



Atena Gerivani¹, Tooraj Sadeghi^{2*}, Hossein Karimi Moonaghi^{3,4,5}, Ahmad Zendedel⁶

¹PhD Student, Neishabour Branch, Islamic Azad University, Neishabour, Iran

²Department of Business Management, Neishabour Branch, Islamic Azad University, Neishabour, Iran

³Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

⁴Department of Medical Education, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

⁵Department of Medical Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran

⁶Department of Statistics, Neishabour Branch, Islamic Azad University, Neishabour, Iran

*Islamic Azad University, Neishabour Branch, Pazhohesh St. Neishabour, 9319975853 Iran

Tel: +98 5142621901
Fax: +98 5142615472
Email: tooraj_sadeghi@yahoo.com

Integrating of Anatomy and Physiology courses in basic medical sciences (case study in Mashhad Faculty of Medicine)

Background: The aim of this study is to organize the educational materials of basic medical sciences by integrating anatomy and physiology courses in Mashhad University of Medical Sciences.

Methods: This is a descriptive cross-sectional study focusing on the views of professors and students of the basic medical sciences in February 2018 and September 2018 in Mashhad University of Medical Sciences, on the presentation of anatomy and physiology courses in the form of system organ and integration. 241 students, who passed their lessons as Integrated, were selected by simple random sampling method. The study instrument was a researcher-made questionnaire that its face validity has been used for validity.

Results: The average of the professors' opinions about integrated teaching indicated that according to the sign test, which is related to non-parametric statistics, the median of 2.893 with a standard deviation of 0.52 was obtained, so the results of the professors' views were significantly higher than the median score. Also, according to the results of students, the statistical number of T was 5.287 and the significance level was assigned less than 0.05.

Conclusion: Overall, according to opinions of professors and students of Mashhad University of Medical Sciences, it can be said that their satisfaction with the integration of basic medical sciences lessons in anatomy and physiology is above average.

Keywords: Integrative Medicine, Academic Medical Centers, Anatomy, Physiology

تنظیم المواد التعليمية للعلوم الطبية في المرحلة الأساسية من خلال دمج مقررات علم التشريح و علم وظائف الأعضاء (دراسة حالة في جامعة مشهد للعلوم الطبية)

الخلفية و الهدف: الغرض من هذه الدراسة هو تنظيم مواد العلوم الطبية في المرحلة الأساسية قبل السريري من خلال دمج مقررات علم التشريح و علم وظائف الأعضاء (دراسة حالة من جامعة مشهد للعلوم الطبية).

المنهج: هذه دراسة وصفية مقطعية يتم من خلالها عرض آراء الأساتذة و الطلاب في مرحلة العلوم الأساسية بجامعة مشهد للعلوم الطبية داخلين في فبراير ٢٠١٨ و سبتمبر ٢٠١٨ بشأن تقديم مقررات علم التشريح و علم وظائف الأعضاء في شكل نظام و تكامل. تم اختيار مجموعة ٢٤١ طالبا من خلال طريقة أخذ العينات العشوائية البسيطة الذين اجتازوا دوراتهم كدمج. أداة الدراسة عبارة عن استبيان من إعداد الباحث تم استخدامه للتحقق من صحة الوجه.

النتائج: يشير متوسط آراء الأساتذة حول التدريس المتكامل إلى أنه حسب اختبار الإشارة المتعلق بالإحصاءات غير المعيارية تم الحصول على متوسط ٢,٨٩٣ بانحراف معياري ٠,٥٢، و بذلك تكون نتائج آراء الأساتذة كانت أعلى بكثير من متوسط الدرجة. كذلك و بحسب نتائج الطلاب فإن الرقم الإحصائي T لـ هو ٥,٢٨٧ و مستوى الدلالة أقل من ٠,٠٥.

الخلاصة: بشكل عام؛ وفقاً لآراء أساتذة و طلاب جامعة مشهد للعلوم الطبية، يمكن القول أن رضاهم عن دمج دروس العلوم الطبية الأساسية في علم التشريح و علم وظائف الأعضاء أعلى من المتوسط.

الكلمات المفتاحية: الطب التكامل، المراكز الطبية الأكاديمية، علم التشريح، علم وظائف الأعضاء

سازماندهی مواد آموزشی علوم پایه پزشکی با ادغام دروس آناتومی و فیزیولوژی (مورد مطالعه دانشگاه علوم پزشکی مشهد)

زمینه و هدف: هدف این تحقیق سازماندهی مواد آموزشی علوم پایه پزشکی با ادغام دروس آناتومی و فیزیولوژی در دانشگاه علوم پزشکی مشهد می باشد.

روش: این پژوهش توصیفی-مقطعی است که طی آن به بررسی نظر اساتید و دانشجویان مرحله علوم پایه ورودی بهمن ۹۶ و مهرماه ۹۷ دانشگاه علوم پزشکی مشهد نسبت به ارائه دروس آناتومی و فیزیولوژی در قالب ارگان سیستم و ادغام پرداخته شده است. تعداد ۲۴۱ نفر از دانشجویان به روش نمونه گیری تصادفی ساده که دروس خود را به صورت ادغام گذرانده اند انتخاب گردیده اند. ابزار مورد مطالعه پرسشنامه محقق ساخته می باشد که برای روایی از روایی صوری استفاده گردیده است.

یافته ها: میانگین نتایج نظرسنجی اساتید از تدریس به صورت ادغام یافته ها حاکی از آن است که طبق آزمون علامت که مربوط به آمار ناپارامتریک می باشد، میان ۲/۸۹۳ با انحراف استاندارد ۰/۵۲ بدست آمده است که نتایج نظرات اساتید به طور معناداری از نمره میانه بالاتر می باشد. همچنین طبق نتایج نظر دانشجویان عدد آماره ی تی ۵/۲۸۷ بدست آمده است و سطح معنی داری کمتر از ۰/۰۵ می باشد.

نتیجه گیری: در مجموع با توجه به نظرسنجی انجام شده از استادان و دانشجویان علوم پزشکی مشهد می توان گفت که میزان رضایت آنها از ادغام دروس علوم پایه از علوم تشریح و فیزیولوژی در سطح بالاتر از متوسط قرار دارد.

واژه های کلیدی: ادغام دروس، دانشگاه علوم پزشکی، آناتومی، فیزیولوژی

ایناتومی اور فزیالوجی کے انضمام سے میڈیکل سائنسی علوم کی اصلاح - مشهد یونیورسٹی آف میڈیکل سائنس کی ایک تحقیق

بیک گراؤنڈ: اس تحقیق کا هدف ایناتومی اور فزیالوجی کے انضمام سے میڈیکل کورس کے ابتدائی برسوں میں سائنسی نصاب کی اصلاح کرنا ہے۔ یہ تحقیق مشهد یونیورسٹی آف میڈیکل سائنس میں انجام دی گئی ہے۔

روش: اس تحقیق میں یونیورسٹی کے اساتذہ اور دوپزار سترہ اور اٹھارہ مین داخلہ لینے والے میڈیکل طلبا سے اظہار نظر کا مطالبہ کیا گیا کیونکہ اس تعلیمی سال سے ایناتومی اور فزیالوجی کو ضم کرکے پڑھانا شروع کیا گیا تھا۔ اس تحقیق میں دو سو اکتالیس طلبا نے شرکت کی۔ ڈیٹا کے حصول کے لئے سوالنامہ پیش کیا گیا جو یونیورسٹی کے علمی معیار پر تیار کیا گیا تھا۔

نتیجے: اس تحقیق سے پتہ چلتا ہے کہ اساتذہ اور طلبا دروس کے ضم کئے جانے سے راضی تھے اور اسے مفید قرار دیتے ہیں۔

سفارش: ان نتیجوں کے پیش نظر کہا جاسکتا ہے کہ طلبا اور اساتذہ کے لئے دروس کو ضم کرنا مفید واقع ہوسکتا ہے

کلیدی الفاظ: ضم کرنا، فزیالوجی، ایناتومی، دروس

INTRODUCTION

Universities of medical sciences all over the country have the important task of training specialized human resources; therefore, medical education needs to be continuously evaluated and reviewed, and constantly improved by eliminating its defects. On the other hand, medical students who are selected in the universities of medical sciences through national entrance exam in a very strong competition have passed different units theoretically and practically through a long period of time. It is noteworthy that after their graduation, medical students are responsible for ensuring the health of patients and their compatriots in various aspects. According to Dadvar (2014), medical students acquire skills, and improve them in the educational opportunities obtained in the curriculum during their study in order to be able to perform their daily clinical tasks; however, it is obvious that achieving learning goals is considered as a criterion for measuring the success of universities as the educational providers (1).

A practical solution to facilitate the integration of curricula is to create experimental opportunities to observe clinical applications as well as to integrate these innovations with training in effective medical education methods (2). Integration has been accepted as an important educational strategy in medical education (3).

Knowledge of human anatomy is a basic requirement for all physicians and it is necessary to formalize the curriculum along with competency standards (4). Also it is important to assess the quality of educational design before integrating the curriculum, so that the quality of medical Massive Open Online Courses (MOOC) can be considered in relation to the quality of existing education(5). The increasing progress and inefficiency of the classic educational method in basic medical sciences have necessitated changes in the general medicine curriculum, especially the basic medical science stage in terms of content and layout in an integrated manner(6).

Educational design, predicting methods, and selecting the order of educational materials in specific situations are effective to achieve results (7).

Educational design is considered as one of the educational subsets with the production of educational materials (8). A good educational program should be designed to ensure that the desired capability and competency is achieved (9). The increasing progress of sciences in the world and the inevitable synchrony of medical sciences with this process have made it necessary to change the curriculum of general medicine, especially the basic medical sciences both in terms of content and layout in an integrated manner more than before (10). Integration in the curriculum means organizing the teaching subjects and making connections between different subjects of different stages. In this way, it forms a single concept (11).

In order to make the researchers more familiar, some research regarding the integration of the curriculum lessons are given below:

Zare Khormizi et al. (2016) examined the views of medical students towards the Integration plan of specific

pharmacology and pathology lessons. This cross-sectional descriptive study was conducted on the attitudes of Yazd medical students in 2013 by census method. According to the research findings, students had a positive attitude towards the integration of these two courses (3).

Khedr et al. (2020) conducted a study entitled Medical Students' Perceptions of Pathology and a Proposed Curricular Integration with Histology. The research method was cross-sectional. The results showed that the integration of histology and pathology courses needs to be tested in the first year (12).

Giurtao et al. (2020) in a study entitled Anatomical Science in Chiropractic Education examined the lack of information on the content of anatomy. The results of this study confirmed that anatomy has a special place in chiropractic education programs in Australia (4).

Considering the mentioned cases, for the administration of the basic medical science program, it is necessary to integrate some lessons, such as anatomy and physiology, which have been discussed in this research.

METHODS

The present study was a descriptive cross-sectional study which focused on the views of professors and students of the basic medical sciences in February 2018 and September 2018 in Mashhad University of Medical Sciences, on the presentation of anatomy and physiology lessons in the form of system organ and Integration.

Sampling method in this research was simple random sampling method. The inclusion criteria of this study were the professors involved in the administration of the horizontal integration plan of basic medical science lessons and also medical students in the second and higher semesters of basic medical science stage. The exclusion criteria were non-cooperation and incomplete or incorrect completion of the questionnaire.

In this research, first, by studying the research literature in the field of educational design and medical education, as well as the integration of some lessons including basic medical sciences lessons, a question was designed. This question was sent to research experts who were professors of basic science lessons to express their agreement on the design of the question and rate the relevance of the question to the title of the research.

It should be noted that in order to collect research data, at the end of the first semester of the 2020 academic year, students were asked to carefully complete the questionnaire in the Salam system (logbook). It should be noted that the data collection instrument was a researcher-made questionnaire which its validity was assessed by psychometricians.

The statistical sample of this research was 246 basic medical science students in the first and the second semesters of 2018 in February 2018 (126 students) and September 2018 (120 students) who had completed their lessons as integration.

The research instrument was a questionnaire consisting of 14 questions about the need for integration and the system organ program.

The questions were graded based on a five-point Likert scale

including 5- very high, 4- high, 3- medium, 2- low, and 1- very low.

In this questionnaire, the integration program of the basic medical sciences was evaluated from the perspective of professors and students of the target group.

To analyze the data, SPSS software was used and the results were expressed by one-factor t-test, mean, and standard deviation.

RESULTS

The research findings are divided into two parts: findings collected from professors and findings collected from students, which are mentioned below.

The descriptive and demographic statistics of the professors in this research are as follows: the total number of professors was 16, of which 10 were male and 6 were female. The frequency showed that 6 individuals are assistant professors, 4 individuals are associate professors, and 6 individuals are professors.

As shown in table 1, the average results of the professors' opinions of integrated teaching indicated that according to the sign test, which is related to non-parametric statistics, the median of 2.893 with a standard deviation of 0.52 was obtained which was significantly higher than the median score (2.893). It means that the professors were satisfied with the integration of anatomy and physiology lessons.

As can be seen, the views of the professors are higher than the average and shows that the satisfaction of the professors with the integration of the lessons is higher than the average level. Also, the following is a survey of students about the integrated lessons, which is shown in Table (2).

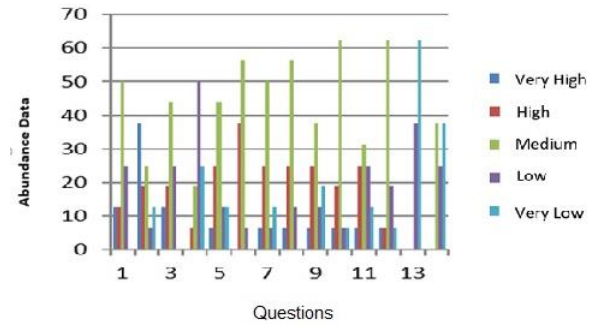


Figure 1. The professors' opinions about the integration of anatomy and physiology lessons

Descriptive and demographic statistics of students in this study are as follows: 246 students of basic medical sciences were in their first semester of 2018 (126 students) and the second semester of 2018 (120 students). The above table shows the frequency, average, and standard deviation. Also, in order to test students' satisfaction with the lessons integration plan, t-test was used, the results of which are shown in Table (3). Based on the results of the students' opinions on integrated teaching, the findings indicated that with 95% confidence, students agreed with teaching lessons as integrated (basic medical sciences). According to the test results, in terms of students, the statistical value was 5.287 and the significance level, which was less than 0.05, showed that the level of students' satisfaction with the integration of anatomy and physiology lessons is significant.

Table 1. Results of research findings on the integration of anatomy and physiology courses based on the professors' opinions

Number	Questions	Frequency (percentage)				
		Very High	High	Medium	Low	Very Low
1	The degree of agreement with the teaching of anatomy and physiology lessons as an integration	12.5	12.5	50	25	0
2	The amount of access to available textbooks and educational books to administer the integration plan	37.5	18.8	25	6.3	12.5
3	The usefulness of combining anatomy and physiology lessons	12.5	18.8	43.8	25	0
4	The necessity to change the administration of the schedule of integrated lessons	0	6.3	18.8	5	25
5	The necessity to change the administration of the schedule of integrated exams	6.3	25	43.8	12.5	12.5
6	The necessity to change the scoring plan of the integrated lessons	0	37.5	56.3	6.3	0
7	The necessity to change the way which unit value is assigned to integrated lessons	6.3	25	5	6.3	12.5
8	The necessity to administer an integration plan to facilitate student learning	6.3	25	56.3	12.5	0
9	The necessity to administer an integration plan of anatomy and physiology lessons to link between theoretical and practical parts	6.3	25	37.5	12.5	18.8
10	The repetition of topics in integration lessons and lessons related to each course	6.3	18.8	62.5	6.3	6.3
11	The degree of coordination of theoretical teaching with practical teaching	6.3	25	31.3	25	12.5
12	The need for facilities to integrate lessons (Anatomy salons, Moulage, etc.)	6.3	6.3	62.5	18.8	6.3
13	The need for laboratory facilities to integrate anatomy and physiology lessons	0	0	0	37.5	62.5
14	The degree of agreement with the continuation of the integration method for other students	0	0	37.5	25	37.5

Table 2. Results of research findings on the integration of anatomy and physiology lessons based on students' views

Number	Questions	Very High	High	Medium	Low	Very Low	Average	Standard Deviation
1	I agree with teaching the lessons in the form of integration	35	71	96	19	25	3.19	1.09
2	I had the resources and textbooks available to administer the integration plan	30	61	113	34	8	3.27	0.98
3	The combination of anatomy and physiology lessons was good	29	65	108	33	11	3.26	1.00
4	I was satisfied with the integrated lessons' schedule	14	37	120	46	29	2.81	1.039
5	How satisfied are you with the integrated lessons' exam schedule?	14	55	118	34	25	2.97	1.03
6	How satisfied are you with the integrated lessons' scoring plan?	9	55	137	27	18	3.01	0.92
7	How satisfied are you with the way the unit value is assigned to the integrated lessons?	12	53	120	41	20	2.95	0.98
8	How satisfied are you with the integrated lessons' learning?	17	74	119	24	12	3.21	0.94
9	How satisfied are you with the degree of matching of the theoretical lessons of the integration plan with the practical lessons?	31	84	98	22	11	3.39	1.01
10	What is the repetition of topics in the integration lessons and the lessons related to each course?	24	78	107	29	8	3.30	0.96
11	What is the degree of coordination between theoretical teaching and practical teaching?	23	76	96	38	13	3.21	1.04
12	I was satisfied with the available facilities such as anatomy salon, moulage, etc.	27	68	104	25	22	3.20	1.08
13	I was satisfied with the laboratory facilities to administer the integration plan.	29	79	111	22	5	3.40	0.93
14	I agree to continue administration of the integration method for other students	29	50	118	29	20	3.13	1.08

Table 3. T-test results for students' satisfaction status with the integration of anatomy and physiology lessons

Number	Average	Degrees of Freedom	Statistics Value	The Significance Level	Confidence Level 95%	
					The Least	The Most
243	3.1690	245	5.287	0.000	0.1060	0.2319

DISCUSSION

As mentioned in the previous sections, the purpose of this study was to organize basic medical science teaching materials by integrating anatomy and physiology lessons in order to improve the knowledge, attitude, and skills of medical students and train professionals through a codified educational program. The results showed that professors are satisfied with the integration of anatomy and physiology lessons. The results also showed that the students' satisfaction level with the integration of anatomy and physiology lessons is significant and is more than average. As mentioned, after the announcement of the National General Medicine Program in 2017 by the Ministry of Health and the requirement to change the way of teaching in the universities of country the stage of basic medical sciences also had some changes. Mashhad University of Medical Sciences should have changed the lessons arrangement according to the curriculum sessions of each university.

Lessons in this university were presented as system organ and integrated (anatomy and physiology lessons). In the classic curriculum, all topics of anatomy and physiology were taught separately. While in the integration, anatomical sciences of the organ were also taught at the same time with the topics of physiology, which according to the present study, the views of professors and students toward the integration plan was moderate to high. In other words, professors and students of Mashhad University of Medical Sciences were satisfied with the integration of anatomy and physiology lessons. Because all curriculum decisions are to improve the quality of student education, this study is very useful in evaluating the changes in the arrangement and integration of these lessons. The results of this study are similar to the results of Zare Khormizi et al. (2016) who examined the views of medical students towards the integration program of specific pharmacology and pathology lessons (3). Also, the results of this study are similar to the findings of Teymouri Jrokani et al. (2015) in the research on

evaluating the changes in the layout of the basic medical science stage of Isfahan University of Medical Sciences: Students' views, that are satisfied with the integration plan (13). These results are not similar to the results of Khedr et al. (2020) whose research results showed that the integration of histology and pathology lessons in the first year needs to be tested and a lot of effort is made to increase students' dependence on anatomical pathology. Overall, according to opinions of professors and students of Mashhad University of Medical Sciences, it can be said that the integration of basic medical science lessons, including anatomy and physiology, is useful; however, it is suggested that studies and researches be conducted to evaluate the method of integrating curricula in other lessons and stages and the opinions of more professors and experts should be used regarding the questions related to the field of research.

By developing a basic medical science education program that has been the subject of this research and has been administered in Mashhad University of Medical Sciences, it is possible to improve the knowledge, attitude, and skills of medical students along with increasing students' learning, which is one of the important strengths of this research. Also, since this program is to eliminate the defects of the previous program and has been developed to meet the needs of the

country's medical education, so this educational design and integration of lessons can be used in other universities in the country as needed.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

ACKNOWLEDGEMENT

Regarding the research process, we would like to thank our esteemed colleagues, professors and mentors and Dean of the faculty, general medical education assistants, professors and students of Mashhad faculty of Medical, as well as the experts who provided the detailed information needed to accomplish the research goals.

Financial Support: This article is part of the first author's PhD dissertation with code of ethics IR.MUMS.REC.1398.190

Conflict of interest: The authors declare that there is no conflict of interest.

REFERENCES

- Dadvar L, Dadgari A, Mirzaei M, Rezaei M. Assessing the Achievement Objectives of Assaki-Based Nursing Clinical Skills Training in Last Year Nursing Students in the ICU. *Journal of Knowledge and Health* 2014; 9(4):24-31.
- Dominguez I, Zumwalt A.C. Integrating the basic sciences in medical curricula: focus on the basic scientists. *Advances in physiology Education* 2020; 44(2): 119-23.
- Khormizi Z. The view of medical students towards the program of merging special pharmacology and pathology courses. *Research in Medical Science Education*. 2016; 8 (1): 57-64. Persian.
- Giuriato R, Štrkalj G, Meyer AJ, Pather N. Anatomical sciences in chiropractic education: A survey of chiropractic programs in Australia. *Anatomical sciences education*. 2020; 13(1):37-47.
- Hendriks RA, de Jong PG, Admiraal WF, Reinders, ME. Instructional design quality in medical massive open online courses for integration into campus education. *Medical Teacher*. 2020; 42(2): 156-63.
- Farzan B, Anbari K, Rezaian J, Shirkhani S, Gholami MR. The need to implement the horizontal integration plan of basic sciences and the satisfaction of professors and students with the implementation of the plan. *Found scientific research journal*. 2015; 17 (3): 5-14. Persian.
- Wylie A, Holt T. *Health promotion in medical education: from rhetoric to action*; Radcliffe publishing; 2010.
- Siribaddana, P. The future of instructional designing in medical education: letting the computer do the work. *Sri Lanka journal of Bio-medical informatics*. 2010; 1(1):76-85.
- Glaser B. *Discovery of grounded theory: Strategies for qualitative research*. Routledge; 2017.
- Yamani N, Shater Jalali M. Integration in the curriculum with emphasis on medical education. *Iranian Journal of Medical Education. Special Education Development and Health Promotion Letter*. 2011; 11 (9):1202-13. Persian.
- Karimi Moonaghi H, Zhanifard A. Instructional design in medical sciences. Mashhad University of Medical Sciences; 2016. Persian.
- Khader A.A. Obeidat F.N. Shahin N.A. Khouri N.A. Kaddumi E.G. Qa'qa, A. et al. Medical Students' Perceptions of Pathology and a Proposed Curricular Integration with Histology: A Future Vision of Curricular Change. *Int J Morphol*. 2020; 38(1): 57-64. Persian.
- Teymouri Jrukani, Z, Ashurion V, Mozaffarpour S, Cyrus S. Evaluation of Arrangement Changes in Basic Medical Sciences, Isfahan University of Medical Sciences: Students' Perspective. *Iranian Journal of Medical Education*: 2015; 15 (13): 79-88. Persian.