

## **Roadmap for Stimulating the Innovative Use of Technology in Higher Education**

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### **Abstract**

Improving the levels of adoption of technology in higher education is important to meet the needs of the 21-century student while enhancing learning and teaching outcomes and to improve efficiency and cost savings in an era where educational budgets are getting continuously reduced. Employing educational technologies requires developing strategies that bring together human and technological elements for improved learning outcomes. These factors, when combined with pedagogically sound methods, represent the cornerstones for a flexible infrastructure that could evolve with time. The human element continues to be the most challenging factor in establishing such a framework. As such, implementing inspiring engagement strategies remains a critical task for the success of any educational technology. Adopting a collaborative approach, this paper proposes a roadmap for developing the human and technology elements so that educators can become effective users of technology in their classrooms. It establishes a framework that is based on a four stage process that involves technology buildup, support infrastructure, skill development, and incentives structure. The paper addresses the importance of each of these factors and dives into an innovation lifecycle that stresses technology challenges, the need for internal support via train-the-trainer programs, and skill development.

### **Introduction**

Change happens for a reason. Competition, technology, desire for growth, need to improve processes, and government regulations are some of the factors that may cause change in an organization. Although the causes of strategic change within the business context are limitless, they can be arranged into four major categories: transition to a global economy, changing industry structure and competitive conditions, suboptimal or declining organizational performance, and stakeholder initiatives (Worley, et. al., 1996). Exploring the drivers of change and strategizing according to which aspects are most likely to affect an organization is often seen as key to the future success or even survival of the organization. With the world changing at a rapid pace, organizations need to be dynamic and flexible to stay in business. Organizations must engage in a planning process that clearly defines strategies for predicting future change and adapting to it while achieving the organization's objectives. The strategic planning process involves defining objectives and assessing both the internal and external situation to formulate strategy, implement the strategy, evaluate the progress, and make adjustments as necessary to stay on track.

Zooming in on higher education, it is safe to say that the same aforementioned principles apply with some differences in the type of issues impacting the industry. Administrators across university campuses are pressured to respond to a variety of factors impacting both students and universities. Factors such as changing student profiles, reduced budgets, decreased enrollments, and altered or reshaped competition represent some of the concerns that administrators need to deal with. Technology offers an innovative cost-effective solution to many of these issues and could be the key for the continued viability of higher education institutions (Smith & Oliver, 2000).

Given the vital role of technology in today's world, it is critical to examine the value of effective technology use in classrooms. With the proliferation of educational technologies that are able to overcome the obstacles of time and

space, the educational landscape is changing. Students can get anytime-anywhere education through on-demand services while institutes can get more out of the same number of resources. Despite the obvious benefits of education technologies and their potential to redefine the learning experience, adoption rates remain low and the learning ecosystem remains stagnant and unable to evolve. In many cases, this is due to the lack of strategic planning as well as the inability to foresee the internal resistance to such decision. The mere integration of new technologies into the learning environment is not enough for faculty to use it.

This paper presents a framework to help administrators implement educational technologies in their institutions. At the core of this framework lies the idea that faculty involvement is the key to the successful evolution of the learning ecosystem and motivating them to use technology is of great importance. The paper presents a strategy that is based on education innovation through implementation.

## Approach

Considering the current and future impact of technology on all aspects of modern life and in particular, on teaching and learning, it is essential that a comprehensive roadmap be developed with the objective of addressing technology enhanced learning. Educational technologies provide educators with numerous tools, inside and outside of the classroom, to meet the preferences of their students while enhancing learning and teaching outcomes.

Employing educational technologies requires developing a strategy that brings together pedagogical and technological matters for improved learning outcomes. In the pursuit of such outcomes, a number of world-class institutions started focusing on and experimenting with educational technologies:

- MIT established the office of Educational Innovation and Technology (OEIT)
- Harvard (TIE) and Stanford (LDT) established specialized graduate level programs that focus on Technology, Innovation, and Education.
- Carnegie Mellon established the Eberly Center for Teaching Excellence and Education Innovation
- University of Michigan established the Center for Research on Learning and Teaching (CRLT)

Exploring the drivers of change and strategizing accordingly is often seen as key to the future success or even survival of an organization. In education, the drivers of change have been thoroughly researched and documented in literature. Many strategies have also been outlined to assist higher education institutions in their pursuit to respond to the changing needs of both students and universities. Strategies focus on achieving specific goals and objectives and are university specific. Therefore, the strategic planning process must start by defining objectives and assessing both the internal and external situation to formulate a strategy. Then comes the remaining phases of strategy implementation, progress evaluation, and strategy adjustments.

At Texas A&M University Qatar campus, the university made the strategic decision to invest in an educational technology infrastructure that supports technology-enhanced learning and to take all necessary steps to promote technology integration in the classroom. Once the strategy was put in place, it was time for execution.

A roadmap is proposed to enable the establishment of a solid framework that promotes the use of technology for improved learning outcome and foster innovative teaching environment. The roadmap addresses the development of technology as well as human resources. A four stage process was established to address both elements. Stage one focuses on the technology resources while the rest of the stages focus on the human element:

- Stage 1: The development of an educational technology infrastructure that aligns with the strategic objectives of your institution. Such infrastructure should be adaptable and flexible to support current needs and future expansions. Examples of educational technologies have already been deployed at our campus to establish the building blocks for such educational technology infrastructure:
  - Learning management system
  - Classroom response systems (“Clickers”)
  - Lecture recording system
  - Audio visual system
  - Video conferencing
  - Mobile tools for interactive content

- Stage 2: The development of a support structure that would assist faculty and teaching assistants with the task of integrating technology into teaching and learning. This stage defines a process for establishing a collaborative support network and a continual development of such network for enabling the use of technology in improving learning outcomes. The support network involves IT and individuals from each academic department.
- Stage 3: The establishment of programs that provide faculty and teaching assistants with the practical skills to integrate educational technologies with teaching using pedagogically sound methods. This stage represents the main focus of the strategy.
- Stage 4: The development of a formal incentive structure that could include a variety of awards. Other incentives include recognizing personnel for their educational technology achievements at our campus.

## **Implementation**

Earlier efforts at our campus mainly focused on the first stage of the educational technology framework and on building a seed for the second stage. Now, the focus is shifting to building a collaborative support network and to stage three which is about focusing on the practical use of technology for improved learning outcomes. And even though stage 3 is centered on faculty and teaching assistants, it is important to consider the student group which is the main consumer of the output of any educational technology.

Teaching, Technology, and Innovation (TTI) is the initiative we developed to implement the roadmap. TTI initiative is established to achieve the following objectives:

- Faculty
  - Develop opportunities to explore emerging educational technologies that have the potential to transform the learning experience.
  - Develop the know how to successfully incorporate the best tools into teaching when and where it makes sense. Such education could also address the benefits of using technology, potential stumbling blocks, and a possible look at best practices for using technology to enhance teaching and learning.
- Teaching Assistants
  - Develop training programs to gain knowledge and stay current on educational technologies available at your campus.
  - Develop opportunities to work collaboratively with IT Educational Technology group to effectively integrate educational technologies in teaching and learning.
  - Support faculty in the use of educational technologies and the adoption of new methods and technologies.
- Students
  - Raise student awareness of educational technologies available at our campus. We are proposing to incorporate an overview session of educational technologies available on campus in the first year seminar to acquaint students with available Educational Technology at your campus. The objective is to brief students on how to benefit from available educational such as blackboard mobile App, smart clickers, view lecture recordings, online collaboration, productivity software, etc.

## **Teaching, Technology, and Innovation (TTI) Lifecycle**

As discussed in previous sections, a strategic objective of TAMUQ is to promote the use of educational technologies and to establish the framework necessary to accomplish such objective. The technology cornerstones have already been put in place, and TTI is now targeting the human cornerstone. This is not to say that this caps the educational technology project but rather that this establishes a smooth foundation for future buildup and expansion.

TTI proposes a simple model to address the human element. The model revolves around an innovation cycle that involves:

- **Alignment and Exploration**
  - Work closely with Academic Affairs to enable and support educational innovation
  - Engage with academic departments to investigate new and emerging technologies, and explore opportunities for their adoption in their classes.
  - Conduct demonstrations that show examples of teaching with technology; for example, how a flipped classroom may be implemented in a classroom.
  - Invite faculty members to experiment with available educational technologies via brief sessions that would be supported by IT.
  - Conduct face-to-face meetings with faculty to address the benefits of educational technologies, and to gather feedback on their teaching with technology needs.
  
- **Candidate Selection**
  - Program chairs nominate two teaching assistants from their respective academic departments to participate in the TTI initiative.
  - Nominees will be expected to participate in all “knowledge development” activities as well as “Teaching with Technology Showcase” as described below.
  
- **Knowledge Development.** Participants will be expected to become technology leaders within their own departments, providing assistance in locating, building and integrating technologies that support their departmental needs. Participants will also be introduced to strategies that make teaching more efficient using educational technology. The two-pronged approach to achieve this leadership status involves:
  - **Training on Educational Technology available:** Initial training that provides participants with a solid foundation on the available technologies. Participants are expected to spend four hours per month in the spring semester in attending the training sessions to gain proficiency in using a variety of educational technology resources.
  - **Workshop on Teaching Methodology using Technology:** This workshop offers structured opportunities for the acquisition of new teaching skills, as well as skills development in the use of technology in the classroom with focus on the pedagogical and instructional design methodologies. The workshop brings together advances in education and technology for flipped classroom to provide a personalized and engaging learning experience for our students. A preliminary agenda for the workshop includes the following activities:
    - Hands-on sessions conducted by professionals with extensive background in the subject of interest.
    - Keynote speaker from a science or engineering background with practical experience that is relevant to the subject of the workshop. The speaker will be expected to share his insights into implementing the instructional design methodology and how it improved his teaching outcomes.
  
- **Implementation.** Participants who utilize the newly acquired knowledge to capitalize on the potential of educational technology in their classrooms will be given the opportunity to demonstrate their achievements through:
  - **Teaching with Technology Showcase:** The showcase will be established to demonstrate the achievements of using available educational technologies in practical settings. The showcase is a project-based approach to transform the course delivery using available technology with the support of the Educational Technology team. This collaborative event will provide teaching assistants in collaboration with faculty the opportunity to demonstrate the value of using educational technology in classrooms and how to fully capitalize on the potential of such technologies to take teaching to the next level.
  - **Teaching Innovation with Technology Competition:** Aside from the Teaching with Technology Showcase, there will be an additional opportunities specifically tailored for faculty to promote the innovative use of technology in education. The competition provides an excellent opportunity for faculty and instructional designers to collaborate, prototype, and assess the impact of emerging learning technologies and to facilitate educational technology innovations. The

competition is a joint effort between Academic Affairs and IT. It creates an environment for technology-based educational innovations through a support partnership between faculty and instructional designers. The technical support partnership helps develop proposals for improving learning outcomes faster and providing support for faculty throughout the project lifecycle. The competition serves as the process for prototyping key trends and exploring the potential of these ideas in improving teaching and learning outcomes.

- Promotions, Incentives, and Rewards. A variety of incentives and awards will be granted to the winners and the finalist of the Teaching with Technology showcase for their work to promote the use of technology for improved learning outcomes.
  - Certification. Participants who complete the training requirements and demonstrate how they integrated technology into their courses will receive a Teaching with Technology certificate. The Teaching with Technology (TWT) certificate is earned by creating a teaching portfolio demonstrating the pedagogically appropriate use of technology in teaching.
- Feedback
  - The cycle concludes by collecting feedback from participants and their respective department to incorporate into the new TTI lifecycle.

## Conclusions

The purpose of this paper is to develop a practical model for promoting the use of educational technology for improved learning outcomes. The paper envisioned a framework that is based on technology factors and a human element, both of which are necessary for developing a flexible infrastructure that could evolve with time. The paper also discussed a process for establishing the practical skill so that educators can become more effective users of technology in their classrooms.

## References

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## Biography

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