayed test showed better retention of knowledge in the main group (79.8±6.7 versus 61.4±9.3 points; $p<0.001$), which is explained by repeated access to digital materials and the active nature of learning. According to the questionnaire, 91.7% of students in the main group rated the new format as "effective" or "very effective", and 85.0% noted increased confidence in clinical decision-making. The data obtained are consistent with the results of international systematic reviews confirming the advantage of simulation and flipped classroom models in medical education. Limitations of the approach included the need for technical equipment, additional teacher time for preparing digital content and a stable Internet connection.

Conclusions. The use of modern technologies in teaching pediatric surgery increases final knowledge scores by 17.0%, OSCE results by 21.6% and long-term retention of material by 30.0% compared with the traditional method, while simulation training reduces the time to master basic laparoscopic skills by more than half. The blended model combining a digital learning platform, 3D visualization, video materials and simulation training can be recommended for wide introduction into the pediatric surgery curriculum of medical universities.

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