



A Review of Integrated Courses in Pharmacy Education and Impact of Integration in Pharm D Curricula

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ABSTRACT

Today, due to ever-increasing knowledge and large volumes of information, educational planners of various fields around the world, have been seeking to establish a better and faster refresh for learning. Integration can be a good educational strategy by blending different subjects and contents when presented to students. The aim of this study is to evaluate the medical literature about integration in the curriculum; its process, importance, necessity and different types of it.

This review article was prepared by searching the PubMed database, Google Scholar and science direct websites, national and international journals in the field of medical education curricula. The keywords were educational planning, curriculum integration, and medical education with integration and incorporation.

Integration and its eleven steps can be an important strategy in educational planning. According to various studies, integration can enhance the students' learning and skills in medicinal and pharmaceutical care. It also improves the satisfaction of faculty and students, the quality of education and increases the students' grades at their examinations. Considering the proper planning, cooperation and co-teaching of faculty members, focus on the desired performance of students and correct assessment of the fundamental principles of integration are crucial to this strategy.

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Introduction

Regarding the ever increasing growth in science and a huge bulk of information, educational planners in various majors throughout the world are looking for solutions for a better recording of information and its faster retrieval. To have the sufficient skills in fulfilling the needs, particularly with regard to majors that pertain to the healthcare system, this retrieval should occur faster and proper decisions should be made immediately, so that health would be

preserved in the best way possible. Although they make a great deal of efforts during their education, many students lack an appropriate efficiency. One of the reasons behind this fact is the long duration of education and the short period of time for reviewing the material. This causes the students to lack the required self-confidence and skills for providing service after graduation and at the outset of their careers (1, 2). In addition, if information is offered to the learners in a discrete manner, it will not be helpful to them after some time and it will not solve any of their problems (3).

In traditional educational plans, the skills are instructed in a discrete manner. It is assumed that each student is capable of incorporating these acquired skills and

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achieving the required qualifications. In the modern view, however, the integration process should not only occur in the student's mind, but also certain organizations are allowed for in the educational plan to attain this goal (4).

Integration is accepted as an important strategy in medical education. Integration aims at offering an overall view instead of a part-by-part vista of concepts. Thus, separate topics are incorporated in a more meaningful manner, consequently resulting in increased efficiency of education (5-7). This change has also been made to medical majors and many pharmacy schools make use of it (3).

A review of the history of thoughts and actions with regard to integration reveals that this issue has had a special position throughout the history of curriculum. It has been one of the major concerns of the educational planning theorists and experts (8).

It seems that integrated learning has many advantages, being an effective key factor in offering educational plans. Discussions about integration, however, are polarized with some in favor of and others against it (1).

Given the fact that there is no history of integration in the educational planning for pharmacy in Iran, the present study aims to investigate different literatures about integration in the pharmaceutical curriculum.

Methods

This is a review study conducted by searching the databases, Google Scholar books, PubMed website, Science Direct website, and accredited domestic and foreign journals on educational planning, curriculum integration, and medical education with integration and incorporation as its keywords.

The American Association for Medical Education in 1982 and the Medical Education Association of UK and the World Federation of Medical education in 1993 and 1994 called to minds the need for changes to the medical education system repeatedly and in various events, such as global medical education conferences. The same need has also been recommended in Iran. In the statement of the Third Conference on Medical Education in Isfahan (1998), the necessity of reviewing and changing educational plans was brought up. At present, Shahid Beheshti University and a number of other universities have implemented the project of changing the medical education system (9).

The Edinburgh statement is perhaps the first official, international reaction in relation to modifying medical education.

In Iran, with the establishment of the Ministry of Health and Medical Education in 1985, this ministry was tasked with educating and training human force in the healthcare sector. With this fundamental step, the integration of education and service, one of the major solutions to improve medical education plans, was realized.

In general, integration or incorporation means merging

fields of content or educational topics, which were separately included into the curriculum in traditional educational systems.

Integration in Medical Education

Integration in medical sciences education planning is used in two forms, namely horizontal and vertical:

Vertical Integration

In vertical integration, educational topics, which exist in a curriculum during the course of years, are combined with each other. For example, holding theoretical and practical pharmaceutics courses simultaneously in one semester.

Horizontal Integration

In this type of integration, the material presented at a certain academic level for the related topics of different courses is combined, such as the integration of joint topics in pharmacology and pharmacotherapy, which may be logically integrated thanks to the closeness of concepts and structure. In such cases, professors from different fields work on a certain content collaboratively (11, 12).

In pharmaceutical educational planning, attention should be devoted to horizontal and vertical integration, as well as educational and structural strategies.

Horizontal integration in pharmaceutical educational planning is adopted in courses such as medicinal chemistry, pharmaceutics, and pharmacology, while vertical integration typically refers to integration of basic and clinical sciences.

Harden et al., put forward the integration ladder with 11 steps as an important strategy in medical education. They considered it a useful tool for planning to be adopted by professors in medical majors, capable of achieving educational and evaluative goals. These 11 steps are briefly introduced in figure 1 (1).

Necessity and Importance of Integration

The following advantages are mentioned about integration in some references:

1. Correcting unnecessary repetition of material in educational systems
2. Materials of courses find greater coherence, reducing the dispersion of the material and also increasing the relationships between disciplines (In fact, increased educational solidarity replaces the vague mosaic of a great number of courses.).
3. Student motivation is increased.
4. Learning is deepened and facilitated, leading to better understanding.
5. It causes relationships and collaborations among professors.
6. It causes educational resources to become rational.

In other studies, increased self-confidence, positive

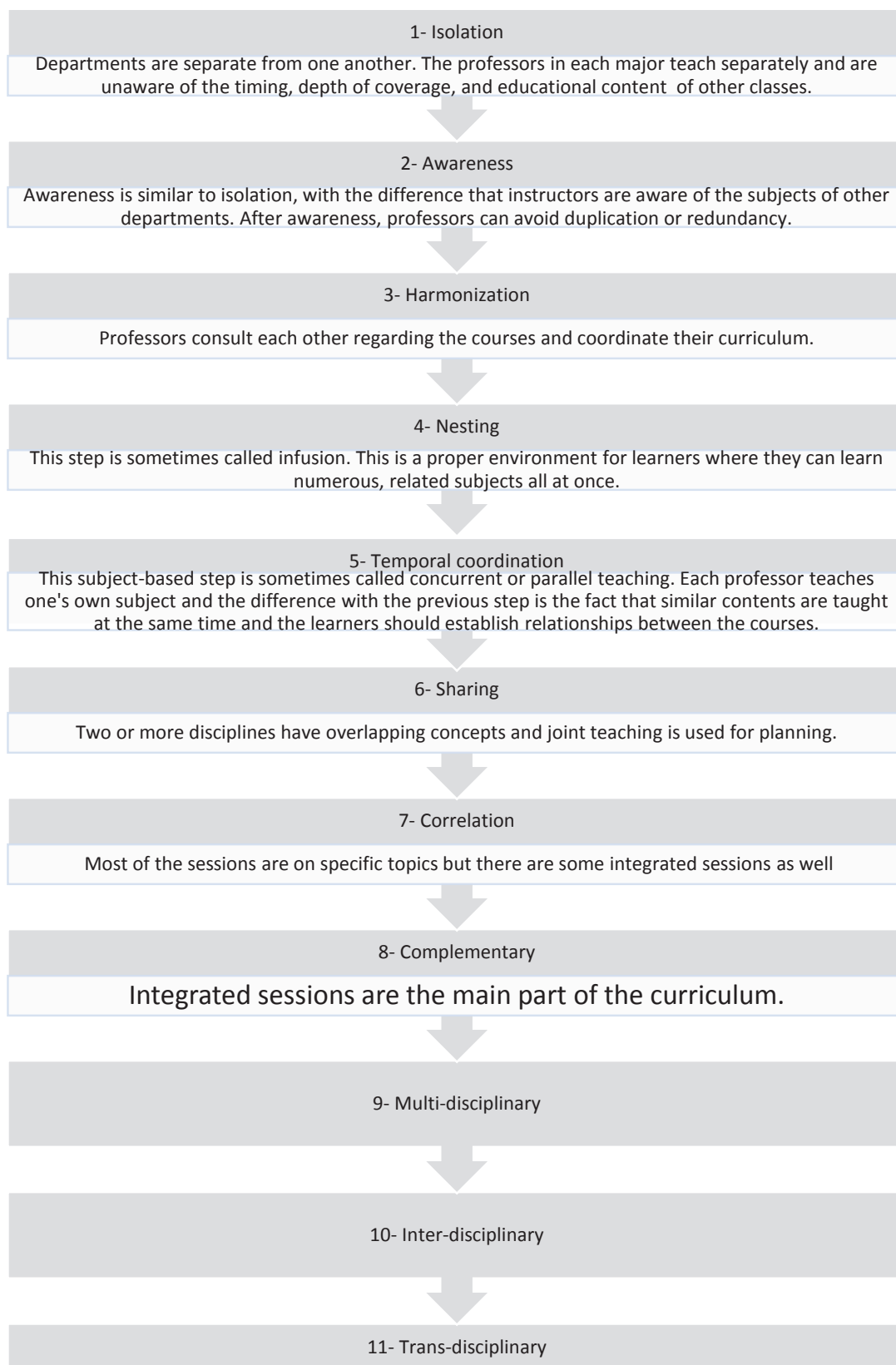


Figure 1. Eleven steps of integration.

outlook, and learning ability are among the results of integration (12).

Implementing integration is, however, hardly accepted by professors and educational planners owing to difficulties in planning, imposing discipline for holding classes with pre-planned subjects, and limited supports regarding the meaningful evidence of this method.

Even though given the previous studies the results of curriculum integration are promising and learners are satisfied by this process knowing integration a factor for better perception of the importance of fundamental sciences, there is little evidence regarding a “substantial improvement” resulting from integration compared with traditional planning. Considering the problems up ahead, the improvements were not so significant and convincing that integration can be applied to planning, leading to fundamental changes (14, 15).

A number of studies indicated that learning efficiency is average at the best case of integration. To identify the ability of medical students, three methods were compared in a study. Traditional curriculum, problem-based curriculum, and integration. The result suggested that students’ performance was similar in integrated and problem-based curriculums and both outperformed traditional curriculum. However, there was little difference among them (16).

Discussion and Conclusion

The present era is the information explosion era. In many cases, the information offered to the learner will not be useful for him. Hence, if information is presented to the learners in a discrete manner, the people’s problems will not be solved (17). On the other hand, when related courses are offered in an integrated manner, students’ creativity and new outlooks are developed because a single subject is investigated from different aspects in a short period of time. This integration occurs once in the curriculum and once the students’ mind (2). The raising of numerous questions and the development of a new outlook makes ready the future pharmacist for encountering complex circumstances. The reason lies in the fact that the pharmacist faces complicated cases in the real world not that he has not experienced before. Thus, he should evaluate the conditions and make the proper decision. To this end, having dispersed information is no great help to the pharmacist.

The research conducted by Robert Kerr demonstrated that integration in the pharmaceutical curriculum can increase information learning and students’ skills in using medicinal sciences, clinical sciences, therapeutic skills and dealing with complex problems of medicinal care. By adopting correct principles of curriculum planning and with the cooperation of faculty members (professors), focusing on students’ desired performance and their evaluation will be successful. Although this

approach creates opportunities for effective learning and collaboration among professors, its design and implementation are difficult (18).

In 1998, three courses, namely medicinal chemistry, pathophysiological pharmacology, and pharmacotherapy were integrated in the School of Pharmacy of Oklahoma University considering human organ systems. The result of this integration was the satisfaction of professors and students and no adverse effect on students’ performance was observed. Meanwhile, the time required for lectures and classes reduced by 14%, which is useful given the huge bulk of material to be covered (19).

The study carried out by Gruen, which reflects the results of two 5-year simultaneous studies conducted by healthcare-educational centers in University of Munich, Germany and University of California, USA, showed that teaching fundamental and clinical sciences to junior medical students using integration increases teaching quality as well as the GPAs of the graduates of medical majors (13).

In the University of British Columbia, horizontal integration was performed using 2 main mechanisms. Case bases were explicitly included for integrating the concepts and the courses were regularly linked taking into account the curriculum and the students’ needs. So far as possible, related material was taught during consecutive hours in a class according to planning and as a necessity. The integration efforts in the University of British Columbia were made with respect to the courses of pharmacy, pharmacy internship, medicinal chemistry, pathophysiology, clinical pharmacy, pharmaceuticals, pharmacotherapy, OTC therapy, and pharmacology in order to maintain the logical sequence of material and goals. Integration was introduced to be a useful tool for medical professors (1).

A study conducted in 2000 aiming at integrating the pharmaceutical curriculum concluded that the integration of the pharmaceutical curriculum in different medicinal and clinical fields improves students’ performance. The various disciplines of a school should collaborate so that the students would be able to concentrate on the curriculum and recall information in a better fashion (18).

There are also other studies on integration regarding disciplines other than pharmacy, supporting the effectiveness of this method in learning and students’ increased GPAs. For instance, in a quasi-experimental study carried out in the Center for Management and Healthcare Economy Research of Isfahan University of Medical sciences in Iran, it was concluded that the average of the students’ grades was significantly higher in the integrated teaching group (20). In another study, anatomy was taught in an integrated manner to externship students of orthopedics in the Medical School of Isfahan University of Medical Sciences in Iran. The purpose of this study was to remind students of necessary material of

anatomy regarding prevalent cases in orthopedics and the application of anatomical content. It was demonstrated that the integrated approach can result in acquisition of positive experiences as well as more profound and more facilitated learning for the externs (21).

In 2012, a study was conducted by Abbasi et al., on the horizontal integration process of the courses in Yazd University of Medical Sciences in Iran. In this study, medical students' awareness of the integration plan for the courses of anatomical sciences, the facilities for the integration plan process, the sequence of the offering of courses, and the quality of the integration plan were investigated. The results suggested that the majority of respondents agreed to the process of the horizontal integration plan of the fundamental science courses of the medical disciplines and that the process improves education (22). In 2012, a research work was carried out in the form of a review paper in the Medical School of Tonekabon Islamic Azad University. The researchers concluded that integration is an important strategy and a complex concept in medical education. They found out that the integration of fundamental and clinical sciences according to human organ systems increases students' learning (11). In 2011, a study on teaching nursing students, especially teaching anatomy in surgical wards, produced excellent results compared to the students who had not passed the anatomy course in surgical wards (The results involved considerable statistical difference) (17). The study performed by Nasiri-Asl on the medical students' outlook on the integration of pharmacology at the physiopathology level showed that the students were satisfied by the process (5). There were also studies on student satisfaction from the integration of courses the results of which agree with those of the present study (5, 9, 20, 22). In 2013, horizontal integration was performed in the physiopathology program using a simple model in a study conducted in Zanjan University of Medical Sciences in order to evaluate and compare students' educational status before and after a change in the curriculum from the term-based system to the course-based system. The results indicated that this change in the curriculum of the physiopathology program can relatively improve students' educational performance, professors' and students' satisfaction, affecting the educational process desirably (9).

In another study, anatomy was taught in an integrated manner to externship students of orthopedics in the Medical School of Isfahan University of Medical Sciences in Iran. The purpose of this study was to remind students of necessary material of anatomy regarding prevalent cases in orthopedics and the application of anatomical content. It was demonstrated that the integrated approach can result in acquisition of positive experiences as well as more profound and more facilitated learning for the externs (21).

Investigating the results of this study supports those of many other studies obtained in over 300 schools throughout the world (4, 6, 7).

More recently two other studies have been published in the area of integration in Pharm D., curriculum. At the school of pharmacy in Bradenton, Florida, USA, medicinal chemistry, pharmacology and therapeutics courses were integrated for 16(students. The web-based survey showed that this course integration had an effective impact on their learning (23).

In 2010, the college of pharmacy at the University of Michigan, USA, changed the curriculum and integrated pharmacology and medicinal chemistry courses. Most of the students and teachers believed that this change had a positive influence on their learning (24).

In the end, it should be noted that integrated education aims at better learning and recalling information and accessing usable information in the students' mind. Given the huge bulk of today's information, this does not occur automatically. Therefore, to achieve more complete results and find solutions, it is recommended that the researchers conduct more investigations. The present paper put forward a definition of integration and integrated courses in medical and pharmaceutical world universities. Considering the fact that no study was carried out before on integrated pharmaceutical curriculum planning in Iran, this research will hopefully pave the way for future studies for improving the present circumstances in this area.

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