Horizontal integration in basic sciences at Kerman University of Medical Sciences: medical students’ viewpoint

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Abstract

Background: Integrated curriculum is a strategy in educational planning. Recently, this strategy has been introduced to medical universities in Iran. The strategy is running at a different level in some of the universities including Kerman University of Medical Sciences (KUMS). In this study, students’ viewpoints toward the horizontal integration of basic sciences were assessed.

Methods: This cross-sectional study was carried out on 144 fourth- and fifth-year medical students at KUMS. They were selected using the census method. Data was collected using a questionnaire that contained demographic data, 26 questions about different aspects of the horizontal integration program in basic sciences and 2 questions about students’ satisfaction with the program. The range of viewpoint and satisfaction scores were 0 to 104 and 0 to 10, respectively. Data was analyzed by SPSS 19.

Results: The majority of participants 83 (57.6%) were female. The means of their viewpoint and satisfaction scores were 58.44 ± 10.61 and 5.48 ± 2.11, respectively. These scores had no statistically significant difference according to age, gender, entrance year and grade point average (GPA) (P > 0.05). Only students’ satisfaction score had a significant direct correlation with GPA (r = 0.3, P = 0.006).

Conclusion: Although our study revealed a positive viewpoint toward the new educational method, this reaction is the first step of evaluation and the next stages of evaluation must be conducted to determine existing problems.

Introduction

In our country, medical students start their educational curriculum with basic sciences, which often lasts 2.5 years. After passing a basic sciences comprehensive exam, the clinical stage starts in which medical students deal with the diagnosis, care and cure of disease.¹ Until a few years ago, basic science courses were typically taught as independent, discipline-based courses. In this traditional method, students do not get a comprehensive view of the structure and function of the human body and the relationship between them.² The integrated curriculum model was introduced by Beane in 1977 for general education and used in medical education by Harden et al in 1984.³ Harden et al defined integration as “the organization of teaching matter to interrelate or unify subjects frequently taught in separate academic courses or departments. This organization can take place across a seemingly infinite spectrum of time periods or depths both within and among subjects.”⁴ There are two main forms of integrated curriculum in medical education: horizontal and vertical integration. In horizontal integration, courses that are within a subject are integrated with each other. For example, basic sciences courses such as anatomy, physiology and biochemistry are integrated. In vertical integration, courses from basic to advanced levels of training in the medical curriculum can be integrated.⁵ Many researchers have studied the effect of integration in medical education. Some of them found integrated curricula promote retention of knowledge.⁶,⁷ Bradley and Mattick revealed integrated programs promote deep learning, improve satisfaction and motivation and help medical students to have a better view toward clinical applications of basic sciences and comprehensive understanding of basic concepts.⁸ In a mixed methods study, Eisenbarth et al found that “promotion of basic understanding of science concepts, integration of foundational and applied learning

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and maximization of students' engagement and motivation are the values of integrated courses. In our country, about 15 medical schools considered integration for revising their traditional curriculum. Most of them used horizontal integration of basic sciences. In Kerman University of Medical Sciences (KUMS), our general medical curriculum changed in September 2011. Our traditional discipline-based courses in anatomy, physiology, histology and embryology were re-designed as introductory discipline-based courses in anatomy, physiology, histology and embryology. Also, we considered early clinical experience and embryology were re-designed as introductory discipline-based courses in anatomy, physiology, histology and embryology. Also, we considered early clinical experience. In Kerman University of Medical Sciences (KUMS), our general medical curriculum changed in September 2011. Our traditional discipline-based courses in anatomy, physiology, histology and embryology were re-designed as introductory discipline-based courses in anatomy, physiology, histology and embryology. Also, we considered early clinical experience.

Results
In September 2011 and 2012, 180 medical students entered KUMS, and 144 of them participated in our study (participation rate: 80%). The mean of their ages was 20.67 ± 7.03. Most of them (83 or 57.6%) were female. Table 1 shows demographic characteristics of the participating medical students.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male</th>
<th>Female</th>
</tr>
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<tbody>
<tr>
<td>Age, Mean (SD)</td>
<td>20.69 (1.45)</td>
<td>15.32 (1.77)</td>
</tr>
<tr>
<td>Gender, %</td>
<td>83 (57.6)</td>
<td>83 (57.6)</td>
</tr>
<tr>
<td>Grade point average, Mean (SD)</td>
<td>61 (42.4)</td>
<td>61 (42.4)</td>
</tr>
<tr>
<td>Entrance year, %</td>
<td>71 (49.3)</td>
<td>73 (50.7)</td>
</tr>
</tbody>
</table>

Data were analyzed by SPSS version 19 using independent t test, Mann-Whitney U test and correlation tests.
the subjects. Seventy-seven (53.5%) agreed or completely agreed that in this educational system, students were more motivated to learn. Seventy-eight (54.1%) agreed or completely agreed that the integration method provided a better connection between basic and clinical subjects. Seventy-nine (54.9%) agreed or completely agreed that this method reduced the amount of duplicate content. Also, 72 (54.9%) and 66 (54.9%) agreed or completely agreed that this method made students confused and created stress, respectively.

**Discussion**

Our study revealed students’ viewpoints and satisfaction with the horizontal integration of basic science courses was generally positive, and that is consistent with similar studies in our country. Dehghan et al. found medical students at Yazd University of Medical Sciences had a moderate viewpoint toward horizontal integration of basic sciences courses.7 Ejtemaei Mehr et al revealed that medical students’ viewpoints regarding the integrated module of basal ganglia was positive in Tehran University of Medical Sciences.10 Amini et al. found that medical students in Shiraz were more satisfied with horizontal integration after the problems got resolved.3 Teimouri Jervekani et al studied students’ satisfaction with the simultaneous presentation of anatomy and physiology courses in Isfahan. They found the satisfaction score of medical students trained with these courses was significantly higher than students trained in the traditional curriculum.7 Rehman et al showed overall satisfaction with the integrated learning program (ILP) in 78% of students.12 Although there were significant differences in some program dimensions according to gender and entrance year, the overall viewpoint and satisfaction had no difference according to the considered variables. This indicates that perhaps other variables influence students’ satisfaction. In our study, more than half of students agreed or completely agreed that simultaneous presentation of basic sciences courses led to a more profound understanding of the subjects, more motivation to learn, better connection between basic and clinical science subjects and reduced the amount of duplicate content. These results are compatible with similar studies.1,5,12 In the Shiraz study, medical students reported the integration program led to active participation in the class, more motivation and self-confidence.1 Ward revealed that “horizontal integration of the basic sciences in the chiropractic curriculum promote more clinically relevant learning, improved learning outcomes”2.

In our study, more than half of participants reported the new curriculum made them confused and created stress that has been mentioned in the study of Amini et al. as well.1 This may be due to problems in the design and coordination of the program. According to our participants’ viewpoints, they had the least satisfaction with program notification and authorities’ accountability in our system which made our students gone under stress and confused. Therefore, it is essential that our educational system specifically targets these issues in the revision of new educational methods. Brauer and Ferguson considered three points for improving integration: being sure of simultaneous methods. Brauer and Ferguson considered three points for improving integration: being sure of simultaneous presentation of integrated content, avoiding the appearance of less importance for basic sciences and using unified definitions.3

Another challenge of integrated curriculum is the fear of threatening the existence of the individual disciplines, which was pointed out by Achike. He recommends that all those who are involved in designing new educational programs must be well-trained.13 In our country, the revision of general medical education has been delegated to every university. So, we have a different type of new curriculum causing trouble for students. These newly-designed programs, under the title of integration, require serious review, revision and coordination. Therefore, if other new similar curriculum was assessed, we may detect similar findings. It is initially required that each university seriously assess problems related to the new program and determine strengths and weaknesses. Then, at the national level, all programs are evaluated and synchronized as much as possible.

Our study was a cross-sectional study. Another limitation was that data collection was based on the participants’ viewpoint, which may not provide a precise picture of the situation. We did not have any control group to compare

**Table 2. The comparison of participants’ satisfaction scores with different aspects of horizontal integration of basic sciences according to gender and entrance year**

<table>
<thead>
<tr>
<th></th>
<th>Program planning Mean (SD)</th>
<th>Program execution Mean (SD)</th>
<th>Program coordination Mean (SD)</th>
<th>Program coordination Mean (SD)</th>
<th>The exams Mean (SD)</th>
<th>Authorities accountability Mean (SD)</th>
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</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Male</td>
<td>4.45 (2.81)</td>
<td>5.03 (2.70)</td>
<td>4.34 (2.40)</td>
<td>4.13 (3.15)</td>
<td>6.24 (2.66)</td>
<td>4.12 (2.79)</td>
</tr>
<tr>
<td>Female</td>
<td>4.36 (2.94)</td>
<td>4.61 (2.34)</td>
<td>4.16 (2.20)</td>
<td>3.32 (2.79)</td>
<td>5.15 (2.82)</td>
<td>3.52 (2.55)</td>
</tr>
<tr>
<td><strong>Entrance year</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>2011</td>
<td>4.38 (2.92)</td>
<td>5.04 (2.40)</td>
<td>4.58 (2.23)</td>
<td>4.28 (2.94)</td>
<td>6.15 (2.53)</td>
<td>3.98 (2.76)</td>
</tr>
<tr>
<td>2012</td>
<td>4.22 (2.84)</td>
<td>4.55 (2.59)</td>
<td>3.91 (2.30)</td>
<td>3.30 (2.90)</td>
<td>5.09 (2.95)</td>
<td>3.57 (2.56)</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>0.45</td>
<td>0.24</td>
<td>0.08</td>
<td>0.04a</td>
<td>0.02a</td>
<td>0.36</td>
</tr>
</tbody>
</table>

*The value less than 0.05 is statistically significant.*
our results with. We did not consider any confounder. It is recommended for future studies to evaluate the faculties’ point of view about this educational method, especially through qualitative studies. It is useful for our policymakers to recognize the bugs and provide practical solutions to remove them to the extent possible.

**Conclusion**
Our study revealed that medical students, after passing the basic sciences stage, had a virtually positive view toward the new educational method. However, besides relative satisfaction, they felt confused and concerned. Given that the learner reaction is the first level of Kirkpatrick’s four-level education model, it is our duty to review the program in consecutive reviews and try to remove the bugs.

**Ethical approval**
The questionnaires were completed anonymously and voluntarily. The participants were assured that the data would be used only for research purposes. The study, including the questionnaire, was approved by the research review board at KUMS.

**Competing interests**
Authors declare that they have no competing interests.

**Acknowledgments**
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**References**