

Integrated Learning in Medical Education: Are Our Students Ready?

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Integration in medical education means breaking the barriers between individual disciplines. As stated by Bradley and Mattick [1], “integrated curriculum aims to provide students with better learning opportunities that will facilitate the development of knowledge that is relevant and meaningful to clinical practice, is deep and retrievable and which is amenable to alteration, updating and development as a part of an ongoing process of lifelong learning.” The expected outcomes of an integrated medical curriculum are undoubtedly admirable but are we overly optimistic?

We are not voting for or against it, rather, in agreement with the medical education fraternity. Integration is essential to avoid the information overload that is associated with the traditional curriculum where information was delivered as a series of disciplinary blocks that is more focused on detail with little emphasis on the links between subjects and its clinical relevance. “Integration seeks to deal more with principles and concepts that can be used to explore and understand problems and develop new solutions” [1].

From the time Flexner’s report of 1910 on medical education [2] was published, medical school curricula around the world underwent a major evolution. Most medical schools adopted the “2+2” curriculum in which the first 2 years of early foundational basic science education are separate from two later years of clinical training [3, 4]. This curriculum format however is viewed as an inadequate system to prepare

future physicians for twenty-first century medicine [5, 6]. A number of commentaries, curriculum maps, and guidelines centered on integration have since been published. However, recent major education reports [7, 8] continue to outline integration as a strategic priority for medical education suggesting that integration is a problem yet to be solved.

Although the innovations and attempts to integrate basic sciences and clinical knowledge by the medical schools are significant and commendable, most are made at the level of programs, courses, and teaching sessions. We feel that the “learners” are sidelined in the process. Integration of the multiple domains of knowledge should depend on the cognitive activity that occurs within the learner. Simply creating an integrated curriculum will not mechanically lead to cognitive integration.

A number of possible reasons could be implicated for unsatisfactory outcomes of integration in medical schools. First, the institutions seem to expect that making logistical changes will lead to active integration of basic sciences and clinical knowledge. Creating an integrated curriculum and delivering it in a coordinated manner do not automatically establish integration. Integrated sessions should ideally be given by teachers from one scientific realm (foundational or applied/clinical) with academic knowledge of the other or collaboratively by teachers from both realms. Trans-disciplinary cooperation among educators must be emphasized by the management or the schools should utilize staff with academic knowledge of both (basic and clinical) realms to deliver the integrated curriculum. Second, it is innovation(s) in curriculum that are loosely referred as integrated curriculum. Examples include introduction of medical ethics and law into the first-year courses and integrating clinical exposure from the commencement phase of medical education. Third, there is a constant pressure to increase applied knowledge from the early years of the medical school. This has dramatically decreased the number of hours spent on theoretical/foundational

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learning. It may result in students undervaluing the relevance of basic science in clinical problem solving resulting in weak foundational knowledge in the clinical years. Further, integrated curricula mostly follow a system-based approach where individual disciplines related to a particular block are delivered concurrently. However, certain topics have relevance across different systems. What would be the most suitable point for the introduction of such areas for example, physiology and pharmacology of autonomic nervous system, antibiotics, etc.?

Evidently, integrating knowledge from the multifaceted medical curriculum necessary for the practice of medicine is an enduring challenge for medical students. It requires a certain level of cognitive maturity to understand, harmonize, and apply the knowledge in a meaningful way. It beats the purpose of having an integrated curriculum if it does not happen at the cognitive level of the learners.

Ideally, integration should commence after a period of initial instruction in some basic and general concepts, especially in the basic sciences. For some students, these maybe unknown territories considering that some medical schools do not require related subjects, e.g., biology as an entry requirement. Expecting the students to integrate the information in the face of inadequate knowledge of basic concepts may lead to anxiety and mistrust in the system. Although activities such as PBL and shared teaching models may create proximity between knowledge domains and foster awareness in students, whether these logistical changes lead to active integration of basic sciences and clinical knowledge in the students at the cognitive level is unclear.

Another modality which is emphasized in integrated curricula is “self-directed learning” (SDL) from the early years with the objective of producing independent lifelong learners. SDL is defined by Knowles [9] as a process in which, individuals take initiative in identifying their own learning needs, formulating goals, identifying human and material resources for learning, finding appropriate learning resources, choosing and implementing suitable learning strategies, and evaluating learning outcomes. In practice, we are assuming that students already possess the needed attributes of maturity, self-direction, responsibility, and individuality for independent learning on entry to medical schools. It is also hard to determine learner’s characteristics that are most suitable for SDL. Whether the learners are able to utilize these dedicated SDL sessions for attaining an integrated understanding of an area of study in the absence of specific guidance is neither clear nor easy to assess. Knowles and others implied that SDL is ideal for mature learners who already have a reservoir of knowledge and can apply their learning in relevance to their practices and past experiences [9, 10, 11]. Accordingly, graduate entry (GE) students have been reported to be more mature, motivated, and self-directed than non-graduate entry (school leavers) medical students [12]. In the recent years, a number of studies that

compared the academic performance and attitudes to professionalism between GE and non-GE students have been published [13–16]. GE medical students were noted to perform better during the early years of the medical course while that advantage was not observed during clinical training in the later years of the program [15, 16]. The reasons behind the loss of early academic advantage during the later years of clinical training among GE medical students need further elucidation. Further research is also required to explore whether this is a consistent observation across the schools and countries. It is plausible that even the mature learners find it a challenge to integrate basic health sciences knowledge with the clinical information while in the later years of the medical program. Needless to say, development of a valid and reliable tool to assess integration has continued to be a challenge despite continuous efforts. Recent propositions include the use of sequential questions and answers (SQA) test [17] and viva format [18] for assessment of knowledge integration. Collaborative consultations with medical educationists from various institutions and possibly including students in the process of developing an integration assessment tool should be explored.

In our opinion, “directed self-learning” (DSL)—wherein the students are given a set of integrated learning objectives and some guidance on the process—would be more fruitful especially in the early years. Identification of learning needs is an essential component of the learning process, and learners often need an expert to introduce them to the basic components of the process. Although most medical schools provide a set of learning objectives for all the teaching and learning activities, students may experience frustration and dissatisfaction if there is a discrepancy between their existing and expected levels of competency. Students at entry level, particularly the non-graduate entry, may not be equipped with the necessary skills required for effective SDL and knowledge integration. Beckert et al. [19] demonstrated that learning activities based on student’s needs and self-drive are more likely to be successful than activities dictated by extrinsic, albeit institutional, sources. For the beginners, individual guidance in self-assessment and awareness of their learning needs and styles, development of learning goals, and some assistance with appropriate learning approaches and knowledge integration strategies may set a good foundation and climate for independent and deep learning to take place. Such support in their initial year will help them to appreciate the relevance of their learning for now and their future besides overcoming the anxieties arising from a feeling of being lost in a jungle of information.

Conclusion

The medical schools and the councils seem to have ever increasing demands for the medical graduates to develop a knowledge and skill base beyond traditional medical school

content. This places an enormous pressure on the current students and future clinicians. Students at entry level may not be equipped with the necessary skills required for effective SDL and knowledge integration. A guided approach in the first year of medical school might help them develop into successful independent learners. Schools and educators should adopt strategies involving students to narrow the gap between reality and aspirational level of competency. Viewing integration from the learner-centered, cognitive perspective can positively contribute to satisfactory outcomes and effective training of clinicians.

Conflict of Interest The authors declare that they have no competing interests.

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