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FROM THE EXPERIENCE OF INTRODUCING NEW EDUCATIONAL PROGRAM AT EXAMPLE OF COMMITTEE "CELL METABOLISM" FOR THE 1-YEAR STUDENTS IN MEDICAL UNIVERSITY SEMEY

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Abstract

Introduction. In non-profit Joint-stock Company "Medical University Semey" new integrated educational program is being introduced. It is model of education based on learning outcomes. For creation of the new educational program development of "Competency Catalogue" of graduates for all specialties was necessary to make. On base of this Catalogue all the teachers started to teach according to new standard. At current moment students of the 1st stream have finished the committee "Cell metabolism". The results of study of this committee are given in this article.

Steps of creation of educational program. The steps involved in creating of the educational program were the development of the "Competency Catalogue" of Undergraduate Medical Education Program, the training of the university faculty how to prepare the blueprints of their disciplines, how to work with electron platform KEYPS.

Content of new integrated educational program. The first 3 years the program consists of "subject committees"composing of modules of different subjects being in integration and includes different number of theoretical and practical classes. The 1st year of study consists of the four consequently following each other committees:1. Chemical, Molecular, and Physical Fundamentals of Life; 2. Cell Metabolism; 3. Heredity and Tissues; 4. Skeletal-Muscular System.

Assessment of students. Assessment of students is realized in KEYPS and includes the following types of testing: formative (30% of year mark) and summative (70% of year mark).

Results of study of committee "Cell Metabolism". This discipline is taught for 1st year students of Faculties "General Medicine", "Pharmacy", "Nursing", "Dentistry". The Committee consists of 3 modules: 1 module – Functioning of cell components (Molecular Biology, Histology, Microbiology topics); 2 module – Basis of molecular genetics (Molecular Biology topics); 3 module – Metabolism of the cell (Biochemistry, Microbiology, Physiology topics).

Conclusion. New educational program demands changes not only in our syllabuses, but also in relation of faculty to teaching process and change of students' relation to study process in the direction of their self-study without daily assessment.

Keywords: *Outcome based education, competency catalogue, integrated program.*

Резюме

ИЗ ОПЫТА ВНЕДРЕНИЯ НОВОЙ ОБРАЗОВАТЕЛЬНОЙ ПРОГРАММЫ НА ПРИМЕРЕ КОММИТТИ «КЛЕТОЧНЫЙ МЕТАБОЛИЗМ» ДЛЯ СТУДЕНТОВ 1 КУРСА МЕДИЦИНСКОГО УНИВЕРСИТЕТА СЕМЕЙ

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Введение. В НАО «Медицинский университет Семей» внедряется новая интегрированная образовательная программа, являющаяся моделью образования, основанного на конечных результатах. Для создания новой

образовательной программы потребовалась разработка каталога компетенций выпускника по всем специальностям, на основе которого профессорско-преподавательский состав начал преподавание по новому стандарту. На текущий момент студенты 1 потока закончили коммитти «Клеточный метаболизм», результаты изучения которого представлены в статье.

Этапы создания новой образовательной программы. Этапы включают разработку каталога компетенций, обучение профессорско-преподавательского состава университета составлению блупринтов, работе с электронной платформой KEYPS.

Содержание новой интегрированной образовательной программы. В первые три года программа включает предметные курсы “subjectcommittees”, состоящие из соответствующих темам модулей (разделов) различных дисциплин, находящихся в интеграции, и включает разное число лекционных и практических часов в зависимости от раздела и дисциплины. 1 год обучения состоит из четырех последовательно следующих друг за другом коммитти: 1. Химические, молекулярные и физические основы жизни; 2. Клеточный метаболизм; 3. Наследственность и ткани; 4. Мышечно-скелетная система.

Оценивание знаний студентов. Оценивание студентов осуществляется в KEYPS и включает следующие виды: формативное тестирование (составляющее 30% от годовой оценки) и суммативное тестирование (составляющее 70% от годовой оценки).

Результаты изучения коммитти «Клеточный метаболизм». Эта дисциплина преподается студентам 1 года обучения факультетов общей медицины, фармации, сестринского дела и стоматологии. Коммитти состоит из 3 модулей: 1 модуль – Функционирование клеточных компонентов; 2 модуль – Основы молекулярной генетики; 3 модуль – Метаболизм клеток (темы биохимии, микробиологии, физиологии).

Вывод. Новая образовательная программа требует изменений не только в рабочих программах, но и в отношении преподавательского состава к образовательному процессу вообще, а также изменения в отношении студентов к обучению, мотивирующем их к самообразованию без ежедневного оценивания.

Ключевые слова: *Образование, основанное на конечных результатах обучения, каталог компетенций, интегрированная программа.*

Түйіндеме

СЕМЕЙ МЕДИЦИНА УНИВЕРСИТЕТІНІҢ 1 КУРС СТУДЕНТТЕРІНЕ АРНАЛҒАН "ЖАСУШАЛЫҚ МЕТАБОЛИЗМ" КОММИТТИ ҮЛГІСІНДЕ ЖАҢА БІЛІМ БЕРУ БАҒДАРЛАМАСЫН ЕНГІЗУ ТӘЖІРИБЕСІНЕН

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Кіріспе. "Семей медицина университеті" КеАҚ соңғы нәтижелерге негізделген білім берудің үлгісі болып табылатын жаңа интеграциялық білім беру бағдарламасы енгізілуде.Жаңа білім беру бағдарламасын құру үшін барлық мамандықтар бойынша бітірушінің құзыреттілік каталогын өңдеу талап етілді, соның негізінде профессорлық-оқытушылық құрам жаңа стандарт бойынша оқытуды бастады. Қазіргі уақытта 1-лек студенттері "Жасушалық метаболизм" коммиттиін аяқтады, олардың нәтижелері мақалада берілген.

Жаңа білім беру бағдарламасын құру кезеңдері. Жаңа білім беру бағдарламасын құру кезеңдеріне құзыреттілік каталогын жасау, университеттің профессорлық-оқытушылық құрамына блупринттерді құрастыруды, KEYPS электрондық платформасымен жұмыс істеуге үйрету кіреді.

Жаңа интеграцияланған білім беру бағдарламасының мазмұны. Алғашқы үш жылда бағдарлама "subjectcommittees" пәндік курстарын қамтиды, олар интеграциялаудағы әр түрлі пәндердің модульдерінің (бөлімдерінің) тақырыптарына сәйкес келетін дәрістер мен практикалық сағаттардың әр түрлі санын қамтиды. 1 оқу жылы төрт келесі коммиттиден тұрады: 1. Тіршіліктің химиялық, молекулалық және физикалық негіздері; 2. Жасушалық метаболизм; 3. Тұқым қуалаушылық және тіндер; 4. Бұлшық ет-қаңқа жүйесі.

Студенттердің білімін бағалау. Студенттердің білімін бағалау KEYPS-та жүзеге асырылады және бағалаудың келесі түрлерін қамтиды: формативті тестілеу (жылдық бағаның 30% құрайды) және суммативті тестілеу (жылдық бағаның 70% құрайды).

"Жасушалық метаболизм" коммиттиін зерттеу нәтижелері. Бұл пән жалпы медицина, фармация, мейірбике ісі және стоматология факультеттерінің 1 курс студенттеріне оқытылады. Коммити 3 модульдан тұрады: 1 модуль-

Жасушалық компоненттердің қызметі; 2 модуль – Молекулалық генетика негіздері; 3 модуль – Жасушалардың метаболизмі (биохимия, микробиология, физиология тақырыптары).

Қорытынды.Жаңа білім беру бағдарламасытек жұмыс бағдарламаларында ғана емес, сондай-ақ жалпы оқу процесіндегі оқытушылар құрамына қатысты өзгерістерді, сондай-ақ күнделікті бағалаусыз өздігінен білім алуға ынталандыратын студенттерді оқытуға қатысты өзгерістерді талап етеді.

Түйінді сөздер: *Оқытудың соңғы нәтижелеріне негізделген білім, құзыреттілік каталогы, интеграцияланған бағдарлама.*

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Introduction

In September of 2019-2020 academic year, the introduction of a new educational standard for the training of future doctors began at Non-profit Joint-stock Company “Medical University Semey”. The developed integrated educational program was a joint work of the faculty of Semey Medical University and colleagues from the medial faculty of the university “Başkent” (Ankara, Turkey), the strategic partner of our university.

Steps of creation of educational program.

The first step in creating of the educational program was the development of the “Competency Catalogue” of Undergraduate Medical Education Program. The created catalogue of the learning outcomes is based on the competency model CanMed (2015), the Swiss catalogue of learning outcomes of medical schools (2008), as well as Turkish national Medical Education Program.

Thus, the new educational program is a model of education based on learning outcomes, i.e. each part of the educational process is aimed to achieve the final result [1]. Focusing on the results is necessary so that the student has a clear idea what should be achieved at the end of his learning of any discipline.

The improvement of the teaching model determined the need of the training of the university faculty. Therefore, during the whole spring-summer period, each department got training seminars under the guidance of a doctor of medicine, director of the Department of Innovative Education of the Semey Medical University Fazıl Serdar Gurel, who trained teachers the skills of blueprint creation (Fig. 1). This is the work program of a discipline or subject, including three mandatory components: learning outcome, content, and assessment.

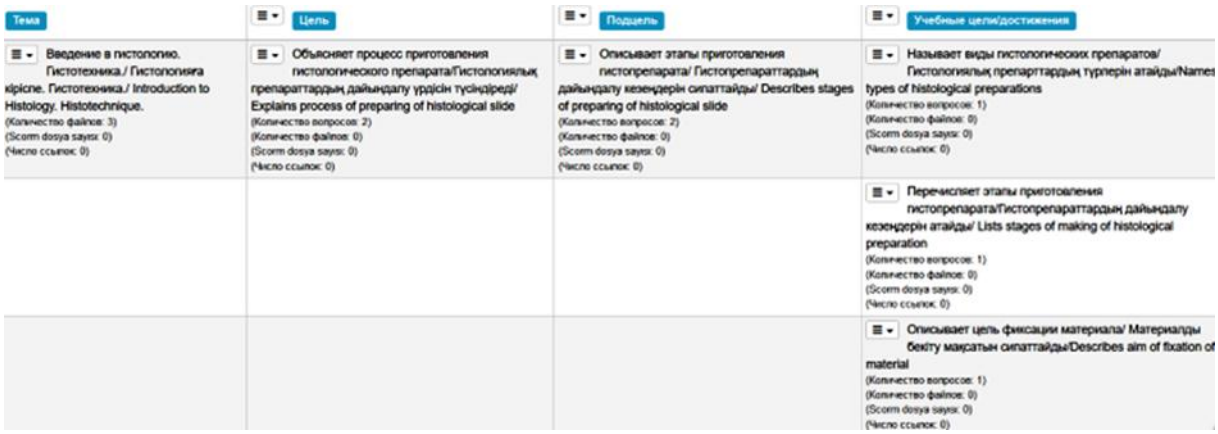

Fig.1 Blueprint.

To the beginning of the academic year, the faculty of each department had developed blueprints [2] in three languages of each theme of the lesson with the definition of learning outcomes (low, medium, high). Each competency has questions that students must answer during formative and summative theoretical assessments. The electronic

platform for this educational program is the Turkish KEYPS program, accessible for every teacher and student. Teachers form blueprints of the themes they are responsible for; they prepare multiple choice questions (MCQ) of various difficulty levels. Students entering KEYPS can see the class schedule for the entire academic year, the theme of the lesson, the department, the name of the teacher and even the number of the classroom in which the lesson will take place.

The blueprint [3] reflects all the learning outcomes, files are attached to the topics in the form of a list of literature, Power Point Presentations, audio, video lectures, links to videos, by opening which student from his smartphone or computer receives all the information necessary for training, up to indicating the pages of the textbook. That is, everything is aimed at facilitating the mastery of discipline by the student, and ultimately, achieving the learning outcomes by him.

Content of new integrated educational program.

Let's consider the content of the new integrated educational program lasting 6 years, for 5 years of which students study at the undergraduate program, the last 1 year - at the internship. During the first 3 years the program consists of "subject committees". Each committee is composed of modules of different subjects being in integration and includes different number of theoretical and practical classes. For example, the 1st year of study consists of the four consequently following each other committees:

1. Chemical, Molecular, and Physical Fundamentals of Life.
2. Cell Metabolism.
3. Heredity and Tissues.
4. Skeletal-Muscular System.

Thus, the levels of structural organization of life in this sequence are kept. Preliminarily, the Curriculum Map was designed (Fig.2).

Due to the large number of the 1-st year students, the department faculty cannot teach practical classes at the same time. So, all the 1-st year students were divided into 3 streams. This became possible thanks to formation of 2 so called "pseudocommitties" including the disciplines Modern History of Kazakhstan and Information Communication Technologies.

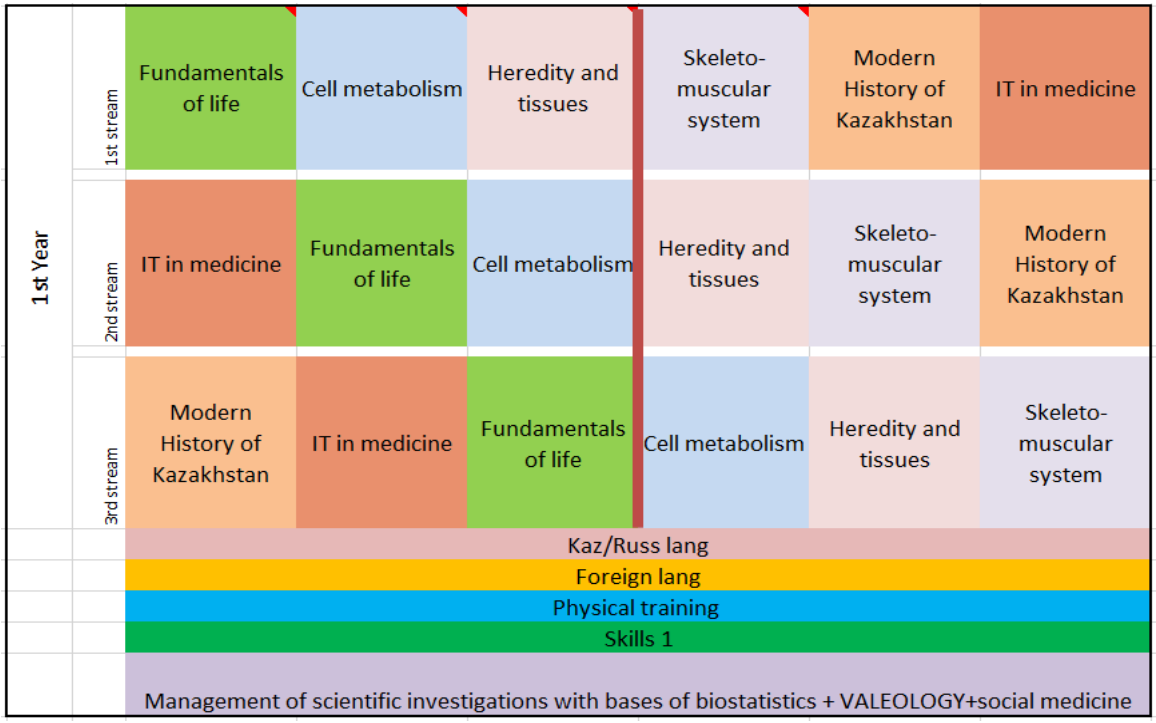

Fig.2. Curriculum Map.

Any educational program of high schools of Kazakhstan involves teaching of the disciplines obligatory for the all types of high school including medical. Such disciplines are already mentioned above Modern History of Kazakhstan, Information Communication Technologies, and also Kazakh/ Russian, English, Physical Education, Political Science, Sociology, Culture Science, Psychology, usually these subjects are taught for the 1-2-year students.

Except four subject committees, education program involves independent and not connected with committee disciplines, such as Management of Science Research, Biostatics, Valeology, History of Medicine, and Public Health. They are called "corridor" disciplines. As obligatory disciplines also do not form a part of committees, they were called "corridor" too.

Academic year starts from committee #1 in September, 2019 and finishes by committee #4 in May, 2020, but the first week of the study is adaptation week, during which the students have lectures about outcome-based education, assessment methods, blueprints and KEYPS.

As was mentioned above, each committee consists of modules uniting themes of integrated disciplines.

Committee #1 “Chemical, Molecular and Physical Fundamental of Life” is divided into three modules: Buffer Systems, Bioorganics, Basics of Biochemistry and Electrogenesis. Committee #2 “Cell Metabolism” represents modules: Functioning of Cellular Components, Basics of Molecular Genetics, Metabolism of Cells. Committee #3 “Heredity and Tissues” includes such units like Basics of Genetics, Genetics and Embryology, and also Epithelial, Connective Tissues. Committee #4 “Skeletal-Muscular System” unites Muscle and Nervous tissues, and regions: Back, Thorax and Abdomen; Shoulder Girdle and Upper Limb; Lower Limb. This sequence of committees reflects levels of structural organization of living material: from atoms and molecules to cell, from cell to tissue, from tissue to organs and to system of organs.

Assessment of students.

Assessment of students is realized in KEYPS and includes the following types of testing: formative and summative. Formative tests conducted after finishing of study of some module or section (30% of year mark). Depending on quantity of formative tests KEYPS calculates their average mark. Summative assessment is integrated exam of the all subjects of committee (70% of year mark). Thus, KEYPS calculates final year mark of all types of assessment taking place during the academic period. Assessment of corridor disciplines is in the end of academic year, in summer.

1 year students “Committee #1”	Group	Student	FT1	FT2	FT3	Average (FT)	SumEx
09.09.19-15.10.19	1105kz	Азамат Маратұлы	60,00	68,97	65,00	64,66	67,35
	1105kz	Жәнібек Жәрдемов	80,00	58,62	55,56	64,73	48,98
	1105kz	Ануар Имандосов	67,00	51,72	70,00	62,91	36,73
	1105kz	Назерке Елубекова	53,00	58,62	75,00	62,21	55,56
	1105kz	Алина Алманова	40,00	82,76	75,00	65,92	65,31
	1105kz	Әмина Бақай	40,00	48,28	75,00	54,43	42,86
	1105kz	Камила Кадылбекова	73,00	62,07	70,00	68,36	57,14
	1105kz	Шынғыс Кайпкожаев	0,00	58,62	65,00	41,21	59,18
	1105kz	Мөлдір Чакерханова	27,00	51,72	85,00	54,57	53,06
	1105kz	Шұғыла Рамазанова	53,00	58,62	75,00	62,21	51,02
	1105kz	Мерей Алиппаев	47,00	31,03	70,00	49,34	44,90
	1105kz	Айым Талғатқызы	60,00	68,97	55,00	61,32	63,27
	1105kz	Алишер Сатбалдин	73,00	82,76	40,00	65,25	61,22
	1105kz	Айнаш Болатова	40,00	48,28	65,00	51,09	51,02

Fig.3. Results of formative and summative examinations.

After passing of 3 formative examinations KEYPS calculate the average result of formative test (FT). Lower you can see results of formative and summative examinations of one of the groups of the 1-year of study (Fig.3). As you see, the results of formative examinations of the committee #1 were not high. The reason was that the teaching according to new program does not include everyday assessment, so our students became lazy, did not prepare for each class. All of them graduated schools where everyday assessment was a rule. Consequently, almost all of them got bad marks in exam. But after finishing the committee #1, the students started to prepare for each class.

Results of study of committee “Cell Metabolism”.

Let’s get to the consideration of the results of study committee “Cell Metabolism” in details. 5 credits (150 hours) allocated for integrated discipline “Cell Metabolism”. This discipline is taught for 1st year students of Faculties “General Medicine”, “Pharmacy”, “Nursing”, “Dentistry”. Committee “Cell Metabolism” includes the integration of disciplines: Biochemistry (40 hours), Molecular Biology and Genetics (65 hours), Histology (10 hours), Microbiology (30 hours), Physiology (5 hours). The duration of each class is 3 academic hours: theoretical class/lecture (2 hours), independent work of students under the guidance of a teacher (1 hour). The Committee consists of 3 modules: 1 module – Functioning of cell components (Molecular Biology, Histology, Microbiology topics); 2 module– Basis of molecular genetics (Molecular Biology topics); 3 module– Metabolism of the cell (Biochemistry, Microbiology, Physiology topics). Discipline “Cell metabolism” studies the structure, functions of cells and organelles, molecular mechanisms and regulation of metabolic processes; explains the causes of changes in tissues and organs, as well as the importance of using biochemical indicators to detect these disorders.

Purpose of the integrated discipline “Cell Metabolism” is formation of a holistic understanding of Molecular Genetics and cellular mechanisms of regulation of basic metabolic

processes, the features of their flow in human organs and tissues.

Final learning outcomes are as follows:

- Characterizes the cell structure with an explanation of the functions of all structural components;
- Summarizes events occurring in a cell at different stages of its life cycle;
- Understands the implementation of hereditary material, is able to tell the molecular mechanisms of gene expression, matrix syntheses;
- Explains the molecular mechanisms of flow and regulation of metabolic processes;
- Describes the main stages of energy metabolism and energy transformation mechanisms.

In the last lesson of each module, students discussed a case made up by the faculty of the Department of Molecular Biology and Medical Genetics named after academician of NAS RK Raissov T.K. together with the teachers of the Department of Propaedeutics of Internal Diseases and students use the acquired theoretical knowledge to analyze the clinical case and summarize the topics of the passed section/module. The analysis of the clinical case is perceived by students with great interest, develops skills in clinical thinking and team work. After each module, students passed a formative examination, including 30 tests in the KEYPS program. The number of tests in the disciplines depends on the hours allocated (seeTable 1).

Table1.

Formative evaluation Committee 2 "Cell Metabolism".

Module 1 - Functioning of cell components.			
Discipline	**Number of hours**	**Ratio, %**	**Quantity of MCQ**
Molecular Biology	30	60	30
Histology	10	20	10
Microbiology	10	20	10
Total	50	100	50
Module 2 - Basis of molecular genetics			
Molecular Biology	35	100	35
Total	35	100	35
Module 3 - Metabolism of the cell			
Biochemistry	40	61	40
Physiology	5	8	5
Microbiology	20	31	20
Total	65	100	65

At the end of the Committee "Cell metabolism", summative examination is conducted, including 50 tests in the KEYPS program. The number of questions on integration disciplines and their percentage are shown in the Table 2.

Table 2.

Summative evaluation Committee 2 "Cell metabolism".

Discipline	**Hours**	**Ratio, %**	**Number of tests**
Molecular Biology	65	43	64
Histology	10	7	11
Microbiology	30	20	30
Physiology	5	3	5
Biochemistry	40	27	40
Total	150	100	150

From 16/10/2019 to 19/11/2019 students of 1st stream of "General Medicine" faculty (groups 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1120, 1121,1126), "Pharmacy" (1134 group), "Nursing" (1135 group) in the amount 145 passed the Committee "Cell Metabolism". The results of formative and summative evaluation of students of the above mentioned groups are in the Table 3. All 145 students of the 1ststream passed summative testing 23/11/2019. For preparation to exam they have 3 days. From the table we see that the average score of the summative testing of 145 students of the 1ststream in the discipline "Cell Metabolism" amounted 72.85; relative performance was 91%; quality indicator amounted to 64.8%. 13students of 1ststream scored below 50, it is 8.9%. If we talk about the final grade in the discipline "Cell metabolism", based on the fact that the summative exam grade is 70% of the final grade, the average score was 72.24. We believe that the reason for the low academic performance of some students is the adaptation to new educational program.

The final results for the 1st course we will get in the end of the 2019-2020 academic year, when we can analyze the implementation of the new educational program at the Semey Medical University for all courses and specialties and we can make conclusions, give suggestions for improving the educational process.

Table 3.

Results of formative and summative testing Committee 2 "Cell metabolism".

Group	Formative assessment #1	Formative assessment #2	Formative assessment #3	Average of Formative assessment	Summative assessment
1101	75.71	78.57	68.10	74.13	70.85
1102	95.14	88.01	73.3	85.50	79.30
1103	76.57	87.25	60.48	74.76	75.80
1104	79.14	58.62	60.0	65.92	69.53
1105	75.66	55.42	61.91	64.33	77.41
1106	51.85	66.67	66.45	61.65	71.16
1107	56.09	68.37	64.76	63.07	68.95
1120	73.67	83.04	52.50	69.74	70.58
1121	74.41	87.66	63.03	75.04	85.16
1126	62.33	92.24	70.28	74.95	82.65
1134	72.51	73.41	65.93	70.62	63.78
1135	73.68	73.21	65.00	70.63	59.00
Total	**72.23**	**76.04**	**64.31**	**70.86**	**72.85**

Conclusion.

All things considered, that this academic year is heavy both for teachers and students of Medical University, because new educational program demands changes not only in our syllabuses, but also in relation of faculty to teaching process and change of students relation to study process in the direction of their self-study without daily assessment.

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Authors contributions:

Uzbekova S. – creation of curriculum map for the 1 – year students, implementation of two themes in module "Functioning of cellular components";

Orazalina A. – administrative support, implementation of new program in committee "Cell Metabolism";

Mussainova A. – technical support;

Mynzhanov M. – interpretation of data;

Uzbekov D. – collection of literature review.

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