

## Lessons learned about integrating a medical school curriculum: perceptions of students, faculty and curriculum leaders

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**OBJECTIVE** Recent educational reform in US medical schools has created integrated curricular structures. This study investigated how stakeholders in a newly integrated curriculum – students, course directors and curriculum leaders – define integration and perceive its successes and challenges during its first year.

**METHODS** We conducted interviews with curriculum reform leaders, course directors and first year medical students. Interview transcripts were analysed for themes, which were compared within and across stakeholder groups.

**RESULTS** Three curriculum leaders, four Year 1 course directors and six Year 1 medical students were interviewed. Fifteen students participated in a group interview. Four major themes emerged: interdisciplinary teaching; interdisciplinary faculty collaboration; building curricular links, and sequencing and framing curricular content. Cross-group analysis revealed participant agreement that an integrated curriculum required interdisciplinary teaching, clinical application and careful oversight. Differences among groups were also identified. Faculty (course

directors and curriculum leaders) discussed faculty collaboration and the challenges of faculty buy-in and course implementation. Students highlighted the impact of integration on their learning and the challenges of sequencing and scaffolding content. Both students and course directors focused on course monitoring and conceptual links for student learning.

**CONCLUSIONS** Integrating a curriculum is a complex process. It is differentially understood and experienced by students and faculty, and can refer to instructional method, content, faculty work or synthesis of knowledge in the minds of learners. It can occur at different rates and some subjects are integrated more easily than others. We point to some specific considerations as medical schools embark on curriculum reform.

**KEYWORDS** \*education, medical, undergraduate; \*schools, medical; \*curriculum; teaching; interprofessional relations; faculty; United States.

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### INTRODUCTION

During the past decade, integrated curricula have become the norm in North American medical schools.<sup>1,2</sup> Although there is no one definition for curricular integration,<sup>3</sup> it typically refers to interdisciplinary block courses in pre-clerkship years that bring together basic, clinical and social sciences into one course, or weave longitudinal curricular themes across the curriculum (e.g. ethics).<sup>4–8</sup> Integrated curricula have been widely adopted, fuelled by dissatisfaction with the way basic sciences have been taught as individual disciplines with no clinical application and by growing recognition that

## Overview

### What is already known on this subject

Integration is a central theme of medical school reform, but little is known about how different stakeholders perceive this curricular change.

### What this study adds

Curriculum leaders, course directors and students shared their perceptions of integration. All parties identified interdisciplinary teaching. Course directors and curriculum leaders described interdisciplinary faculty collaboration. Course directors and students spoke about curricular links. Students identified the need for curricular sequencing and frameworks.

### Suggestions for further research

Research is needed to understand the generalisability of these results and to track stakeholder perceptions as a new curriculum matures.

traditional instructional modes no longer meet current demands for interdisciplinary inquiry and practice in medicine.<sup>7,8</sup> At the same time, cognitive theories of learning suggest that an integrated approach to education may have important benefits for learning and retention because it facilitates contextual and applied learning, and can promote development of the well organised knowledge structures that underlie effective clinical reasoning.<sup>9–12</sup>

The medical education literature contains numerous stories of curriculum change.<sup>3,13–17</sup> A few studies also report programme outcomes: students trained within an integrated curriculum made more accurate diagnoses than did students trained in a conventional curriculum;<sup>18</sup> vertical integration between basic sciences and clinical medicine in problem-based learning curricula stimulated better understanding of biomedical principles than did conventional curricula,<sup>19</sup> and a high degree of horizontal integration occurred in the early years, but more input from clinicians was needed throughout the curriculum to achieve vertical integration.<sup>20</sup> Conceptual approaches to integration have also been proposed. Harden<sup>21</sup> argues that curricular integration can be viewed as a ladder, with discipline-based teaching ('isolation') at the bottom

of the ladder and full integration ('trans-disciplinary teaching') at the top.

Although interest in integrated curricula is growing, little attention has been paid to the perceptions of different stakeholder groups – the leaders of education reform, the students directly affected by curriculum change, and the directors of newly integrated courses – especially during the transition from a traditional to an integrated model.<sup>4,8</sup> The aim of this study was to explore the meaning of integration to students, faculty members and curriculum reform leaders and to compare and contrast the perceptions of students and faculty of the successes and challenges of curriculum integration during the first year of reform.

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## METHODS

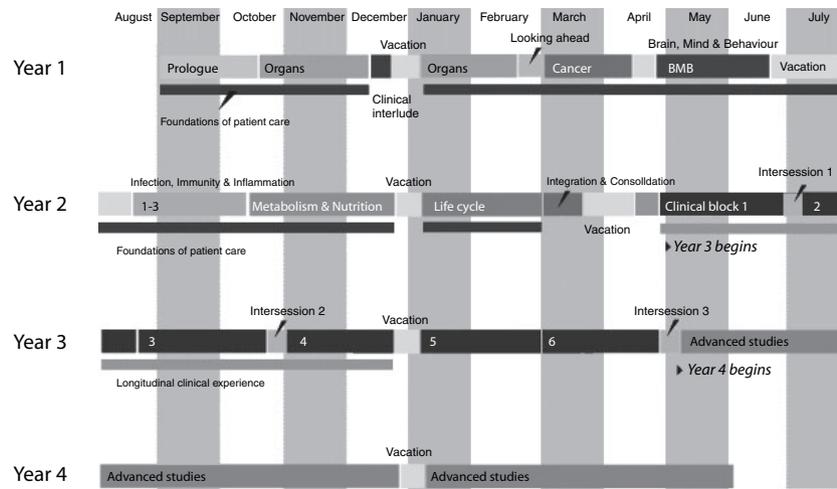
### Setting and study participants

A major curricular transformation was launched at the University of California San Francisco (UCSF) School of Medicine with the incoming class in 2001.<sup>13</sup> The traditional lecture-based, departmentally segmented pre-clerkship curriculum was redesigned to emphasise interdisciplinary approaches to teaching, small-group and case-based learning, and the application of basic science to patient care. The new model included: eight interdisciplinary blocks in the first 18 months of medical school that were planned, administered and taught by faculty from basic sciences, social and behavioural sciences and clinical academic departments; a clinical core year, comprised of core clerkships, intersessions and longitudinal clinical experiences, and an advanced studies year, including sub-internships and electives in areas of concentration (Fig. 1).

Using a purposive sampling strategy,<sup>22</sup> we identified study participants in the following groups: faculty leaders who were drivers of educational reform; directors of new Year 1 courses, and Year 1 students who were taking an active role in curricular change activities.

### Design and data collection

To best explore participants' perceptions and interpretations of their experience, we selected a qualitative research design using semi-structured interviews.<sup>23</sup> Having gained approval from the institutional review board, we conducted this research



**Figure 1** The integrated curriculum

over a 6-month period at the end of the first year and the beginning of the second year of the new curriculum. Two of the authors (JM and SJ), conducted individual semi-structured interviews (Appendix 1). To triangulate methods,<sup>24</sup> we also conducted one group interview of Year 1 medical students. We stopped interviewing at the point of data saturation, when interviews yielded no new information about themes.<sup>25,26</sup> The interviews, which lasted 30–60 minutes, were audiotaped and transcribed.

### Data analysis

Data analysis was carried out in five stages. Following grounded theory methodology,<sup>26</sup> two authors (JM and SJ) initially read the interview transcripts and devised a coding framework based on emerging themes. After coding transcripts individually, they met to conduct between-coder comparisons until they agreed on the meaning and application of the codes. The process was conducted again with all four authors, who individually coded samples of the interviews before meeting to assess inter-rater reliability. After extensive discussion, they too reached agreement about the definition of coding categories and themes and their application to the data under consideration. Using constant comparison to ensure consistent coding, the primary authors then analysed the remaining interviews. Once the data were organised using NVivo,<sup>27</sup> a qualitative data analysis software program, the researchers analysed the thematic categories within and across stakeholder groups. A theme was attributed to a stakeholder group if most or all members of that group made comments relating to that theme.

## RESULTS

Individual interviews were conducted with three members of the educational leadership team (vice-dean for education, associate dean for curricular affairs and chair of the curriculum committee), four Year 1 course directors and six Year 1 medical students. In addition, 15 students participated in the group interview. Four major themes emerged in participants' discussions of what an integrated curriculum meant to them and how they perceived the successes and challenges of the new curricular model:

- 1 interdisciplinary teaching;
- 2 interdisciplinary faculty collaboration;
- 3 building curricular links, and
- 4 sequencing and framing curriculum content (Table 1).

Analysis across the three stakeholder groups revealed both commonalities and differences, which are discussed below for each theme. Illustrative quotes have been edited slightly for ease of reading.

### Interdisciplinary teaching

All stakeholder groups characterised an integrated curriculum as the interweaving of disciplines to teach a subject from multiple perspectives. An example of successful interdisciplinary teaching was instruction related to the cardiovascular system. In one course, students learned about the physiology of blood circulation, the anatomy of the heart, the cardiac examination, medications, behavioural change to prevent cardiac disease and health care

Table 1 Themes identified by different stakeholder groups

Themes	Stakeholders		
	Students	Course directors	Curriculum leaders
Interdisciplinary teaching	X*	X	X
Interdisciplinary collaboration		X	X
Building curricular links	X	X	
Curricular sequencing and frameworks	X		

\* 'X' in a cell signifies that the theme emerged in that stakeholder group; a blank cell denotes that the theme did not emerge in that group

disparities. The clinical contextualisation of basic science provided another example of effective interdisciplinary teaching. A curriculum leader noted:

'I think the most obvious way that people have performed a uniformly good job is integrating basic science with clinical science and really creating interplay between these two disciplines.'

Students found that the clinical cases and interactions with actual patients helped them synthesise and retain basic science knowledge. They particularly liked the dramatic presentation of one case at the beginning of Year 1, which became an anchor for multidisciplinary instruction throughout the year. According to one student:

'[Integration] makes learning more enjoyable, more meaningful, and it makes much better clinicians. We are learning about the neurobiological aspects of substance abuse and addiction. Tomorrow we are going to have a psychiatrist lecture. Today we interviewed a patient with an addiction. When we see people, it all comes together.'

At the same time, members of all stakeholder groups pointed out how interdisciplinary approaches had not worked well with certain subjects and teaching modalities. Several students commented that histology and anatomy had not been taught in an integrated fashion, and both students and faculty observed that the social and behavioural sciences were not well integrated into the rest of the curriculum. In addition, all participants found that many lectures remained discipline-specific, making them the least integrated of all teaching methods.

### Interdisciplinary faculty collaboration

To course directors and curriculum leaders, but not students, integration also referred to the interdisciplinary faculty teams created to plan, administer and teach the new block courses. When asked what integration meant to her, a course director replied:

'The first thing that comes to mind is sitting around the table with members of different departments and different disciplines... and recognising that this was such a different mix than in the old curriculum, where the faces around the table were largely from one or two disciplines.'

At the same time, faculty recognised that the traditional 'siloed' disciplinary perspectives of academic medical centres made collaboration across academic boundaries difficult. They described the hurdles faced in gaining the initial co-operation of some basic science department chairs, who opposed the interdisciplinary nature of the new block courses and doubted the pedagogical soundness of moving to a new curricular model. Course directors in particular spoke of the challenges presented by interdisciplinary faculty. Their co-directors often came from different disciplines and did not share the same disciplinary assumptions or pedagogical practices. Moreover, course directors had to co-ordinate a large group of teaching faculty who came from disparate academic fields or clinical specialties and did not routinely communicate with each other. Faculty members acknowledged that obtaining faculty buy-in for the new curriculum would have been difficult without the support of the dean, who provided oversight, resources and a compelling vision of educational reform.

Despite these challenges, several block leadership teams emerged that effectively combined faculty from different disciplines, as described by this curriculum leader:

'The directors of the Organs block [cardio/respiratory/renal organ systems] were a great team because they merge a basic scientist and a clinician. So whenever they were looking at content issues, they had both eyes on it. And that works extraordinarily well. That's the real joy in this process; it is a learning process for those involved as well as for the students.'

### **Building curricular links**

Course directors and students defined integration in terms of co-ordinated curricular components and faculty who understood the overall curriculum and made conceptual links between new and previously learned material. Students in particular viewed these links as essential in a curriculum where different subjects and disciplinary perspectives were represented in one block. This was one area where students believed the curriculum often fell short. They described numerous missed opportunities for achieving true integration because their teachers did not know the curriculum beyond their own lectures, did not communicate with one another, made no effort to discover what content had already been covered or what students would be learning in the future and failed to link their subject matter with the rest of the curriculum. As a result, redundancies and gaps occurred:

'We get certain really basic things repeated over and over again, and then some basic things not taught at all because there is not communication between disciplines.'

Students as well as course directors felt that co-ordinating and monitoring curriculum content should be the responsibility of course directors, as this student observed:

'A good course director sits in on every lecture to question what we did not cover, what to carry forward.'

At the same time, both faculty and students acknowledged the challenge of maintaining curricular threads when content was dispersed within and across blocks. Students appreciated the efforts of course directors to build planned redundancies into the block curriculum, so topics covered earlier in the block could be revisited. They also found it more

effective if one individual took responsibility for linking content in the longitudinal curricular themes that were threaded through multiple block courses. As one student stated:

'One good example where integration has worked is pharmacology, which has been stratified through each block, where we have the same individual who taught pharmacology in the previous block build upon it for this block.'

### **Sequencing and frameworks**

Sequencing and framing of curricular content emerged as a fourth theme, identified primarily by students. Some students found that the curriculum lacked organisation, whereas others worried that they were being given advanced content before they had learned basic terminology or concepts:

'Part of the issue of the curriculum is not the content but the organisation. Part of integrating is deciding when to present certain information... And sometimes I have difficulty seeing the logic or the rationale behind how they organise the block.'

Students also expressed the concern that they were not getting a solid foundation in some of the core content knowledge and that their teachers were not providing sufficient overviews or conceptual frameworks for curricular material. These overviews and frameworks were seen as crucial elements of an integrated curriculum because they provide both a context and a roadmap for learning. Without them, students found it difficult to bring together disparate subject matter and to build their own integrated representations of course material:

'If you become practised at thinking about things in an integrated fashion, it becomes easier and you have one step up when you're actually in practice. It's like laying the groundwork in your mind for how you go about thinking about things. But there has to be some support system and background so that you have confidence creating this foundation.'

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### **DISCUSSION**

This study, which took place at the end of the first year of a major curricular transformation, found considerable congruence among curriculum leaders, course directors and students. All stakeholders agreed that an integrated curriculum requires interdisciplinary teaching, clinical application of basic

science material and course directors who provide detailed course oversight. They also agreed on many of the challenges, including: achieving truly interdisciplinary lectures; overcoming the reluctance of faculty to shift to a new curriculum model; getting faculty to communicate with one another, and establishing oversight and continuity of themes across courses.

We also found differences between groups. The faculty involved (course directors and curriculum leaders) perceive the issue through a different lens to that of students. Faculty spoke of their challenges in course planning and implementation, whereas students emphasised content sequence and co-ordination. Faculty focused on collaborative interdisciplinary course leadership, which was not mentioned by students. Students consistently commented on the impact of integration on their learning, which was enhanced when instructors made links between different subjects, built on what students knew and offered conceptual frameworks. Course directors bridged the perspectives and insights of both curriculum administrators and students. They shared with curriculum leaders a belief in the importance of collaborative interdisciplinary course leadership and concurred with students that it is important to have oversight of themes and teaching across courses and small groups, and to provide conceptual links for student learning.

This research suggests several lessons learned about integrating curriculum. Firstly, it identifies the importance of providing conceptual frameworks for learning. In discipline-based courses there are commonly shared assumptions about content progression, curricular priorities and teaching methods, whereas in integrated block courses the directors are required to create new, larger conceptual frameworks encompassing multiple disciplines that may not share common assumptions or approaches. The curriculum must be organised in such a way as to permit scaffolded instruction,<sup>28</sup> so teachers can provide sufficient guidance to address gaps in student knowledge and skills. Students desire conceptual frameworks and scaffolds but most course directors and teachers were initially either unable to provide them or did not recognise the need for them. The ability of the faculty and the curriculum to convey content in instructionally powerful ways that are directly relevant to learners' developmental level – what Shulman,<sup>29</sup> Irby<sup>30</sup> and others call 'pedagogical content knowledge' – may take several years to acquire and remains one of the biggest challenges facing an integrated curriculum.

Secondly, integrating a curriculum is a more complex and uneven process than Harden's<sup>21</sup> hierarchical continuum of integration suggests. We found that some subjects and disciplines lend themselves more easily to integration than others, resulting in a curriculum that is more integrated in some areas and less in others. The integration process occurs at different rates, with different emphases and commitments over time. Integration may be differentially understood and experienced by students and faculty, and can refer to rearrangements of content, innovative instructional methods, faculty work or the learning that takes place in the minds of learners.<sup>4</sup>

Mirroring the experience of other schools, this study reveals the importance of co-ordination and joint planning between teachers from different disciplines, as well as the importance of an organisational structure with appropriate resources and effective leaders who define and promulgate their vision of educational reform. As other reports have shown, this study demonstrates that a case-based approach effectively promotes integration among basic, clinical and social sciences, and that clinical contexts may be fundamental to successful integration.<sup>4,9–11</sup> Faculty and students in this study recognised the benefits of an integrated curriculum for learning and retention, emphasising that learning is enhanced when it is meaningful, relevant and learned in the context in which it will be later recalled.

We also encountered some of the same pitfalls experienced by other schools. Although architects of the new curriculum envisioned courses as well as individual lectures that were truly interdisciplinary, this goal was not always achieved.<sup>4,21</sup> Similar to other institutions, we faced the challenges of integrating longitudinal curricular material without losing the curricular thread and of integrating the social and behavioural sciences into the curriculum.<sup>4,5</sup>

Limitations of our study include a small sample of individuals who planned, implemented and participated in the new integrated curriculum in the initial year of implementation. Moreover, our findings are from a single institution and may not generalise to other schools. It must also be emphasised that this study was performed at the end of the transition year to the new curriculum, when the integrated model was still tentative and all involved in curriculum reform were learning how to deliver an integrated curriculum as they proceeded with implementation. Integrating a curriculum is an evolutionary process and significant changes have been made at UCSF since the time of this study. There is now more

co-ordination of material within and among block courses and faculty are providing more conceptual scaffolding and overviews of curricular material. In addition, some of the initial concerns about student learning have been dispelled as student performance in the new curriculum has equalled or surpassed that in the old disciplinary curriculum.

In summary, this case study illustrates the key successes and challenges involved in integrating a curriculum in the eyes of its stakeholders during the first year of implementation. Although students, faculty and curriculum leaders share similar perspectives on many aspects of curriculum integration, they also have differing perceptions of what integration means, how it succeeds and where it faces important challenges. For an integrated curriculum to succeed, these different perspectives should be given voice as medical schools envision, plan and embark upon redesign of their undergraduate medical education curricula.

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*Conflicts of interest:* none.

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 APPENDIX 1. INTERVIEW GUIDE

- 1** I would like to start off with a very general question. When you hear or use the word ‘integration’, what does it mean to you?
- 2** How do you think others involved in the new curriculum define integration?
- 3** What types of integration have you seen in the new curriculum?
- 4** Where in the new curriculum do you think efforts at integration have been particularly successful? Why?
- 5** Where have they been less successful? Why?
- 6** What barriers or challenges to integration have you encountered or heard about?
- 7** Now that we are at the end of the first year of the new curriculum, how have your perspectives on integration changed with time?
- 8** Where would you like to see the curriculum go from here in terms of integration?

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