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SYNCHRONOUS HYBRID LEARNING WITHIN THE FRAMEWORK OF THE IMPLEMENTED DISCIPLINE "PEDIATRIC ONCOLOGY," USING THE EXAMPLE OF THE DEPARTMENT OF ONCOLOGY OF THE FEDERAL STATE BUDGETARY EDUCATIONAL INSTITUTION OF HIGHER EDUCATION IRKUTSK STATE MEDICAL ACADEMY OF THE MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

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Abstract: Modern higher medical education over the past five years (from 2019 to 2024) has made a global evolution of its development and stopped at a qualitatively completely different level. Starting from 2022, the existing accumulated array of remote digital technologies has systematically introduced into educational activities almost inseparable from traditional areas of pedagogical methods, while significantly expanding them, adapting them for inclusive education and making them more comfortable for students. Since June 2024, synchronous, hybrid classes have been introduced for the first time at the Department of Oncology, and since September 2024, synchronous, hybrid classes have been used on a regular basis, which have repeatedly reduced the number of absences of practical classes by students due to temporary disability to isolated cases, without affecting the average score. The results of the ongoing prospective study clearly demonstrate the success and timeliness of the introduction of advanced, innovative, world, pedagogical methods and technologies in the educational activities of the Department of Oncology on the example of teaching students of the 5th year of the pediatric faculty the discipline "Pediatric Oncology," making the learning process continuous.

Keywords: *Synchronous hybrid learning, pediatric oncology, mixed learning, modern education, digitalization.*

Introduction: Since 2019, fundamental evolutionary changes have been observed in modern university pedagogy, largely facilitated by the COVID-19 pandemic, which has predetermined the widespread adoption of digital distance learning technologies. As a result, traditional education has been replaced by blended education, which can be roughly divided into four levels, based on which learning components have been converted to a distance (digital) format and subsequently used not only during traditional classes but also in inclusive learning for relevant categories of students (individuals with disabilities and those with temporary disability) [5, 6, 10].

Currently, the first level of blended education is represented by web-enabled learning, which involves the extensive use of video recordings of webinars, conferences, and symposia held at leading federal centers during traditional classes, allowing for a qualitatively new level of presentation of certain discipline topics. At the Department of Oncology, the first «Oncology + MOOC Support» model was implemented in 2020, when students transitioned from distance learning and restrictions caused by the COVID-19 pandemic began to ease. However, the department has maintained an active position in sharing existing video content from conference and webinar recordings. Unfortunately, due to the intense focus on the educational process, it is not technically feasible to regularly display videos on current topics during practical classes. However, we can offer the option of viewing them during independent study, which some students actively utilize. As of 2025, the video library of the Department of Oncology contains more than 400 video materials from conferences and webinars, accumulated through active participation in them from 2019 to 2025, occupying a volume of 5.0 TB [4].

The second level, called «Discipline + Massive Open Online Course (MOOC),» involves mastering individual elements of the taught discipline remotely, through individual modules of the online course. At the Department of Oncology, the second educational model, «Oncology, Radiation Therapy + MOOC,» began to be implemented simultaneously with the first level model in 2020 [1,2].

Using this model, lectures were converted into video format and uploaded to the oncology department's YouTube and Moodle channels, which students have constant access to. The student independent work section features thematic collections of electronic literary sources approved by department staff, including video materials. These collections are regularly distributed through incoming group leaders and are used by all students in preparation for practical classes.

The third level of the hybrid education system is «MOOC + taught course.» This level entails a nearly complete transition of the course to an online course format, with the instructor acting as a moderator and tutor, providing technical support to students. At the Department of Oncology, the third blended learning model has been implemented under conditions of temporary disability for students, with the consent of both parties (instructor and student). Initially, it was implemented asynchronously (from 2020 to 2024), and then synchronously from September 2024 to the present [9, 11].

The fourth level involves a complete transition to remote learning. In the Department of Oncology, this fourth level of blended learning has been implemented through the creation of webinar rooms on the MTS-Link platform, allowing students on long-term electronic sick leave to continuously complete a series of practical classes alongside other students. Beginning in September 2024, through the implementation of comprehensive digitalization, the creation of webinar rooms in all classrooms, and the implementation of a «digital teacher twin» system, the Department of Oncology will essentially become a digital department, ensuring continuity in the educational process and fully aligning with global educational methods and technologies [3, 7, 8].

Purpose and objectives: The aim of our work is to evaluate the effectiveness of the implementation of a personalized educational process in the format of synchronous hybrid practical classes, which allows for the creation of continuous learning for students in the context of their temporary disability.

Material and methods: The technical components of the educational process at the Department of Oncology at the Irkutsk State Medical Academy of the Ministry of Health of the Russian Federation, enabling the successful implementation and routine implementation of cutting-edge, global, and innovative teaching methods and technologies, include the following equipment. Each classroom is equipped with a laptop, a multimedia projector, additional 27- to 32-inch monitors with a 4K resolution (3840x2160 ppi), HDMI splitters allowing the image from the laptop display to be mirrored to additional monitors and displayed on the projector screen, and audio systems with a video bar for conferences, effectively transforming the classroom into a fully functioning webinar room.

Conducting a practical lesson in a synchronous hybrid format is implemented using the following proven algorithm. Before the start of a practical lesson in this format, students with temporary disabilities are identified in the student group and provided with a document containing active links to webinar rooms corresponding to the department's classrooms. When a student connects to a webinar room, their avatar is displayed on the instructor's laptop screen, while the connected student sees the instructor, the whiteboard, and, if using screen sharing mode, presentations or other digital elements displayed during the lesson. High-definition video transmission allows attendees to see everything the instructor is demonstrating online. Students can also ask questions in the webinar room chat or directly to the instructor.

We are currently conducting a prospective study from 2021 to the present on a general population of fifth-year pediatric oncology students enrolled in the course «Pediatric Oncology» and completing a series of practical training courses at the Department of Oncology. The study is being conducted as a cross-sectional, mass, anonymous survey using a developed and regularly updated questionnaire.

The questionnaire used at the Department of Oncology consists of 4 questions:

1) How satisfied are you with the overall course content?

2) How satisfied are you with the teaching style?

3) How would you rate the quality of the teaching materials provided?

4) How satisfied are you with the instructor's use of active and interactive teaching methods (process modeling, case studies, videos, grapho-logical structures, and offline/online connectivity)?

Since September 2024, question 5 has been included, concerning the conduct of practical classes in a synchronous hybrid format: "How satisfied were you with the offline-online practical classes conducted by the department."

All questions are rated on a scale of 1 to 10, with 1 being the lowest and 10 being the highest. After completing the comprehensive, anonymous survey following the practical sessions, the data was compiled into a single table, with the average score calculated for the course.

From 2021 to 2025, we obtained the following results:

When answering the question «How satisfied are you with the overall course content?», the average score for fifth-year pediatric students over the five years studied was 9.54 (in 2021), 9.72 (in 2022), 9.59 (in 2023), 9.57 (in 2024), and 9.81 out of a possible 10.0. Moreover, in 2025, the indicator became statistically significant ($p < 0.001$), which may indicate the relevance of the course taught among students, especially in the case of the synchronous hybrid component.

When answering the question «How satisfied are you with the teaching style?», the following results were obtained among fifth-year pediatric students. The average course score was 9.74 (in 2021),

9.77 (in 2022), 9.58 (in 2023), 9.59 (in 2024), and 9.76 (in 2025). No significant change was observed. However, it is important to note that this criterion was extended to the remote format of practical classes during the COVID-19 pandemic, where students were physically engaged.

In response to the question «How do you rate the quality of the proposed methodological materials?», the average score among 5th-year students of the Faculty of Pediatrics was 9.34 (in 2021), 9.64 (in 2022), 9.47 (in 2023), 9.54 (in 2024), and 9.72 (in 2025). This is due to the planned transition to video materials from federal and international conferences to prepare students and the implementation of a synchronous hybrid format for conducting practical classes. A significant increase in this indicator in 2025 is noted ($p < 0.001$). It should be noted here that modern students do not know how to individually use the provided multi-hour array of video data, viewing it in full without focusing on specific aspects, which may subsequently negatively affect their immersion in the system of continuous medical education.

In response to the question "How satisfied are you with the teacher's use of active and interactive teaching methods (process modeling, cases, video materials, graph-logical structures)?" for the analyzed period, in the 5th year of the pediatric faculty, we obtained the following average values - 9.26 (in 2021), 9.41 (in 2022), 9.43 (in 2023) and 9.52 (in 2024) and 9.85 (in 2025) ($p <0.001$), Consequently, the widespread use of active, interactive and digital technologies (including synchronous online connection) in teaching activities began to find its positive reflection in the opinion of students, their interest in studying the discipline and the growth of the average grade for the course - 4.33 in 2021, against 4.38 in 2022, against 4.47 in 2023 and against 4.5 in 2024, 4.51 in 2025. However, the decrease in the indicator that we expected did not occur.

When students in the Class of 2025 answered the question «How satisfied were you with the offline-online practical classes conducted by the department?» an average score of 9.92 points out of 10.00 was obtained for the course. This may indicate, on the one hand, that students encountered this technology for the first time in practical classes, and on the other hand, that this technology really works and that students on the other side of the monitor (present online) actually see everything demonstrated in the class and do not drop out of the educational process, which has become continuous for them.

Thus, it should be noted that during the analyzed period from 2021 to 2025, for 5th-year students of the pediatric faculty, the taught discipline «Pediatric Oncology» with the use of modern, digital, global pedagogical technologies is beginning to have an ever-increasing relevance, built on a multi-component platform that includes not only the work of the teacher in the classroom and his image, but also the provision by the oncology department of modern preparatory materials and digital technologies, which greatly facilitate learning and make it continuous.

Results. Summarizing the preliminary results of a prospective study conducted at the Department of Oncology of the Federal State Budgetary Educational Institution of Higher Education Irkutsk State Medical Academy of the Ministry of Health of the Russian Federation, we have found that the regular use of advanced, global pedagogical methods and technologies in the conditions of a digital department leads to a reliable (when comparing similar indicators for previous years) ($p < 0.001$) increase in the level of relevance of the discipline «Pediatric Oncology» for 5th-year students of the pediatric faculty, due to an increase in the quality of the offered educational materials, the image of the faculty and teaching style, due to the use of digital technologies by the latter, which allow for the implementation of the continuity of the educational process, bringing it closer to the postgraduate level.

Discussion. It is important to note that modern, cutting-edge, global teaching methods and technologies, adapted for medical students, allow for a qualitatively new level of teaching, training students to work with the vast volume of incoming information, and allowing them to remain engaged in the educational environment, even in cases of temporary disability, using synchronous (offline-online) and hybrid technologies and methods in practical classes, transforming higher medical education in the specialty into a continuous format similar to continuous medical education of the postgraduate type.

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