



VitalSigns

Biological Science in the New Curriculum

Office of Medical Education Research and Development

Spring 1998

Reflections on Change

The “new” curriculum of 1991 was the product of a major effort to strengthen undergraduate medical education. Now that the dust has settled, CHM has an opportunity to look back at our work in the time before the LCME self study begins.

This edition of *VitalSigns* is the first of two examining the “new” curriculum, and focuses on Years 1 and 2, addressing biological science education. Clinical and professional education will be addressed in the Fall 1998 edition.

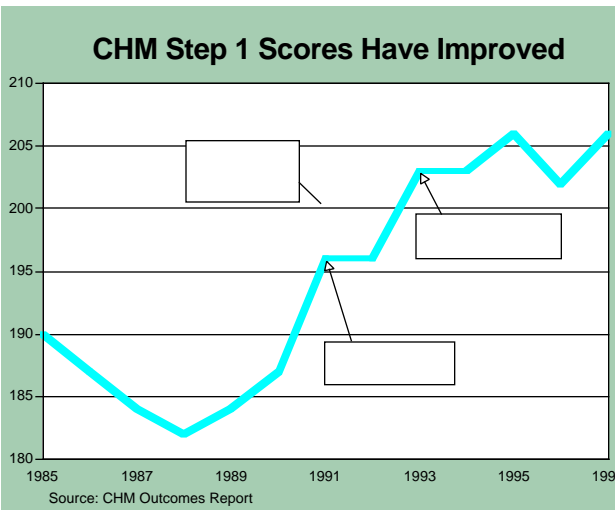
We thank the many CHM faculty members who authored parts of this *VitalSigns*. They highlighted issues in basic science education, framing them with data where possible. The first article describes improved basic science outcomes attributable to the new curriculum. Although some faculty members are proud of its successes (p.2), others question what has been lost in the process (p.3). To more fully represent this picture, CHM faculty (p.5) and students (p.8) were surveyed regarding their views of the curriculum.

The preclinical curriculum map (pp.2-3) provides an overview of CHM curricular structures and processes. Further extending the backdrop for science education, the national and local context of curricular change (p.7) and problem-based learning (p.4) are presented.

Basic Science at CHM: Good News

Kathryn Doig and Elizabeth Werner

The current CHM curriculum was initiated in 1991, born amid concerns about the strength of our basic science content. Our traditional strengths have been in behavioral and clinical sciences, but CHM faculty perceived a need to address



weakness in our basic science education. We were not satisfied with the NBME Part 1 (now USMLE Step 1) scores of our students (see figure at left). Our graduates were dissatisfied too, rating the time devoted to basic science preparation as inadequate when compared to graduates nationwide. Prior to 1995 CHM graduates rated basic science teaching as

merely adequate and much less consistent than other aspects of the curriculum.

A major goal for curriculum reform was to strengthen preclinical basic science education. Many of the structural principles for the “new” curriculum were intended to help achieve this. Now seven years later, how have we done?

Structural principles were the easiest to achieve. These included sequencing the preclinical curriculum content from more fundamental to more complex. In addition to lecture-based instruction, the curriculum includes problem-based learning, correlation conferences, meetings with mentors, and increasingly, laboratories and computer-based instruction. Indeed, most of the structural features specified were incorporated and have been retained. In the first year, only three or four sciences are taught at any one time, compared to as many as six previously. In the second year, clinical vignettes provide the basis for problem-based cases.

Did these features contribute to improved basic science learning? As evident in the figure above it would appear so. Contemporaneous with the implementation of the new curriculum, USMLE scores rose and remained up from prior years, beginning in 1993. This increase remains above what was achieved in 1991, when CHM required students to pass the board examination at national levels. Further, 86% of the graduates of the new curriculum feel the amount of time devoted to basic science is appropriate, but more importantly the percentage

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Assessing The New CHM Curriculum: A Success

Harvey Sparks

A medical school curriculum is nothing more or less than the art of the soluble. It is the result of the beliefs, experience, personalities and politics of the community at the time it was created. If we were to create a new curriculum today it would be the result of another set of compromises and therefore only slightly better or worse than our present one. A curriculum is just a framework for the efforts of the faculty to teach and students to learn. Education boils down to good students and good teachers. With this perspective, I believe the new curriculum is a significant step forward for CHM. It is far from perfect, but it is good and can get better.

to advance to Block III but also because the new curriculum gives the students the opportunity to be better prepared. A minimal expectation of any curriculum is that it prepares students for licensure. Our curriculum allows us to accept students from varying academic backgrounds and bring them all to a nationally competitive level. This is a big accomplishment.

Block II of our curriculum contains the mechanism to allow improvements at any time. Each domain is guided by a curriculum development group (CDG) that, for all practical purposes, controls curriculum content. These

...the new curriculum is a significant step forward for CHM

Although there is not a shred of evidence that problem based learning turns out better doctors, I am among those who believe in it. Because of the new curriculum, all of our students regardless of academic background participate in PBL. The fact that PBL works for all of our students is probably because of the quality of Block I. The lecturers in Block I know every hour with the students is precious, and both the lectures and the accompanying supplementary material have never been of higher quality. Furthermore Block I students have the time and are fully challenged to use it for self directed study. They are well prepared for Block II.

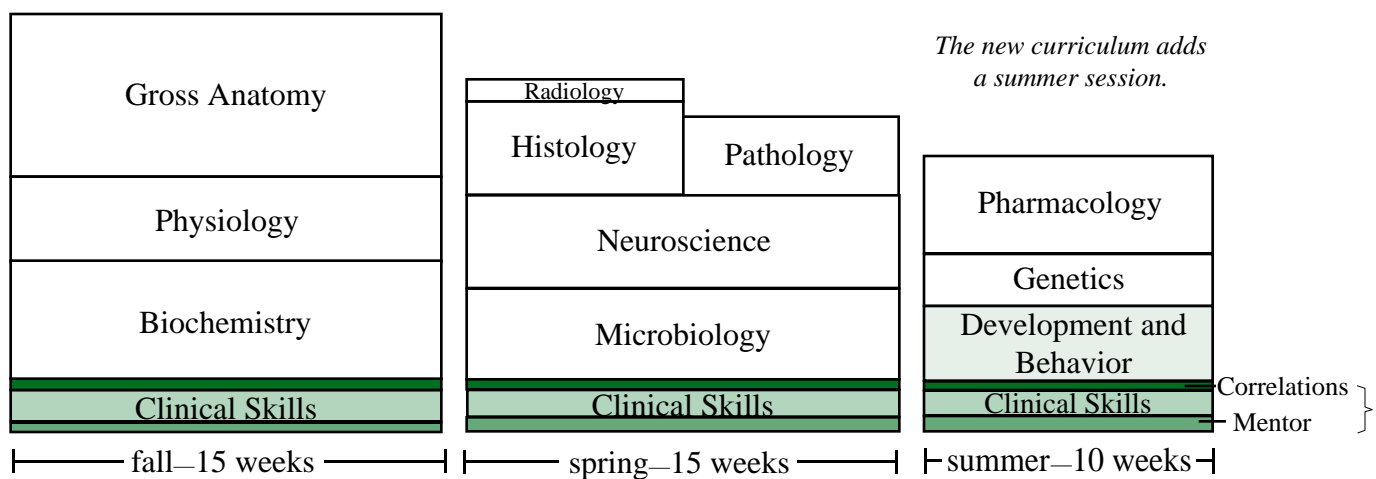
small groups are responsible for development and/or modification of the cases, detailed content lists, the examinations and the lectures. If there is a lack of coordination between basic scientists and clinicians, it is the fault of the CDGs and they can fix it. If exams are not interdisciplinary, the CDGs can change that. If there is not enough primary care represented in the cases or lectures, the CDGs can make adjustments. This powerful mechanism for ongoing development is a significant achievement.

Average USMLE scores have gone up. This is probably due in part to the requirement that all students pass Step 1

Finally my experience of both Block I and Block II is that both teachers and students are turned on. Learning medicine is exciting at CHM. The new curriculum didn't cause that, but it provided a framework for it to happen. I think it is time to declare the new curriculum a success.

BLOCK I CURRICULUM MAP—Lecture Format

Unshaded courses co-taught with the College of Osteopathic Medicine



Assessing The New CHM Curriculum: Missed Opportunities

Howard Brody and Mary Noel

A great deal of energy and good intentions went into the revision of the CHM curriculum. We acknowledge that a number of good things were accomplished, despite the fact that CHM had very few resources to invest in this transition. We wish, nonetheless, to discuss what we and our colleagues have identified as missed opportunities.

We contend that our job is not yet done and that another round of curricular reform is needed. We have focused our discussion on the preclinical curriculum, while bearing in mind that there are important issues needing remediation in the clinical years also.

ability to integrate medical reasoning and not merely the ability to memorize basic science content. We believe that students who are given a problem-based, clinically focused learning environment, plus some technical preparation in exam skills, will learn what we want them to learn in order to become good physicians, and will be able to pass the Boards.

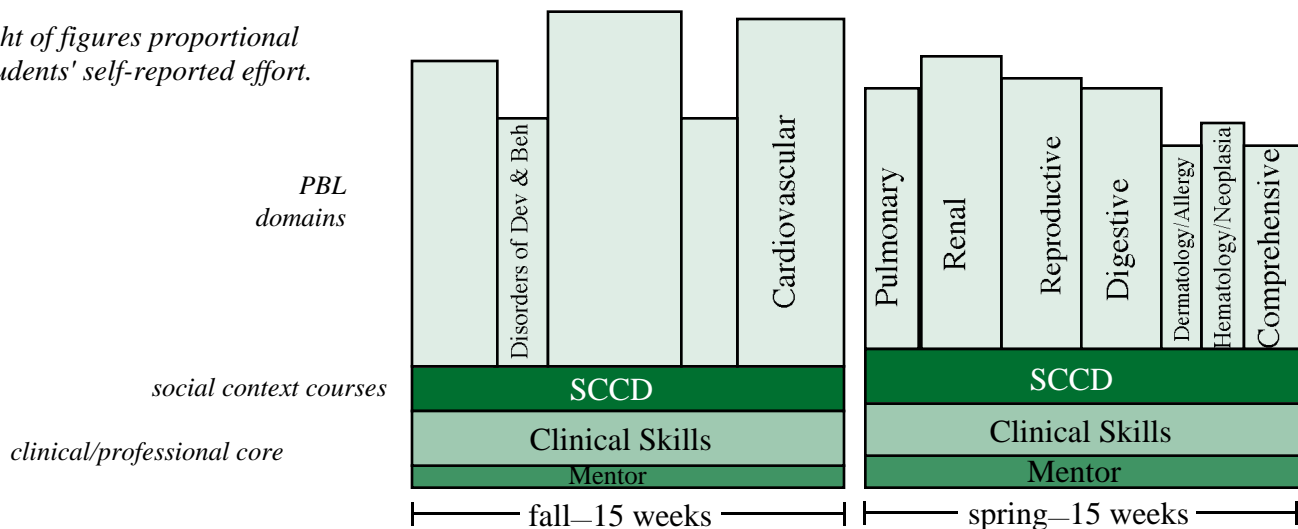
Despite the general track record, there are individual instances where we have succeeded in integrating basic science and clinical information in a problem-based mode. Where this has happened, it usually means that individual

Perhaps the most serious deficiencies we have identified relate to the lack of clinical experience in the first two years. Students have less and less clinical contact through other courses, and the PBL course (unlike Track II, its predecessor) was conceived as a way to integrate basic and behavioral science knowledge, not as a way to prepare students for entry into clinical medicine. Especially for a primary-care-oriented medical school, this is a serious gap. It leads directly to the second major problem—students, having no real clinical experience to guide them in knowledge acquisition, use exams and Boards as their sole guide to what they should study. Wherever the blame lies, the fact remains that we as a faculty have largely failed to revise the PBL exams so that they reflect the

basic scientists and individual clinicians have gone out of their way to learn how each other view the world, and to work closely on presentation of information and exam format. The CDG is a possible mechanism for this interaction but does not necessarily lead to close working relationships. As hard as this may be to envision, we believe that if CHM is to succeed in teaching clinically relevant basic science that students are likely to retain for the long term (not just to regurgitate on the next exam), a more general culture shift is needed. The system needs to reward faculty for spending time getting to know their colleagues “across the bridge,” not just for bringing in revenue for their Departments and teaching their basic course assignments.

BLOCK II CURRICULUM MAP—Problem-Based Learning Format

Height of figures proportional to students' self-reported effort.



Why Problem-Based Learning?

Phyllis Blumberg, Guest Contributor

Despite increasing use of Problem-Based Learning (PBL), basic questions about it are often raised. This column identifies and addresses challenges PBL curricula confront in achieving medical school and medical practice goals.

What is PBL? While differences exist among medical schools' implementation of PBL, defining features of PBL consistently include the use of clinically relevant problems to involve students in active learning. Group learning sessions take the form of discussion among students, who focus on identifying the problem's key features and learning issues. Students extend their understanding through independent learning activities, identifying resources that enable them to learn more about these issues and assimilating the relevant information. Returning to the group setting, students seek to elaborate their deeper understanding of the problem and the content and related practice challenges it represents. In PBL curricula, the responsibility of faculty includes development of problem cases and identification of resources that will guide students' independent learning. In group sessions with students, faculty facilitate the student-groups' efforts to explore the problems and articulate a deeper understanding.

What motivated PBL? Critics charge that traditional preclinical medical education has been too didactic, too theoretical and not clinically relevant. As the knowledge required to practice medicine undergoes continual changes, medical schools need to foster the desire and skills for physicians' self-directed learning. Educators believe that acquisition of a solid knowledge base, a goal stressed in traditional medical school curricula, is a necessary but not sufficient attainment to be a competent professional.

Other desired medical practice-related goals that use of PBL was hoped to promote include self-directed learning, problem-solving and clinical skills. To develop reflective practitioners, medical education must foster opportunities for students to learn by doing and reflecting before taking action. Traditional basic science education leaves students with little opportunity for reflection-in-action.

What are the objectives of PBL? Barrows stresses that PBL focuses on achieving four medical education objectives. Knowledge needs to be structured for use in clinical contexts; this facilitates recall and application of information from the basic and clinical sciences. PBL

should foster development of problem-solving skills, including hypothesis generation, self-inquiry, data analysis, problem synthesis, and decision making. PBL should develop skills that allow students to identify their learning needs and relevant information sources. PBL should also increase motivation for learning.

How well does it work? How well does PBL prepare students for medical school and medical practice goals? In some respects, there is a disappointing lack of information to address this question fully. Existing studies directly comparing traditional and problem-based curricula examined the extent to which, from medical school faculty and student perspectives, a traditional and PBL curricula 1) helped students pass examinations and become good physicians; 2) fostered educational activities that were effective in attaining these goals; and 3) promoted concepts of physician roles in students congruent with those held by medical school faculty.

Both traditional and PBL curricula include elements that students and faculty agree are important to becoming good physicians. These include discussions of patient cases, clinically oriented behavioral science discussions, and community field health experiences.

These studies also show that PBL students are more engaged in the activities that both students and faculty agreed had more bearing on becoming good physicians. Although students in the PBL curriculum perceived congruence between studying for their examinations and preparing to be good physicians, the opposite was true for students in the traditional curriculum. For example, students in traditional curricula saw the use of content-laden materials (such as lecture notes and syllabi) as quite effective for passing examinations, but characterized these as very ineffective for becoming good physicians.

A challenge for PBL is the design of relevant and appropriate student evaluation. If that challenge is met, PBL curricula appear to encourage the development of professional values and behaviors including developing problem-solving skills, learning acquisition skills, and fostering an attitude that encourages students to continually improve their knowledge. We still need, however, to better understand how, when, and why PBL fosters the development of self directed learning.

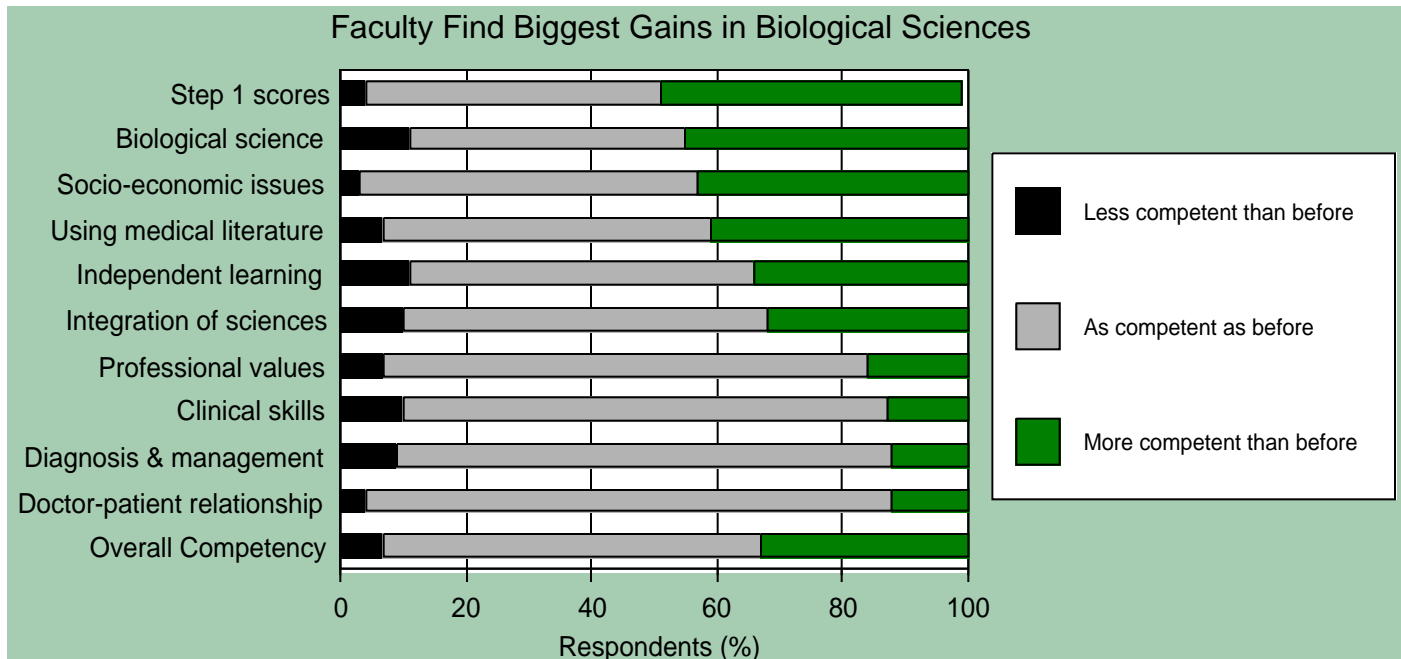
Faculty Opinion Survey: Some Things Better and None are Worse

Part of the close examination of the new curriculum involved a survey of faculty perceptions of the impact of those changes. Each department was contacted to identify the active teaching faculty to receive the questionnaire. Overall 112 faculty responded, representing a 34% return rate from 14 departments and 4 community campuses.

If one major goal of the new curriculum was the strengthening of basic biological science instruction, almost half of the faculty (45%) responded that current graduates are more competent than those of the prior curriculum in this area. Faculty also identified Step I scores as another place in which significant gains had been made.

In addition, it should be noted that less than 11% of faculty respondents felt that the students graduating under the new curriculum were less competent than their predecessors in any area.

Faculty also were asked their opinion about the competence of CHM students compared to medical students nationally. More than half of the faculty indicated that doctor-patient relationships (57%) and knowledge of health related social and economic issues (56%) were two areas in which CHM students excelled compared to medical students nationally. Conversely, 29% of respondents indicated that CHM students were less competent than their national



On other curricular areas, faculty opinion was split regarding gains attributable to the new curriculum. Using the medical literature, knowledge of health-related social and economic factors, independent learning and the integration of basic and clinical science were all areas in which at least a third of faculty respondents thought that current graduates were more competent than past graduates. However at least 50% of faculty respondents thought current graduates were as competent as past graduates with regards to these same abilities.

Most faculty thought that few gains could be attributed to the new curriculum when considering clinical skills, diagnosis and patient management, professional values and behavior, and the doctor-patient relationship. In

counterparts in the use of medical literature. Thus, even though almost half of the faculty attributed increased competence in this area to the new curriculum, room for further improvement remains.

A significant number of faculty (16%) returned a blank survey, saying that they did not know enough about the curriculum or students to offer an opinion. A number of them indicated that they had limited contact with students and a restricted view of curricular outcomes. Nonetheless, 71% of faculty respondents were mostly satisfied with their involvement in medical education, 51% were mostly satisfied with opportunities available to them for curriculum development, and 65% were mostly satisfied with their teaching commitments.

Answers to Never-Asked Questions

The addition of a summer session in Block I yields an additional ten weeks of basic science education.

Since 1991, 140 students aged 30 or older have matriculated at CHM: about 18% of CHM students over seven years. The proportion of older students is decreasing with the success of the Medical Scholars program, the college's baccalaureate - M.D. program.

The MCAT scores of CHM matriculants have remained relatively consistent over the past eight years; during this time, there has been a small increase in the Science GPA.

Block I basic science instruction involves 38 lecturers.

According to the Faculty Survey (see p. 5), over half of the respondents believe that CHM graduates are more competent than students nationally regarding physician-patient relationships and consideration of health-related social and economic factors. Conversely, faculty believe that CHM graduates are weaker in integrating basic and clinical science, and effectively using medical literature.

Prior to 1991, about 23% of students extended their preclinical program. More recently, the rate has declined. Policy changes in the past year may further reduce the rate of preclinical program extensions.

According to the CHM Faculty Survey, the "best" aspects of the preclinical curriculum are: integrated learning in PBL (37 responses); clinical and interactional skills teaching (13); and small group/independent learning approaches (9).

Faculty opinion of the worst aspects of the preclinical curriculum are: emphasis on superficial learning and testing that targets memorization (13 responses); faculty not qualified to teach PBL or not involved with students and the curriculum (13); and the curriculum lacks early clinical exposure and sufficient clinical integration (11).

The PBL curriculum requires 2,090 preceptor contact hours; 780 hours of faculty time are dedicated to the PBL curriculum development groups.

Good News (Continued from page 1)

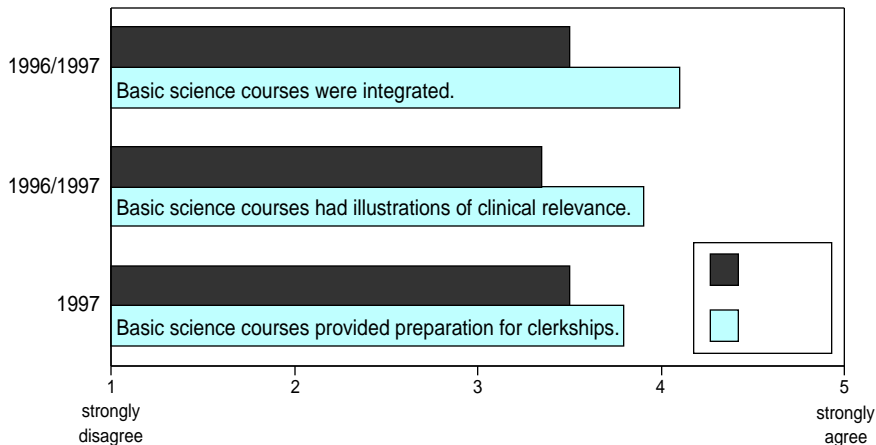
of graduates rating it as inadequate dropped after 1994. Data from the 1996 and 1997 AAMC Graduation Surveys indicate that most recent CHM graduates rate their basic science education as being as good or better than medical students nationally, as shown below.

Is this success sufficient? No. There are more areas to explore. Is the preclinical science curriculum too dense? If it is, the result might be the overshadowing, for many

students, of fundamental principles by excessive numbers of relatively unrelated facts. Further, the organization of the content may not be ideal to promote its retrieval in clinically useful ways. Our student evaluation still makes significant use of multiple choice questions, often at lower cognitive levels, not challenging students to apply concepts and solve problems. To the extent that evaluation drives the curriculum, this impairs our ability to challenge students to higher applications of their knowledge. Even though computers are increasingly being adopted, active learning is a continuing challenge when one year of the preclinical curriculum remains lecture-based.

So, the news of the new curriculum in regard to basic science education is generally good. We should not lose sight of the success. Faculty members who were skeptical should now be convinced that a complete second year PBL curriculum for basic science can work. In seeking excellence in our educational programs, however, we need to continue to examine ways to strengthen and improve what is already a good thing.

Recent CHM Graduates More Satisfied

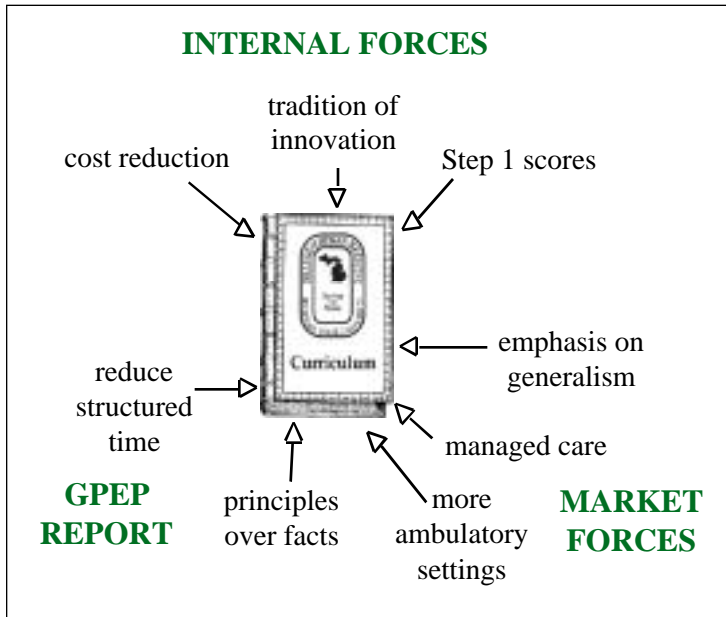


The Context of Curriculum Change

Ruth Hoppe

Both national and local forces fueled the new curriculum effort at CHM initiated by Dean Donald Weston in the mid 1980's. Dean Weston felt that CHM had always been at the forefront of innovation in medical education, and his charge for curriculum change represented his desire that this institutional position be maintained. His blue-ribbon

also called for continued student immersion in patient care during the clinical phase of medical school, but with better explication and measurement of the learning goals. Subsequently, many of these recommendations have been accepted into the standards-setting process for medical schools.



In recent years, market forces have exerted great pressure for change in medical schools. Clinical education is shifting from hospital to ambulatory settings, many of which operate under managed care. While acknowledging the demand for primary care emphasis, including more prevention-oriented care, we must also respond to the needs of an aging, more culturally diverse population, to further advances in the technologic component of care, and to the specter of a too-large physician workforce. Our students must learn principles of management that embody the concept of value, not just quality or cost, and must appreciate the importance of measuring outcomes of care. Finally, physicians of the future will be asked to assume responsibility for the health of populations and communities, in addition to providing the more time-honored, disease-oriented care. This will require facility with concepts and tools not previously part of the doctor's "black bag."

faculty committee, chaired by Harvey Sparks M.D. and Norbert Enzer, M.D., concluded that major curriculum reform was needed. Another goal was to reduce the cost of maintaining two preclinical curricular tracks at CHM. Many believed that all CHM students should have exposure to case-based instruction, the hallmark of Track II. Another cost saving strategy was the merging of the basic sciences in CHM and COM. A final concern was the weak performance of CHM students on the Step I licensure examination.

CHM should take pride in its willingness to engage in significant curricular change – EVERY CHM course is new and represents a truly monumental effort by faculty. And, recognizing that external and internal forces for change never cease, faculty and administrators have committed to a process of ongoing curriculum review and change. While someday we will certainly need again to consider major reform, many share a sense of curriculum vitality that continues today.

At the national level, the Association of American Medical Colleges created a panel in 1981 to address concerns about the education of physicians. Among the findings, the GPEP report called for limiting the teaching of facts in favor of essentials, principles, values and skills. It suggested that baccalaureate education be broadened to include significant study of social sciences and the humanities, and emphasized that preclinical curriculum should reduce the number of lectures and contact hours per week, increasing opportunities for independent learning, interaction with faculty, and problem solving. The report

Join the Discussion!

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Students provide an important perspective to the curriculum. CHM students assess their learning of basic science at the end of their course work, during their clinical training, and after they graduate and enter clinical practice.

As students engage in their PBL courses, they point to the transition from lecture-based instruction to the small group and independent learning as challenging. Most students “agree” or “strongly agree” that PBL increased their understanding of clinically relevant behavioral and social sciences (89%) and developed their ability to integrate biological, behavioral, and social sciences with clinical concepts (91%.) Students’ evaluations also indicate that they see themselves as better able to learn on their own (95%) and to learn in groups (88%.) By the end of the preclinical program, all of these medical education goals receive even higher ratings.

Students report that the PBL domains are difficult and stressful. Despite the intellectual demands, the majority of students also rate their PBL experience as providing role models for competent, humanistic care and as helping them to reflect on their development as physicians-in-training.

During their clinical training, CHM students look back at their basic science preparation. Most (94%) rate their first year as preparing them well for continuing basic science instruction. Students credit PBL with good preparation for understanding the pathophysiology of disease (94%), the biopsychosocial model of disease (95%), and understanding and responding to behavioral issues of patients (85%). Many rate the PBL program as preparing them to acquire information independently (95%), and function in groups (96%).

Two years after their graduation, CHM alumni again assess the quality of their undergraduate medical education. Among these first graduates of the new curriculum, 60% gave very high ratings to their Year I basic science courses, as well as to their training in PBL (62%) and Clinical Skills (62%).

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