Preliminary Proposal for the Establishment of the *Learning College* at MIT

In response to the 'Call for Preliminary Proposals from the Committee on the Undergraduate Program and the Council on Educational Technology', January 2000,

Initiated by Grant B. Harris[1] '81

I propose the establishment of a new organization at MIT, called the *Learning College*[2], that will take responsibility for and lead a collaborative effort to develop an innovative two-year *Learning Program* that will "enhance and potentially transform dramatically the experience of our first year students," and more. The Program will consist of a variety of innovative project- and inquiry-based *learning opportunities* that are organized around an integrated, modular *curricular framework*. In order to substantially and sensibly integrate core elements of engineering study with the GIRs, the Program must encompass and modify *both* the first and second years of study.[3] The Learning College will establish and support numerous *study communities* that will provide the context for the collaborative, participative, and active engagement of students and instructors in the Program. It will also support projects like UTEACH that cultivate *Student Instructors* and other efforts aimed at better motivating and rewarding teaching throughout MIT. A rough estimate of the cost to establish the Learning College, develop the Learning Program, and create 25 study communities (accepting 100 freshmen in the first year, and 500 in the fifth) is $22 million over 5 years, with $8M coming from the d'Arbeloff Fund.[4]

The proposed **Learning College** (LC) will provide a focal point for the "wealth of new pedagogical ideas welling up at MIT," a place where people and groups at MIT can coalesce to form a 'critical-mass' that will not dissipate. The institutionalization of the LC will assure that the interests of the students and alumni of MIT are continually injected into the Program of education; perhaps alumni could direct their contributions to the LC with the assurance that the funds would go *directly* to support undergraduate education. No doubt, many worthy proposals, large and small, will be submitted; the LC is not offered as a substitute for them, but rather as a place, a possible architecture for an organization that brings them together into something coherent. The most challenging aspect of developing a Learning Program will not be the design of its content or pedagogy, but rather the achievement of a consensus among MIT's leadership to entrust the 'educational commons' to an organization that has the authority to coordinate the process in order to "strike the appropriate balance between independence and coordination in… research and educational activities.[5]" MIT has two, not always congruent, goals: to be a globally recognized leader in research and to be a world-renowned educational institution. The history of attempts at substantive educational reform teaches us that any serious effort to improve undergraduate education must be established in such a way that it does not get undermined by traditional disciplinary interests. Disciplinary, professional, and Departmental interests do and will continue to drive the enterprise of research, publishing, grant making, etc. that maintains MIT's reputation. But the interests that support the Institute's undergraduate educational mission are diffused and don't coalesce to reliably serve the interests of our young students. We must establish and institutionalize an organization that effectively represents their interests. This will only happen if enough of the leaders of our community rise to the occasion and contribute to this effort to improve the 'educational commons[6]'. If a way cannot be found to bridge the interests of the Departments, and give our common educational interests the overdue attention they deserve, substantive innovations, including the one herein proposed, will remain "impractical".

The **Learning Program** (Program) will dissolve the boundaries between disciplines, between theory and practice, between academics and research, between natural and social sciences, between individual and community, between teachers and learners. The Program will be active and interactive rather than passive, holistic and coherent rather than fragmented, more applied than theoretical, and more

collaborative than competitive. The undergraduate years are the formative transition to adulthood, and while MIT is, and should remain, exceptionally capable of preparing individuals for careers in research and the academy, many MIT graduates find themselves ill-prepared for some important aspects of life in the broader world most find themselves working and living in. Alumni and student have clearly said[7] they would like to see changes that: reduce destructive competition; increase the development of self-motivated, self-directed learning; nurture critical-thinking skills; link classroom learning to research; facilitate a well-informed choice of major; instill strong social, communication, and teamwork skills; increase intellectual creativity and the attendant sense of intellectual self-confidence; and better prepare them for life as a 'citizen of the world'. The proposed Program will consist of a comprehensive set of interlocked curricular, organizational, and social aspects that combine to address these concerns.

At its worse, undergraduate study is the rote learning of static concepts and procedures that have been abstracted out of their interdisciplinary, historical, and practical contexts. The Program will put learning back into both intellectual and practical context by providing a coordinated, cross-disciplinary progression of small-group classes, seminars, tutorials and project-based study in which conceptual learning (science) and practical application (engineering) mutually build upon and reinforce one another. This coherent and integrated two-year program of study will deliver at least the academic equivalent of the existing 1st & 2nd year 'educational commons.' Students will choose from a 'menu' of modular *learning opportunities*[8] (including classes, seminars, projects, research, internships, field visits, etc.) organized around a flexible, yet comprehensive *curricular framework* that defines the many competencies within and across disciplines that the student must master (see note[9]). This modular approach will enable students to 'place-out' of some materials at a finer level of granularity,[10] and as students progress through the Program they will engage in increasingly complex and challenging learning opportunities. Early projects will be 'scripted' to lead project teams through the basic modules in the curricular framework, with later projects allowing increasing innovation and direction by the students, allow them to better explore and accentuate their areas of interest as they acquire and demonstrate the competencies required to move on to the junior year in the Departments of their choice.[11] By replacing passive lectures and recitations with small interactive and participative learning venues, students will develop communication, leadership, teamwork, self-confidence, creativity, and critical thinking skills as a normal part of their educational experience. The College will support and coordinate the development of innovative seminars, projects, research, internships, site-visits, and other activities that more effectively bring learning into the practical contexts of engineering and design, experimentation and research, invention and entrepreneurship, organization, finance, etc., accomplanied by systematic processes of assessing of competency in various subject areas and the student's readiness to proceed. Students gain more exposure to the political, professional, social, ethical, and aesthetic realities and accumulate practical experience as they concurrently work toward completion of the *curricular framework*, .

Communities of Learners. The LC will organize and support small *study communities* that provide stable social contexts for learning. Membership and active participation in these communities will help cultivate the capacity for inquiry, initiative, leadership, teamwork, and ethical responsibility while facilitating personal development and providing robust social and emotional support, incorporating some aspects "tutorial" approaches, such as at Oxford. The undergraduate experience cultivates life-long styles of learning and interaction; many of them learned implicitly in the way-of-life experienced at MIT. To successfully cultivate a dynamic, life-long learning style, experiential learning (in addition to academic learning) must be incorporated into the undergraduate experience as a whole, so that these skills are learned and consistently practiced as a matter of course. Each year, 20 freshmen will enter each *study community*,[12] joining 20 sophomores, 2 faculty leaders and a coordinator. This group will 'anchor' the student's learning activities, providing a base from which they engage the curriculum and

each other. A physical place or 'home' for these communities is essential to their cohesion and permanence, and a portion of the funding for this proposal will be invested in these common spaces, each having a minimal kitchen and an Athena cluster. Each year, 5 new community spaces will be built, allowing 100 additional freshmen into the Program; in the fifth year perhaps 500 freshman will enter 25 curricular communities. We already know this is an investment worth making - for 30 years now, ESG and Concourse (and more recently additional programs) have consistently demonstrated that community and innovative cross-disciplinary studies enhance and support the learning process[13] for students at MIT. These communities and common spaces will not replace, but will be in addition to those centered in residences. For many, MIT can be an alienating and isolating experience, and while the expected changes in the residential system addresses some of the need for more 'community', there need to be ample opportunities to connect with and be supported by others in the academic sphere as well as the residential.

Teaching. The Learning Program will be effective in part because the student-to-instructor ratio will be decreased. The faculty leaders of the curricular communities (with compensation from the LC) will devote most of their time to teaching their own and other groups in the Program, with many other faculty from the Departments instructing, leading, and sponsoring classes, seminars, projects, etc. And, since the best teachers are often the best learners, a formal system to cultivate *Student Instructors (SI)* (based on UTEACH) will not only supplement existing instructional resources, but will enhance the education of those students that participate. With appropriate compensation (including tuition-credit), SIs will be encouraged to continue their education beyond the fourth year, helping to retain these valuable instructional resources as well as enabling many of these exceptional students to go further in their studies than might otherwise be possible. The LC may also work with the Departments to raise the recognition of and compensation for teaching efforts across the Institute in order to substantially increase time devoted to instruction and other opportunities for student/faculty interaction (such as providing financial incentives for increased teaching commitments, sponsoring fellowships for the on-going development of the Program, exploring ways to reflect instructional commitment and innovation in the tenure process, finding ways to fund 'teaching' chairs, etc.) The LC can also coordinate the increased engagement of MIT's global community of alumni and facilitate their involvement in the study communities as mentors and role models, counselors and advisors, reviewers and judged, instructors and learners, clients for projects, sponsors of internships, etc. Alumni can relate to and meaningfully connect with undergraduates, while at the same time providing connections to the *real world* for which MIT collectively aspires to better prepare its students.

Assessment. As a 'learning organization', the LC must continually assess and critique its own performance, take risks, and learn from experiments, and adapt to the needs of the students and alumni it represents. A *Learning Research Center* will be established which will employ researchers who, in addition to contributing to the development of the Program, will actively solicit feedback through observation, interviews, surveys, etc. in order to continually improve the Program[14]. The Learning College should grow only to the point that it is serving all of those who want to join the Program. The best measure may be to watch how the students vote with their feet - if students sense that they are not benefiting from involvement in the Program, they will 'walk', and disparaging cues from upperclassmen will cause incoming students to scrutinize the program.

A Unique Opportunity. This proposal is offered in a spirit of collaboration, as an invitation to participation, as a general framework around which the many diverse and innovative interests and efforts might coalesce in order to engage in the serious and difficult business of changing the 'educational commons.' Somehow we have to overcome the pervasive sense of futility that I have encountered in discussing the possibilities for significant change at MIT. Ways must be found for the academic, research, educational, and community interests at MIT to complement one another, rather than being at

odds.

It is my sincere personal hope, regardless of the destiny of my particular proposal, that the extraordinary initiative and generosity of the d'Arbeloffs, in combination with the spirit of educational innovation that seems to be rising at MIT, will prove to be a once-in-a-generation opportunity to change and improve the undergraduate experience, preparing the Institute and its graduates for the turbulent technology-dominated world that, more than ever, needs innovative and insightful engineers and scientists who can be more effective participants and leaders in the global community.

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[2] 'College' need not imply any strict definition. I ask the reader to consider the proposed organization independent of this 'working name'.

[3] A coherent program which intertwines science and engineering, theory and practice cannot be achieved if we restrict change to only the freshman year. Much of the engineering typically learned in the sophmore year not only does not require the completion of the freshman year, but would be more easily learned and better understood if it were not studied, perhaps, a year after the relevant math/physics was learned and mostly forgotten. In order to sensibly and substantially incorporate engineering, research, and practical learning into the first year requires the concurrent modification of at least a substantial part of the second year.

[4] The proposed funding envisions that each year for 5 yrs the d'Arbeloff Fund would fund the establishment and growth of the College/Program, with the Institute assuming the on-going cost in subsequent years. A very rough estimate: d'Arbeloff funding of about $3 million in the first yr. and $1M per yr. thereafter, totaling $8M. Institute 5-yr total about $15M. By the 5th yr. with 500 freshmen and 500 sophomores in the Program, the on-going annual LC operating budget will be about $6M with the balance of necessary instructional resources continuing to come from the Departments.

[5] From TC, note also: "Without coordination, collaboration among groups and departments is difficult or impossible." The LC is intended as an organization that can take responsibility for coordinating some of the initiatives proposed by the Task Force and the EDP.

[6] 'Educational commons': EDP's term for the general educational programs pursued by all students, regardless of major.

[7] See EDP and 'The Charrette'. I am of the opinion that the ultimate judges of the quality of the MIT educational experience are graduates with 5 – 10 years of living and working beyond MIT, and that among the many voices calling for changae, their's have the most authority.

[8] The review and approval (qualification) of new learning opportunities will, of course, involve faculty, but I propose the substantive involvement of students and (especially) alumni in that process.

[9] The existing courses of study (GIRs plus common aspects of sophomore level subjects) will be modularized by identifying the essential conceptual and practical competencies acquired. The modules from the different disciplines will combined and interwoven in various ways into coordinated, coherent learning opportunities through which the strudent develops an "appreciation of the deep interrelationships among fundamental concepts in various disciplines" that constitutes "literacy in science and technology" (EDP) The curricular requirements of the various engineering departments, in spite of their individual foci, share a common set of conceptual and practical learnings (Course 16's Unified Engineering exemplifying such a synthesis.) that can be coordinated with the learnings in the freshman science core into an integrated, concurrent science/engineering core. Replacing the currently compartmentalized and fragmented sequence of studies could even enable an increase in the curricular content of the freshman and sophomore years, while maintaining the intellectual rigor expected at MIT. This approach may lighten the sense that 'MIT is about drudgery and requirements' (TF).

[10] I am aware of numerous efforts that seem to point in this direction, including a modularized math curriculum, variants of freshman physics incorporating design (D) and experimentation (X), to mention only a couple. And there are, of course, many well developed models elsewhere, both in New and Old Worlds.

[11] Initially, there may be Departments that require unusual focus and specialization in the sophomore year, in which case students who wish to pursue such majors would be advised to enter the regular freshman and sophmore curriculum. But over time, the Departments may develop versions of their offered subjects which can be more focused on the specific dicipline, because students will have already learned the basics that currently versions have to teach.

[12] A substantial portion of the learning activities in the first year will occur within the Study Communities with increasing participation in project teams in the second year providing opportunity to develop larger, more diverse communities. These groups are intended to provide some of the benefits

[13] While we can also point to many 'failures', most result from inadaquate structurally support by resources that are beyond the influence of 'departmental' interests, not because they did not provide an education as good or better than conventional programs. (See EDP).

[14] Measurable impacts may not manifest until students in the Learning Program enter their junior year (where they will or will not rival those from the regular curriculum), and it will not be until the fifth year that concrete GPA results will show up.

References: **EDP**: Preliminary Findings and Recommendations of the Educational Design Project. **TF**: President's Task Force Report. **SAC**: Final Report of the Student Advisory Committee, Task Force on Student Life and Learning. **The Charrette**: web.mit.edu/newsoffice/tt/1999/may19/charrette.html A list of links to these documents may be found at: h*ttp://www.workframe.com/learning/*