Fostering Innovation in Higher Education

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Keywords: accreditation, quality assurance, innovation, entrepreneurship

Abstract
One of the most important roles of institutions of higher education is to serve as well springs of innovation and creativity. But if we expect institutions to play this important role in society and the economy, then mechanisms are needed to evaluate the extent to which they are achieving this purpose. Indeed, at the recent Barcelona Conference on Higher Education, an important theme that emerged is the need for accreditation systems that value and promote innovation in higher education. The traditional standard-based view of accreditation has been criticized as stifling innovation, but the lack of incentive to innovate remains even with the more modern and liberal fitness-for-purpose based approach to accreditation. While the fitness-for-purpose approach accommodates more variety in approaches to higher education, it still does not directly measure and reward innovation and creativity in higher education. A mechanism is needed to assess the extent to which the environment at an institution fosters innovation. Good theories of what constitutes such an environment can be found in the large body of literature on entrepreneurship. This paper outlines theories on the entrepreneurial mindset as driver in new knowledge creation and innovation, shows how they can be mapped to an academic setting, and provides a number of case studies of universities, colleges, and research agencies where these concepts have been successfully applied.

1. Introduction

In November 2006 the Third International Barcelona Conference on Higher Education was held with a focus on accreditation [1]. An important theme that emerged in presentations and discussions was the need for accreditation systems that promote innovation in higher education. Singhal [2] points out that accreditation systems may, in fact, stand in the way of innovation. Van Ginkel and Dias [3] make the case even more strongly: "This contribution is a strong plea for approaches in quality assessment and accreditation, which honor diversity and promote innovation and creativity in higher education." The issue emerges particularly from the standard-based view of accreditation:

> *Accreditation refers to a process of quality control and assurance in higher education whereby, as a result of inspection or assessment, or both, an institution or its programmes are recognized as meeting minimum acceptable standards.* [4]

As van Ginkel and Dias [3] observe: "Beyond this, the issue here is that quality in higher education cannot be seen as 'conformity to a standard', as higher education is supposed to promote creativity and innovation." One approach to help ensure that systems of

accreditation do not impede innovation is to use a more open fitness-for-purpose concept of accreditation which "checks whether the higher education institution or programme is achieving its stated purpose and verifies whether that purpose is acceptable" [2]. Van Ginkel and Dias also support movement in this direction:

> *The quality and relevance of higher education institutions, together with their programmes and diplomas, cannot be judged in terms of given models, however perfect they may seem. They must ultimately be assessed within a particular context, and at a given time. Quality cannot be derived from a universal model, and it cannot emerge only from theory and abstraction or, following present attempts toward commercialization, have response to market interest as its main criteria. Quality is the result of a series of actions responding to precise social needs at a very specific moment.* [3]

In the United States, ABET moved from a standard-based approach to a fitness-for-purpose based approach to accreditation in 1996 for exactly this reason [5]. The 2007-2008 Criteria for Accrediting Engineering Programs include the following under the category Program Educational Objectives:

> *Each engineering program for which an institution seeks accrediation or reaccreditation must have in place:*
>
> *(a) detailed published educational objectives that are consistent with the mission of the institution.*
>
> *(b) a process based on the needs of the program's various constituencies in which the objectives are determined and periodically evaluated.*
>
> *(c) an educational program, including a curriculum that prepares students to attain program outcomes and that fosters accomplishments of graduates tha are consistent with these objectives*
>
> *(d) a process of ongoing evaluation of the extent to which these objectives are attained, the result of which shall be used to develop and improve the program outcomes so that graduates are better prepared to attain the objectives.* [13]

Indeed this approach to defining quality has become the standard for accreditation in the US and in some other countries such as Norway. For example, the accreditation criteria of the Higher Learning Commission of the North Central Association of Colleges and Schools states:

> *The Criteria are intentionally general so that the accreditation decision focus on the particulars of each organization, rather than on trying to make it fit a preestablished mold. The widely different purposes and scopes of colleges and universities demand criteria that are broad enough to encompass diversity and support innovation, but clear enough to ensure acceptable quality.* [14]

The fitness-for-purpose approach accommodates more variety in approaches to higher education. And evaluation criteria of agencies using this approach generally also look at quality improvement mechanisms in academic programs, as in point (d) of the ABET criteria above. But the criteria do not directly measure and reward innovation and creativity in higher education institutions. An approach is needed to assess the extent to which the environment at an institution fosters innovation. While good theories of the key components of such an environment can be found in the large body of literature on entrepreneurship and innovation in business, no work has yet explored how to map these to an academic environment. There does exist a growing body of literature on Intellectual Entrepreneurship, but the emphasis there is on training entrepreneurs, commercialization of intellectual property, and technology

transfer, rather than on applying concepts of entrepreneurship to the management of institutions of higher education. The remainder of this paper outlines theories on the entrepreneurial mindset as driver in new knowledge creation and innovation, shows how they can be mapped to an academic setting, and provides a number of case studies of universities, colleges, and research agencies where these concepts have been successfully applied.

2. Entrepreneurship and Innovation constructs

Entrepreneurs distinguish themselves through their ability to accumulate and manage knowledge, as well as their ability to mobilize resources to achieve a specific business or social goals [9]. Personal characteristics required, include leadership, decisiveness, and competitiveness. Important factors in personal style include will power, and self-discipline, comfort with the planning process, and working with others (SBA, US). Richard Branson, billionaire founder of Virgin Records and Virgin Atlantic Airlines, better known for his efforts to circle the globe in a hot-air balloon than for his business successes, suggested that "Being an adventurer and an entrepreneur are similar… You're willing to go where most people won't dare." Still, entrepreneurs are also skillful at knowing which risks are worth taking.

Successful entrepreneurs recognize an opportunity while it is still taking shape. An *opportunity* is a favorable juncture of circumstances with a good chance for success or progress. Opportunities emerge because there are changing circumstances, inconsistencies, chaos, lags, or leads, information gaps, and a variety of other vacuums, and because there are entrepreneurs who can recognize and seize them [10]. These empty spaces frequently relate to the prospective entrepreneur's current profession or interests, where he or she perceives

- some business or geographic "niche" that is being underserved,
- an attractive new service or improvement of an existing service, or
- a process that can be more efficiently performed.

The process of creating or seizing an opportunity is less the result of a deliberate search than it is a *mindset* of maintaining a form of vigilance that is sensitized to business opportunity. The entrepreneur is often quite different in mindset from a manager, who is generally charged with using existing resources to make an existing business run well. The roles of entrepreneur and manager are not necessarily incompatible, but entrepreneurs are seldom patient enough to be good managers. This entrepreneurial mindset is formed through a living experience, meaningful only when learning is rooted in real life.

Entrepreneurship is generally characterized by some type of innovation, a significant investment, and a strategy that values expansion. However, while Peter F. Drucker [11] suggested that innovation "is the specific instrument of entrepreneurship", Joseph Schumpeter [12] thought that the embodiment of new knowledge in the innovation process is the core function of entrepreneurship.

Consequently, entrepreneurship is more an attitude than a skill or a profession. There is a difference between learning how to be, and succeeding as an entrepreneur. "When a person earns a degree in physics, he becomes a physicist," says Morton Kamien, a professor of entrepreneurship at Northwestern University. "But if you were to earn a degree in entrepreneurship, that wouldn't make you an entrepreneur." The concepts of entrepreneurship

cannot be absorbed passively, because they are based on the power of observation and critical thinking.

3. Entrepreneurship and Accreditation

A university that wants to become entrepreneurial must transform itself from an institution of research and teaching to become a place where entrepreneurship is nurtured and innovation created. Entrepreneurial universities enable all members of the academic community to apply new knowledge in action rather than controlling teaching, learning, and other processes. An entrepreneurial environment is one that encourages open dialogue and debate, that welcomes change, that encourages people to take calculated risks, that is tolerant of failure, and that focuses more on the long-term process of moving the organization forward rather than on short-term outcomes. For accreditation systems to evaluate the degree to which institutions foster innovation, they must measure these factors. This can be done in terms of evaluating processes and evaluating outcomes. There has been a strong trend recently toward the use of outcome evaluation in accreditation, particularly in terms of measuring student outcomes [5]. While outcomes of innovation such as introduction of new interdisciplinary programs, new pedagogical techniques, new modes of collaboration with industry, and new approaches to administration can be taken as evidence of the presence of an innovative environment, emphasis must be placed on evaluating the structure and processes to foster innovation. Specific structures and processes we might look for are

- mechanisms to support high-risk, high-return ventures;
- existence of forums for discussion of strategic directions with a broad range of stakeholders, including faculty, staff, students, alumni, and representatives from the public and private sectors;
- a system of leadership that empowers faculty, staff, and students to pursue innovative ideas, including those that originate outside the normal planning processes;
- "Capability to develop expeditionary and future-oriented market intelligence for the development of new products and processes."[6]; and
- open administrative structures that foster interdisciplinary dialog and facilitate creation of interdisciplinary programs.

There are good examples of universities, colleges, and research agencies that have such structures and processes in place. Olin College in the United States has become a showcase for innovative engineering education. The curriculum is the result of broad-based efforts to update engineering education for the 21st Century. The curriculum was created taking as input recommendations from the National Science Foundation and with full participation of student partners. The curriculum is based on the "Olin Triangle", a combination of rigorous science and engineering fundamentals, entrepreneurship, and liberal arts [8]. Innovation lies at the heart of the college's founding principles:

> *A founding principle of Olin College is that it should attempt to develop a unique culture of innovation and continuous improvement. Traditional educational institutions in the U.S. are well known for their remarkable resistance to change. This has resulted in serious difficulties in providing a contemporary education in engineering where the underlying science is changing at an accelerating pace and where leading edge discoveries in industry often precede those at universities.*
>
> *In recognition of this important need, Olin College created the unprecedented leadership position (for an undergraduate institution) of Vice President for Innovation and Research. The primary duties of this position are to lead the institution in*

> *developing a distinctive culture which embraces continuous improvement and change, stimulates intellectual vitality of both faculty and students through learning by discovery, and encourages appropriate risk taking in a wide spectrum of activities, including teaching, research, invention, commercialization and entrepreneurship.* [15]

The Thayer School of Engineering at Dartmouth College is well known for its strong emphasis on interdisciplinary programs. The school has avoided grouping faculty members into departments as one means of promoting interdisciplinary activity.

The United States National Science Foundation has recently placed renewed emphasis on funding work on frontier science. In the words of NSF Director Arden L. Bement, Jr., "If we at NSF stop short in our pursuit of high-risk endeavors, it seems to me that we leave an absolute vacuum. In a science and technology-based world, to divert our focus from the frontier is to put the nation at peril." [7] The National Science Foundation is pursuing this by allocating funds through initiatives like the Small Grants for Exploratory Research program and by taking a broader approach to strategic planning: "… NSF modified its strategic planning process this year to incorporate a wider range of opinion, incorporating the opinions of NSF staffers and the broader scientific community. Much more emphasis has been placed on public comment. A less insular approach could well allow NSF to do a better job spotting the frontiers." [ibid]

At AIT we have been working hard over the past two years to establish an environment that encourages and supports innovation and entrepreneurship. We have introduced a number of mechanisms and initiatives to promote innovation.

- All major decisions are discussed in open forums that include faculty, staff, students, and alumni.
- In addition to its Board of Trustees, the institute also has a board for each of its three schools, including primarily members from outside AIT.
- Our School of Management has eliminated the concept of departments in order to foster greater collaboration among faculty members.
- The institute has taken an approach to administration in which we decide first what we need to do and then create or modify the structure needed to support it.
- We have achieved an openness to new ideas and an empowering environment, evidenced by a large number of new activities that were initiated by the faculty members, staff, and students rather than administrators.

4. Conclusions

Institutions of higher education should serve as centers of innovation and creativity. If they are expected to play this important role in society and the economy, then mechanisms are needed to evaluate the extent to which they are achieving this purpose. To do this we need first to define what we mean by quality in the context of innovation. The literature on entrepreneurship and innovation in business contains good theories of what constitutes a high-quality innovative environment. We have illustrated how these concepts can be applied in the context of higher education by providing a few diverse examples. It remains to fully develop the concept of entrepreneurship in higher education and apply it in systems of accreditation.

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