

METHODOLOGIES AND MODELS FOR INTEGRATION OF MEDICAL CURRICULUM FOR EFFECTIVE TEACHING AND LEARNING: A THEORETICAL REVIEW

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ABSTRACT

INTRODUCTION

There is a famous saying that, 'Knowledge that is learnt in isolation is rapidly forgotten'. The dictionary meaning of integration is "to make entire". Integration is defined as the organization of teaching matter to interrelate or unify the subjects which are frequently taught in separate academic courses or departments. Integrated curriculum seeks to break down the barriers between the subject areas i.e. basic and clinical sciences, in order to promote acquisition, retention, and progressive development of knowledge and skills, and facilitate applications of principles and concepts to understand problems and develop new solutions. To learn is to connect thoughts and ideas. If there is no connection, there is no learning. Integration views learning and teaching in a holistic way and reflects the real world, which is interactive. Disconnection breeds apathy while integration thrives on connections. An integrated curriculum helps raising students who will be able to apply their knowledge to their work and personal development. Integrating curriculum is a complex process. It can occur at different rates and some subjects are integrated more easily than others. This article reviews and discusses the comparison and commonalities of two most prominent methodologies/models of integration by Robin Fogarty and Ronald Harden.

KEYWORDS

Integration, Medical curriculum, Teaching and learning.

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INTRODUCTION

Because human beings are complex organisms whose discrete systems are linked intricately and elaborately within the body and modified profoundly by external influences, we need to teach in ways that reflect this complexity and that stimulate students to synthesize information across disciplines.^{1,2} In this regard, the integrated curriculum is a well-recognized approach in medical education curriculum.³⁻⁹ Shoemaker *et al* defined an integrated curriculum as education that is organized in such a way that it cuts across subject-matter lines, bringing together various aspects of the curriculum into meaningful association to focus upon broad areas of study. It views learning and teaching in a holistic way and reflects the real world, which is interactive.¹⁰ Harden defines integration as the organization of teaching matter to interrelate or unify subjects frequently taught in separate academic courses or departments.¹¹

Curriculum integration bridges the gaps between theory and practice, and hospital based medicine and community medicine. Integration is of three types based on time frame and clinical disciplines in the curriculum.^{3,6,12-14}

Horizontal integration is defined as integration across disciplines but within a finite time period. The integration is said to be horizontal, when there is integration, between the basic sciences or between the clinical disciplines.¹⁵⁻¹⁷

Vertical integration is achieved by integrating clinical sciences and clinical education in the basic sciences and vice versa.¹⁵⁻¹⁷

Spiral integration combines both horizontal and vertical integration across time and disciplines. In this, there is a better reinforcement of topics through a natural progression from simple to complex using a curriculum that breaks down the barriers and boundaries between the courses and the departments.¹⁸

METHODOLOGIES OF INTEGRATION OF MEDICAL CURRICULUM

The two most prominent common continuums of methodologies/models for integration discussed over the past few decades were the ten ways to integrate curriculum described by Robin Fogarty,¹⁶ and the integration ladder introduced by Ronald Harden.¹¹

FOGARTY METHODOLOGIES OF INTEGRATION

Fogarty described **ten ways or models to integrate curriculum**, ranging from the fragmented model to the networked model (Figure 1). Fogarty's work has influenced curriculum integration of various fields including medical education. Beginning with an exploration **within single disciplines** (the fragmented, connected, and nested models), and continuing with models that integrate **across several**

disciplines (the sequenced, shared, webbed, threaded, and integrated models), the continuum ends with models that operate **within** learners themselves (the immersed model) and finally **across** networks of learners (the networked model).¹⁹

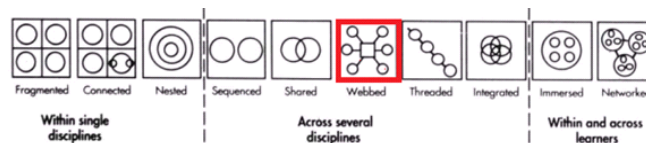


Figure 1. Ten ways of integrating curriculum¹⁹

I. WITHIN SINGLE DISCIPLINES

1. The fragmented model: It is a traditional curriculum design which fragments topics and courses into separate and distinct disciplines (or subjects). Students will have a clear and discrete view of subjects or disciplines.¹⁹

2. The connected model: Within each subject, course content is connected topic to topic, concept to concept, leading to the review, reconceptualization and assimilation of ideas.¹⁹

3. The nested model: Within each subject area, this integration targets multiple skills: a social skill, a thinking skill, and a concept-specific skill, leading to enriched and enhanced learning.¹⁹

II. ACROSS SEVERAL DISCIPLINES

1. The sequenced model: Topics or units of study are rearranged and sequenced to coincide with one another. Similar ideas or similar units are taught in concert, although the subjects are separate, which facilitates transfer of learning across content areas.¹⁹

2. The shared model: The shared model of integration brings two distinct disciplines or subjects together into a single focus. Shared planning and/or teaching involves two disciplines focuses on shared concepts,¹⁹ skills, and attitudes using overlapping concepts or ideas.

3. The webbed model: The webbed model of integration uses thematic teaching using a theme as a base to integrate subject matter. A fertile theme is webbed to curriculum contents and disciplines. Theme must be carefully and thoughtfully selected to be meaningful with the relevant and rigorous content. It will be motivating¹⁹ for students, helps students see connections between ideas.

4. The threaded model: This model of curriculum integration threads various concepts and skills (thinking skills, social skills, multiple intelligences, and study skills) throughout all disciplines, taking learning to a synthesis level.^{19,20}

4. The integrated model: This integrated model integrates or blends the disciplines by finding the overlapping skills,

concepts, and attitudes found across the disciplines. This encourages to see interconnectedness and interrelationships among disciplines (interdisciplinary approach), and students are motivated as they see these connections.^{13,15,21}

III. WITHIN AND ACROSS THE LEARNERS

1. The immersed model: In this model, learner integrates by viewing all learning through the perspective of one area of interest. The disciplines become part of the learner's lens of expertise; the learner filters all content through this lens and become immersed in his/her own experience. Integration takes place within the learner, with little or no intervention.¹⁹

2. The networked model: In this model, learners themselves knowing the intricacies and dimensions of their field, direct the integration process through selection of a network of experts and resources both within and across their subject areas and thus it is totally student-centered. In other words, learner filters all learning through expert's eye and makes internal connections that lead to external networks of experts in related fields.^{19,20}

HARDEN'S INTEGRATION LADDER

Harden suggested eleven sequential steps as a ladder for development of integrated curriculum, with discipline based teaching (Isolation) at the bottom of the ladder and full integration (Trans-disciplinary teaching) at the top. Harden makes clear the progressive nature of integration from one step to the next; steps 1 and 2 nonintegration, steps 3 to 5 early integration efforts, steps 6 to 8 cooperative integration, steps 9 and 10 collaborative integration and step 11 is trans-disciplinary is learner-centred (Figure 2). Harden's integration ladder is a useful tool for the medical teacher and can be used as an aid in planning, implementing and evaluating the medical curriculum.¹¹

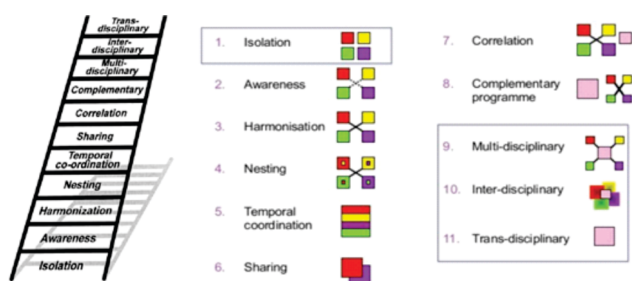


Figure 2. Eleven steps of Harden's integration ladder⁹

Step 1 is isolation: This isolation model was termed **fragmented model** by Fogarty.¹⁹ The curriculum is fragmented and each subject / department/ faculty organizes and design teaching of their discipline without considering other subjects or disciplines. Students attend a lecture on anatomy, and then move on to a lecture in physiology with neither lecturer being aware of what was covered in other lecture. This isolation approach may be found in the traditional medical

curriculum with blocks of time allocated to the individual disciplines. The advantage is departments/ subjects are restricted to their boundaries so the content is kept clear and intact. The disadvantage is each subject is seen as an entity in itself. No attention is given to other related subjects in the curriculum. The related topics from two subjects are not correlated.¹¹

Step 2 is awareness: Teachers of one subject are aware of what is covered elsewhere, avoiding unnecessary duplication and cross-referring, but no attempt is made to help students look at a subject in an integrated manner.¹⁹

Step 3 is harmonization/consultation: The disciplines or subjects remain separate as with isolation, but the teacher may make the explicit connection within the subject areas to other subjects and adapt their content accordingly. This process of consultation or harmonization may be under the responsibility of Head of Department/ Chair of the subject. This will encourage teachers to plan their teaching material in such a way that the overall curriculum objectives are achieved.¹¹ This harmonization approach was known as the **connected model** by Fogarty.¹⁹

Step 4 is nesting/infusion: It is same as nested model by Fogarty.¹⁹ The teacher targets, within a subject-based course, few objectives (content or skills) relating to other subjects. The content drawn from different subjects are used to enrich the teaching of a particular subject. The term **infusion** is applied to this stage of integration but the teaching remains subject-based under the control of subject or department.¹¹

Step 5 is temporal coordination/ parallel teaching: The related topics within a subject are taught separately but are sequenced/arranged/scheduled at same time in consultation with other subjects. In other words, the time table is adjusted in such a way so that topics within the subjects or disciplines which are related are scheduled at the same time. Therefore, a parallel teaching is initiated. Thus the similar topics are taught on the same day or week but the teaching remains subject-based and retain their fragmented nature.¹¹ This temporal coordination approach was termed as the sequenced model by Fogarty.¹⁹

Step 6 is sharing/joint teaching: Two or more separate disciplines may agree to plan and jointly implement a teaching program using overlapping concepts or ideas as organizing elements.¹¹ This sharing/joint teaching was known as the shared model by Fogarty.

Step 7 is correlation: Integrated teaching sessions may be introduced within the subject-based teaching, which bring together areas of common interest in each subject.¹¹

Step 8 is complementary programing: This curricular approach has both subject-based and integrated teaching, often related to a theme or topic to which several disciplines can contribute. The basic difference with the correlation is that the percentage of integrated sessions are introduced.¹¹

Step 9 is multi-disciplinary: This multi-disciplinary approach brings together a number of subject areas in a single course with themes, problems, topics, or issues as the focus of teaching. The subjects or disciplines still preserve their identity and demonstrate how they contribute to the understanding of the theme or problem.¹¹ This model was termed **webbed** by Fogarty.¹⁹

Step 10 is inter-disciplinary: This inter-disciplinary approach was termed as integrated model by Fogarty.¹⁹ The subject or discipline boundaries become blurred, overlap and merge, due to further development of the commonalities across disciplines, and there may be no reference to individual subjects or disciplines in the teaching schedule. Inter-disciplinary integrated teaching implies a higher level of integration, with the content of all or most subjects combined in a new course and presented in the curriculum.^{11,21}

Step 11 is trans-disciplinary: Top integration Step 11 is trans-disciplinary and it is learner centered, and focuses on how to solve real life problems. There are no subjects or discipline. There is only one subject for education, and that is Life in all its manifestations. The teacher provides a structure or framework of learning opportunities, and the integration takes place in the mind of the students, based on situations of the real world of clinical care.¹¹ This trans-disciplinary approach was termed **Immersed model** by Fogarty.¹⁹

CONCLUSION

Integration in medical education is the need of the hour. Integration of curriculum is a complex process. The threaded model and networked models of integration of Robin Fogarty are not correlating with any of the steps of Harden's integration ladder. The two most prominent methodologies of integration i.e., the ten ways to integrate curriculum described by Robin Fogarty, and the integration ladder introduced by Ronald Harden can function as useful prototypes and teachers should go on invent their own designs for integrating the curriculum.

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