

Academia–industry partnership: an impetus for strengthening teaching and research in higher education institutions

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Today, higher education institutions (HEIs) and the industry are keen on building strong and purposeful partnerships. Education policies worldwide, promote partnership between HEIs and the industry. National qualification frameworks, accreditation bodies, and various arms of the governments across the HE sector emphasize the need for the presence of industry in various segments of the academic systems through internships, industry-based student projects, and representation on academic boards.

The industry also seeks partnerships with universities because of the complexity of scientific knowledge, the increase in and greater size of competition and the drive for innovation¹. Several examples such as HP–Stanford linkages, and the arrangement between Harvard Medical School and Monsanto stand testimony to industry–academic collaboration. Allen and Williams² describe different models for engagement between industry and HEIs, and adapt the same in the context of built environment education. The role of the governments in fostering the relationship between the two sectors has been studied in the framework of the triple helix model, in which the university, industry and the government jointly create a new entity to establish knowledge links between universities and industry³.

Academy–industry relations encompass a wide range of activities, structures, and concepts⁴. The overriding consideration that contributes to the success of partnership is the recognition that both the sectors are important entities for uninterrupted exploration, creation and dissemination of knowledge. Hence, an important task is to develop appropriate strategy, which considers barriers to progress, covers risk and focuses on long-term relationships, rather than working for restricted mutual benefits.

Teaching and research are inseparable components in institutional development^{5–7}. A strong link with industry will facilitate the academic staff to develop commercial applications with students' participation. Also, students will have opportunities to understand real-time environments, and to develop appropriate

solutions under the guidance of the faculty. In institutions where the emphasis is on applied research and community service, the academic staff will be able to engage students and help them gain an exposure to the society.

With academia–industry interaction gaining momentum, industry captains and academic administrators are jointly engaged in creating a context-sensitive, student-centric approach to teaching and research, that lays emphasis on good teaching and research as building blocks to enhancing learning experience. Assessment is looked at as a tool to skill mapping and knowledge building. Curriculum as a whole is structured to enhance the profile of a student and provide the necessary fundamentals so that the student is able to meet the challenges of the work place and in a larger context, contribute to the society. In the following paragraphs we shall discuss some of these aspects in detail.

Instruction methods

There is an urgent need to move from memory-based learning to a system that promotes critical thinking, analytical ability and logical reasoning. A system that supports self-effort, demanding students to take responsibility and contribute to their learning process, is required to be practised effectively across the sector. The limitations of conventional classroom lectures, tutorials and laboratory sessions need to be recognized.

Academic staff need to interact with the industry to understand the ongoing changes and the skills required in the work environment. They also need to get feedback on the performance of their students, especially with regard to their soft skills and accordingly make changes to the curriculum and their instruction strategies. Effectively implementing appropriate teaching strategies is more important than increasing student workload. Industry will help simulate a work environment, provide case studies that have emerged in their daily lives, describe the need for technology tools in a work

environment and highlight the importance of communication skills, team building and interpersonal relationship. Academic staff can develop teaching strategies that orient students in all these directions.

Curriculum design and development

To begin a university course is for many students, a period of uncertainty and confusion⁸. As students shift from a protected, familiar and guided environment in a school to a university, they need support as they try to discover and understand the links between life and learning. They have queries relating to the purpose and rationale behind inclusion of different items in their academic process. All these make it critical to design a curriculum, carefully taking inputs from different sectors.

Involvement of information technology (IT) leaders in HE sector is well known. By establishing Microsoft IT Academy in HEIs, Microsoft has developed platforms to offer programmes in its products. Local and regional academies of Cisco in HEI campuses facilitate networking tools at academic pricing. Oracle Academic Initiative, popularly known as OAI, is a departmental-level partnership with Oracle that helps HEIs gain access to Oracle products.

Partnership initiatives with these technology giants help in offering courses, leading to certifications such as CCNA, CCNP, MCSE, MCSA, etc. which are globally recognized. Fox *et al.*⁹ describe a partnership among a US institution, a German institution, and several German industries that helped in the design and delivery of a specialized programme to students. In many of the Master's level programmes, companies not only sponsor their employees but also participate in various levels, contributing to the quality of the programme.

It must be emphasized that employers' suggestions on curriculum and feedback on students' performance must be treated with caution. Should all of what employ-

ers want to be part of the curriculum, then programmes will head towards vocational streams and HEIs will become training centres, eventually losing their character. An appropriate translation of the requirements and the right integration of theory, skills and practice with inputs from employers, constructed and led by the academic community will enrich the curriculum, minimize the learning curve and increase the confidence levels of graduates getting into work.

Assessment

It is worth considering assessments as tools to improve teaching and to understand what students have learnt, rather than as rewards to students' accumulation of what was believed to have been taught and learnt. A variety of assessment strategies are being adopted by the academic staff. Factors that govern the choice of the assessment strategy include the need for evidence on students' comprehension, possible legal issues, constraints such as space; availability of academic staff and other administrative routines. Very rarely are inputs from the industry used to consider assessment tools.

Industry experts will be able to provide useful information relating to exact knowledge domains that need to be assessed. For instance, in a conventional programming course, an academic assessment may include questions relating to syntax, its usage and applications. Interactions with experts in the industry will help academic staff develop assessment tools that emphasize debugging, ways to handle common errors, and efficient programming techniques, rather than using the programming language to obtain a set of outcomes.

Enhancing student profile

Industry has an important role in influencing HEI administrators and policy makers to enhance the profile of students. Students should be able to do multi-tasking; they should have primary and secondary specialty; they should be willing to work alone and in groups; with people from diverse cultures and backgrounds. Students' portfolio should cover sports, culture, extracurricular activities, in addition to academic performance. The focus should be on overall develop-

ment and preparedness to face the challenges in the real world. Industry should insist that HEIs promote cultural fossilization, globalization and respect for value systems and institutional culture.

Promoting entrepreneurship

HEIs alone cannot develop entrepreneurial skills of the students. Industry must be actively involved in the industrial advisory boards and other forums of HEIs. They must support HEIs to develop incubation centres, testing laboratories, technology parks and the like on the campus. Creating joint ventures with equity participation from HEIs, developing spin-off companies and financial support systems for budding entrepreneurs will also promote entrepreneurship on campus.

Enriching the learning process

Teaching staff want their students to rapidly pass through a process of learning that usually begins with rote learning, moves along assimilation and analysis of facts, leading to a thought process that explores alternatives, questions the fundamentals and challenges the facts. As the student traverses this path, knowledge and skills are acquired. Employers can help academic staff to assess and strengthen the learning process; they could help teachers to make students identify the links between what they learn and how it is used; they could address more fundamental issues such as whether higher education has added any value to the student. Employers can provide insight into whether the student has moved beyond rote learning and that he/she has benefitted from the academic systems. When teaching and learning are linked, employers' input will help investigate the learning process, identify tools that are required to make it more meaningful, and strengthen the academic system.

Student engagement

Employers are keen on choosing graduates who will not only work efficiently, but also contribute to the organization. Students who are dependent on the teachers, fit themselves in a frame, answer set queries/respond to well-defined or familiar scenarios, and being anxious about failures rarely explore and innovate. Effec-

tively they have minimum engagement throughout their academic process. Such students cannot move to decision-making levels in the organization. Employers can share the nature and structure of portfolios that a student must reflect; demonstrate the benefits of cooperative learning, and how student must take complete charge of the learning process, including building the curriculum that he/she believes is appropriate.

Leadership and teamwork

It is important to recognize the possible influences that industry can exercise to develop leadership and teamwork among students. Internships and dedicated projects involving group studies will promote team-building. Industry could create spaces for tasks that require students and graduates to move around, meeting different types of people, gathering information from a variety of resources through structured and unstructured interviews, and networking people and resources. These activities will help students understand team spirit, identify skills within teams and use them effectively, and coordinate and organize themselves as successful groups working with common goals.

Lifelong learning

With innovations and technology changes frequently occurring, employers look for opportunities to equip their manpower with competencies that are current and useful in the workplace. Slotte and Tynjala¹⁰ highlight how universities can assist companies for continuous professional development. Allocating budgets, providing incentives, and working with HEIs to design programmes which are industry-specific will enhance the quality of workforce. Programmes for mature students, which rely more on experience than academic awards, need to be carefully designed. HEIs and employers should jointly promote work-based learning.

Quality assurance

Beyond prescriptions and statistical considerations, quality assurance in an academic environment demands enhancing students' learning experience, helping them get involved in what they learn, support them to take charge of their aca-

demographic growth and equip them to benefit from the academic process. To find indicators to measure all these attributes, and to fit them in a common scale is rather hard. This is what makes quality enhancement in higher education interesting and challenging. Feedback and suggestions from different sectors such as parents, alumni, HE sector as a whole and the industry is important. Industry feedback will help academic staff, course developers and evaluators, quality assurance units, marketing units, and learning resource centres. Most of their suggestions are usually qualitative in nature. HEIs have the task of identifying the appropriate ones and adapting them usefully to enhance the quality of programmes they offer.

Infrastructure and human resource sharing

In the case of technology-intensive academic programmes and research activities, significant investment is required for the purchase of equipment, fine instruments and infrastructure. These equipments are usually available and used for several functions in an industrial setting, whereas in a HEI the same will be used for research purposes only. In these situations replication of resources can be avoided when employers share resources. Alumni may help HEIs to coordinate with their employers for this purpose. Usually, experts from the industry have substantial professional experience and a better understanding of the business environment, than the academic staff. This expertise will be required at various stages of the project, which may even begin with preparing a budget, project management, and risk cover.

International networking

Networking with the international community will help HEIs gain easy and early access to sensitive data. It will also help publish joint research papers, hold international events such as conferences and workshops, and bring out newsletters and other periodicals. Companies with overseas operations will have an understanding of the developments in different related spheres and the bearing it is likely to have on their business operations. Their local offices will have information which will be useful to develop a network of researchers with common interests.

Information on regional developments, contributions made by the local research community, availability of cost-effective machinery, and tax benefits will help HEIs identify possible research zones.

Building successful research careers

It is often a hard decision to invest in research and research scholars on account of uncertainty of success of the projects. It is in this context that the research student is considered a liability, adding additional costs to the project. Also, to get a promising research student is an uphill task.

Industry can create opportunities for research and research scholars within their organizations. Alternatively, HEIs and industry may jointly create teaching assistant schemes, wherein research scholars may get involved in teaching and support senior academics. Upon completing their doctoral programmes, the employers may absorb them.

Commercialization of research

HEIs may find the industry as a useful partner and beneficiary in projects that have commercial value. The industry may have some of its own employees to work on projects in the HEIs under the guidance of the academic staff and develop commercially successful products. Marketing strategies, advertisement campaigns, and pricing should rest with the industry, while HEIs should address core research objectives.

Research funding

The industry may directly or otherwise provide research funding to HEIs. Specific contracts for developing products, supplying items, or providing certain services may be given to the HEIs. Such contracts will bring down the burden on the companies to have additional work force. In some cases, companies fund research initiatives of academic staff through national/international research councils, agencies and foundations. Companies also create endowments, professorships and chairs in areas that are of interest to their organizations. Senior academics, researchers and scholars who are part of this initiative in the HEIs, also provide strategic guidance to the companies.

Training and guidance

Industry could provide training to researchers in areas such as health and safety, ethics in an industrial setting, and customer satisfaction. Industry and HEIs have a larger responsibility towards the well-being and progress of the society. Guided by a passion to discover, disseminate and use knowledge for improving the life of the common man and resolving issues, HEIs rarely understand the links between knowledge and its relevance and use in a commercial environment. This situation may lead to legal issues. Employers could provide HEIs the necessary understanding, along with possible implications, in the areas of intellectual property rights, patents and other related legal issues.

Industry-HEI partnership: benefits vs barriers

A transformation of the character of HEIs from traditional to entrepreneurial is promoting the cause of industry-HEI partnerships today. This places demands on institutions to carefully analyse the risks involved and the possible benefits before engagement. There are several studies enquiring the benefits and risks of partnership between the industry and university^{11,12}.

The benefits from a HEI perspective can be classified into the following broad areas:

- Sources for funds, equipment and laboratories.
- Opportunities to access state-of-the-art technology.
- Exposure to real-time environment.
- Research with commercial value.
- Royalties, patents, publications and licenses.
- Enhancing the experience of students and faculty.
- Opportunities to contribute to regional economic development.

For an industry, the partnership benefits are manifold, which include the following:

- Minimizing the learning curve – identifying students for employment.
- New energy and knowledge from the HE sector.
- Move from profit orientation to exploration of new opportunities.

- Exposure to community and social life.
- Brand building and image enhancement.

Though the benefits to partners are promising, they are not without risks. Dilemmas arise because of conflict in principles that govern the existence and operations of partners. Industry is concerned that academic staff tend to be slow and seldom recognize the demands of a competitive market environment. Engagement in regular academic functions necessitates academic staff to be away, even during critical stages of project. They tend to emphasize jargons, give undue importance to rigour, and fail to be practical, leading to delays. On the other hand, the academic community is concerned that the university should not relinquish its academic freedom and that there should be no compromise on academic values.

What makes the partnership work is the understanding of key techniques to building successful relationships. Alves *et al.*¹³ emphasize the need for academics and industry to agree on both strategic and tactical aspects for university–industry cooperation initiatives. Recognizing inherent strengths and effective utilization of resources will support partnership. Discussions at early stages and clarity in important areas such as funding procedures, areas of research, bringing about a right mixture of research and the mission of the university, intellectual property rights, and ownerships over resources will help the staff at functional levels to work without stress throughout the project. Beyond strategies, a strong inter-personal relationship and synergies

of culture at the functional level will go a long way in driving the partnership, putting the differences behind.

Conclusion

There is a growing interest to see a continuum and growth in the partnership between HEIs and industry in general. New models for partnership and cooperation are being developed. Beyond funding, HEIs look for a participatory role from the industry to strengthen their institutions on various academic domains. Academic staff find industrial collaboration important for their research initiatives and students' placement. Industry finds that collaboration with HEIs provides opportunities, professional development and work-based learning.

The industry has to involve itself more seriously with the activities of the HEIs in its own interest. After all, there is a significant proportion of graduates who pass out of the HEIs and reach the industry. Employers can, therefore, determine the kind of graduates they need. They can play an important role in redefining the entire HE system. HEIs need to be committed, appreciate the role of the industry in a HE environment and engage the industry sector in all their efforts to equip the students to respond to global challenges.

Both the industry and the HEIs have shown willingness to create value for the partnership. Effectively, this should result in HEI products useful to the society in general and industry in particular. Nevertheless, undue influence of the industry on HEIs will force changes to the fundamental character of HEIs and pull

them in different directions. An approach that combines academic interests with legitimate rights of a prospective employer is required. This is important to HEIs, especially when improving the quality of graduates is no longer an internal activity confined to a university or a group of academics.

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