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The Effectiveness of Flipped Classroom during the COVID-19 Pandemic in Higher Pharmaceutical Education

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Abstract

BACKGROUND: Despite the apparent advantages of the flipped classroom model especially during a pandemic or natural or technogenic disasters, its overall effectiveness in higher medical and pharmaceutical education continues to be debated.

AIM: The goal of the study was to test the effectiveness and acceptability of using the flipped classroom model during the COVID-19 pandemic in higher pharmaceutical education based on the example of the "Pharmaceutical Marketing" discipline at Sechenov First Moscow State Medical University, Russia.

METHODS: The study involved 156 fourth-year pharmacy students. They were divided into three clusters: FC – studying in accordance with the flipped classroom model, FC+TBL – using the flipped classroom technology combined with the team-based method, and CC – studying by the traditional scheme (control). The study used the Unified educational portal of the Sechenov University. Additional elements were developed for the electronic educational and methodical complex for the studied section "Analysis of the marketing environment of a pharmaceutical organization." The effectiveness of the flipped classroom model was evaluated through test control (entrance, formative, thematic, and final) and control of the development of skills and abilities in solving situational problems (thematic and final). The study participants' attitude toward the use of the flipped classroom model was assessed through a survey.

RESULTS: The study demonstrated that students from the FC and FC+TBL clusters were significantly better prepared for practical lessons and worked more effectively and productively during these classes compared to the CC cluster students. The results of the final control also substantiate the advantages of the flipped classroom technology both in assessing practical skills and abilities and in testing. The opportunities for rational implementation of the complex technology (FC+TBL cluster) are identified.

CONCLUSIONS: The analysis of students' general opinion on the flipped classroom model shows that 90.4% of the FC cluster members and 84.6% of the FC+TBL cluster members are satisfied with the results of using this model and consider it suitable for studying both the "Analysis of the marketing environment of a pharmaceutical organization" section and the entire pharmaceutical marketing course. Students' positive feedback on the use of the flipped classroom model provides grounds for further implementation of this technology in the "Pharmaceutical Marketing" discipline in its entirety and demonstrates that further research on the use of other blended learning models is quite promising.

Introduction

The COVID-19 pandemic brought global changes in the functioning of the higher education system. Students from different countries around the world were forced to study remotely or in various hybrid and blended forms [1], [2], [3], [4], [5]. A tectonic shift occurred in educational technologies: Formats that were previously a rarity have become a norm for teachers and students. More often than not, these were not carefully designed and planned formats, but spontaneous forms of learning activities. Many teachers were forced to teach some classes directly from home and students also studied at home. In this situation, blended learning became the norm of the educational process [1], [2].

Various models of blended learning in higher education are currently widely represented in the literature [6], [7], [8], [9], [10], [11]. Most common are the following four models: Flipped learning or the flipped classroom, laboratory rotation, station rotation, and a flexible model [9], [11], [12], [13], [14].

The flipped classroom model is considered the most advanced and useful in higher pharmaceutical and medical education [15], [16], [17], [18], [19], [20]. This teaching model involves the students studying the set of didactic materials at home when it is convenient for them and at their own pace. The free academic hours are used to solve actual professional situational problems. Since this pedagogical method promotes active learning and is based on social constructivism, experts in pharmacy and medical education advocate this model of learning [20], [21].

Flipped learning is not a new method essentially, but rather presents a new way of thinking aimed at optimizing classroom work with students by the means

of extracurricular activities focused on an in-depth study of the subject [22], [23], [24]. The objective of the teacher here is to motivate students to search for knowledge outside the classroom independently, to teach them to not only look for information but also check its reliability, to analyze and critically comprehend it, as well as to get students' active intellectual reaction to the educational material during classes.

The flipped classroom model provides students with several advantages. Students show greater interest in mastering the material, they enjoy this form of a differentiated approach and value the opportunity to study when it is comfortable for them and at their own pace [25], [26]. Students with a high level of self-regulation skills including goal setting, planning, performance monitoring, and self-assessment can achieve better results in flipped learning [27], [28]. These results are confirmed by the studies conducted as a part of the European projects iFlip and Flipping First in the Erasmus+ program [29], [30]. The key advantages of flipped learning also include the increased accessibility of higher education [31].

Despite the apparent advantages of the flipped classroom model, its general effectiveness in pharmaceutical and medical education is still debated [15], [17], [18], [19], [20], [23], [32], [33], [34]. It was discussed that if flipped learning is not conducted in a technologically sound manner and is not linked to the final grade, students do not complete their homework pre-assigned for independent study [35]. Therefore, it is important to assess the effectiveness of the flipped classroom model each time it is implemented in new conditions of the internal and external environment.

The present study aimed to test the effectiveness and acceptability of using the flipped classroom model during the COVID-19 pandemic in higher pharmaceutical education based on the example of the "Pharmaceutical Marketing" discipline at Sechenov First Moscow State Medical University, Russia.

Subjects and Methods

Study design

A controlled cluster study was conducted at the Sechenov First Moscow State Medical University in February-March 2021, in the "Pharmaceutical Marketing" discipline. The course is one of the mandatory disciplines (modules) of the main professional educational program of higher pharmaceutical education in Russia.

The study participants were selected from among the fourth-year students of the "Pharmacy" specialty (Specialist degree program) above 18 years old who agreed to take part in the study. The participation was voluntary and did not depend on students' academic performance and diligence. The students were fully informed about the goal, nature, potential benefits, and risks of using the flipped classroom model in the educational process. The study was conducted in accordance with the principles of the Declaration of Helsinki and the ICC/ESOMAR International Code of Market, Public Opinion, Social Research, and Data Analysis [36].

The total sample of the study included 156 students from 12 student groups (68.4% of the total number of 4th-year students). The sample size was determined by the possibilities of class schedules (four groups of students had to study at the same time) and students' consent to participate in the study. All students were randomly divided into three clusters of 52 students each (Figure 1). Students from the first cluster (FC) studied in four-student groups at the same time and participated in the program involving the flipped classroom technology. Students in the second cluster (FC+TBL) were also studying in four study groups simultaneously using integrated technology with the flipped classroom model and the team-based method. Participants in the third cluster, or the control cluster (CC), were also studying in four study groups at the same time according to the traditional scheme. The study also involved four teachers. Each teacher was teaching the same study group from each cluster at all times (Figure 1).

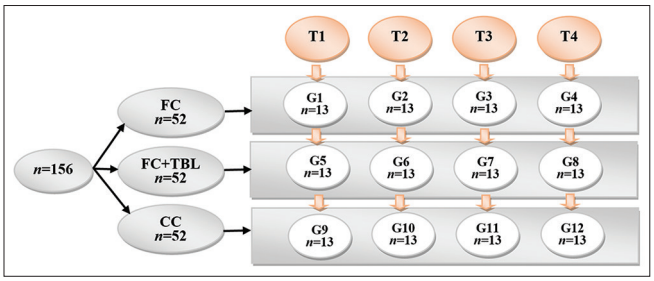

Figure 1: Study design. (T1, T2, T3, T4 – teachers, G1, G2, G3… – student groups)

All students involved in the study were studying the "Pharmaceutical Marketing" course following the academic discipline program. Six topics composing the "Analysis of the marketing environment of a pharmaceutical organization" section of the course were selected for the study. The section involved one lecture (2 academic hours), 6 practical lessons (18 academic hours), and 12 hours of independent work. Due to the special conditions of learning during the COVID-19 pandemic, the lectures were organized remotely and practical lessons were held in person.

Educational materials aside from those obtained from the university library were provided for the study participants from the CC (control) cluster on the Unified educational portal of the university (EOP, https://www.sechenov.ru/pressroom/news/edinyy-obrazovatelnyy-portal-eop/). The EOP design was based on the Learning

Management System (LMS) with educational content from Moodle Mobile to develop unified information and educational space of the Sechenov University. On the EOP, in the "Pharmaceutical Marketing" course section, students from the CC cluster could access the electronic educational and methodical complex including the operational program of the discipline, lectures, textbook, and practical manual, additional educational and methodical manuals, and materials for practical lessons, as well as situational tasks and test assignments (in PDF or PowerPoint format).

Students from the FC and FC+TBL clusters were taught using the flipped classroom model combining the model of Technological, Pedagogical, and Content Knowledge (TPACK) [37] and the three-dimensional model of Bloom's taxonomy [38], [39]. The study participants were informed about the methodology and technology of the flipped classroom model. They were able to use all educational materials available for the CC cluster students. Moreover, additional elements for the educational and methodical complex for students from the FC and FC+TBL clusters were designed and developed by teachers-researchers using the systemic approach and the process quality approach [40], [41]. The specifics of the flipped classroom model were also accounted for in this process. Thus, the traditional problem lecture on the "Analysis of the marketing environment of a pharmaceutical organization" section (2 academic hours) was transformed into a video lecture. Explicative and explanatory videos (20–30 min for each topic) were also created along with the methodical and didactic recommendations on the organization of the educational process and students' independent work for each practical lesson, the requirements for the procedure of various types of tests and practical skill assessments, and the list and order of use of teaching tools for the "Analysis of the marketing environment of a pharmaceutical organization" section. The modified educational and methodical complex was then uploaded to the EOP in the research module of the "Pharmaceutical Marketing" course before the beginning of lessons on the section.

Practical lessons for students from the FC+TBL cluster were based on the complex technology combining the flipped classroom model and the team-based learning method. The technology involved studying in small groups (4-5 students) with a certain distribution of roles and responsibilities between teammates [42], [43], [44].

The effectiveness of teaching was assessed using:

- Test control: Entrance control on stage 1 and formative control (before and after extracurricular self-study, 50 test tasks with one correct answer), entrance control on stage 2 (before studying the topic in the practical lesson, 50 test tasks with one correct answer), thematic control (after studying the topic in the practical lesson, 50 test tasks with one correct answer), and final control (after completing the section, 100 test tasks with one correct answer option);
- Control of the development of practical skills and abilities in solving situational tasks associated with professional competencies for the "Pharmacy" specialty (Specialist degree program): Thematic control (after studying the topic in the practical lesson, a 10-point grading scale) and the final (after completing the section, a 10-point grading scale).

All test assignments were completed in the testing system of the EOP which ensured automated individual testing of students, automated processing of grades and test results recording, as well as result storage in the online register on the EOP. The results and grades for the situational tasks were also recorded in the online register on the EOP.

Students' attitude toward the use of the flipped classroom model in the Pharmaceutical Marketing course was assessed through a survey administered on the EOP. The method used for the survey was a questionnaire comprising 6 questions on the title of the student's cluster (FC or FC+TBL) and the assessment of satisfaction with learning using the flipped classroom technology and the acceptability of using the model in the educational process (Appendix A). The assessment was carried out using the Likert scale. Preliminary testing of the survey questionnaire on 13 4th-year students (after classes based on the flipped class model) showed its sufficient internal reliability according to Cronbach's Alpha (α = 0.72).

Sample characteristics

Among the students included in the study sample, 80.8% (126 people) were females and 19.2% (30 people) were males. The male to female ratios in the clusters corresponded: in the CC cluster – 9:43, in the FC cluster – 10:42, in the FC + TBL cluster – 11:41, or about 1:4, respectively. The participants' age ranged from 20 to 28 years. The Me and IQR of age and mean academic performance rate were 21.1 (20.9 and 21.4) years and 4.4 (4.2 and 4.7) points (on a 5-point scale), respectively. No significant differences were found between the FC, FC + TBL, and CC clusters in terms of the participants' age and academic performance (Kruskal–Wallis test: H = 0.4441, p = 0.5052 and H = 0.0214, p = 0.8837, respectively). In terms of gender, age, and academic performance, the study sample roughly corresponds to the general population of fourth-year students.

The stages of implementing the learning process by the flipped classroom model

The process of study for students from the FC and FC + TBL clusters involved two stages.

- Stage 1. Self-preparation for practical lessons (extracurricular work or transfer of knowledge and skills).
- Stage 2. Training in practical lessons (classroom work or the internalization of knowledge, the development and consolidation of skills and abilities).

Stage 1 - Self-preparation for practical lessons. The implementation of the flipped classroom model implied an increase in the role of students' independent work in preparing for practical lessons. The study participants had to study the materials for the practical lesson included in the modified electronic educational and methodical complex and complete a homework assignment that involved solving cases, filling-out blank flow charts, developing a presentation, writing a report or essay, search and analysis of statistical, reference, and scientific information data. Explicative and explanatory videos allowed introducing students to the problem of the topic in a minimum amount of time, exploring the orientational basis for completing the homework assignment and reduce the time required for the teacher to explain the method of independent work in the practical lesson. This stage involved holding an online discussion, a forum built in the EOP to clarify the relevant questions on the topic and the opportunities for the use of homework fragments in solving situational tasks on the practical lesson. The role of the teacher at this stage was to ensure effective group communication on the EOP, motivate students to search and analyze the necessary information on their own, and check the homework assignments.

Stage 2 - Training in practical lessons. In practical lessons, the students were solving professional situational tasks of analyzing the marketing macro- or micro-environment of a pharmaceutical organization. The homework was typically a fragment of one or several of the presented situational tasks. Students from the FC+TBL cluster were completing all tasks in a team. Each teammate's homework was an element of the common situation task to be solved. If a student did not complete the homework or did it wrong, the solution of the common situational task was delayed. The whole team had to help the student falling behind. All parts of the situational task completed by the team members were then combined through synthesis. At the practical lessons, students of the FC and FC+TBL clusters discussed the key points in solving situational tasks, presented presentations created by them, and listened to presentations on the completed essays and reports. The work resulted in individual or collective conclusions. At this stage, the teacher was coordinating, guiding, and evaluating the results of work on the situational tasks and ensured effective group communication.

The statistical processing of the study results was carried out using the SPSS. Statistics.v17. Multilingual-EQUiNOX program (SPSS Inc). The study results were expressed either in absolute and relative values, or in metric units such as median (*Me*), the lower (25%) and upper (75%) quartiles (*IQR*), or mean ± standard deviation (*M* ± *SD*). Correlations between the results of control measures were assessed using Pearson's linear correlation coefficient (*r*). The correlation between the assessments of the entrance control at stage 1, the formative control, the entrance control at stage 2, and thematic control was tested using the average values of each student's grades for all topics. The correlation of the final control results involved using the grades of each participant in the study. The critical level of significance in testing the statistical hypotheses of the study was 0.05.

Results

Evaluation of the effectiveness of the flipped classroom model

Comparative analysis of students' learning outcomes by the main stages of the learning process when using the flipped classroom technology and the traditional scheme showed that the participants of the FC and FC + TBL clusters were significantly better prepared for all practical lessons compared to the students of the control CC cluster (Table 1, formative test control at stage 1 and entrance control at stage 2, $p < 0.05$). The results of the thematic test control among the students of the FC and FC + TBL clusters were only better in comparison to the CC cluster members in five practical lesson topics. No significant difference was found between the control and experimental clusters in topic 3 ($p > 0.05$). The results of the entrance test control at stages 1 and 2 for all the topics of the section for all study participants were significantly lower than the results of the subsequent formative or thematic control (Table 1, $p < 0.0001$).

The assessment of correlations between the results of formative test control (F) and thematic control (T) revealed that students' grades correlate to a very high degree (on the Chaddock scale): Cluster FC – $r^{F-T} = 0.912$ ($p < 0.0001$), cluster FC+TBL – $r^{F-T} = 0.910$ ($p < 0.0001$). The determination coefficient (r^2) equals 0.832 and 0.828, respectively. Similar calculations for the results of entrance control at stage 2 (E2) and thematic control (T) show that the grades of students from the FC and FC+TBL clusters are in direct correlation with a high degree: $r^{E2-T} = 0.804$ ($p < 0.0001$, $r^2 = 0.646$) and $r^{E2-T} = 0.705$ ($p < 0.0001$, $r^2 = 0.497$), respectively. The relationship between the results of the formative test control (F) and the entrance control at stage 2 (E2) among the students of the FC and FC + TBL clusters was direct and had a noticeable degree (on the Chaddock scale): $r^{F-E2} = 0.570$ ($p = 0.0001$, $r^2 = 0.325$) and $r^{F-E2} = 0.541$ ($p = 0.0001$, $r^2 = 0.292$), respectively. Correlation analysis of the results of entrance control at stage 1 (E1) and formative control (F) indicates that the grades of students from the FC and FC+TBL clusters

Table 1: Results of test control of students on the main stages of the learning process for the flipped classroom model and the traditional model

Type of control	Lesson topic	Grade, score, M ± SD*[1]			p*[2] (For comparison between clusters)
		FC (cluster 1) (n = 52)	FC+TBL (cluster 2) (n = 52)	CC (cluster 3) (n = 52)	
Stage 1 - Self-preparation for practical lessons					
Entrance control	1	8.04 ± 1.45	7.96 ± 1.28	8.02 ± 1.29	p^{1-3} = NA, p^{2-3} = NA, p^{1-2} = NA
	2	9.58 ± 1.82	9.44 ± 1.98	9.38 ± 2.18	p^{1-3} = NA, p^{2-3} = NA, p^{1-2} = NA
	3	12.17 ± 0.74	12.05 ± 1.83	12.11 ± 1.42	p^{1-3} = NA, p^{2-3} = NA, p^{1-2} = NA
	4	13.21 ± 1.22	13.11 ± 1.56	13.14 ± 1.48	p^{1-3} = NA, p^{2-3} = NA, p^{1-2} = NA
	5	12.31 ± 1.82	12.44 ± 1.33	12.39 ± 1.95	p^{1-3} = NA, p^{2-3} = NA, p^{1-2} = NA
	6	13.13 ± 1.91	13.24 ± 1.98	13.32 ± 2.02	p^{1-3} = NA, p^{2-3} = NA, p^{1-2} = NA
Formative control	1	44.22 ± 2.45	44.53 ± 2.84	43.61 ± 3.16	p^{1-3} = 0.0076, p^{2-3} = 0.0003, p^{1-2} = NA
	2	45.07 ± 1.94	44.98 ± 2.77	44.21 ± 4.12	p^{1-3} = 0.0114, p^{2-3} = 0.0338, p^{1-2} = NA
	3	43.55 ± 3.05	43.64 ± 2.95	42.59 ± 3.57	p^{1-3} = 0.0210, p^{2-3} = 0.0006, p^{1-2} = NA
	4	45.78 ± 1.87	45.92 ± 1.95	45.34 ± 2.66	p^{1-3} = 0.0045, p^{2-3} = 0.0003, p^{1-2} = NA
	5	46.83 ± 1.62	46.71 ± 1.33	46.45 ± 2.31	p^{1-3} = 0.0012, p^{2-3} = 0.0180, p^{1-2} = 0.0499
	6	45.26 ± 2.16	45.34 ± 2.04	44.76 ± 2.69	p^{1-3} = 0.0032, p^{2-3} = 0.0005, p^{1-2} = NA
p*[2] within cluster		$p^{1,2,3,4,5,6}$<0.0001	$p^{1,2,3,4,5,6}$<0.0001	$p^{1,2,3,4,5,6}$<0.0001	
Stage 2 - Training in practical lessons					
Entrance control	1	21.18 ± 2.81	20.96 ± 2.15	14.88 ± 2.21	p^{1-3}<0.0001, p^{2-3}<0.0001, p^{1-2} = NA
	2	21.13 ± 1.86	21.34 ± 2.05	15.05 ± 2.60	p^{1-3}<0.0001, p^{2-3}<0.0001, p^{1-2} = 0.0471
	3	20.77 ± 1.77	21.03 ± 1.94	16.85 ± 2.18	p^{1-3}<0.0001, p^{2-3}<0.0001, p^{1-2} = NA
	4	24.58 ± 2.66	25.06 ± 3.19	18.85 ± 2.13	p^{1-3}<0.0001, p^{2-3}<0.0001, p^{1-2} = 0.0467
	5	22.16 ± 1.92	21.93 ± 2.16	16.61 ± 2.44	p^{1-3}<0.0001, p^{2-3}<0.0001, p^{1-2} = 0.0475
	6	23.22 ± 2.15	23.13 ± 2.25	17.34 ± 2.26	p^{1-3}<0.0001, p^{2-3}<0.00001, p^{1-2} = NA
Thematic control	1	46.24 ± 2.01	46.42 ± 1.76	45.98 ± 2.16	p^{1-3} = 0.0310, p^{2-3} = 0.0001, p^{1-2} = NA
	2	46.75 ± 1.88	46.91 ± 1.54	46.54 ± 1.74	p^{1-3} = 0.0207, p^{2-3}<0.0001, p^{1-2} = NA
	3	45.47 ± 2.04	45.41 ± 1.96	45.19 ± 2.53	p^{1-3} = NA, p^{2-3} = NA, p^{1-2} = NA
	4	47.71 ± 1.32	47.63 ± 1.12	47.38 ± 1.94	p^{1-3} = 0.0001, p^{2-3} = 0.0014, p^{1-2} = NA
	5	47.43 ± 0.94	47.37 ± 1.22	47.27 ± 1.45	p^{1-3} = 0.0004, p^{2-3} = 0.0446, p^{1-2} = NA
	6	46.99 ± 1.54	47.10 ± 1.09	46.82 ± 1.77	p^{1-3} = 0.0262, p^{2-3}<0.001, p^{1-2} = 0.0333
p*[2] within cluster		$p^{1,2,3,4,5,6}$<0.0001	$p^{1,2,3,4,5,6}$<0.0001	$p^{1,2,3,4,5,6}$<0.0001	

Here and in Table 2. *[1]Experimental, empirical distribution of the variables was almost indistinguishable from the normal distribution (Kolmogorov-Smirnov test and normal distribution plot in SPSS). M: Mean value, SD: Standard deviation. *[2]Significance of differences between the clusters (the numbers indicate cluster numbers) and within a cluster (between entrance and formative or thematic control, the numbers indicate the lesson topic numbers) via Student's t-test. NA: No significant differences.

are in direct relation to a moderate degree: r^{E1-F} = 0.402 (p = 0.0029, r^2 = 0.162) and r^{E1-F} = 0.411 (p = 0.0021, r^2 = 0.169), respectively.

The analysis of students' grades for solving practical situational tasks in practical lessons demonstrated that the use of the flipped classroom model in the FC and FC+TBL clusters significantly increased student performance compared to the traditional learning model used for the CC cluster (Table 2, p < 0.05). The additional use of the team-based method with the flipped classroom model (the FC + TBL cluster) had a positive effect on learning outcomes only in two topics compared to the FC cluster. These were the topics "Analysis of the marketing macro-environment of a pharmaceutical organization: STEP-analysis" (topic 1, p < 0.05) and "Interaction of the external and internal environment of a pharmaceutical organization: SWOT-analysis" (topic 6, p < 0.05). In the topic "Analysis of the proximate environment of the microenvironment of a pharmaceutical organization: Consumers," the learning outcomes of students from the FC + TBL cluster were lower than in the FC cluster (topic 3, p < 0.01).

Table 2: Results of control of the development of skills and abilities in solving situational problems in practical tasks in the flipped classroom model and the traditional model

Type of control	Lesson topic	Grade, score, M ± SD			p between clusters
		FC (cluster 1) (n = 52)	FC+TBL (cluster 2) (n = 52)	CC (cluster 3) (n = 52)	
Thematic control	1	9.05 ± 0.84	9.09 ± 0.72	9.01 ± 0.68	p^{1-3} = 0.0154, p^{2-3}<0.0001, p^{1-2} = 0.0212
	2	9.00 ± 0.72	9.03 ± 0.88	8.95 ± 1.00	p^{1-3} = 0.0229, p^{2-3} = 0.0014, p^{1-2} = NA
	3	9.34 ± 0.62	9.31 ± 0.64	9.28 ± 0.62	p^{1-3}<0.0001, p^{2-3} = 0.0066, p^{1-2} = 0.0066
	4	9.30 ± 0.50	9.31 ± 0.44	9.28 ± 0.54	p^{1-3} = 0.0079, p^{2-3}<0.0001, p^{1-2} = NA
	5	9.42 ± 0.36	9.41 ± 0.40	9.39 ± 0.44	p^{1-3}<0.0001, p^{2-3} = 0.0254, p^{1-2} = NA
	6	9.44 ± 0.43	9.45 ± 0.32	9.42 ± 0.51	p^{1-3} = 0.0015, p^{2-3}<0.0001, p^{1-2} = 0.0157

The results of correlation analysis between the thematic test control (T) and thematic control of the development of skills in solving situational tasks (TT) showed a direct but weak correlation (on the Chaddock scale): Students of the FC cluster – r^{T-TT} = 0.253 (p > 0.05, r^2 = 0.064), and students of the FC+TBL cluster – r^{T-TT} = 0.226 (p > 0.05, r^2 = 0.051), respectively.

Comparative analysis of the final effectiveness of studying the "Analysis of the marketing environment of a pharmaceutical organization" section demonstrated the superiority of the flipped classroom model (the FC and FC + TBL clusters) over the traditional model (the CC cluster) both in terms of the formation of skills and abilities in solving situational tasks and according to the results of the final testing (Figure 2). No significant difference in the final learning outcomes was found between the FC and FC+TBL clusters (p > 0.05).

The results of the thematic test control (T) and the final testing (FT) correlate directly to quite a high degree (on the Chaddock scale): Students of the FC cluster – r^{T-FT} = 0.985 (p < 0.0001, r^2 = 0.970), and students of the FC+TBL cluster – r^{T-FT} = 0.978 (p < 0.0001, r^2 = 0.956). The relationship between the results of thematic control of the formation of skills and abilities in solving situational tasks (ST) and the final control (SF) in students from the FC and FC+TBL clusters is direct and has quite a strong degree: r^{ST-SF} = 0.989 (p < 0.0001, r^2 = 0.978) and r^{ST-SF} = 0.995 (p < 0.0001, r^2 = 0.990), respectively.

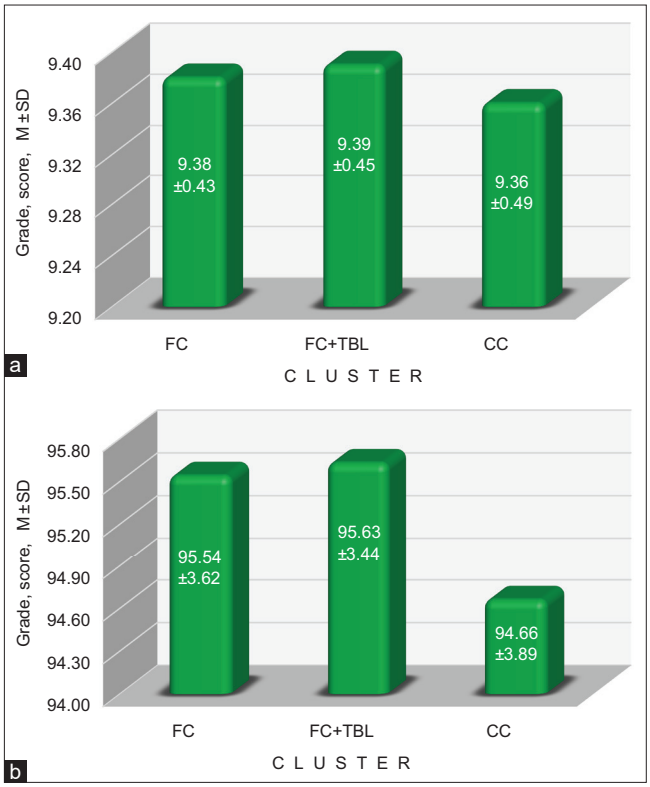

Figure 2: The results of the final control of the development of skills and abilities in solving situational tasks in the "Analysis of the marketing environment of a pharmaceutical organization" section (a: $p^{FC-CC} = 0.0009$, $p^{(FC+TBL)-CC} < 0.0001$, $p^{FC-(FC+TBL)} = NA$) and the final testing (b: $p^{FC-CC} = 0.0243$, $p^{(FC+TBL)-CC} = 0.0100$, $p^{FC-(FC+TBL)} = NA$) in the flipped classroom model and the traditional model. Significance of differences between clusters tested by Student's t-test

The study of participants' attitude toward the use of the flipped classroom model

The survey of students on their satisfaction with learning using the flipped classroom technology in the pharmaceutical marketing course showed that 90.4% of the participants in the FC cluster (average score – 4.6) and 86.5% of the FC + TBL cluster (average score – 4.5) members have a positive attitude toward this learning model ("completely satisfied" – 71.2% and 65.4%, respectively, and "rather satisfied" – 19.2% and 21.1%, respectively) (Appendix B). Noteworthy, the "completely unsatisfied" and "rather unsatisfied" answer options were not used by the study participants at all. The most common answers to the question "Do you consider the interactivity between the student and the teacher when using this model sufficient?" in the FC and FC+TBL clusters were "completely sufficient" – 90.4% and 86.5%, respectively, and "rather sufficient" – 3.8% and 7.7%, respectively. The average score in the FC and FC+TBL clusters' survey participants on this issue was 4.8. The distribution of answers to the question "Do you consider the increase in the volume of homework justified?" in the FC and FC+TBL clusters was as follows: "completely justified" – 67.3% and 75.0%, respectively, "rather justified" – 17.3% and 19.2%, respectively, "difficult to answer" – 15.4% and 5.8%, respectively. The average score on this issue was 4.5 in the FC cluster and 4.7 in the FC+TBL cluster. The study participants' opinion on the acceptability of the further use of the flipped classroom model in teaching the "Analysis of the marketing environment of a pharmaceutical organization" section of the pharmaceutical marketing course generally in emergency situations corresponded to similar data on satisfaction with the educational process. Specifically, 90.4% of the FC cluster (average score – 4.6) students and 84.6% of the FC+TBL cluster (average score – 4.5) students considered this model acceptable for teaching both the "Analysis of the marketing environment of a pharmaceutical organization" section and the entire pharmaceutical marketing course.

Discussion

In recent years, blended learning models including the flipped classroom model have been growing in demand in medical and pharmaceutical higher education. These models make the educational process more mobile and adaptive in relation to the conditions of the outside environment which is especially relevant during pandemics and natural or technogenic disasters [45], [46]. Moreover, such models provide students with greater opportunities for active participation in studying the main modern scientific areas of pharmacy, for example, in the development of new innovative medication [47]. However, these methods require modern innovative electronic learning tools [48], [49]. They are usually subdivided into [50]:

- external systems: MOOC platforms of higher education institutions, national systems, MOOC platforms of the international level;
- Internal systems: Material storages (possibly in the form of educational portals), electronic communication services (primarily video conferencing), e-learning systems without video conferencing, etc.

The most popular MOOC platforms for higher education institutions in Russia are Open Education (https://openedu.ru/), Universarium (https://universarium.org/), and Lectorium (https://www.lektorium.tv/).

Technologically, the implementation of blended learning in higher education is typically carried out using the LMS as an internal system. At present, the most popular LMS in higher education in Russia are Moodle Mobile, Canvas Student, Blackboard, and G-OpenLMS. The present study demonstrated that using an LMS-based higher education portal with Moodle Mobile educational content is the best option for organizing and introducing a blended learning model – specifically, the flipped classroom model – into the educational process. In our case, the deployed LMS portal was the EOP of the Sechenov First Moscow State Medical University.

The study participants generally showed a positive attitude toward the use of the flipped classroom model in the "Pharmaceutical Marketing" discipline. Students from the experimental clusters FC and FC+TBL were significantly better prepared for all thematic lessons of the "Analysis of the marketing environment of a pharmaceutical organization" section compared to the students from the control CC cluster. They were also effective and productive when solving situational tasks in practical lessons compared to students taught by the traditional model. The results of the final control for the section also supported the advantages of the blended learning model both in practical skill assessment and in testing. Our findings are consistent with survey data on the effectiveness of the flipped classroom model in medical education [51] and higher education during the COVID-19 pandemic [52]. The attitude of students to this technology in our study and in other published works is also commensurate. For example, 86.4% of medical students are satisfied with the use of the flipped classroom model in the educational process [53], and 76% of medical students approve of conducting classes using the model in the future [15]. We support the authors who point out the need to develop reliable, uniform tools for objective assessment of short-term and long-term results of the effectiveness of the application of the flipped class model [54].

The combination of the flipped classroom model and the team-based learning method (the FC+TBL cluster) had an ambiguous effect on solving the situational tasks. This result is possibly associated with the lesson topics. The results in the topics where situational tasks could be completed by students in a group were higher in the FC+TBL cluster compared to the FC cluster. In the topics that required students to take a personalized approach to solving situational tasks, the learning outcomes in the FC+TBL cluster were similar or even lower than in the FC cluster.

It should be noted that the advantages of team learning (the FC+TBL cluster) over the individual approach (the FC cluster) were:

- Increasing the educational, cognitive, and research motivation of students both in self-preparation for practical classes and in class work (the desire to be the best in the team);
- Self-organization of student teamwork (if someone is behind the work schedule, then the rest helped them, since the overall result of solving situational problems in practical classes depends on the work of each student and the whole team);
- The ability to perform more complex situational tasks, including elements of scientific research, based on the synthesis of the results obtained by each member of the team;
- Development of more significant collective conclusions and conclusions on the performed situational tasks;
- Improving the quality of acquired skills and abilities, the quality of training in the field of pharmaceutical marketing, which increases the demand for graduates of a higher education institution in the labor market.

The approving reviews received from students in the "Pharmacy" specialty (Specialist degree program) on the use of the flipped classroom model in the "Analysis of the marketing environment of a pharmaceutical organization" section provide a basis for further implementation of this technology in the "Pharmaceutical Marketing" course in its entirety and show the prospects for further research on the implementation of other blended learning models.

Conclusion

1. The study of the effectiveness of using the flipped classroom model during the COVID-19 pandemic in higher pharmaceutical education in the "Pharmaceutical Marketing" discipline showed that students from the experimental clusters FC and FC+TBL were significantly better prepared for practical lessons and worked in them more effectively and productively compared to the control CC cluster. The results of the final control also substantiated the advantages of the flipped classroom technology both in the assessment of practical skills and abilities in solving situational tasks and in testing.
2. It was established that the implementation of the complex technology combining the flipped classroom model and the team-based learning method (the FC+TBL cluster) in the pharmaceutical marketing course is only rational for those practical lessons that involve professional situational tasks that could be solved by students in a team successfully.
3. The analysis of students' opinion on the use of the flipped classroom model revealed that 90.4% of students from the FC cluster and 84.6% of students from the FC+TBL cluster were satisfied with the results of the experiment and consider this method appropriate for teaching the "Pharmaceutical Marketing" course in its entirety.

References

1. Abbas JR, Kenth JJ, Bruce IA. The role of virtual reality in the changing landscape of surgical training. J Laryngol Otol.

134(10): 863-866. https://doi.org/10.1017/s0022215120002078
PMid:33032666

2. Abdulkareem SA, Augustijn EW, Filatova T, Musial K, Mustafa YT. Risk perception and behavioral change during epidemics: Comparing models of individual and collective learning. PLoS One. 2020;15(1):e0226483. https://doi.org/10.1371/journal.pone.0226483
PMid:31905206
3. Jones TA, Vidal G, Taylor C. Interprofessional education during the COVID-19 pandemic: Finding the good in a bad situation. J Interprof Care. 2020;34(5):633-46. https://doi.org/10.1080/13561820.2020.1801614
PMid:32811228
4. Lischer S, Safi N, Dickson C. Remote learning and students' mental health during the Covid-19 pandemic: A mixed-method enquiry. Prospects (Paris). 2021:1-11. https://doi.org/10.1007/s11125-020-09530-w
PMid:33424041
5. Ramlo S. The coronavirus and higher education: Faculty viewpoints about universities moving online during a worldwide pandemic. Innov High Educ. 2021;46:241-259. https://doi.org/10.1007/s10755-020-09532-8
PMid:33437113
6. Adams Becker S, Cummins M, Davis A, Freeman A, Hall Giesinger C, Ananthanarayanan V. NMC Horizon Report. Higher Education Edition. Austin, Texas: The New Media Consortium; 2021. Available from: http://www.cdn.nmc.org/media/2017-nmc-horizon-report-he-EN [Last accessed on 2021 Mar 25]. https://doi.org/10.5209/tekn.58102
7. Margolis AA. What kind of blending makes blended learning? Psychol Sci Educ. 2018;3(23):5-19. https://doi.org/10.17759/pse.2018230301
8. Moro C, Smith J, Stromberga Z. Multimodal learning in health sciences and medicine: Merging technologies to enhance student learning and communication. Adv Exp Med Biol. 2019;1205:71-8. https://doi.org/10.1007/978-3-030-31904-5_5
PMid:31894570
9. Pletyago TY, Ostapenko AS, Antonova SN. Pedagogical models of blended learning: On the experience of Russian and foreign practice of design and implementation. Educ Sci J. 2019;5(21):113-30. https://doi.org/10.17853/1994-5639-2019-5-113-130
10. Tudor Car L, Kyaw BM, Dunleavy G, Smart NA, Semwal M, Rotgans JI, *et al*. Digital problem-based learning in health professions: Systematic review and meta-analysis by the digital health education collaboration. J Med Internet Res. 2019;21(2):e12945. https://doi.org/10.2196/12945
PMid:30816846
11. Vasilieva JS, Rodionova EV, Chicherina NV. Blended learning: Models and real cases. Open Distance Educ. 2019;1(73):22-31.
12. Sánchez J, Andreu-Vázquez C, Lesmes M, García-Lecea M, Rodríguez-Martín I, Tutor AS, *et al*. Quantitative and qualitative evaluation of a learning model based on workstation activities. PLoS One. 2020;15(8):e0236940. https://doi.org/10.1371/journal.pone.0236940
PMid:32756582
13. Staker H, Horn MB. Classifying K-12 Blended Learning. 2012. Mountain View, CA: Innosight Institute; 2012. Available from: http://www.christenseninstitute.org/wp-content/uploads/2013/04/Classifying-K-12-blended-learning [Last accessed on 2021 Mar 25].
14. Twigg CA. Improving learning and reducing costs: New models for online learning. Educause Review. 2003;38(5):28-38.
15. Angadi NB, Kavi A, Shetty K, Hashilkar NK. Effectiveness of flipped classroom as a teaching-learning method among undergraduate medical students-an interventional study. J Educ Health Promot. 2019;8:211.
PMid:31807601
16. Decloedt A, Franco D, Martlé V, Baert A, Verwulgen A, Valcke M. Development of surgical competence in veterinary students using a flipped classroom approach. J Vet Med Educ. 2020;48(3):281-8. https://doi.org/10.3138/jvme.2019-0060
PMid:32108546
17. French H, Arias-Shah A, Gisondo C, Gray MM. Perspectives: The flipped classroom in graduate medical education. Neoreviews. 2020;21(3):e150-6. https://doi.org/10.1542/neo.21-3-e150
PMid:32123119
18. Ge L, Chen Y, Yan C, Chen Z, Liu J. Effectiveness of flipped classroom vs traditional lectures in radiology education: A meta-analysis. Medicine (Baltimore). 2020;99(40):e22430. https://doi.org/10.1097/md.0000000000022430
PMid:33019421
19. Gillette C, Rudolph M, Kimble C, Rockich-Winston N, Smith L, Broedel-Zaugg K. A meta-analysis of outcomes comparing flipped classroom and lecture. Am J Pharm Educ. 2018;82(5):6898. https://doi.org/10.5688/ajpe6898
PMid:30013248
20. Goh CF, Ong ET. Flipped classroom as an effective approach in enhancing student learning of a pharmacy course with a historically low student pass rate. Curr Pharm Teach Learn. 2019;11(6):621-9. https://doi.org/10.1016/j.cptl.2019.02.025
21. Jensen JL, Kummer TA, Godoyd PD. Improvements from a flipped classroom may simply be the fruits of active learning. CBE Life Sci Educ. 2015;14(1):ar5. https://doi.org/10.1187/cbe.14-08-0129
PMid:25699543
22. Bishop J, Verleger MA. The Flipped Classroom: A Survey of the Research Paper. Atlanta, Georgia: ASEE Annual Conference and Exposition; 2013. https://doi.org/10.18260/1-2--22585
23. El Miedany Y. Flipped learning. In: Rheumatology Teaching. Cham: Springer; 2019. p. 285-303. https://doi.org/10.1007/978-3-319-98213-7_15
24. Moffett J. Twelve tips for flipping the classroom. Med Teach. 2015;37(4):331-6.
PMid:25154646
25. Tomas L, Evans N, Doyle T, Skamp K. Are first year students ready for a flipped classroom? A case for a flipped learning continuum. Int J Educ Technol Higher Educ. 2019;16(5):1-22. https://doi.org/10.1186/s41239-019-0135-4
26. Vali I. The flipped classroom. Educ Quart Rev. 2019;2(2):395-407.
27. Bossaer JB, Panus P, Stewart DW, Hagemeier NE, George J. Student performance in a pharmacotherapy oncology module before and after flipping the classroom. Am J Pharm Educ. 2016;80(2):31. https://doi.org/10.5688/ajpe80231
PMid:27073284
28. Hwang GJ, Lai CL, Wang SY. Seamless flipped learning: A mobile technology-enhanced flipped classroom with effective learning strategies. J Comput Educ. 2015;2:449-73. https://doi.org/10.1007/s40692-015-0043-0
29. De Jaegher L. What is the impact of the flipping the classroom instructional e-learning model on teachers. Educ Stud Moscow. 2020;2:175-203. https://doi.org/10.17323/1814-9545-2020-2-175-203
30. iFLIP Project. Adult Learners Needs Analysis Report. Survey Results and Conclusions; 2017. Available from: http://www.projectiflip.eu/wp-content/uploads/2018/05/ifLIP_IO2_Adult-Learners-needs-analysis-report [Last accessed on 2021 Mar 25].
31. Dziuban C, Graham C, Moskal P, Norberg A. Sicilia N. Blended learning. The new normal and emerging technologies. Int J Educ Technol Higher Educ. 2018;15(3):1-16. https://doi.org/10.1186/

s41239-017-0087-5

32. Banerjee Y, Tuffnell C, Alkhadragy R. Mento's change model in teaching competency-based medical education. BMC Med Educ. 2019;19(1):472. https://doi.org/10.1186/s12909-019-1896-0
PMid:31882006
33. Lewis CE. Is the flipped classroom a panacea for medical education? Curr Surg Rep. 2019;7(9):348. https://doi.org/10.1007/s40137-019-0230-4
34. He Y, Lu J, Huang H, He S, Ma N, Sha Z, *et al*. The effects of flipped classrooms on undergraduate pharmaceutical marketing learning: A clustered randomized controlled study. PLoS One. 2019;14(4):e0214624. https://doi.org/10.1371/journal.pone.0214624
PMid:30969976
35. Sajid M, Shaikh AA, Ikram MF, Cahusac P, Yaqinuddin A, AlKattan W, *et al*. Comparative analysis of effectiveness between flipped classroom and lecture-based classroom in undergraduate medical education at Alfaisal University. Cureus. 2020;12(11):e11408. https://doi.org/10.7759/cureus.11408
PMid:33312806
36. ICC, ESOMAR. International Code on Market, Opinion and Social Research and Data Analytics. ESOMAR; 2016. Available from: https://www.esomar.org/uploads/pdf/professional-standards/ICCESOMAR_Code_English [Last accessed on 2021 Mar 25]. https://doi.org/10.1002/rwm3.20379
37. Mishra P. Considering contextual knowledge: The TPACK diagram gets an upgrade. J Digit Learn Teach Educ. 2019;35(2):76-8. https://doi.org/10.1080/21532974.2019.1588611
38. Bloom BS, Engelhart MD, Furst EJ, Hill WH, Krathwohl DR. Taxonomy of educational objectives: The classification of educational goals. In: Handbook I: Cognitive Domain. New York: David McKay Company; 1956. https://doi.org/10.1177/001316446502500324
39. Kurt S. Using Bloom's Taxonomy to Write Effective Learning Objectives: The ABCD Approach. Educational Technology; 2019. Available from: https://www.educationaltechnology.net/using-blooms-taxonomy-to-write-effective-learning-objectives-the-abcd-approach [Last accessed on 2021 Mar 25]. https://doi.org/10.1016/b978-0-12-814702-3.00025-1
40. GOST R 55751-2013. Information and Communication Technologies in Education. Electronic Educational-methodical Complexes. Requirements and Characteristics. Available from: http://www.docs.cntd.ru/document/1200108264 [Last accessed on 2021 Mar 25].
41. GOST R 53625-2009 (ISO/IEC 19796-1: 2005). Information Technology (IT). Learning, Education, and Training. Quality Management, Ensuring Quality and Metrics. Part 1. General Approach. Available from: http://www.docs.cntd.ru/document/1200082197 [Last accessed on 2021 Mar 25].
42. Burgess A, Roberts C, Ayton T, Mellis C. Implementation of modified team-based learning within a problem based learning medical curriculum: A focus group study. BMC Med Educ. 2018;18(1):74. https://doi.org/10.1186/s12909-018-1172-8
43. Koh YY, Schmidt HG, Low-Beer N, Rotgans JI. Team-based learning analytics: An empirical case study. Acad Med. 2020;95(6):872-8. https://doi.org/10.1097/acm.0000000000003157
PMid:31972678
44. Wheeler S, Valentino AS, Liston BW, Li J, McAuley JW. A team-based learning approach to interprofessional education of medical and pharmacy students. Curr Pharm Teach Learn. 2019;11(11):1190-5. https://doi.org/10.1016/j.cptl.2019.07.010
PMid:31783968
45. Dohaney J, de Róiste M, Salmon RA, Sutherland K. Benefits, barriers, and incentives for improved resilience to disruption in university teaching. Int J Disaster Risk Reduct. 2020;50:101691. https://doi.org/10.1016/j.ijdrr.2020.101691
46. Masha'al D, Rababa M, Shahrour G. Distance learning-related stress among undergraduate nursing students during the COVID-19 pandemic. J Nurs Educ. 2020;59(12):666-74. https://doi.org/10.3928/01484834-20201118-03
PMid:33253395
47. Babaskina LI, Litvinova TM, Babaskin DV. Key points in the development of medicinal products for electro-and phonophoresis based on a phytocomplex in the rehabilitation of patients with osteoarthritis. J Pharm Sci Res. 2018;10(8):1991-4.
48. Lawson R, Géniaux H, Bailly S, Pouget C, Fagnère C, Laroche ML, *et al*. Contributions of a blended learning based on peer evaluation for teaching drug-drug interactions to undergraduate pharmacy students. BMC Med Educ. 2019;19(1):426. https://doi.org/10.1186/s12909-019-1867-5
49. Soy-Muner D. Continuous learning through platforms. Farm Hosp. 2020;44(7):71-3.
PMid:32533676
50. Radygin VY, Lukyanova NV, Kupriyanov DY. LMS in university for in-class education: Synergy of free software, competitive approach and social networks technology. AIP Conf Proc. 2017;1797:020015. https://doi.org/10.1063/1.4972435
51. Oudbier J, Spaai G, Timmermans K, Boerboom T. Enhancing the effectiveness of flipped classroom in health science education: A state-of-the-art review. BMC Med Educ. 2022;22(1):34. https://doi.org/10.1186/s12909-021-03052-5
PMid:35022002
52. Divjak B, Rienties B, Iniesto F, Vondra P, Zizak M. Flipped classrooms in higher education during the COVID-19 pandemic: Findings and future research recommendations. Int J Educ Technol High Educ. 2022;19(1):9. https://doi.org/10.1186/s41239-021-00316-4
PMid:35252548
53. Ito A, Watanabe K, Fukuzawa Y, Mitani K, Fujimoto S, Matsuda T, *et al*. Development of Kampo (traditional Japanese medicine) e-learning program: Evaluation of the flipped classroom for medical students. Med Educ Online. 2021;26(1):1938504. https://doi.org/10.1080/10872981.2021.1938504
PMid:34134610
54. Lee RF, Wong WJ, Lee SW, White PJ, Takeuchi T, Efendie B. Cultural adaptation and validation of instruments for measuring the flipped classroom experience. Curr Pharm Teach Learn. 2022;14(1):23-32. https://doi.org/10.1016/j.cptl.2021.11.028
PMid:35125191

APPENDICES

Appendix A: Questionnaire for surveying students

Dear survey participant,

We are conducting a study on the effectiveness and acceptability of using the flipped classroom model during the COVID-19 pandemic in higher pharmaceutical education. This will optimize and improve the existing system of pharmaceutical education. Please answer the questions below.

1. You were trained in the section “Analysis of the marketing environment of a pharmaceutical organization” using the model:
   - Flipped class
   - Flipped class and team-based method
2. Are you satisfied with the use of this learning model?
   - Completely satisfied
   - Rather satisfied
   - Find it difficult to answer
   - Rather dissatisfied
   - Completely dissatisfied
3. Do you consider the interactivity between the student and the teacher when using this model sufficient?
   - Completely sufficient
   - Rather sufficient
   - Find it difficult to answer
   - Rather insufficient
   - Completely insufficient
4. Do you think the increase in the amount of homework is justified?
   - Completely justified
   - Rather justified
   - Find it difficult to answer
   - Rather unjustified
   - Completely unjustified
5. Do you consider it acceptable to use this model in the future when studying the section “Analysis of the marketing environment of a pharmaceutical organization”?
   - Completely acceptable
   - Rather acceptable
   - Find it difficult to answer
   - Rather unacceptable
   - Completely unacceptable
6. Do you consider it acceptable to use this model in the future when studying the course “Pharmaceutical marketing”?
   - Completely acceptable
   - Rather acceptable
   - Find it difficult to answer
   - Rather unacceptable
   - Completely unacceptable

Appendix B: Results of the survey of students

Question	Number of responses on the Likert scale									
	Completely agree (5 points)		Rather agree (4 points)		Find it difficult to answer (3 points)		Rather disagree (2 points)		Completely disagree (1 point)	
	Cluster									
	FC	FC+TBL	FC	FC+TBL	FC	FC+TBL	FC	FC+TBL	FC	FC+TBL
Are you satisfied with the use of this learning model?	37 (71.2)	34 (65.4)	10 (19.2)	11 (21.1)	5 (9.6)	7 (13.5)	0	0	0	0
Do you consider the interactivity between the student and the teacher when using this model sufficient?	47 (90.4)	45 (86.5)	2 (3.8)	4 (7.7)	2 (3.8)	1 (1.9)	1 (1.9)	1 (1.9)	0	1 (1.9)
Do you think the increase in the amount of homework is justified?	35 (67.3)	39 (75.0)	9 (17.3)	10 (19.2)	8 (15.4)	3 (5.8)	0	0	0	0
Do you consider it acceptable to use this model in the future when studying the section “Analysis of the marketing environment of a pharmaceutical organization”?	37 (71.2)	33 (63.5)	10 (19.2)	11 (21.1)	4 (7.7)	7 (13.5)	1 (1.9)	1 (1.9)	0	0
Do you consider it acceptable to use this model in the future when studying the course “Pharmaceutical marketing”?	37 (71.2)	33 (63.5)	10 (19.2)	11 (21.1)	4 (7.7)	7 (13.5)	1 (1.9)	1 (1.9)	0	0