

Institutional EdTech Support for Faculty at Research Universities – Insights from a Case Study at the Massachusetts Institute of Technology (MIT)

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Abstract: Today, American research universities direct their attention increasingly towards teaching and introduce educational technology into the curriculum. There exists substantial literature that shows best practices in how to support faculty in this new environment, but so far there is a lack of systematized scientific knowledge. This exploratory case study at MIT is a step in an attempt to close this gap. On the basis of qualitative interviews the author systematizes the faculty's needs and describes the approaches adopted by MIT's support organization to meet the needs of the institution. At MIT it is conceivable that a paradigm shift in faculty support may be taking place that would take the difficult incentive structure and constrained time resources of faculty into account and better recognizes the faculty's needs.

Problem Statement

Educational technology (edtech) only recently (in the late 90s) got a foothold in Swiss university teaching, and its sustainable integration proves to be a major challenge in various respects (Seufert & Euler, 2003). Lepori states in a recent report: "In Swiss universities, there is an evident lack of suitable organisation models for eLearning. The bottom-up approach is very well suited for experimenting and learning how to use new educational technologies, but hardly so for using and maintaining applications." (Lepori, 2003, p. 58) But not only Swiss institutions are facing this challenge; across the various types of American higher education institutions the search for appropriate support structures and organizations to enable and motivate faculty to integrate technology in a sustainable way into their teaching has proven to be a major challenge and therefore a worthwhile research object to study (e.g., Hagner, 2000, Zellweger, 2003).

In order to elucidate the important issues relevant to the introduction of technology in higher education, the author conducted an exploratory case study at the Massachusetts Institute of Technology (MIT) in regard to what support and incentive structures are in place for faculty to become engaged with educational technology and how those structures developed over time. MIT is an interesting case due to its long and rich history of educational technology initiatives and with a wide variety of innovative projects that make the study of best practices valuable.

The study underlying this talk tries to shed light on the following research question:

In general, *how can faculty at research universities be supported to integrate technology in a sustainable way into their teaching?* And more specifically, *what support structures should ideally be put in place to contribute to this endeavor?*

Review of the Literature

A recently published article in *Nature* reported on a new movement among research universities towards devoting more attention to science teaching (often by using educational technology) and declared it as a matter of genuine social concern (Powell, 2003). Powell argues that in a world that increasingly depends on science and technology, it is more important than ever that students learn the scientific basics. Armstrong approaches the need for change in higher education from a different angle. He argues that the appearance of virtual, for-profit colleges provides students an alternative value structure for education that draws on a just in time, life-long learning paradigm. He further argues that today the for-profit institutions are not established enough to be a serious threat to research universities, but in the long run they have the potential to funnel away important sources of income in a way that could destabilize the existing, non-profit institutions that see the combination of research, teaching and service as key elements of their mission (Armstrong, 2002).

The growing awareness of the changing environment and the requirement for answers to this change are also expressed in a recent report by the National Research Council of the National Academies titled, "Preparing for the Revolution. Information Technology and the Future of the Research University" (2002). As a consequence, research universities increasingly invest in educational technology in order to enhance the quality of their on-campus education and possibly become engaged with distance education.

In 1990, Boyer initiated a discussion about how scholarship should be redefined based on the concern that the faculty reward system does not match the full range of academic functions. In particular, teaching deserves more attention (Boyer, 1990). Boyer coined the term "scholarship of teaching", which according to the definition of Shulman entails a public account of the teaching vision, design or outcome in a manner that can be peer reviewed and used by members of one's community (Shulman, 1998, as cited in Kreber, 2002). Kreber in a recent article summarizes the discussion of the past decade and concludes that not everybody should be expected to practice the scholarship of teaching but that teaching excellence should be valued in its own right (Kreber, 2002).

As a consequence research universities are discussing modifications of the infrastructure and an environment that would enable and motivate faculty to become engaged with educational technology and teaching in general.

To a great extent the research and discussions among practitioners focus on technical issues such as learning management systems or open source solutions. There also exist a number of publications that focus on faculty development (e.g., Epper & Bates, 2001). Hagner for example describes how on each campus there are a first and second wave of faculty who engage with technology at a different pace. It is important therefore not only to build structures based on the needs of early movers, but also to take the second wave into consideration (Hagner, 2000).

Regarding the management of support systems, Pahl states that educational systems are often designed and developed without change in mind, and he suggests anticipating change from the very beginning (Pahl, 2003).

Even though there exists extensive literature on the topic, there is a lack of systematic knowledge on how to establish or reframe support structures within the complex environment of a research university. This presentation shall be a contribution towards closing this gap.

Research Setting

The Massachusetts Institute of Technology is a renowned research university¹ that was founded in 1861 as a land grant university with a main emphasis on engineering. In 2002/2003 4178 undergraduate and 6139 graduate students studied in the various disciplines. The faculty body (professors of all ranks) counts 956.

MIT decided in an explicit strategy process in 1999/2000 that they would not get involved with distance learning as many peer institutions did, but instead set the following guiding principles (MIT Council on Educational Technology, 2000):

- MIT is moving away from large passive lectures toward a variety of innovative learning environments.
- MIT demonstrates intellectual and educational leadership by making materials freely available to strengthen university commons.
- MIT is demonstrating new ways to collaborate across traditional university-university and university-company relationships.
- MIT is developing and using technology to enhance its on-campus education and engage members of the community.

This process has had a large impact and numerous initiatives all over the campus aim at the four designated goals.

¹ According to the Carnegie Classification research universities are defined as the following: These institutions typically offer a wide range of baccalaureate programs, and they are committed to graduate education through the doctorate. During the period studied, they awarded 50 or more doctoral degrees per year across at least 15 disciplines. (<http://www.carnegiefoundation.org/Classification/CIHE2000/defNotes/Definitions.htm>)

The Massachusetts Institute of Technology was chosen as a starting case for different reasons.

- As a university focused on science and technology, MIT seems to be naturally devoted to the use of technology in education. The institute holds an extremely high level of technological competence, which has led to many interesting initiatives in almost every corner of the campus.
- The study of the development of MIT's edtech support structures is promising since the first, university-wide edtech initiative Project Athena dates back to 1983 (Champine, 1990). It is possible to describe different stages of development and accordingly efforts to build valuable support structures for students and faculty.
- In 1999/2000 MIT founded a Council for Educational Technology² and underwent a thorough strategic planning process. The results were a number of groundbreaking initiatives such as Open Courseware³ and the iCampus⁴ initiative. It is particularly interesting to study the process and take stock now three years later.
- The researcher was provided with excellent access to planning documents and interviewees as part of doing this case study. The author has spent a year (2003/04) as a visiting student working at the MIT Center for Educational Computing Initiatives.

Qualitative Case Study Approach

In order to investigate the above outlined research question a multiple case study approach was chosen (Eisenhardt, 1989). In order to understand how e-learning could be integrated into university teaching the researcher needs to understand the mechanisms of the complex system of the research university. Yin argues that case study research is appropriate if the research question is formulated towards the understanding of the how and why things occur, such as how can faculty be best supported or why universities so far didn't manage to better encourage faculty to get engaged with technology. This research strategy is further relevant if the researcher has no control over the actual behavior of people (as opposed to an experiment) and if the focus is on contemporary as opposed to historical events. In contrast to historic research, direct observation and systematic interviewing are additional sources of evidence (Yin, 1994).

The presentation reflects on the initial findings of the doctoral research project which started with an initial survey of selected American universities in order to narrow the research focus (Zellweger, 2003). On this basis, a first exploratory case study at the Massachusetts Institute of Technology was conducted in the fall/winter 2003/04. Two more case studies in the American context followed in order to triangulate initial findings and provide a different perspective on the core issues of the project. This article will only present result on the first of the three case studies. The final goal is to develop a framework for the sustainable integration of educational technology into university teaching, and to explore its transferability to the Swiss context.

Data was collected by a variety of methods such as semi-structured interviews with key persons who represent various perspectives within each university, the analysis of documents (e.g., edtech strategy documents) or participant observation (e.g., edtech administrator meetings, classes, student council meetings).

The data analysis process follows the core ideas of grounded theory and is guided by a codifying procedure. Data from the various resources such as interviews or field notes are assigned codes to enable the organization of data for further analysis. This procedure supports the researcher in managing the vast amount of data and prevents an early bias in the analysis procedure. The researcher didn't exclusively follow the recipe-like procedure suggested by Corbin and Strauss (1990) but also draws on methods suggested by Miles and Huberman (e.g. document summary, interim case summary in the early stage of the process) (Miles & Huberman 1994).

Initial Insights

In order to be able to build suitable support structures, it is crucial to understand the goals, culture, and structures of an institution and to be aware of the diverse needs of individual faculty. Therefore the following chapter consists of

² MIT Council of Educational Technology <http://web.mit.edu/cet/>

³ MIT Open Courseware <http://ocw.mit.edu>

⁴ iCampus Initiative <http://www.swiss.ai.mit.edu/projects/icampus/index.html>

two parts: In the first section the author outlines factors that guide the behavior of MIT faculty regarding educational technology. Only on this basis it is possible to shape appropriate services and support structures. Hence the second section is devoted to the process and solutions of MIT's support organization to match the needs of the institution.

Faculty Profile

In order to reach sustainable and long lasting effects with educational technology, it is not only important to understand what enables faculty but also what motivates them and provide incentives that make it a worthwhile endeavor to devote time to teaching with technology.

Figure 2 illustrates that in order to shape an appropriate support organization it is necessary to understand what infrastructure and competences faculty have and if resources and incentive structures are shaped in a way that motivates faculty to make use of their abilities. These activities have to be understood in the context of the culture and values of an institution. In the following, each of the elements of Figure 2 below is discussed.

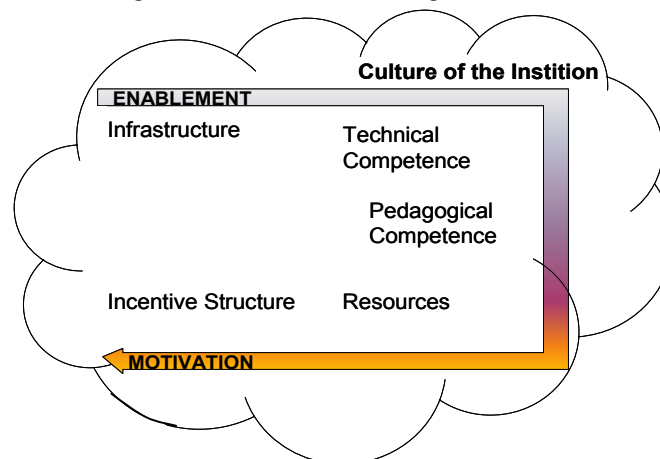


Figure 1: Influencing factors that guide faculty behavior regarding educational technology

Infrastructure

MIT, as one of the top research universities, maintains a high level of technological infrastructure. Some basic services are provided centrally, but most infrastructure decisions are made within the individual academic departments, laboratories and centers. There are computer clusters for students spread over the campus, and a laptop loan program was recently put in place.

There are some differences within the departments due to the decentralized structure and the marginal role of the central organization in regard to computing resources for research. But in general the basic infrastructure for teaching with technology is in place.

Technical Competence

MIT Faculty on average are computer savvy and are attracted to technical innovation. In case a faculty member lacks the required skills, he/she can rather easily hire a student from the highly talented student body.

The following quote of a faculty shows the natural acquaintance with technology:

“I guess I am a little bit low tech. I mostly use computer animations. I am fortunate that there is a lot on the web already.”

Pedagogical Competence

Effective teaching with educational technology requires advanced knowledge of pedagogical concepts. Only since 1997 have the previously ad hoc faculty development activities been consolidated in the Teaching and Learning Lab (TLL). Although there are big differences among the departments, teaching assistants and faculty are not required to attend mandatory training.

As the outstanding technical competence has been omnipresent, so it seems that for a while there was a low awareness of the importance of pedagogical ideas. But in the past decade the institution has gradually raised the importance of teaching in general and pedagogical knowledge in particular. Among others, the launch of the highly respected McVicar Faculty Fellow Award and the formation of the D'Arbeloff Fund for Excellence in Education were major changes that raised awareness and interest in teaching innovation.

Resources

MIT is in the comfortable situation of being able to provide generous funding to its faculty for innovative edtech projects from the iCampus initiative (sponsored by Microsoft) and the D'Arbeloff Fund for Excellence in Education⁵.

However, for smaller, less well-equipped departments it is a challenge to sustain educational projects on their operating budget. These projects sometimes still get treated as experiments and do not get the status of "infrastructure" that has to be maintained. Now, in times of tighter budgets, this is a particular challenge as a faculty expressed with the following statement:

"What about the long term sustainability? We are worried about sustainability. But they don't ask that question about yes you need books for your library or you need classrooms. They don't see the web in the same category. They still see it as an experiment where it is no longer an experiment. It's going to be 9 or 10 years in a year or two and it's seen... I think it should be seen in the same delivery importance as having a microphone in the classroom or having a blackboard that works, or having classrooms where the walls don't fall down. So the server doesn't crash, the walls don't fall down in the classroom."

As a senior administrator puts it, the single greatest impediment to educational change is the lack of time. In general faculty tend to be open for new ideas in education, but spending time on writing grants for a teaching initiative stands in direct competition with writing grants for research.

"I think the single most important parameter is just time. It requires faculty members to have the time, to think about what am I doing, why am I doing it this way? (...) And probably many people will have a very hard time to devoting the time because there is pressure from many different areas. This is very strong. But I really don't think that apart from that there are serious impediments. "

Incentive Structure

Closely linked to the lack of time is the culture of what achievements are most rewarded. In this respect MIT is not different from any other research university that will only grant tenure to excellent researchers. It is not conceivable that this formal incentive structure will change significantly ever. But there is a culture shift regarding the informal incentives structure for teaching taking place. For example, beginning in 1992, outstanding teachers have been selected as Margaret MacVicar Faculty Fellows, which is a highly endowed and respected award⁶. More recently, untenured faculty became eligible for this award, which is a clear commitment to the importance of teaching. The institute accepts the risk of a potentially delicate decision on granting tenure to a faculty that is publicly rewarded as an outstanding teacher but possibly doesn't meet MIT's high standards in research.

MIT's Institutional Response

Today there are several organizational units in place that carry out service functions supporting faculty with edtech projects.

Within information systems and technology organization, the academic computing group⁷ supports faculty with basic technical services such as operational support of Stellar, a home-grown learning management system. The academic media production service (AMPS)⁸ offers a complete set of multimedia, web, video, and teleconferencing

⁵ D'Arbeloff Fund for excellence in education <http://web.mit.edu/cet/init/darbeloff.html>

⁶ Margaret MacVicar Faculty Fellow Program <http://web.mit.edu/provost/macvicar/index.html>

⁷ Academic Computing: <http://web.mit.edu/acs/>

⁸ Academic Media Production Service <http://web.mit.edu/amps/>

services to the MIT academic community. Pedagogical support is provided by the Teaching and Learning Lab⁹. The Center for Educational Computing Initiatives¹⁰ is a research unit that hosts a number of larger educational technology projects. The newest addition in the MIT organization is the Open Courseware project with its fairly independent support structure that creates an infrastructure to convince and support faculty in displaying their course content on a central Open Courseware website¹¹.

All these units co-exist fairly independently but collaborate on many occasions.

It is a huge challenge to respond with appropriate services to faculty needs; MIT's twenty year old history of large scaled experimentation with educational technology not only proved that faculty needs are very diverse, but also showed that they are changing at a fast pace.

As Figure 2 illustrates it is crucial for support units to understand the characteristics of faculty and the environment they are exposed to and respond accordingly with appropriate support services. As the faculty profile is changing constantly the appropriateness of services needs to be rethought on a regular basis.

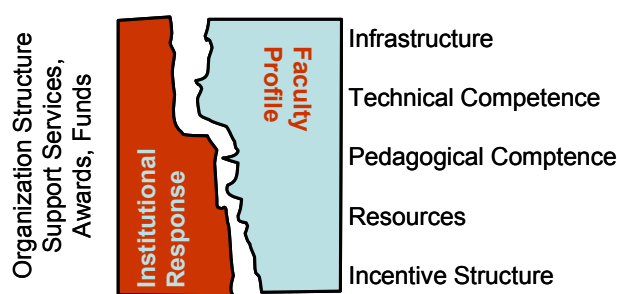


Figure 2: Institutional Response

From the perspective of MIT's central support units two major issues proved to be challenging and hindered the staff to be as responsive to faculty needs as they wished to be.

As a very early mover, MIT developed many applications in house. With the growing availability of commercial solutions that might fit better certain faculty needs than the homegrown systems, it proves to be a challenge to abandon "outdated" systems and keep the efforts focused on future requirements. Even though this difficulty is very specifically tied to MIT's history, this can also be a danger in regard to open source and elaborate customized solutions. It is crucial to not only establish a support organization that responds perfectly to today's needs but that is also able to adjust flexibly to a fast changing environment.

Further challenges that the fast changing environment poses to central academic computing can be described by the following cycle.

In the past, central faculty liaisons, in charge of providing comprehensive individualized support for faculty faced a repeating pattern. These members of the academic computing group contribute with their expert knowledge to the development of new edtech solutions (e.g., a learning management system). After the launch, faculty liaisons spend most of their time providing first level helpdesk support for a vast range of technical questions. Once the system stabilized they manage to hand over the routine work to the existing helpdesk. Now they only are contacted for very specific questions and are increasingly available for consulting with individual faculty. But again a new innovation cycle starts and faculty liaisons, with their expert knowledge of faculty needs, are important contributors to the success of new central edtech applications.

This dilemma is partly due to the lack of central funding and the structure of organization that wasn't established to cope with a changing environment.

⁹ Teaching and Learning Lab http://web.mit.edu/tll/about_tll.htm

¹⁰ Center for Educational Computing Initiatives <http://ceci.mit.edu/>

¹¹ MIT Open Courseware <http://ocw.mit.edu>

As a consequence of this situation and together with the recent arrival of a new CIO and substantial budget cuts within central IT (Sternier, 2004), there is an intense discussion going on about the future of central support and in particular about the organizational model of the relationship between central and decentral support.

Like many research universities MIT has a highly decentralized structure and culture in which the locus for change lies to a large extent within the scope of the departments.

There are huge differences in the economic resources among the departments. This leads to a mismatch on different levels. The central organization should not hinder large departments with regulations that prove to be helpful for smaller ones. Furthermore, the tight central budget doesn't allow providing appropriate services for the technologically weakest academic units. This dilemma can't be easily resolved by transferring resources from the stronger departments to the weaker or even to the central organization. This would constrict the degree of freedom of individuals, which is from a different perspective the source of great strength. A faculty representing a well equipped department puts it the following way:

"MIT is a place where some departments are very strong where the departments in fact have many more resources than the central organization. So partly it's IS¹² getting out of the way of those departments. Partly it's doing things that really clearly are central."

The phenomenon educational technology brings together different groups on campus with very different cultures and "languages". Independent from the organizational model it is crucial to put communication mechanisms in place that secure the exchange for information and knowledge between the support units and the central and decentral places to serve faculty needs in an optimal way. A faculty emphasizes the following:

"One needs to consider multiple layers of overlapping communication structures: within the department, within the school, and across several schools so that there is increased interaction between these groups."

"These communication channels also need to be fluid. They should be set up in a way so that they can evolve over time and take on new functions."

Being aware of this situation, MIT is searching a new paradigm for central support. Several projects and attempts lead towards a new philosophy. One attempt to increase "customer orientation" is the establishment of "fee for services" operational models. Another interesting model evolved in the context of MIT's Open Courseware project. It is the goal of this initiative to make available all teaching material on a central website in order to provide high quality teaching materials to scholars, teachers and individual learners around the world. The participation of MIT faculty is voluntary. In order to manage this operation successfully, it is crucial to make the participation for faculty as easy as possible. Therefore, a completely new organization was established that consists of a relatively small central production staff and a number of department liaisons that are located in the departments and have a strong background in the specific fields of study (Lerman & Miagawa, 2002). In addition, the production process is relatively standardized; professors basically hand over their material (electronic, handwritten, etc.) and review the result in a later stage. In addition the support culture of this unit is quite distinct in that the leadership very proactively searches dialogue with faculty.

The model of an organization with a small, central staff and dispersed support within the academic departments is powerful since it overcomes the resource and incentive problems cited above and better accommodates the needs of the faculty. The department liaisons have a dual loyalty and therefore promote an information exchange between the central and distributed staff. This helps to overcome a weakness of highly decentralized organizations.

Even though there are other organizations that successfully introduced similar support models (e.g. the Stanford Academic Technology Specialist Program¹³) there exist several issues that challenge the sustainable introduction of this model. First of all, it requires substantial resources.

Open Courseware benefits from generous outside funding to maintain such an expensive support approach. The long term success of department liaisons depends heavily on the capability and willingness of the involved parties to establish a joint funding model. A representative of Academic Computing expresses the following view:

¹² Information Services is the central computing support unit at MIT.

¹³ Stanford Academic Technology Specialist Program <http://academiccomputing.stanford.edu/atstp/>

“I think it's an extraordinarily viable and useful change model that makes a transition happen but the sustainability down the road is a whole other question.”

Although the realization of such a support model and its long term sustainability doesn't remain unquestioned already today it clearly initiated a culture change from a reactive support model towards a mindset that recognizes the need of proactive steps out into the departments.

It remains to be seen how the transformation into an even more responsive and flexible support organization will evolve that will foster the sustainable integration of technology into teaching.

References

- Armstrong, L. (2002). A new game in town. Competitive higher education in American research universities. In W. H. Dutton & B. D. Loader (Eds.), *Digital academe : the new media and institutions of higher education and learning* (pp. 87-115). London, New York: Routledge.
- Boyer, E. L. (1990). *Scholarship Reconsidered. Priorities of the Professoriate*. San Francisco: The Carnegie Foundation for the Advancement of Teaching.
- Champine, G. A. (1990). *MIT Project Athena. A Model for Distributed Campus Computing*. N/A: Digital Press.
- Epper, R. M., & Bates, T. (Eds.). (2001). *Teaching faculty how to use technology: best practices from leading institutions*. Westport, CT: Oryx Press.
- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review*, 14(4), 532-550.
- Hagner, P. R. (2000). Faculty Engagement and Support in the New Learning Environment. *Eduause Review*, 2000(September/October), 27-37.
- Kreber, C. (2002). Teaching Excellence, Teaching Expertise, and the Scholarship of Teaching. *Innovative Higher Education*, 27(1), 5-23.
- Lerman, S. R., & Miyagawa, S. (2002). Open Course Ware. A Case Study in Institutional Decision Making. *Academe Online*, 88(5).
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook* (2nd ed.). Thousand Oaks, CA; London: Sage.
- MIT Council on Educational Technology. (2000). *Strategy drives the MIT Portfolio*. Retrieved December, 17, 2003, from <http://web.mit.edu/cet/strategy/index.html>
- National Research Council of the National Academies. (2002). *Preparing for the Revolution. Information Technology and the Future of the Research University*. Washington DC: The National Academies Press.
- Pahl, C. (2003). Managing evolution and change in web-based teaching and learning environments. *Computers & Education*, 40, 99-114.
- Powell, K. (2003, September 18). Spare me the lecture. *Nature*, 425, 234-236.
- Sterner, B. W. (2004, January 3). MIT Lays off 100 Staff Members. *The Tech*. Retrieved April 25, 2004 from <http://www-tech.mit.edu/V124/N1/11Slayoffs.1n.html>
- Seufert, S., & Euler, D. (2003). *Nachhaltigkeit von e-learning Innovationen*. St.Gallen: Institut für Wirtschaftspädagogik.
- Strauss, A. L., & Corbin, J. (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Thousand Oaks: Sage.
- Yin, R. (1994). *Case Study Research: Design and Methods* (2nd ed.). Thousand Oaks: Sage.
- Zellweger, F. (2003). *E-Learning Strategy: Findings from an Empirical Study of "Innovative" Higher Education Institutions*. Paper presented at the E-learn. World Conference on E-learning in Corporate, Government, Healthcare & Higher Education, Phoenix.