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V ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION

INTRODUCTION INTERDISCIPLINARY NATURE TO HIGHER EDUCATION INSTITUTIONS

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Abstract: This article well explains the basics of interdisciplinary education and analyzes the importance, benefits and handicaps of interdisciplinary courses in higher education systems. It also shortly discusses the history of interdisciplinary approach and future prospects in a short and long term. Finally, it provides some aspects need to be considered by faculties and students while developing and selecting one of these courses.

Keywords: interdisciplinary (ID),higher education institution (HEI), synergy, collaboration, multidisciplinary team, senior design projects, integration.

Introduction. Considering the growing need for quality graduates with professional skills and ability to work efficiently with personals from variety of educational backgrounds at a multicultural environment, most universities and HIEs are keenly involved in building courses and overall curricula which are best suitable to target an open-based problem through teamwork and synergy between students from various field of studies and faculties. This growing need is also exhilarating much because interdisciplinary aspects have started to be regarded considerably while ranking HEI or university locally or globally among others.

The advancement of instructional technology and wide-availability of information through mass media have also brought participation potential from across higher education campuses, as well as unprecedented inter-campus collaboration potential (1).

Materials. The history of interdisciplinary study goes well beyond the prehistoric times when hunter gatherers came socially together to get most of hunting; each would offer best qualities of their tools and game strategies for a particular area and /or animal species. For example, one would bring utmost land intelligence survey, another would supply the best hunting tools (sharpenedstones, hand sticks and so on) and the other would yield the best butchering during the seasons. This process would later become a tradition for new generations to get used to and later would create stimulus for improvement and modernizing.

The best examples of how ID approach was used coincide with the Golden Ages of civilizations when conquerors of famous empires would bring well-known masters, artisans and scientists to the capital to build great structures. For example, there is a still famous square in Samarkand, a historic city in Central Asia and situated nowadays in Uzbekistan, called the Registan assembly which was built and reconstructed during the Tymurid dynasty in the middl e ages. Registan, consisting three major madrasas

(Islamic institutions), involves all the great ideas, artworks and craftsmanship of the time into one project when one examines in detail.

With the growing mobility of human-beings around the globe through historical ages (the stone ages, the bronze ages, the middle ages, the industrial ages , the information ages and so on), interdisciplinary approach of study and research has gotten deep into each field of social life, including academies and HIEs.

In the upcoming future years, there is high expectation that due to the globalization and internationalization, there would be high demand for scientists, researchers and industry specialists creating synergies after common goals. The foremost one of the goals would surely be related to targeting space exploration and some other one would concern nanotechnology.

As an old saying says the one side of the moon is bright and the other is dark, even interdisciplinary nature of education visibly has its own pros and cons too. The table 1 below outlines a number of advantages and disadvantages in parallel.

Table 1.

1	develops a number of intellectual skills, including problem solving, critical thinking, evaluation, synthesis and integration	cannot be effective unless students are first adequately schooled in at least one of the disciplines contributing to an interdisciplinary program
2	is excellent preparation for the role of citizen and worker in a pluralistic, technological and democratic society.	are shallow and lacking in intellectual rigor-builds on the arguments.
3	answers how best to prepare higher education graduates for future employment and leadership positions.	are costly in time and money because they often rely on team-teaching, independent studies and low faculty-student ratios
4	improves faculty morale by revitalizing instructors' interest in teaching introductory and survey courses closely related to their areas of specialization.	can be challenging to find common ground between researchers and faculty members across fields
5	allows employers and industry to observe the quality of students, participate in their education andcheck an in-depth technical design project	urges employers to create more internships, placements, short-work bursts, and embedded doctorates than usual

Methods and results. Interdisciplinary courses are based on organizing around a topic, broadly defined as an issue, theme, problem, region, institution, person or idea. Faculty and universities that use Interdisciplinary Senior Design process design, build, and test real products and systems, while learning professional teamwork skills and how to complete projects on time and within budget while working on a multidisciplinary team(2).

Fieldwork, internship, service learning, and travel-study courses may also employ interdisciplinary approaches to assist students in connecting life experiences with classroom learning (3).Primary responsibility for senior course planning, content

integration, teaching and assessment can be taken by all members of the faculty team, individuals or students themselves.

When choosing a senior design program, there are several factors for students and faculty members to consider. The table below defines what elements have to be taken into consideration while comparing Interdisciplinary Senior Design and Departmental Senior Design. In this case, students are well assessed based on their active participation, clarity and integration in oral and written work, and self and peer-evaluation as a team member (Table 2).

Table 2.

ProgramElement	DepartmentalSeniorDesign	InterdisciplinarySeniorDesign
Faculty Mentor	Varies by Department	Multiple faculty disciplines
Project Ideas	Institute and Local Industry	National and International Companies
Project Funding	Varies by project	30 mil SOM typical in UZ (exceptions for small and medium-sized companies, government, & humanitarian projects)
Project Travel	Local Only	Domestic travel fully funded At least three visits to client sites
Sponsor Location	Typical: Local Region of UZ	Uzbekistan Mostlywithin300 Kmradius
Student Disciplines	One Engineering Department with one to three specialties in department, depending on faculty department	All engineering, science, and business disciplines are eligible to participate
Course Credits	Varies by Department 3-credit course on 1 Semester or 6 credits spread over 2 semesters	Two 3-credit courses (6 credits)
Course Structure	Varies by Department Class lectures on relevant topics with external meetings	1st course lectures and practicums to talk with industry, design potential solutions & develop the team and process, second course is developing, testing, evaluating and presenting solutions Weekly client meetings
Prototypes Required	Varies by Department Typically, a final prototype (breadboards acceptable)	Minimum Viable Product (MVP1) end of Semester 1 MVP2 middle of Semester 2 Fully functional system end of Semester 2

Conclusion. It is possible to conclude that ID approach could yield great benefits for each member groups of campus trinity (students, faculties and employers) if it is constructed orderly with the outlined focuses, details and goals considering the needs and abilities of participants.

The successful application of interdisciplinary projects usually brings general happiness for stakeholders in and out of the campus in a short term and has a big impact on the global ranking of the institute in a long term.

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